

Kofax Communication Server

TCOSS System Manual

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The KOFAX logo is displayed in a bold, blue, sans-serif font. The letters are thick and closely spaced, with a modern, clean design.

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Preface

The Kofax Communication Server and its components formerly used the name TOPCALL. Some screen shots and texts in this manual may still use the former name.

The TCOSS System Manual explains the general architecture of the TC Open Server Software (TCOSS). The software is organized in modules: the TC Application Module (TAM) which is responsible for controlling documents and the TC User Module (TUM).

This document explains:

- Special system files such as NN99, rr99, vv99, tt99, kk99, uu99, the log files as well as the pseudo files +INHALT and +STATUS and their functions.
- The TCOSS features that include inbound distribution, routing (including least cost routing), cost accounting, automatic file name generation and the user profiles for fax server commands.
- The TCOSS code pages and a summary of the use of system resources.
- The fault tolerant systems: Tandem Disk and Tandem System.

A comprehensive list of system error messages is also provided in this document. Refer to the specific TUM description in TUM specific error messages.

Related Documentation

This document refers to the following documents:

- *ASP Installation Manual*: Installation guide for Application Service Providers
- *Environment Guide - Platform System Manual*
- *Error Codes Manual*
- *Line Server Model 305*: Manual of the TC Model 305 Line Server (LS1)
- *Monitor User Manual*
- *PBX Requirements Technical Manual*
- *Services User Manual*
- *Tandem Server Technical Manual*
- *TC/LANPrt Technical Manual*
- *TC/SNMP Technical Manual*
- *TC/VoiceAccess User Manual*
- *TCOSS Application Module Manual*: (formerly two manuals: DotDot: and Directories:Manual): Includes description of the "..":interface commands and TCOSS directory structure.
- *TCOSS Configuration Manual*: Includes configuration parameters of all modules (channel types) and the system.
- *TCOSS Application Module Manual*
- *TCOSS ISDN Technical Manual*: Includes description of the ISDN configuration and operation.
- *TC/LANPrt Technical Manual*
- *TC/SNMP Technical Manual*

The full documentation set for Kofax Communication Server is available at the following location:

https://docshield.kofax.com/Portal/Products/en_US/KCS/10.3.0-SihMvq5oti/KCS.htm

Chapter 1

General

This chapter covers the organization of the "hard disk", information about TC models, error handling and some general administrative functions.

A TCOSS system (**TC Open Server Software**) is a system for sending, receiving, storing, forwarding and administering documents in a Network environment via client-server computing.

The following hardware can be connected to the interfaces ("channels") of a TCOSS-system:

- TCSI applications (TCfW, TC/LINK, and more) via network
- LAN printing module (TCLANPRT) or File API and Break Messages Module (TCFILBRK) via network
- Archive Server (TC/ARCHIVE) via network
- Telefax lines (normal a/b - ISDN - E&M)
- Telex lines
- Host computers
- Personal computers
- Various input and output devices (terminal, printer, and more)

The following terms are used.

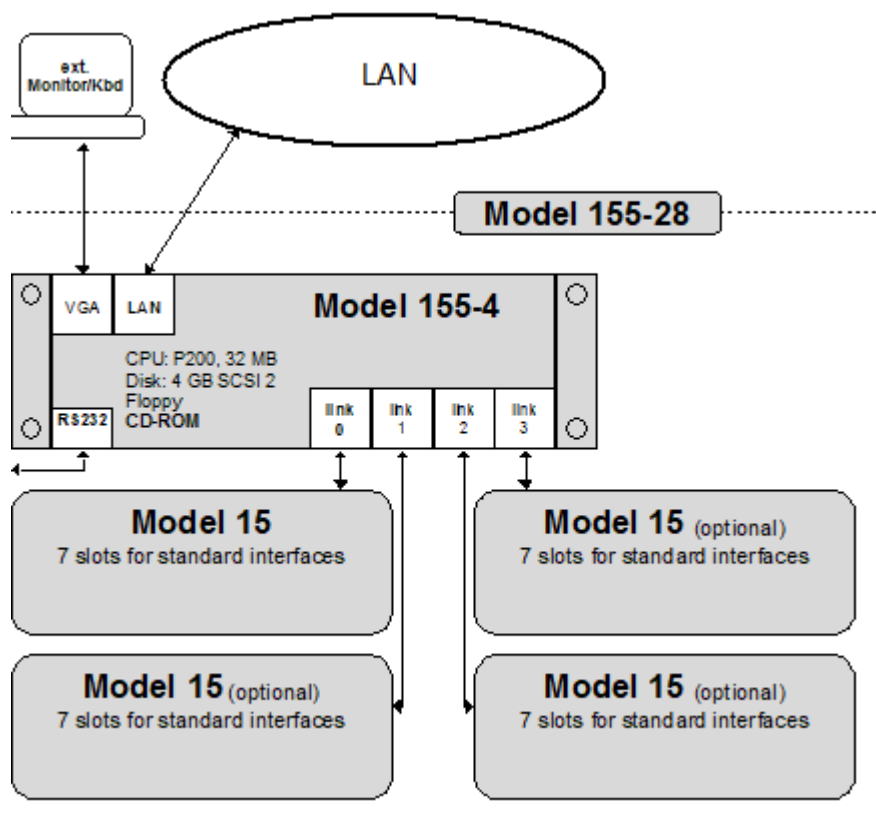
Master	KCS Server running under Windows.
Primary Master	This term is used with fault tolerant servers (models/165/22x) to indicate the system master if the whole system is working properly.
Secondary Master	This term is used with fault tolerant servers (models/165/22x) to indicate the system that takes control if the primary master fails.
Slave	KCS 3 - Model 202 that can be connected to a master via optical links. A Model 202 is a KCS without a floppy or hard disk drive. It can be used for all TSxx based interface cards.
Line Server	Model 202. It has a passive back plane and power supply only and can be used for TC20 line interface. It is connected with the master via optical links.

Kofax Communication Server Models

Note Some models in this section are no longer supported.

Model 155/165/2xx Overview

These models are either 19" rack mountable or desktop models and do not hold any line interfaces. The following is an example of a model/155.



Model 23x

Model 23x support consists of the following enhancements:

- Up to 1 million files
- Up to 1010 channels
- Up to 20 TCOSS instances on a single server

A number of optimizations have been implemented.

Model 3xx

These models are described in the *KCS Platform System Manual*.

Optimized Data Transfer Between Primary and Secondary Master

The data transfer via TCP/IP on the dedicated LAN between primary and secondary master has been optimized by adapting to the network package size. By default the optimization is done for a maximum TCP segment size of 1460 Bytes.

The package size value used for the optimization may be changed by setting a registry value `HKLM\Software\Topcall\TCOSS\NetworkPackageSize (REG_DWORD)`. A value of 0 or 1 would disable the optimization; the maximum allowed value is 2048. Usually it is not necessary to enter this registry key.

TCOSS Disk Cache Settings

In some cases the default disk cache settings have to be adapted for optimum performance.

If more than 16 TCOSS instances are installed on a model 23x, the document cache size for all TCOSS instances has to be reduced from default 40 MB to 28 MB by setting the registry values `..\TCOSSnn\Drive0\DocCacheSize` to 0x7000.

If a single, large TCOSS instance with 1 million directory entries is installed on a model 23x, the disk cache should be increased by setting the following registry values (all values are in kB):

```
..\TCOSS\Drive0\DocCacheSize = 204 800
..\TCOSS\Drive0\DirCacheSize = 250 000
..\TCOSS\Drive0\DataBaseCacheSize = 20 480
```

Important here is the directory cache of 250 000 kB which covers the complete directory. With the above disk cache a single TCOSS instance with 360 channels will use about 664 MB of memory.

Refer to the "Capacities - Large Systems - Disk Cache Settings" section in the *TCOSS Application Module Manual*.

Important Use these large cache settings only with TCOSS release 7.45.00 or later. Older releases will crash during startup, deleting presumably inconsistent files.

Installation and Administration

- The system installation is described in the *TCOSS Configuration Manual* [1].
- TCOSS can be started manually (run `C:\TCOSS\SYSTEM\TCOSS.exe /n`) or automatically via the KCS Supervisor Service (TCSRv - see separate chapter below) .

Note If TCOSS is running in the background (started by TCSRv), it cannot be started manually (Application event log error "RPC failed open" will occur in that case).

- Severe system errors are always written to the system's application log. This log can be viewed by Windows Event Viewer application. From the Log menu, select Application to display all Kofax Communication Server events and more.
- Use Registry settings to set trace options for TCOSS. See TCOSS Configuration Manual [1].
- To check if TCOSS is started, use TCMON32. (See separate chapter)

Service Pack Support Overview

Recent changes to the service pack process are listed here.

- All program files are no longer stored in TCfW folder format. WConfig performs the conversion to Kofax Communication Server format during installation.

- The config program version is no longer directly coupled with the TCOSS version. The product and major version must fit together (such as 7.25). The minor version (last two digits) is independent. This implies that all TCOSS versions with the same product and major version code must have compatible configurations.
- The minor version number has been removed from the Wconfig.exe icon.
- All program files are checked by signature files. If any program file is missing or wrong, the user gets a warning. If the user decides to continue, a question mark is appended to the version number indicating that there is no official released version installed.

Current Directory Structure

The current structure of the Maketcooss Version directory is similar to the example below.

Directory	Content	Usage
C:\mt\72700	wconfig.exe, master.cnf blockdesc.txt ctc.exe	Config program requ. for generation of loadertable requ. for generation of reports TC Copy utility
C:\mt\72700\prg (base version directory)	*.exe, *.dll, *.run, *.rsc, *.com, sign.ini	executables for Windows and interfaces; Signature File
C:\mt\72700\prg\72701 (service pack directory)	*.exe, *.dll, *.run, *.rsc, *.bin,sign.ini	Module update 72701 Signature File

- Subdirectory i386 does not exist any more. All program files are now stored in the PRG folder.
- The meaning of all other subdirectories (new, src and std) has not been changed.

Signature File (sign.ini)

This file is used to verify the content of program files in the base version and the service pack directory. Each directory has its own sign.ini file.

Syntax:

```
[Version]
Version=<file version number>

[Files]
<Filename>=<Checksum>
...
```

Example of sign.ini

```
[Version]
Version=72700

[Files]
BOOTER.RUN=0x85C9C408
LK900.COM=0xBC4E0D21
TCCOPY.EXE=0x8B3BB9A6
TCDEL.EXE=0x9D39041A
```

The signature file is calculated by Kofax. The checksum is made using both the content of the file and the version number (taken in section [Version] of sign.ini).

Switch Service Pack Level

The new menu item "Switch service pack level" has been added to the main menu of wconfig. If this item is selected, wconfig shows a list with all available service packs and the main version. Service packs are detected, if an appropriate sub directory exists. The base version number is hard-coded in wconfig.exe.

If a service pack version has been selected, both the service pack directory (such as C:\mt\72600\prg\72601) and the base version directory (such as C:\mt\72600\prg) are verified according to the rules described below. If a base version has been selected (such as 72600), only the base version directory is verified.

For every file (taken from a hard-coded list in Wconfig.exe) the following checks are invoked:

1. File exists?
2. SIGN.INI exists?
3. Is there a CRC value for the file?
4. Is the CRC value correct?

If the file exists and one of the checks fails, a question mark is appended to the version number in the common configuration file. It indicates that the used version is not authorized.

Note This feature is implemented in the current version. See Restrictions in [Sending Graphics](#).

Install Configuration and Program Files

Before starting installation of configuration or program files, wconfig verifies the program files as described above (see [Switch service pack level](#)). If verification fails, the user is notified with an appropriate message box. If the user decides to proceed, all program files found in the program file directories are installed (even if the files do not exist in sign.ini).

The subject field in the system folder does always show the file version. Files taken from the service pack directory get the service pack version. Files taken from the base version directory get the base version number. All non-authorized files show a question mark after the version in the subject.

Installation History

Each time WConfig installs configuration or program files to Kofax Communication Server, a short description is written into the installation history file "+TECH/AHISTORY" as shown in the following example.

Example:

```
*** 2007-02-19 14:12:43 Release 7.73.02
TCOSS program files installed.
TCOSS configuration files installed.
from dir c:\myconfiguration on host MYHOST.
```

As you can see, the used configuration directory and the hostname are also written to the history file.

Installation of TCOSS Service Packs

- Service pack directory must be copied to hard disk.
- Start Wconfig with the configuration where you want to install the service pack
- Change the service pack level (not implemented now, see restrictions)
- Install the configuration and program files to Kofax Communication Server

Installation of TCOSS Single Files

If you get single files (without signature files, no official service pack) you have to copy the appropriate file to the used base version (or service pack) directory.

The next steps are the same as described above (steps 2 to 4 in installation of TCOSS Service Packs). In every case, you will get a warning that some files are not authorized. If you proceed with the installation, a question mark is added to the TCOSS Version shown by TCMON, TCfW, or +STATUS.

Install Configuration Local

Because WConfig cannot communicate with an older version of TCOSS.EXE (earlier than 7.24.00), the following feature was added. When files have to be installed locally, WConfig checks the version of TCOSS.EXE first.

CASE 1 : If the version is earlier than 7.24.00:

The version of TCOSS.EXE is assumed to be the current installed version.

NT program files are copied first, and then the TCOSS program files.

CASE 2 : If the version is equal to or higher than 7.24.00

+TECH/ASYSCONFCCCC file is used to determine the current installed version. If the connection to Kofax Communication Server cannot be established, CASE 1 is performed.

TCOSS program files are copied first, and then the NT program files.

Auto Start and Supervising

This section describes automatically starting and supervising TCOSS processes.

TCSRVR

The supervisor service (TCSRVR) is responsible for automatically starting and stopping TCOSS processes and modules. This service will be installed by the setup program but is passive after installation. Its operation is fully controlled by registry keys and the Control Panel (Service). See the *TCOSS Configuration Manual* and *KCS Supervisor Service (TCSRVR) Manual* for more details.

System Attendant TC90/91

The System Attendant can be connected to any KCS mod./1xx via TP80.2x (TC90) or via printer port (TC91 or TC92+TC90). It will be controlled by TCSRVR and can reset the system, if a fatal system hung up within TCSRVR occurs.

Note

- The watch-dog must be disabled during installation (Press button during PowerOn Reset).
- If TCSRVR is stopped the watch-dog time-out will be set to 3.8 hours.

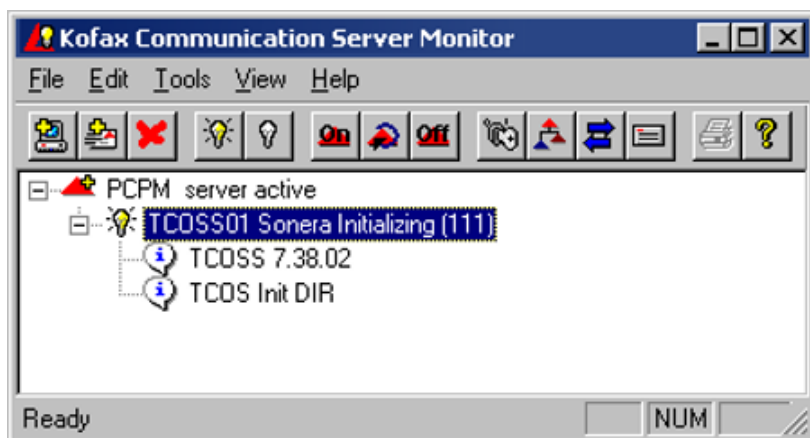
TCMON32

TCOM32 will be installed together with TCOSS or MAKETCOSS. It can be used on any PC under Windows NT to display the current state of all applications started via TCSRVR. Furthermore, single applications can be stopped and restarted remote.

Note User rights are checked even if TCMON32 is running on the same PC as TCSRVR. For example, if the current user has no remote login rights, TCMON32 gets no connection to TCSRVR.

The TCOSS process information displayed by the KCS Monitor TCMON includes the customer ID if it is set in the registry for an ASP installation.

Here is an example of an ASP TCOSS01 instance configured for customer "Sonera".



Refer to the *Monitor User Manual* for more details.

Overview of the Software

The tasks of a TCOSS-system can be divided into:

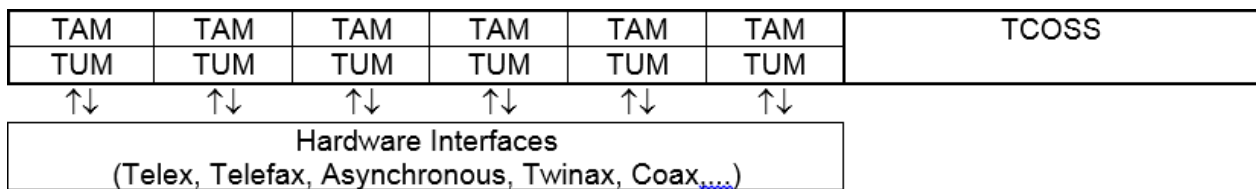
- Document-oriented (TAM) - TCOSS Application Module
- Interface-specific (user-specific) (TUMs) - TCOSS User Module

- Functions of the operating system. (TOS)

An important feature of the TCOSS software is its modularity with respect to:

- Easy adaptability of the software
- Various "standard system configurations" (= connecting various standard modules to one comprehensive system)
- Special versions using custom user modules instead of standard ones (for clients with specified needs).

TCOSS-structure:



TCOSS Operating System

This section describes general information about TCOSS operating system.

General

TCOSS supports only one hard disk (by default, the file `C:\TCOSS\Data\KCS File Structure.tco` is accessed as disk). Files are enclosed in folders (similar to one level of subdirectories in DOS). Folder names must be unique and up to 8 characters, letters or digits.

Folders

The hard disk space is divided into 3 areas. The number of file entries and the disk space for every area can be changed with TCDisk during installation or later provided TCOSS is not running.

Once the file structure size is defined, it cannot be changed, you can however, use TCDisk to copy the file structure and modify the size of the copy.

The following table gives an overview about the content of every area.

Area	Example File entries	Value for Disk space	Folder	Files	Description
+TECH	300	10M	+TECH	*	Config files, programs
+USER	30000	100M	+USER	UserID	User Profiles
			UserID	*	User folder

Area	Example File entries	Value for Disk space	Folder	Files	Description
+MAIL	remaining	remaining	+MAILSYS	ACOMINFOFILE AREGISTRATIO ARECEIVERFIL AARCHIVFILE0 ASERVICESFIL ALICENSESFIL	Mail entries registration store System address book Log file (short term archive) Services store
			+MAIL5V	*	Visible TCOSS 5 files
			+MAIL5I	*	Invisible files for CF, routing
			+MAIL	*	Mail files

The values in the user area should be set according to your requirements. All other values don't need to be changed. To change the values, you must use TCDisk.

+MAIL Folder

The +MAIL folder contains information about the user registration, log files, services and all mail files (incoming or outgoing documents like faxes, telex or TTX). It has one special property the other folders don't have. Files can be erased virtually: they are still stored, similar to the recycle bin in Windows. Yet unlike the recycle bin in Windows, they are not visible and cannot be deleted manually. They can be opened via TCSI (TC Client Server Interface) as a log file entry used by TCfW. If the max. number of directory entries or max. disk space is reached, the oldest files from the recycle bin are automatically removed.

Mail files stored in this folder have unique file names and do not necessarily have send orders.

+TECH Folder

The +TECH folder contains different system files, such as channel-configurations and program files for interface cards. The size of it can be set just as with the mail folders, but files within +TECH folder are not cyclically erased.

+USER Folder

The +USER folder contains all stored user profiles and all private user folders. Every user within the system can have a private folder on the Kofax Communication Server to store messages in it.

Licensing

Kofax Communication Server software is protected by license keys. These keys are maintained in the KCS server. Any change in the setting of TCOSS internal licenses becomes active at the next system reboot, except for additional link channels, which apply immediately.

For more information about Kofax Communication Server licenses, refer to the *Environment Guide - Platform System Manual*.

Version Check

A version check for the modules TCSI and TCfW has been implemented into TCOSS to prevent working with older modules that cause system malfunctions for TCOSS. Therefore, two config lines implemented into the system configuration to define the module numbers to communicate with KCS.

```
system configuration, line 14: 40 characters TCSI versions
system configuration, line 15: 40 characters TCfW versions
```

The supported release numbers are listed separated by a space. The "+" in front of a release number means that all higher releases are supported as well. Up to 5 release numbers fit into the config line.

Example:

```
line 14: +1.05.14
line 15: +1.08.03
```

Accept TCSI version 1.05.14 or higher and TCfW version 1.08.03 or higher

System Indicators

There are three LED's (light emitting diodes) on the front panel of the Kofax Communication Server device, and two system LED's and a hard disk LED.

The hard disk LED is red and turned on during read or write accesses on the hard disk.

The system LED's are green or red. If only the green LED is on, the Kofax Communication Server system is ready for operation; the red LED light, if on, indicates a restricted readiness for operation.

Meaning of System LED During System Startup

- During system start-up both lights are on until the TCOSS operating system and all software modules are loaded.
- Both lights turn off and various directories are loaded into Kofax Communication Server memory. Finally, the initialization of the individual channels begins (reading in the config files).
- If the green light is on, all channels are loaded successfully and the entire system is ready for operation.

Meaning of System LED During Operation

green LED	red LED	Meaning
On	Off	Normal operation
On	On	Degree of system fill-up 80% (either disk space or number of documents or number of sending orders has exceeded 80% of available capacity)
Continuously blinking	Random behavior	Internal error

Operator Warnings in Case of "Disc Full"

Two operator messages are implemented to alert the system administrator if the disk usage exceeds certain limits and to provide the information that the "disk full" situation is resolved. All three messages appear in the application event log and are sent as "TENnnn" KCS system error message to the operator short number .ERROR2, .ERROR3 or .ERROR1, depending on the error level.

ID Event type	Message	Corrective action	Error level	Generated when
16026 Warning	More than 80 % of KCS disk space is in use.	Check disk usage with TCfW. Check in/out boxes and terminate unused messages. Check correct setup of number series.	2	Disk usage increases from 80% or less to more than 80%. Red LED is turned on.
16027 Warning	More than 90 % of KCS disk space is in use. Reception has been stopped.	Check disk usage with TCfW. Check in/out boxes and terminate unused messages. Check correct set-up of number series.	3	Disk usage increases from 90 % or less to more than 90 %. Reception is stopped.
16028 Info	Free disk space has increased to 20 % or more.		1	Disk usage decreases from 80 % or more to less than 80 %. Red LED is turned off.

Warning If Archive Is Inactive

TCOSS checks if a connected archive or archive server is active and generates a warning, if the archive is found inactive for more than three hours. This check is done if any archive or archive server licenses are set. If several archives connect to the same TCOSS system, no warning is generated as long as at least one archive is active.

The warning is repeated every 24 hours if the archive continues to be inactive.

After a TCOSS reboot, the first archive inactive warning is generated after one hour if the archive is not active at all after the restart. The reason for the shorter timeout (one hour instead of three) is that in this case it is unknown how long the archive has already been inactive before the reboot.

Event ID	Severity	Error level	Message	Corrective action
16036	Warning	2	KCS Archive is stopped or has no connection.	Please check why the TCARCH process is not archiving.

The reason for the archiving to have stopped may be:

- Archive process TCARCH not running
- Archiving stopped by operator
- Archive unable to connect to TCOSS because of a broken network connection
- Archive unable to connect to TCOSS because of a user ID or password error
- Archive unable to connect to TCOSS because of an expired archive license

Status Display (LCD), TCMON Info Lines

The LCD (if available) permanently displays system status information. In case of a fatal error, it will also display the corresponding error message. If a Kofax Communication Server server is supervised with TCMON, the content of both LCD lines is shown as info lines.

Layout of the LCD

```
xxxxxxxxxxxxxxxxxxx  
eeeeeeeeeeeeeeeeee
```

x First line of the LCD display - shows the error messages or internal problems

e Second line of the LCD display - System status information see next chapter !

LCD Messages

LCD messages are visible both on each connected TS0d (model/202) with LCD and in info lines in the KCS Monitor program TCMON.

The second line is used for the following purposes:

If the internal problem / error message is longer than 16 characters

Upon the 12th position, a counter shows the Kofax Communication Server running time in minutes. This counter is updated every minute and starts with 0 after starting the system.

Positions 1 to 11 show the free RAM of the local transputer. This value is updated every minute if it has been changed since the last update or at least after 10 min.

During booting, the following messages are written in the sequence listed here.

TCOS init DIR	root transputer is loaded; hard disk directory is read.
TCOS Boot Nodes	all Slaves and T-Slot interfaces are booted
TCOS Start TUPs	all tasks will be started
TCOS started	all tasks running
00:started	channel 00: starts initialization
init user	init. user store
init mail	Init. Mail
init services	init. services store
init sessions	init. sessions handling
init recip.	init. recipient store
init registr.	init. registration store
init archive	init. short term archive
check receive	check documents for power failure during reception
00:ready	channel 00: is ready to work

01:started	same as with channel 00:
check receive	same as with channel 00:
01:ready	same as with channel 00:
02:started	same messages as with channel 01:
.....	
System is ready	all channels are ready to work

In case of fatal errors, a full description of the error message is displayed in the first line of the LCD display. For a description of the error message, see the chapter "Meaning of the error messages" on the following pages.

System Error Messages

System error messages (called error messages in the following description) are created automatically in case of internal problems. They may be caused by hardware malfunction, wrong configuration or software errors.

The system handles link errors in connections to slave nodes. Operator messages are created and nodes are rebooted automatically with retries every 60 seconds. The system detects also a time-out condition on the user module interface (after 20 minutes). Error messages are generated and the system status shows the problem.

Error messages created by TCOSS are characterized by their error level and message number.

All error messages are written into the application event log and into the TCOSS trace file. Additionally, error messages with a level less than 6 are stored as (TE????) files on KCS with an automatic send order to the abbreviated number .ERROR1 to .ERROR5 according to the error level. If messages of different classes are combined in one document, the recipient is determined by the highest error class.

The last error message is shown on LCD (if available) of each slave and the first info line below the TCOSS process when supervising the server with the TCMON program.

Note The text in the TE-files, the first TCMON info line and on LCD is truncated after 255 characters!

Errors with level 6 cause the following actions:

- The whole system to be stopped and restarted by TCSRVR.
- The green LED on every TS0C/0D starts to blink continuously.
- BREAK condition is sent to all telex and asynchronous lines.
- An error message (as described in [System Error Messages](#)) is printed on the LCD (If a LCD display exists) and is send out (enclosed in '<' and '>') to the hardware channel 0, port A (Data format: 7 data bits, no parity, 2 stop bits) of every TS0C/0D. A LCD display can be connected with every TS0C/0D main board.

Error Levels

The six levels are described in the table.

Level	Short description	Severity	Description	Examples
1	Trace	Info	Situation that is caused by user activities or previous errors.	Operator node reboot, operator system reboot, auto reboot DISK-reassign block, shutdown requested
2	Warning	Warning	Complete System is available now, but with reduced security or for restricted time.	Disks deactivated in tandem server. Status box defective License will expire within x days
3	Line out of order	Error	Any module detected a error. Any channel stopped working due to wrong configuration, insufficient license and line errors.	Telex/fax line out of order UAS: script not loaded License expired
4	HW/SW error corrected	Error	Errors that should not occur but could be corrected (such as by reloading an interface)	User module timeout node n error reboot Notification not generated Program crc error Several messages indicating "inconsistent data repaired "
5	Partial stop	Error	An unexpected error that could not be corrected. Parts of the system are not available any more	Node stopped, link error Node n channels stopped (too many error reboots)
6	System stop	Error	Entire TCOSS process is stopped.	Sync stop

About Data Loss

TCOSS, which behaves like a database server, is designed to work transactionally. This means that all confirmed data is guaranteed to be stored permanently.

The exceptions from this rule are unexpected software or hardware errors (non-detected RAM errors). In case of a fault tolerant system, the following hardware errors can be handled without data loss:

- Failure in the disk of either the primary or secondary master.
- Fatal hardware error in either the primary or secondary master (such as power supply, Power On Self Test finds a RAM error).

Message Number

The message number is used to read the correct error message from the supplied messages DLL (by default: C:\Topcall\shared\tcmsg.dll). This DLL is accessed if the event log is examined (such as by the Windows NT event viewer or SNMP agent) to format the message. It is also used within TCOSS itself, to generate the text for system error messages (TE-files), LCD and TCMON status information. The three cases in the table are possible.

	Trace file	Event log entry	TE-files, LCD, TCMON
The error has no message number	Short Message	Long Message type 1	Short Message

	Trace file	Event log entry	TE-files, LCD, TCMON
The message number cannot be found in the messages DLL	Short Message	Long Message type 2	Short Message
The message is found in the messages DLL	Short Message	Long Message type 2	Long Message type 2

Error messages in TE-files start with the header:

```
Topcall System Error Message
***** Internal Problem Report *****
Date: YY-MM-DD Time: HH:MM
```

One or more lines with the error description are appended to the header.

Short Message:

This format is used for trace output and as the default if no message text is available. It contains the error location (described later) and a short description. The purpose of the short description is to have a compact and unique description of the error. This means that it is often not readable for system administrators.

Short messages have the following format: {location} + '-' + {short description}

Example:

```
TS29(1.2.T0)-08:UTF-ecmb_sto_bin,257
```

Long Message Type 1:

These kinds of messages are available in the event log for all errors that do not have a message number. In that case, the message depends on the error level according to the table below.

Level	Severity	Description	Corrective Action
1	Info	Info %3 in %1	
2	Warning	Warning %3 in %1	
3	Error	A channel stopped working due to wrong configuration, insufficient license or line errors. Error message: %3 in %1	Refer to the TCOSS system manual for more details.
4	Error	An error that could be corrected (such as by reloading an interface) occurred. Error message: %3 in %1.	Refer to TCOSS system manual for more details.
5	Error	An unrecoverable error occurred. Parts of the system may not be available anymore. Error Message: %3 in %1.	Refer to TCOSS system manual for more details.
6	Error	System has been stopped due to error: %3 in %1	Refer to TCOSS system manual for more details.

Where:

%1 is the error location

%2 is reserved for future use

%3 is the short description (see description of short messages)

Further information about the error can be found in Appendix B.

Long Message Type 2:

These messages describe errors that have a unique message number. The entire error text is read from the messages DLL. Parameters can be used within the message for variable information. The first two parameters (%1 and %2) have a predefined meaning. All other parameters are optional and error-specific.

Refer to the Error Codes Manual [3] for a complete list of all Long Message Type 2.

Example:

If a TS33 interface in Slot T1 of Slave 1.1 is missing the following error information is stored in the event log.

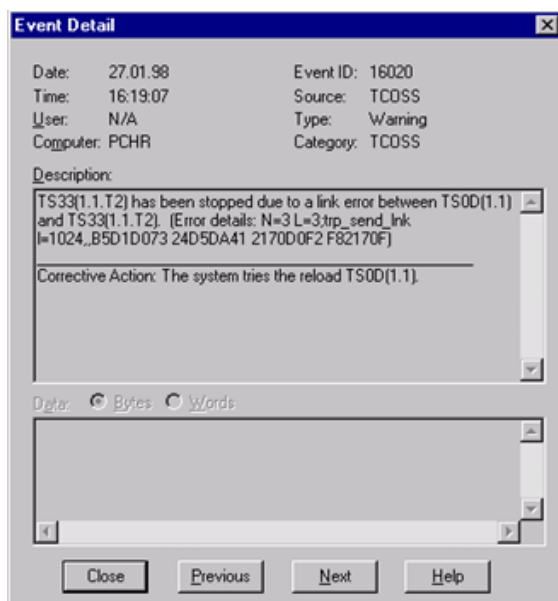
```
Message number: 16020
Severity: Warning
Source: TCOSS
Parameter %1: START (process that detected reported error)
Parameter %2: empty (reserved)
Parameter %3: TS33(1.1.T2) (Interface that has been stopped)
Parameter %4: TS0D(1.1) (parent node)
Parameter %5: N=3 L=3;trp_send_lnk l=1024,,B5D1D073 ...
```

The following text has been defined for message number 16020.

Description: %3 has been stopped due to a link error between %4 and %3. (Error details: %5)

Corr. Action: The system tries the reload %4.

The description and the corrective action are stored as two different lines in the messages DLL. If the Windows NT Event Viewer displays the event, the text is taken from the messages DLL and parameters are resolved. You will see the following result:



Error Location

This information appears in trace, TE-files, on LCD and KCS Monitor program (TCMON). It describes where the error has been detected (on which hardware, which thread, which channel)

```
[{Hardware} + '-' + [{TCOSS Channel}+':'] + {KCS User Process Name}['.'{Child Thread Name}]
```

Parts within [] are optional.

Examples:

07:TAM	TC application module (TAM) for channel 07 on the primary master
Sec. Master-02:UAS	TCOSS Channel 02: UAS (User Module for Asynchronous) running on Sec. Master (secondary master).
TC20 (2.3.L2) -07:UTF	TC20 interface in slot L2 of slave 2.3. Error was reported by UTF (fax channel) 07:
TS33 (1.1.T0) - Q921L2.OSIMOT	TS33 interface in slot T0 of slave 1.1. Error was reported by OSIMOT which is a thread of Q921L2. Since Q921L2 is used for 2 TCOSS channels there is no specific channel number in error message

Line Fault Messages

System error messages are created in case of defective communication lines. They will be created with the ..ERROR command by the User Module. They are sent to short number .ERROR3 (if existing). In every case a "Txnnnn" document as described in chapter "System error messages" will be created.

```
Topcall System Error Message No. nnn
***** mmmm *****
Date: dddddd Time: tttt Topcall Channel: cc
```

where:

nnn	Internal number (ORDER parameter in ..ERROR command)
mmm	Error message
dddddd	Date or occurrence in format yy-mm-dd.
tttt	Time of occurrence in format hh:mm
cc	KCS channel that causes the error.

The following error messages are defined.

Number	Message	Description
001	Telex Line Out of Order	Local problem with telex line. Further send attempts are made.
002	Fax Line Out of Order	Local problem with fax line. In that case the fax channel is set to WAIT condition for 2 hours. See "Line fault detection for fax" for more details.
010	Cannot load Script File	Reference for an auto loading script not found
011	Program Syntax Error Auto loading Script	Syntax error within script program

Example:

```

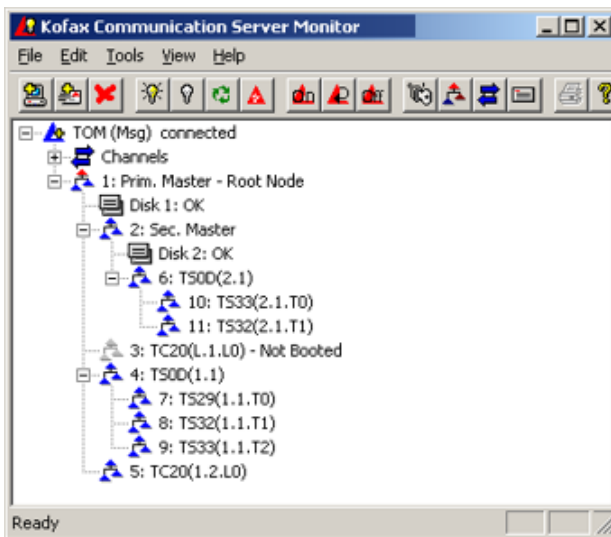
Topcall System Error Message No. 001
***** Telex Line Out of Order *****
Date: 95-12-02 Time: 12:55 Topcall Channel: 05

```

The generation of system error messages can be tested with the command `..ERROR'.

TCOSS Nodes

TCOSS is a distributed system that consists of several nodes. Each node represents a process in the TCOSS system. For instance each DSP in the line Server is an own node. An overview about all nodes can be viewed by using the message server function in TCMON. In some cases, a node depends on any other node. This relationship is indicated by the tree view. A sample screen shot is shown below:



In the example above, the node TC20 (L.1.L0) was not booted. All other nodes are OK.

TCOSS supervises all nodes. If any node fails, a warning message as shown below is created.

Event log Id	Description	Parameter
16020	%3 has been stopped due to a link error between %4 and %3. (Error details: %5)	%3=defective node %4=parent node %5=error reason
16021	%3, %6 have been stopped due to a link error between %4 and %3. (Error details: %5)	%3=defective node %4=parent node %5=error reason %6=list of stopped sub nodes

TCOSS then tries to restart the nodes that failed. If the restart operation succeeds, there are no further error messages. Otherwise, the system expects that the error cannot be solved by restarting the node. The following error messages are generated in that case.

Event log Id	Description	Parameter
16022	Reloading %3 failed due to link error between %4 and %3. (Error details: %5)	%3=defective node %4=parent node %5=error reason
16023	Reloading %3 failed due to link error between %4 and %3. %6 are still not usable. (Error details: %5)	%3=defective node %4=parent node %5=error reason %6=list of stopped sub nodes

Even if the restart of the node was not successful (as indicated by error 16022/16023) the system tries to restart the nodes once every minute. If the restart operation succeeds, the following Info message is created.

Event log Id	Description	Parameter
16048	Node %3 has been rebooted successfully	%3=node that has been restarted

Resource Bottleneck Observation

During the TCOSS operation, disk access times (disk latency) and TCOSS nodes round-trip-time Performance counters are being observed and checked against configurable threshold limits. If these limits are exceeded, corresponding Windows event log entries are generated.

There are two kinds of counters to be checked:

- Average of the particular value during the last measurement cycle
- Peak of the particular value that occurred during the last measurement cycle

If any of these values (average or peak) exceeds the corresponding threshold, the following event log types would be written:

- If average for the particular counter exceeds its threshold limit, the event log of the type "Warning" would be written (and thus sets the error state of this counter to warning). If the counter being in the Warning state exceeds its threshold limit during any later measurement cycle, the Warning event log would be also written.
- If the average for the particular counter being in the warning fulfills its threshold limit, the event log of the type "Information" would be written (and thus sets the error state of this counter to Ok).
- If peak for any counter exceeds its threshold limit, the event log of the type "Information" would be written (but no error state of peak counters is being kept).

The measurement cycle is by default set to 60 seconds, and can be configured in the following registry value: (but it cannot be set lower than to 60 seconds, each value lower than 60 seconds would be set back to 60 seconds!)

HKLM\Software\TOPCALL\TCOSS\PerfCounterCheckCycle

The following table provides an overview of Performance counters that are being checked, their default threshold limits, and the corresponding event log IDs.

Performance Counter Thresholds			Configuration in the Registry	EventLogID	
Performance Counter Name	Default thresholds(ms)		(HKLM\SW\TOPCALL\TCOSS\...)	Warning	Information
Local Disk access time [ms]	Avg.	20	DiskLocalAvgAccessTime	16054	16060
	Peak	2000	DiskLocalPeakAccessTime	-	16055
Remote Disk access time [ms] (1)	Avg.	25	DiskRemoteAvgAccessTime	16056	16061
	Peak	2000	DiskRemotePeakAccessTime	-	16057
Remote Disk network delay [ms] (1, 2)	Avg.	10	DiskAvgNetworkDelay	16058	16062
	Peak	500	DiskPeakNetworkDelay	-	16059
RTT Node ⁽²⁾	Avg.	100	NodeAvgRoundTripTime	16063	16065
	Peak	1000	NodePeakRoundTripTime	-	16064
RTT storage-media ⁽³⁾	Avg.	10	MediaServerAvgRoundTripTime	16066	16068
	Peak	500	MediaServerPeakRoundTripTime	-	16067

- (1) The "remote disk access time" and "remote disk network delay" are ignored while "local disk access time" is in a warning state.
- (2) Network delay during access secondary masters disk by the primary master.
- (3) Round-Trip-Time between TCOSS and any other node (LS1, FoIP, secondary master of model/205).
- (4) Round-Trip-Time between Storage and Media server nodes in the case of ASP System.

If any threshold is exceeded, Event Logs as shown below are created.

Event log Id	Description	Parameter
16054 16056 16058	Avg. <perf.counter> time %2 ms exceeded avg.limit, peak was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec EventID determines particular <perf.counter> string: 16054 = "local disk" 16056 = "remote disk" 16058 = "disk network delay"	%2=Average counter value in ms %3=Peak counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds
16063	Node %1 avg. round-trip time %2 ms exceeded avg.limit, peak was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec	%1= Node name, such as "L.10" %2=Average counter value in ms %3=Peak counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds

Event log Id	Description	Parameter
16066	Media server %1 avg. round-trip time %2 ms exceeded avg.limit, peak was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec	%1= Media server name %2=Average counter value in ms %3=Peak counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds
16055 16057 16059	Peak <perf.counter> time %2 ms exceeded peak limit, average was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec EventID determines particular <perf.counter> string: 16055 = "local disk" 16057 = "remote disk" 16059 = "disk network delay"	%2=Peak counter value in ms %3=Average counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds
16064	Node %1 peak round-trip time %2 ms exceeded peak limit, average was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec	%1= Node name, such as "L.10" %2=Peak counter value in ms %3=Average counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds
16067	Media server %1 peak round-trip time %2 ms exceeded peak limit, average was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec	%1= Media server name %2=Peak counter value in ms %3=Average counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds
16060 16061 16062	Avg. <perf.counter> time %2 ms is within avg.limit again, peak was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec EventID determines particular <perf.counter> string: 16060 - "local disk" 16061 - "remote disk" 16062 - "disk network delay"	%2=Average counter value in ms %3=Peak counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds

Event log Id	Description	Parameter
16065	Node %1 avg. round-trip time %2 ms is within avg.limit again, peak was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec	%1= Node name, such as "L.10" %2=Average counter value in ms %3=Peak counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds
16068	Media server avg. round-trip time %2 ms is within avg.limit again, peak was %3 ms, %4 perc. values exceeded peak limit (%5 ms), %6 perc. values exceeded avg.limit (%7 ms) during last %8 sec	%1= Media server name %2=Average counter value in ms %3=Peak counter value in ms %4=Perc.of values above Peak limit %5=Peak limit in ms %6= Perc.of values above avg. limit %7=Average limit in ms %8= Measurement cycle in seconds

SNMP Support

The following performance counters are presented to an administrator via SNMP.

Object	Counter
TCOSS	Open Files (TCSI)
TCOSS	Send order created/sec
TCOSS Disk	Read kb/sec
TCOSS Disk	Reads/sec
TCOSS Disk	Write kb/sec
TCOSS Disk	Writes/sec
TCOSS Disk	Write Queue Length Peak

These counters are described below together with all other counters. Refer to the *Kofax Communication Server SNMP Manual* for more details.

Performance Counters

The NT performance counter objects created by a single-instance TCOSS installation are:

- "TCOSS"
- "TCOSS Cache"
- "TCOSS Disk"

- "TCOSS Links"

Multi-instance TCOSS servers (ASP) will show extended performance counter objects as in this example for two instances:

- "TCOSS1"
- "TCOSS1 Cache"
- "TCOSS1 Disk"
- "TCOSS1 Links"
- "TCOSS2"
- "TCOSS2 Cache"
- "TCOSS2 Disk"
- "TCOSS2 Links"

Object: TCOSS

These counters are used to show some general performance information about the KCS Server.

Counter	Description
Open Files (Perm. Chan.)	<p>This counter shows the number of file handles used by all permanent channels (such as the Fax channel). Each permanent channel has a known need for file handles. Therefore 6 handles are reserved for each channel. If any channel tries to use more than 6 handles, they are taken from the general TCSI handle pool. See Counter: Open Files (TCSI).</p> <p>During normal operation, the value of this counter can be estimated as follows: $8 + \{\text{Number of Sending Channels}\} + \{\text{Number of receiving channels}\}$ where sending with back reception is counted both as sending and receiving activity.</p>
Open Files (TCSI)	<p>This counter shows the number of file handles used by all external applications (such as TCfW, TC/LINK-xx, Server Extensions) that access KCS via TCSI. On the KCS side, there are 10000 handles reserved for this case. If this limit is reached, you may get error code 309 (temporarily no handle available).</p> <p>This kind of handle is used temporarily during open or save of any KCS file. If some parts of the file (usually attachments or images) are not loaded during opening, the associated file handle is used until the file is closed. If there are no files open by any TCfW user and there is no other traffic, this counter should be zero.</p>
Sendorder created/sec	<p>This counter shows the number of send orders that have been created within one second. It is a subset of the counter "Sendorder writes/sec". Since it is expected that all created send orders will be sent at any later time, this value can also be used to determine the number of sent messages within one second. In this case, it is recommended to use an average value within a long interval.</p> <p>Multiplying this value by 3600 can affect the number of Sendorder (or messages per hour).</p>
Sendorder reads/sec	<p>This counter shows the number of read accesses to the KCS Mail system database. Typically a Sendorder will be read only once per send attempt. But, much higher values may be shown when working with TCfW. If the in or out box will be opened every single (except entries from the short-term archive) are counted by this counter.</p>

Counter	Description
Sendorder writes/sec	<p>This counter shows the number of writes (updates) in the KCS Mail system database within one second. This counter includes all new created send orders (see Counter: Sendorder created/sec)</p> <p>Each user activity (such as open a new message, terminate a message) is counted. As mentioned above, each created send order is counted. Messages sent via permanent channels (such as fax) increase the counter with 3 + number of transmitted pages. Messages sent via any link increases the counter by 2.</p>
Unique ID's/sec	<p>The unique ID is a permanent stored 32-bit integer value that is used within TCOSS to detect changes within any object (such as a file, send order, recipient). In some cases it is used for sorting entries within a list. It is not very meaningful for system administrators. It just gives an overall value of current system activity (without considering the size of each file).</p> <p>This value is incremented upon nearly every activity that changes one of the KCS internal databases or if any file on KCS is saved.</p>

Object: TCOSS Disk

These counters are used to give information about all physical disk access performed by the KCS Server. A second hard disk may be connected to the system (in case of fault tolerant servers), and both disks are logically used as a single disk. The same applies to any kind of Windows mirror set, volume set, RAID cabinet, and more.

Disk traffic produced by Windows and other applications is not considered. For this case, Windows provides the performance objects *LogicalDisk* and *PhysicalDisk*.

Counter	Description
Read kb/sec	Amount of data read from the disk within one second. If this value is divided by counter "Reads/sec," the average read block size can be calculated.
Reads/sec	Number of occurrences of read access from the disk. Since TCOSS uses a non-buffered access mode, each read results in a physical read from disk. In a fault tolerant model, read accesses are performed on the hard disk of the primary master (if it is operable).
Section Table Writes/sec	This counter shows the additional write overhead that is required in fault tolerant system to allow resynchronization of both disks in a tandem server. It does not show the extra disk write access for each written data block in a synchronized tandem system or the writes during updating one disk.
Update kb/sec	Shows the updating speed on a tandem KCS server in Kbytes per second. In a non-tandem system or updated tandem system, this count is always zero
Update Write kb/sec	Shows the amount of data that was different on both disks and therefore has been copied during Tandem Disk update within one second. If both disks are identically (usually after shutdown and restart of a synchronized tandem server) this counter shows zero during an update.
Write kb/sec	Write data throughput in Kbytes / second. In a Tandem server, the additional overhead for disk synchronization is not considered.

Counter	Description
Write Queue Length Peak	All write accesses within TCOSS are queued. This value shows the maximum queue size before any new write request is put into the queue. The theoretical maximum of this counter is 16, which means that a write request was delayed because the queue was full.
Writes/sec	Number of writes to the disk within one second. Since TCOSS uses a non-buffered access mode, each write results in a physical write to disk. In a fault tolerant model, each write access increments the counter by one, even though it may be performed on 2 separate disks.

Disk Access Times

These counters give information about physical disk read and write times. In contrast to the other disk performance counters described above they show the two disks of fault tolerant servers separately.

The access times of the primary master's disk can be seen in the "local disk" counters on the primary master. The access times of the secondary master's disk show up in the "local disk" counters on the secondary master. Additionally the secondary master's disk times are shown in the "remote disk" counters on the primary master and these values include the network delay between primary and secondary master; they show the speed of the secondary master's disk as seen from the primary master.

Counter	Description
Avg. local Disk ms/Read	Shows how long a disk read on the local disk took on average (in milliseconds) during the last performance monitor measurement cycle
Peak local Disk ms/Read	Shows the maximum disk read time on the local disk (in milliseconds) during the last performance monitor measurement cycle
Avg. local Disk ms/Write	Shows how long a disk write on the local disk took on average (in milliseconds) during the last performance monitor measurement cycle
Peak local Disk ms/Write	Shows the maximum disk write time on the local disk (in milliseconds) during the last performance monitor measurement cycle
Avg. remote Disk ms/Read	Shows how long a disk read on the remote disk took on average (in milliseconds) during the last performance monitor measurement cycle. This counter shows non-zero values only on the primary master of a tandem system
Peak remote Disk ms/Read	Shows the maximum disk read time on the remote disk (in milliseconds) during the last performance monitor measurement cycle. This counter shows non-zero values only on the primary master of a tandem system
Avg. remote Disk ms/Write	Shows how long a disk write on the remote disk took on average (in milliseconds) during the last performance monitor measurement cycle. This counter shows non-zero values only on the primary master of a tandem system
Peak remote Disk ms/Write	Shows the maximum disk write time on the remote disk (in milliseconds) during the last performance monitor measurement cycle. This counter shows non-zero values only on the primary master of a tandem system

Note All Peak counters described in this chapter may show wrong values if multiple Performance Monitor Applications are reading the counter values at the same time!

Object: TCOSS Cache

The TCOSS cache is divided into three different instances.

- Directory Cache: Caches the directory entries of all files managed by the KCS Server.
- Database Cache: Used for all record oriented files (such as Mail system database, Receiver directory, Services, and more) on KCS.
- Document Cache: Used for all other files (such as all sent and received messages)

The most efficient way to increase the KCS performance is to change the TCOSS cache configuration. This is possible using the registry editor. The new release uses default values that do not depend on the available physical memory size:

Directory cache	Document cache	Database cache
2MB	40MB	5MB

The actual used cache size is shown in the TCOSS trace file as shown in the example below.

```
...
14:10:46.821 (ef/ed) Install Directory Cache (200 * 1k = 200k)
14:10:49.254 (ef/ed) Install Document Cache (125 * 16k = 2000k)
14:10:49.264 (ef/ed) Install Database Cache (31 * 16k = 496k)
...
```

Instances: Database, Directory and Document

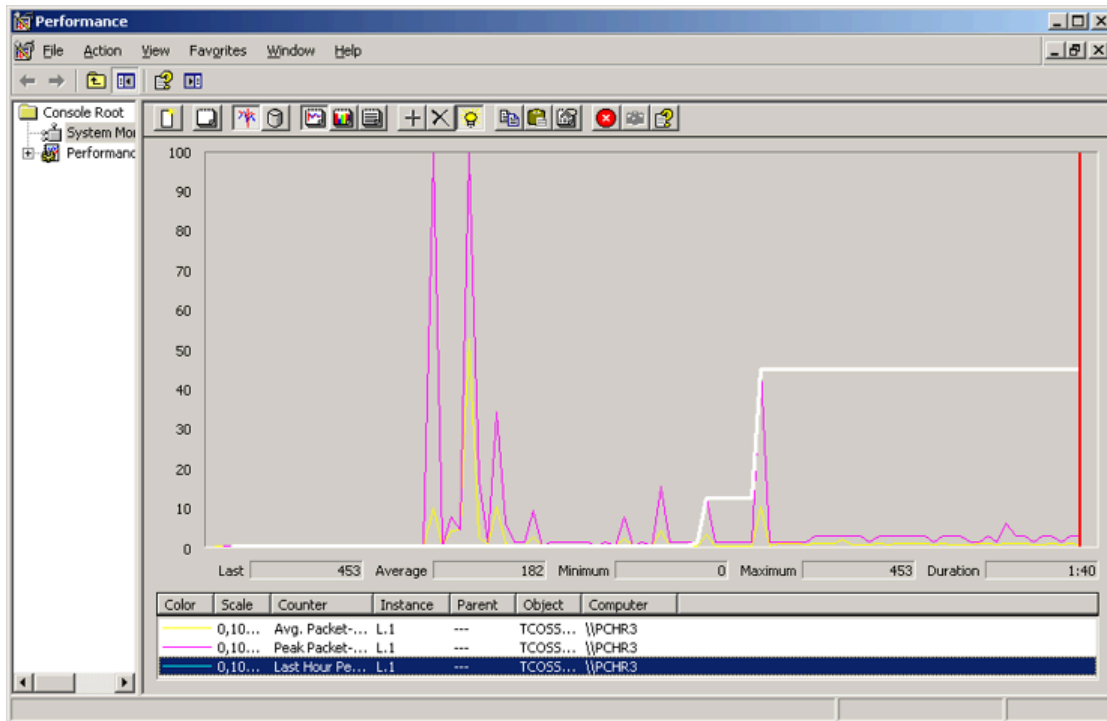
Counter	Description
Cache Read Bytes/sec	Number of bytes read from the cache buffer within one second. Since cache accesses may be on any Byte position additional overhead due to blocking is not considered. Example: If the content of file is read, this value is incremented by the exact file size even if there may be more data read from disk.
Cache Write Bytes/sec	Number of bytes that were written into the cache buffer within one second. Since cache accesses may be on any Byte position, additional overhead due to blocking is not considered. Example: If the content of file is written, this value is incremented by the exact file size even if there will be more data written to disk.
Disk Read kb/sec	Number of Kbytes that were read from the disk within one second. Since there is no additional buffer, these bytes are really physically read from the disk. This value can be kept very low, if the appropriate cache is large enough. It is the most important value for tuning the cache size of a KCS Server.
Disk Reads/sec	Number of disk reads within one second. It can be used together with the "Disk Read kb/sec" value to calculate the average read block size.
Disk Write kb/sec	Number of Kbytes written to disk within one second. Since there is no additional buffer, these bytes are really physically written to disk. This value can be kept very low, if the appropriate cache is large enough. It is the most important value for tuning the cache size of a KCS Server.
Disk Writes/sec	Number of disk writes within one second. It can be used together with the "Disk Write kb/sec" value to calculate the average write block size.

Counter	Description
Cache Hits/sec	Number of cache accesses within one second without prior disk read to validate the cache buffer.
Cache Misses/sec	Number of cache accesses within one second with a prior disk read to validate the cache buffer.
Auto Flushes/sec	Number of modified cache pages that have been re-used within one second. In that case, modified data is written on disk before the cache page used. This situation is expected to occur very seldom and therefore should not reduce the performance.
IO Conflicts/sec	Number of IO conflicts within one second. An IO conflict occurs if a disk access (read or write) is required while any other disk access to the same cache page is still active. This situation is expected to occur very seldom and therefore should not reduce the performance.

Object: TCOSS Links

These counters are used to give information about all link connections within a TCOSS server. The instance name of the counter is a simple number (such as "1") if the counter refers to a link connection via optical interface. It has to format L.<LanlinkNumer> (such as "L.1") for all nodes connected via network connection. For example, this is the case for LS1 and FoIP. The counters can be used to check if the network between TCOSS and LS1/FoIP is good enough for error-free fax real-time operation.

The counters use the Packet Acknowledge (approximately Packet-Ack) time to give an indication about the current network quality. This value is defined as the time between sending a data packet via link connection until the reception of an acknowledgment that this packet has been received. It is like a turn-around trip time but it includes an additional delay of 0...300 ms which happens on the receiving side before the acknowledgment is sent back. Even though the result suffers from the unknown delay, the counter provides the best possible values because (unlike an turn-around trip time measurement) it considers actual transferred data and it does not produce additional network traffic. A sample screen shot is shown below.



Counter	Description
Avg. Packet-Ack Time ms	This counter indicates the average packet acknowledge time (in milliseconds) during the last performance monitor measurement cycle. It provides an information about the average link turn-around time.
Peak Packet-Ack Time ms	This counter indicates the highest packet acknowledge time (in milliseconds) during the last performance monitor measurement cycle. This counter value should not exceed 1000 ms operation. Please note that this counter may show wrong values if multiple Performance Monitor Applications are reading the counter values at the same time.
Last Hour Peak Packet-Ack Time ms	This counter indicates the highest packet acknowledge time that happened within the last hour (detailed rule: all peaks within the last hour are considered; peaks that happened between one or two hours ago may be considered; peaks that happened 2 or more hours ago are not considered; the first 30 seconds starting a node are always ignored). This counter may be read from multiple viewers. It can be samples with up to a 1 hour sampling interval without excluding the highest Packet-Ack time that happened. This counter value should not exceed 1000 ms.

Note The counters Read Bytes, Read Bytes/sec, Write Bytes, Write Bytes/sec are implemented for the optical link connection (using TP80-interface) only. With LAN-Links these counters always stays on zero.

TCOSS Media Server

These counters are used to give information about the network connections between a storage server and its media servers. There is a separate instance of this object for each connected media server. In a non-ASP system these counters do not exist.

Counter	Description
Avg. Round Trip Time ms	Shows how long it took to send a data frame on the network connection from the storage server to the media server and back again (on average, in milliseconds).
Peak Round Trip Time ms	Shows how long it took to send a data frame on the network connection from the storage server to the media server and back again (maximum value, in milliseconds). This counter only increases, it is cleared at TCOSS startup

Object: TCOSS Queues

For further information refer to the *TCOSS Configuration Manual* chapter "Queue Length Log & NT performance counters".

Chapter 2

Controlling Documents (TAM)

The TAM (TCOSS Application Module) is the heart of the software and provides the user with essential functions. The user (or the user module) activates a function by entering a COMMAND and then receives an ACKNOWLEDGMENT as an answer.

This section explains some terms which occur repeatedly in the description of various commands. These terms will be commented on later in this guide.

Documents

A document is a text stored on a TCOSS system disk. The term *envelope* is sometimes used instead of document. It has the same meaning.

Documents are created either via document entry commands or via the reception of a document.

Documents can be:

- created, received
- modified (with client software (such as TCfW) only)
- erased and
- sent (examined).

If documents are created via TCSI (KCS client server interface - used by TCfW of TC/LINK) additional information such as originator, recipients, and send options are stored.

The TAM section is described separately in the TCOSS Application Module Manual, including topics such as the DotDot function and Directories description. It describes many of TCOSS' internal functions.

Chapter 3

Interface Control (User Modules)

The user modules CARRY OUT the channel-specific and user-specific functions of the TCOSS software.

The following user modules are available:

- UAS for operating an asynchronous V.24 interface
- UC0 for operating the logical Client-Server module
- UTX for operating a telex channel
- UTF for operating a transputer telefax channel
- UIF for operating the ISDN telefax module
- ULL for operating the LAN laser printer module
- ULP for operating the KCS system to a laser printer device (not supported)

A detailed information about operating these channels, their special features and the specific error codes is described in these sections.

The allocation of hardware channels to user modules is determined in the configuration.

Note Only the UC0 user module is explained within this chapter.

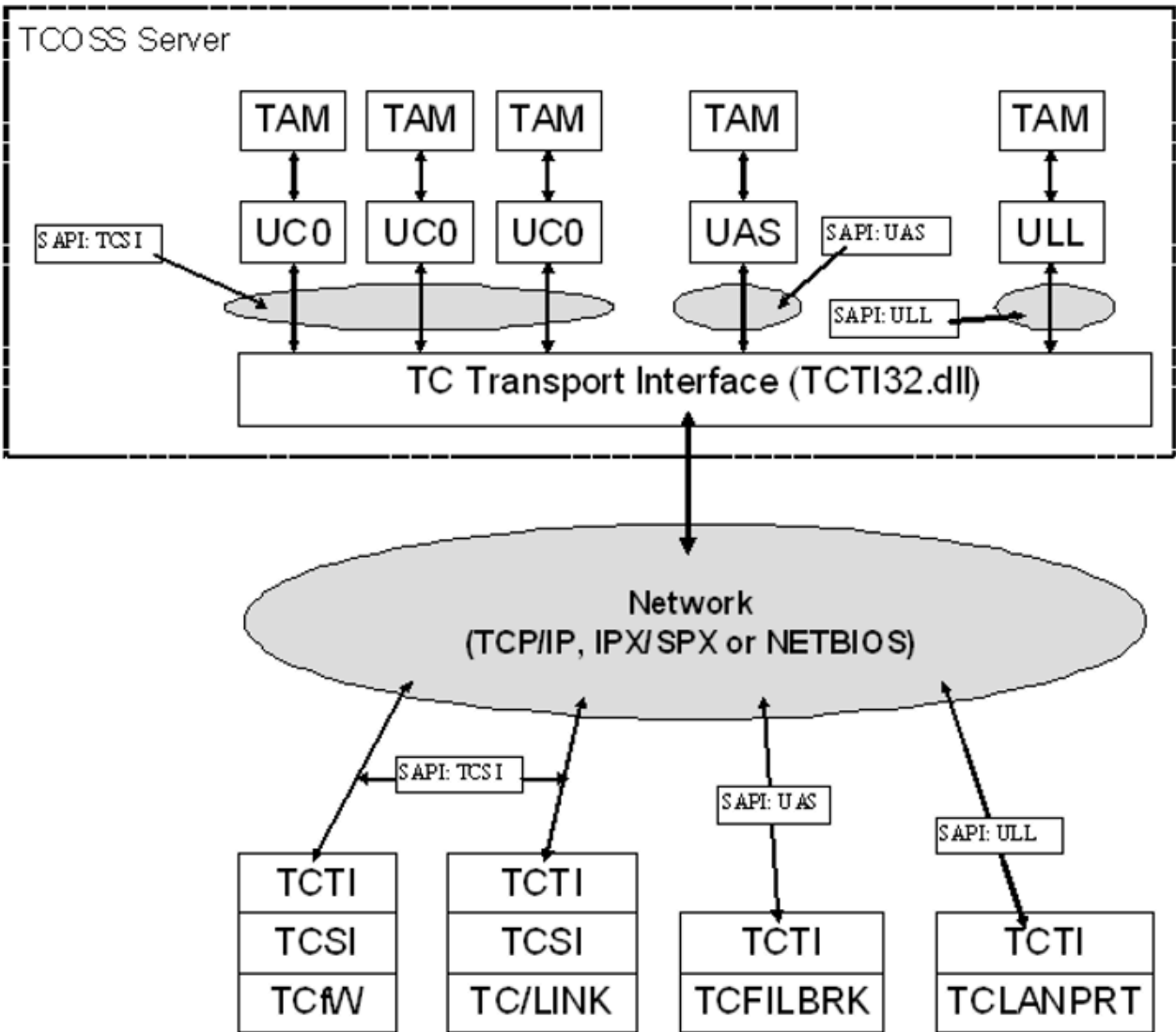
For a comprehensive list of configuration parameters for these TUMs, refer to the *TCOSS Configuration Manual*.

TC Transport Interface (TCTI)

The TC Transport Interface (TCTI) is used as communication layer between KCS applications (both clients and servers) and the network protocols (TCP/IP, IPX/SPX, NETBIOS).

There are 3 different kinds of modules (services) that use TCTI. Each has a unique Service Access Point Identifier (SAPI). The connection is always initiated from the client. It has to specify a both the path to the server and the requested SAPI. TCTI takes care that clients are connected to any free server channel with the corresponding SAPI.

Functional diagram



Using Registry for TCTI Settings

In previous releases, TCOSS used Topcall1.ini file to store settings. With the current release, all parameters are stored in the registry.

TCTI configuration	Old location < 7.27.00	New location >= 7.27.00
For RPC transport (default of registry value TCTIIniFile1)	Section [TCTI_RPC] in C:\tcoss\system\topcall1.ini	Registry key {ApplRegKey}\tctiServer\rpc
For native transport (default of registry value TCTIIniFile)	Section [TCTI] in C:\tcoss\system\tcopall1.ini	Registry key {ApplRegKey}\tctiServer\native

{ApplRegKey} is the Root application key (_KEY_LOCAL_MACHINE\Software\Topcall\TCOSS).

Configuration

This section describes the configuration of TCTI.

TCTI

The supported network protocols are configured during TCOSS setup, which is used for all channels using TCTI (independent of SAPI). You can choose any combination of the following protocols.

	TCP/IP	NETBIOS	IPX/SPX
Native transport	Supported	Supported	Not supported
RPC transport	Supported	Supported	Supported

TCSI Channel (UC0)

The UC0 (user module for client server interface) offers an efficient way to access KCS functions via the TC Client Server Interface (TCSI). The client server interface is used for sending and receiving data on any LAN environment.

Each configured Client/Server module UC0 provides one server module (TAM started as Object Handler Low (OHL) - TCSI.dll/TCSI32.dll represents the Object Handler High). The KCS application uses these Server channels such as TCfW, TC/Gate, TC/LINK-xx, TCMON (message server), TC/SX, TC/Java, TC/DC, and TC/ARCHIVE.

Because every client occupies one server channel while the Client/Server connection is active, a sufficient number of server channels should be configured. TCTI supports both native and RPC transport, and UC0 must be configured either for native or RPC. If you have clients using both transports, you must configure some UC0 channels for native and all other channels for RPC (RPC is the default).

Optionally an UC0 can be configured as Transfer Module. In that case it works as a client that connects to any other KCS server channel. The transfer module is used for least cost routing between KCS servers via TCP/IP. Refer to the *TCOSS TAM Manual* for details.

UAS via TCSI (UC0)

If a UAS is configured to slave "T", it will be a connection to TCTI. This channel is used by TCFILBRK only for File API and generation of break messages. Note that this file API is different to the file API used by TC/LINK-FI.

These channels can only be accessed via RPC transport! If you have multiple UAS channels via TCTI, TCFILBRK is connected to any free UAS channel. This means that all UAS channels via TCTI should have the same configuration!

User Module for LAN Laser Printer (ULL)

The ULL is always connected the TCTI. It is used by TCLANPRT only for printing on a network printer or file conversions.

Note

- These channels can only be accessed via RPC transport.
- If you have multiple ULL channels, TCLANPRT is connected to any free ULL channel. This means that all ULL channels should have the same configuration.
- Take care that you have the same number of TCLANPRT processes as ULL channels (in active state) running. Otherwise, you may get error messages during operation.

The ULL supports the failure counter, similar to UTF/UIF. For error codes RK, RL and RM (TCTI problems), the error counter in position 3 of config line 129 is used. The following configuration is recommended if multiple TCLANPRT modules are used:

```
Config line 129: 00 00 01 00,
```

With this configuration, any ULL channel that gets error RL (RK or RM) will generate a system error message as shown in the following example:

```
Topcall System Error Message No. 003
***** Network Printer Out of Order *****
Date: 99-12-21 Time: 13:55 Topcall Channel: 23
```

The status of the ULL channel is set to XW (error state - waiting). In this state, no further documents are sent. The channel can be reactivated by changing the status from Wait to continue. If there is no user invention, this error condition is reset after 2 hours and the channel continues to work.

User Module for Asynchronous Interfaces

The software module UAS (asynchronous user module) enables you to connect various units to the TCOSS system by means of an asynchronous V.24 interface.

The series of configuration parameters controls the adaptation of the module to the actual conditions (baud rate, data format, protocol) or its adaptation to individual requirements for communication with the system. The various possibilities are shown below. For a detailed description of the configuration parameter, see [Configuration](#).

The functions can be put in the following categories:

- Operation of the V.24 interface
- Operation via TCTI interface
- Sending documents (output)
- Receiving documents (input)
- Multiplexer operation

Operation of V.24 Interface

This section describes the operation of V.24 interface.

Allocation of Channels

To make the allocation of the "logical" channel <-- hardware channel (TS70), you have to indicate the corresponding SIO-port-addresses in the config file.

Baud Rate

Normally, the baud rate is adjusted by means of the hardware; as far as the software is concerned, the following restriction for the maximum baud rate applies:

It is possible to configure a maximum speed of 60 kBaud per TS0C/TS0D main board.

Example of a configuration:

1 AS channel with 19200Baud

2 AS channels with 9600Baud

4 AS channels with 4800Baud

Data Formats

The following configurations are possible:

- 5, 6, 7 or 8 data-bits
- 1, 1.5 or 2 stop-bits
- even, odd or no parity

Protocols

The following protocols can be realized:

- I STX/ETX
- I XON/XOFF

STX/ETX and XON/XOFF are controlled by separate config-parameters.

Hardware-Handshake

A connected device can stop the V.24 channel with the signal "CTS" (pin 5). The V.24 channel stops another device with the signal "DTR" (pin 20).

Operation via TCTI Interface

The UAS module can be used via TCTI interface. This configuration is normally used by TCFILBRK to communicate directly to TCOSS. Therefore, slave number T must be entered in the config program after selecting the UAS module in the software-hardware assignment.

By using the configuration for the TCFILBRK running directly on the LCU, take care that you choose "TCFR-standard config"; otherwise the communication will not work (also define a "channel group" such as "L" and configure line number 24 to "0" on the AS module).

Output of Documents

This section describes the output of documents.

Conversions at Document Level

This section describes the conversion at document level.

STX,ETX

- The STX and ETX characters can be configured.
- STX is sent prior to the start string, ETX is sent after the end string.

Start String

With the start string you can define any (max. 10-character) code sequence which is automatically sent at the beginning of a document before the 1st character of the text.

Application: printer-control-sequence

End String

With the end string you can define any (max. 10-character) code sequence sent automatically at the end of a document after the last character of the text.

Application:

- Printer-control-sequence
- Positioning the line pointer (is otherwise behind the last line)

Suppressing the First Form Feed

You can indicate the code of a character you want suppressed at its 1st occurrence in a document; the code refers to the status after all conversions (see below).

TCI Output Code Length

The TCI (KCS Image) output code length can be configured by changing config line number 33, to the appropriate value.

```
config line 33: any value between 1 and 254 (FE Hex), default F8 (248 char.)
```

The higher the value, the more system performance is needed. If problems occur on any channel due to this long lines, config line 33 can be changed to :45 (line length 69 characters) on this channel.

Note To avoid problems with UMM channels (MEMO), the standard value of config line 33 has been set to :45 (69 characters). This value should not be changed.

Pauses on an Asynchronous Connection

The asynchronous module is able to insert pauses during transmission to meet the requirements of some computer systems such as NCR or HP. These computer systems require a pause after the string CR/LF and STX. Pauses are not supported with an UAS on a Windows NT Master.

Pauses can be inserted by means of specific "pause-characters" using the ability of the asynchronous module to define sequences for the STX and the TCOSS format control characters (LF1, LF2, BS2, and more).

Two specific "pause characters" can be defined in the config line 60 of the asynchronous module; the first for 10ms pause and the second for 100ms pause.

During transmission, both of them are suppressed and the corresponding pause value is inserted.

To insert a pause after STX or one of the TCOSS format control characters during transmission, following steps are necessary:

1. Define "pause-characters" in config line 60. This is necessary if the default pause characters are not acceptable.
2. Configure replacement sequences for STX or one of the TCOSS format control characters which uses the appropriate combination of the "pause-characters" in order to achieve the required pause.

Note If the pause characters are configured to HEX code FF, the pause character will not be used. This is required for script programs that must be able to send all codes from HEX 00 to HEX FF on an asynchronous line.

Example:

During transmission via an asynchronous line, a 130 ms pause should be inserted after the string CR.

Corresponding config lines:

060:FF 01 04 01 and 04 are HEX values for the pause characters

Config line 69: replacement sequence for LF2

```
069:05 0D 04 01 01 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Explanation:

05	5 characters
0D	CR
04	100 msec. pause
01 01 01	3 * 10 msec. pause
Total:	130 msec. Pause

EOT Command During Sending via Asynchronous Module

It is possible to process input lines during sending or examining the document with the asynchronous module. This feature can be used to terminate sending or examining at any point with the ..EOT command.

This feature is activated with the second config position of line 102 in the asynchronous configuration.

If the command ..EOT is entered during sending of a document, no more lines are sent (except the characters that are already part of the output buffer). The send order is considered executed or is put back to the corresponding queue, depending upon the parameter BREAK.

In case of examining a document, the ..EOT command terminates only examining, but didn't generate any retrials (parameter BREAK is not used).

If other commands or text lines are entered during sending, the KCS system responds with acknowledgements "317 wrong command" or "400 bad command syntax" (except for the configuration with back reception - no response to wrong commands are sent).

After the correct ..EOT command is sent, several complete text lines (up to 2000 characters from the output buffer), the configured end string (config line 65), the ETX sting (config line 124) and the acknowledgement "100 OK" are sent in this order.

Caution:

- The output must not be stopped (XON/XOFF or hardware handshake) after the ..EOT command is entered. The input is checked if a sent line has been written completely into the output buffer. If the asynchronous module is configured with a time-out (config line 121) and the output is stopped after entering the ..EOT command, sending is terminated with a time-out, the ..EOT command is processed afterwards and the acknowledgement "317 wrong command" is sent.
- In asynchronous configurations with a time-out function and a manual EOT command, the time-out does now apply to the input of the ..EOT command (the EOT command has to be entered within the configured time; otherwise a time-out occurs).
- The time-out function is restarted if HEX 00 (or any other character in the input code table of the asynchronous module is converted to FF HEX) is received. This will only work until the first complete line has been entered.

Headline

When sending documents, the configuration determines whether a headline will be inserted automatically at the beginning of the text or not. The headline has the following form:

```
++++++REFERENCE.
```

REFERENCE indicates the reference of the document (max. 12 characters).

Call Collision Detection

The detection of call collision can be configured. With normal call collision detection, sending of a document will not start if there are any characters in the input buffer.

In case of extended call collision detection, the configured STX and ETX characters are used to detect start and end of a transmission. No transmission is initiated in the time between reception of STX and reception of the mating ETX character.

In case of sending with priority STX, start string, text, end string and ETX are sent if the input buffer is empty and not between STX - ETX.

When sending without priority, there is an additional delay of 2 seconds after transmission of STX and a second check for STX-ETX and for characters in the input buffer. If transmission cannot proceed because of an incoming message, the send operation is postponed. ETX is sent to offset the STX already transmitted.

Acknowledgments

With config line 59, you can indicate whether acknowledgments are:

- Put out as text (such as 100 OK)
- Suppressed
- Put out as beeps (1 beep is positive, 3 are negative)
- Stored as text with the last one stored sent with STX-ETX upon reception of a break control character.

Line for Line Conversions

Line for line conversion during output is done by replacement sequences for the "format-control-character"; a code sequence up to 20-characters can be allocated to every format-control-character of the TCOSS-code. With documents, the sequence allocated to the format-control-character is output at the beginning of the document line; with acknowledgments (if acknowledgments are configured) the replacement sequence for LF2 is, in any case, sent after the acknowledgment.

Left Margin

To create a left margin, the sequences for LFX, for example, can contain the corresponding number of blanks (such as 5) while the sequences for BSx contain no blanks.

Suppressing Lines

You can suppress lines which have certain format-control-characters by indicating HEX FF for the length of the corresponding replacement sequence.

Line Division

Lines that are too long can be cut off, divided into 2 lines or put out unchanged.

Conversions at the Character Level

The 256-byte output code table is used to convert the various characters from the internal TCOSS-code to the code of the connected device. Prior to sending, every character is converted by this table. The characters of the inserted sequences and those of the replacement sequences, as well as XON/XOFF, are not converted.

Printing of Documents

The following requirements usually apply for printing documents via an asynchronous module:

1. Each document should start on a new page
2. The system should not insert empty pages, for example, when form feed is activated at the end of one document and at the beginning of the text

The following points should also be taken into consideration:

1. Moving to a new page can be realized by a form feed:
 - within the document
 - within the start string (configurable)
 - within the end string (configurable)
2. Two conditions must be fulfilled for the form feeds to appear in the document text:
 - TCOSS-FF (= TCOSS page format control character) must exist within the text.
 - Replacement sequence for the TCOSS-FF must include a form feed for the printer.
3. Not every document in the system has to start with a TCOSS-FF (for example, received telex documents do not have TCOSS-FF).

The following example is an asynchronous module configuration that fulfills the preceding requirements:

```
config-line 60: :0C , suppress character
config-line 65: :02 0D 0C 00 00 00 00 00 00 00 00 ,end string.
```

Caution: This configuration suppresses the first form feed in the document, even when the form feed is not at the beginning of the document and therefore intended for the second page. This means telex documents are printed out correctly with this configuration. Other documents containing TCOSS-Form-Feed which should be printed with form feed have to begin with a TCOSS-FF.

Automatic EOT

After a transmission initiated by a send order (not by examining) TAM waits for a "..EOT" command (further information on the "..EOT" command can be found in the "TAM Manual").

It is possible to configure whether the module should generate internal "..EOT" automatically or if the command has to be entered by the user (or by the connected host software) to confirm reception of the document.

If configured for the TCOSS master-slave-system, the asynchronous module will wait for an acknowledgment (100 OK, .. this line may be terminated with a break control character) after transmission of the text.

The received acknowledgment is transformed into an EOT command using config-line 125 to determine the value of the parameter BREAK. The parameter 'error code' (EC) of the EOT command is set to:

- Space for BREAK=0.
- 'SE' for BREAK=1 .. 5
- 'SL' for BREAK=6
- 'SR' for BREAK=7

The received acknowledgment can be put into the AUTHOR parameter (configurable).

Cost Accounting

With the help of the EOT-Command, it is possible to have cost accounting on asynchronous lines too (see chapter '..EOT') . The EOT-Command can either be entered manually or generated automatically. For further explanations refer to the *TCOSS TAM Manual*.

The telex, teletex or telefax area codes may be used for cost accounting and the channel type has to be set by configuration accordingly (config line 3).

Example:

Channel type of asynchronous channel 05: is set to 'F' (FAX - channel).

```
..S,R=TEST,N=05:676209-TCINT
```

The fee will be calculated as set by the parameters in kk99 for this certain (fax-) receiver number.

The receiver number will not be dialed; it is only to inform the system how the fees have to be calculated.

Timeout

It is possible to configure a timeout for the sending of documents. If the output is stopped by handshake for a period exceeding the configured timeout, the asynchronous module terminates transmission and generates an EOT command with parameter BREAK=3.

The timeout supervision is not active during sending of acknowledgments (100 OK) and during waiting for user input (such as waiting for EOT command when sending without automatic EOT).

Back Reception

It is possible to receive documents back during sending. For this purpose a back-received document, is created. After transmission it contains the sent text in its original form.

The back reception of the asynchronous channel is configurable by menu.

Back reception of rendered text blocks is handled correctly by the fax module in full image back reception mode.

Text back reception by the fax module or back reception by an asynchronous channel shows the following restrictions:

- " The "+FX1 0,1" control line is stored as "+FX1"; the special information contained in the parameters "0,1" is lost
- " As a consequence, the top margin (image top margin instead of text top margin) and the page make up (image block may be broken at all white line) are incorrect.

Input of Documents

This section describes the input of documents.

Conversion at the Character Level

For converting the read-in characters from the code of the connected device to the internal TCOSS-code, a 256-byte table is used.

When the configuration is 7 bits with parity, the read-in character contains the parity as 8th bit (before conversion). To neutralize the parity, the input code table in this case has to be set up so that the lower half of the table (00H to 7FH) is identical to the upper half (80H to FFH). See also table with standard configuration. If using no parity the unused 8th bit is set to 1.

The following characters cannot be used during reception because they are not passed on by the module:

1. 00H, 80H
2. With XON/XOFF protocol, such as XON = 11H, XOFF = 13H:, the characters 91H and 93H are also treated as XON/XOFF and therefore not transferred.

Additionally, a configurable string-to-byte conversion is implemented. The string can have a maximum length of 6 characters which will be converted to a single character.

Note The conversion takes place after the input data stream has passed the input code table. For example, this conversion can be used to convert the string 'NNNN' to the TCOSS break control character (0D Hex). See subsequent chapters for additional information.

Conversion to TCOSS Lines

This section describes the conversion to TCOSS lines.

Control Characters

The following "special lines" enable you to enter TCOSS format characters without using control characters.

We have defined various control characters to enable the user to convert the stream of characters to TCOSS lines or, as the case may be, to enter TCOSS lines on a common asynchronous terminal. By means of the input code table, it is possible to assign any control character of the connected device to such a format-control-character or characters. In order to convert the read-in characters to lines in the TCOSS format, two conditions have to be fulfilled:

1. Recognition of the line limits
2. Generation of the correct format-control-character at the beginning of the TCOSS line (LF2, A4H ...)

For this purpose:

1. So-called line-separating characters are defined to mark the end of line
2. A TCOSS format-control-character is allocated to each one of these separating characters that is inserted at the beginning of the next TCOSS line.

As a rule, the 1st read-in line gets a LF2 as format character (unless it is a "++" line, see below).

Format-control character	Hex-code of format control character
A4H	01
A4Q	02
BDH	03
BDQ	04
LF0	10
LF1	11
LF2	12
LF3	13
BS0	14
BS1	15
BS2	16
BS3	17

Further format-control-characters

Hex 0D BRK (see automatic receiving)

Hex 0E backspace (not destructive)

Hex 0F delete (destructive backspace)

Hex FF invalid character

Example:

Allocation of control characters by config-line 105 (1st line of the input code table):

```
:FF FF FF FF FF FF FF FF 0F FF FF FF 01 12 FF FF;
```

Carriage return (0D): Line-separating character with line feed (the next TCOSS line gets LF2 as format-control-character)

Form feed (0C): Line-separating character with line feed to next page (the next TCOSS- line gets A4H as format character)

Backspace (08): destructive backspace

++Lines

The following "special lines" enable you to enter TCOSS format characters without using control characters:

++A4H

++A4Q

++BDH

++BDQ

++LF0

++LF1

++LF2

++LF3

++BS0

++BS1

++BS2

++BS3

When one of these special lines is read in:

- Text of the line is not passed on
- The next line contains a format-control-character that corresponds to the special line (++A4H = A4H,...)

Note There are ++ lines, which do not control the format of the next line (such as ++FX2, ++INC, ++FRM)

Command Lines

Lines beginning with " .. " or " //" are transferred as command lines. The format-control-character of this line has no significance.

Note Previously entered special lines (++ lines) have no effect on subsequent text lines.

Zero Lines

Zero lines are TCOSS lines whose format character is LF0 or BS0.

Zero lines overlay lines (if the connected device is able to do this) at output. A maximum of only 3 overlay lines is possible.

During input, one line with feed is prepared with the subsequent zero lines in a 4-line matrix. The most recently entered characters are always in the line with feed; the possibly overwritten characters "slide" into the zero lines below. As soon as a new line with feed is written, the TCOSS lines which have been prepared up to this point are transmitted.

With command lines, subsequent zero lines are not transmitted.

This mechanism, however, only works if the zero line is entered by means of control characters (see chapter on control characters). When entering with ++LF0 or ++BS0, the zero lines are stored without any modifications; no preparation in the 4-line matrix is done and, in this form, you can enter more than 3 subsequent zero lines in a row.

Note If more than 3 consecutive zero lines appear within a document, it is not defined how the modules will interpret this situation (various results occur).

Automatic Reception

Automatic reception enables you to receive documents on an asynchronous channel in a similar way as on a telex channel. The automatic reception can be switched on or off by configuration. If it is switched on, the following applies:

- As soon as the channel reads in a line and before any received document has been opened, a received document is created automatically. TCOSS delivery or non-delivery notifications are detected and handled like control documents. For generation of references, see TAM.
- All characters read in are converted and stored in the received document on a line to line basis as previously described in "Conversions at input"
- Reading in the control character BREAK closes the received document.

Note The function automatic reception may not be used if the channel is configured for "query."

Enabling Internal Commands

Internal commands (LOGON, LOGOFF, ESEITE, and SSEITE) are accepted only by an asynchronous module for which the first position of the config. line 102 is configured to '3'.

Pay attention to the fact that host connections that have the internal commands enabled should start their communication cycle with:

```
..2eot,break=1  
..2logoff
```

The change of the order of these two commands could lead to problems in case of using automatic back reception (config. line 126 set to '1').

Default setting of config. line 102 is '2' what means that internal commands are not accepted.

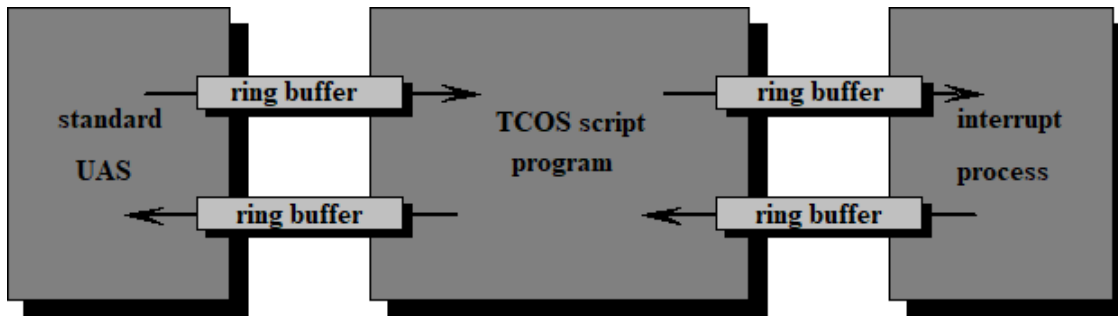
TCOSS Script Language

The TCOSS Script Language is an extension of the UAS module to make it programmable in an easy and powerful way. More flexibility in handling different equipment connected to the UAS channels can be achieved and it is similar to common programming languages (such as BASIC or C). Therefore, it is easy to learn and allows almost any programmer to become familiar with it. Different powerful library functions are included to ease programming work.

Structure

A running script program is located between the hardware servicing functions of the UAS (called interrupt process) and the standard UAS module (includes link to the KCS operating system, character conversions functions,). These both parts of the entire UAS usually are connected via two ring buffers. One for incoming data and one for outgoing data. The compiled script program provides two more ring buffers to connect to the interrupt process and to the standard UAS on either side. Data input and output is done using library functions.

The compiler producing the actual program is connected to the TAM/TUM interface and is active when the script is downloaded only.



Data received from or sent to either side by the script program has no special format. It is exactly the same as it would be produced or received by a user's terminal connected to the asynchronous channel. Any code conversion functions are still performed by the UAS. The interrupt process just represents an interface to the hardware and performs only handshaking tasks.

For details concerning the available functions, parameters and syntax of the script language, refer to the *TC Script Language Manual* [11].

How to Create a Script Program

A script program is simply a text file stored on the KCS system. It may be created by any text processing application producing simple ASCII text files. The maximum line length within the file is restricted to the maximum line length within the KCS system (254 characters). The maximum file length depends on the KCS disk capacity and memory space available for the compiled script.

A program can be loaded either automatically at system start-up or manually by a send order to this channel. For script auto load the name of the source file must be configured within a config line of the UAS (see [Configuration](#)). A second config line disables or enables the possibility of manually loading a script file. This switch also determines if a running program can be terminated and reloaded.

A manual send command has following format:

```

..2S,R=<anyScriptFile>,N=xx:SCRIPT dd
..2Q (in case your channel is set to QUERY)

```

Where

- xx: Channel number
- dd: Optional parameter to specify a SIO channel being used to send debug information to (such as port 0A which should be an asynchronous module - printer).
- SCRIPT: Keyword for the compiler that this document is a script source file (without entering SCRIPT after the channel indication the document is transferred as any other document)
- QUERY: In case your script program contains `..QUERY` commands, the channel where the script program is running must be configured for QUERY.

Note A `QUERY` command must be entered to activate a send order (such as reloading of a script program).

While testing a script program, we recommend that you enable reloading to interrupt a running program and to load a new one without turning off the entire system.

For production, this switch must disable reloading to avoid accidentally terminating the current program.

A script program may be terminated simply by executing the very last statement of the main function that does not lead into a loop. In this case, the program interpreter is removed and the UAS continues working in its standard configuration (without script language) such as the Interrupt process directly connected to the UAS. Any time a script program is terminated (without regard to the reason) the transmission is disabled (DTR is reset within UAS).

Note When the program exits, the ring buffers connected to the asynchronous port are cleared and all data is lost. So, be sure to wait until all data has been sent before you exit your program.

Tip Before running a script program on the KCS system, we recommend that you compile the script program on the PC version for script language included in PC/SV 1.12.

Errors

On error (syntax, memory, internal,...) the script compiler within the UAS module generates a response depending upon how the script has been loaded. A file manually loaded using a send command gets an error string visible in the author field of the appropriate entry within the contents. This error string has following format:

```
TTTCCCC Linr/Pos
```

Where

- **TTT**: Type of error:
 - 'SYN' Syntax
 - 'INT' Internal
 - 'MEM' Out of memory
- **CC**: Additional error code describing it more detailed. For further details, refer to the *KCS Script Language Manual [11]*.
- **Linr**: Line number where the error was encountered.
- **Pos**: Position of the error within the line.

Example: SYN0200 10/6

'if' keyword expected in line 10 at Position 9

Automatically loaded programs do not generate entries within the contents such as send commands do. Additionally automatically loaded programs are expected to compile without errors. Thus, an error while auto-load is treated as 'fatal' error and generates a file containing an error message. This file and message is produced as it would be using the `ERROR` command (for details please refer to the description of this command). For this purpose four new messages have been added to the system messages (numbers 010, 011, 012 and 013).

When auto-load failed the channel may be reloaded manually regardless of the state of the reload switch within the config. As long as the channel is not loaded correctly it is not started fully and does not accept data (except a script file).

Compiler

During booting the compiler tries to auto-load the script file. For this purpose it takes the file name from the config, checks it for validity and generates an internal `..LIST` command with the following format:

```
..2LIST,R=<Filename>
```

The first file that is received now is treated as source script and the compiler tries to build the actual program out of it. All this time the interrupt process is not started. Therefore, no call collision can occur.

On success the interrupt process is started. Otherwise the interrupt process remains stopped (this allows to boot manually without losing data in between).

Afterwards a `CONT` command is generated to enable sending on the closed channel (it is required that the channel is configured to be closed on start-up; config line 1 value 0).

```
..2CONT
```

If the compiler could not create the program previously, a manual send command may load the source script again now (regardless of the reload parameter).

When the reload parameter of the config file enables reloading, the currently running script program can be terminated by loading a new script file. In this case a break signal is sent to the port and DTR is set to the inactive state. Afterwards the newly created program is started.

When reloading is disabled, a running script program cannot be terminated by any other source script. But, source scripts may be reloaded when previously loaded files did not compile successfully (because there is no program running yet and the interrupt is still stopped).

If no valid file name is specified (all blanks) the compiler does not generate the `..LIST` command and starts the interrupt process immediately. This allows to use the UAS with standard configuration.

In this case loading of script files is allowed only when it is enabled by the reload parameter within configuration. Otherwise any source script is ignored (because the channel is already working).

On error the compiler sends an `EOT` command to cancel the send order and to set the error code. The error code is sent as `AUTHOR` parameter of the `EOT` command.

Additionally the auto-load procedure sends a `ERROR` command to generate a file holding the appropriate system message.

Compiler Error Codes

The following table provides a list of all syntax error codes and their description.

Error code	Description
0000	Program does not have 'main' function.
0001	The 'main' function must not have parameters.
0100	'sub' keyword expected.
0200	'if' keyword expected.
0300	'then' keyword expected.
0500	'while' keyword expected.

Error code	Description
0600	'do' keyword expected.
0700	'end' keyword expected.
0800	String identifiers require an immediate '\$' postfix
0900	Left parentheses '(' expected
0a00	Right parentheses ')' expected
0c00	Right bracket '[' expected
0e00	Assignment operator '=' expected
0f00	Keyword not allowed as identifier
0f30	Identifier expected
1000	End of statement expected
1660	Cannot define integer variable; identifier with this name already exists
1700	Size of string variable out of range
1760	Cannot define string variable; identifier with this name already exists
1801	Array size out of range
1860	Cannot define integer array; identifier with this name already exists
1900	Element size of string array out of range
1901	Array size out of range
1960	Cannot define string array; identifier with this name already exists
1a60	Cannot define string function; identifier with this name already exists
1b60	Cannot define function; identifier with this name already exists
1d60	Cannot declare integer parameter; identifier with this name already exists
1e00	Size of string parameter out of range
1e60	Cannot declare string parameter; identifier with this name already exists
1f60	Cannot declare integer array parameter; identifier with this name already exists
2000	String size of array parameter out of range
2060	Cannot add string array parameter; identifier with this name already exists
21c0	Operand type mismatch within expression
23c0	Type mismatch in call of user function
23c1	Missing parameter in user function call
2420	User function does not return anything
24c0	Type mismatch in call of user function
24c1	Missing parameter in user function call
2500	The function name must not have a '\$' postfix when it does not return a string
25c0	Type mismatch of return value

Error code	Description
2690	Too many parameters in call of library function
26c0	Type mismatch in library function call
26c1	Missing parameter in library function call
2790	Too many parameters in call of library function
27c0	Type mismatch in library function call
27c1	Missing parameter in library function call
27b2	Illegal parameters in call of library function
27b4	Call of library function produces overflow error
2890	Too many parameters in call of library function
2820	Library function does not return anything
28c0	Type mismatch in library function call
28c1	Missing parameter in library function call
2920	Library function does not return anything
2990	Too many parameters in call of library function
29c0	Type mismatch in library function call
29c1	Missing parameter in library function call
29b2	Illegal parameters in call of library function
29b4	Call of library function produces overflow error
3a00	Array index out of range
3ac0	The array index must be of type integer
3b00	One or both sub string indices out of range
3bc0	Any sub string index must be of type integer
44c0	Type mismatch in assignment to system variable
46c0	Type mismatch in assignment
ff11	'(', '\$' or end of statement expected
ff13	'(', '[' or end of statement expected
ff16	'[' or end of statement expected
ff20	Variable or function definition expected
ff21	(' or '\$' expected
ff22	)' or identifier expected
ff28	)' or ',' expected at function call
ff2c	(' or end of statement expected
ff33	Keywords 'end' or 'else' expected
ff40	Identifier is no defined function or variable

Error code	Description
ff46	']' or ',' expected
ff4d	')' or ',' expected at function call
ff50	')' or ',' expected at function call
ff53	')' or ',' expected at function call
ff60	Unknown identifier
ff63	')' or ',' expected at function call
ff66	')' or ',' expected at function call
ff69	')' or ',' expected at function call
ff80	Expression syntax

Example

Script program 'TEST'

```
sub main ()
prints (a$)
end sub
```

Send command

```
..2S,R=TEST,N=02:SCRIPT
```

Received document at compiler (includes header line)

```
+++++A:TEST
sub main ()
prints (a$)
end sub
```

Contents

951107 1126		
REFERENCE		DATE TIME
A:TEST	35	951107 1122
SCRIPT	SYNFF60: 3/10	951107 1125 021

Where

- SYN: Syntax error.
- FF60: Compiler error code: 'unknown identifier'.
- 3: Error in line 3: In the original document the error is in line 2, but in the document which the compiler receives the error is in line 3 because there is a header line inserted.
- 10: Error in column 10.

Corrected script program 'TEST'

```
sub main ()
def a$[10]
a$="hello^13"
prints (a$)
end sub
```

New send command

```
..2S,R=TEST,N=02:SCRIPT 1A
```

Contents

951107 1128		
REFERENCE		DATE TIME
A:TEST	35 SCHUETZ (BERN)	951107 1122
SCRIPT	SYNFF60: 3/10	951107 1125 021
SCRIPT1A	Script OK	951107 1127 02+

Where Script OK means that Script program has been compiled successfully.

Configuration

Note Script language is not supported on UAS channels connected to TCT!!

Two config lines for the script compiler control loading of the script program:

- **Line 128:** 12 characters to specify a script program to load automatically. If there is a file specified here a script file must be loaded correctly until the channel can be used properly. A drive can be specified by a leading drive specifier, such as 'S:FILE1', 'A:S:FILE1', 'B:S:FILE2'. Lower case characters are accepted and distinguished from capital letters.
- **Line 129:** 1 character to enable ('1') or disable ('0') manually loading. When switched off, a script file is treated as ordinary file and is not compiled. When switched on, any currently running program is cancelled by a new script file and the compiler tries to translate it.

When using a script program, following configuration changes of the UAS should be made:

- Configure the channel to be closed (WAIT) at start up to avoid former send orders from being processed before the channel could have been loaded (config line 1 value 0). The channel is automatically opened after script start-up. If you want to use ..QUERY commands within the script program you have to configure the channel for QUERY (config line 1 = '2,')
- Configure the UAS' character set to U.S. standard. This avoids problems with characters required within the script source (such as '[', ']', '^') that may be converted by another code table.
- When handling asynchronous status lines within the program, it is recommended to use XON/XOFF handshake to avoid conflicts with automatic handshaking of the UAS' hardware servicing function. Such problem may lead to a receiver overrun and therefore into losing characters. The case of receiver overrun sets the error variable within the program to give the program the ability to act upon.

Note The required memory size reported by the config program does not consider the additional memory needed for script processing. Therefore, you must add 70kbytes for every UAS configured for script language.

Remark: For further details, also refer to PCSV 1.12 and SLPC descriptions (PC version of script language for testing script programs on PC). If a **UAS on Model/1xx Master** is used, the control of handshake control lines such as DTR is not supported. Setting the corresponding variables has no effect. Reading the variables results in random values.

Configuration for Least Cost Routing

For generating a least cost routing network via asynchronous lines the following changes in the UAS from standard or PC standard are necessary:

For internal commands:

```
line 1:      '1,      channel configured to 'Continuous'
```

```
line 102:      '31,      internal commands
```

Explanation: First position of config line 102 must be set to '3' to activate and accept internal commands (LOGON, LOGOFF, ...). For perfect communication with internal commands config line 1 must be set to '1'.

For sending channel:

```
line 56:      '2,      automatic EOT according to config line 125
line 61:      '2,      no line division at output
line 125:     '725555551, break codes
```

Example 1: The send command is not automatically terminated successfully. The sending channel waits for an acknowledgment from the receiving channel (config line 56).

Acknowledgment: 100 OK

This acknowledgment corresponds to the acknowledgment group 100-199 of config line 125 and causes a break code '7' (1st position).

Internal EOT command: `..EOT,BREAK=7`

Send command is terminated "successfully" and waits for the active acknowledgment (status is 'SR').

Example 2: Acknowledgment: 317 wrong command

This acknowledgment corresponds to the acknowledgment group 300-399 of config line 125 and causes a break code '5' (3rd position).

Internal EOT command: `..EOT,BREAK=5`

Send command is terminated "unsuccessfully" and tries to send the message again (status depends on sending error, time interval depends on configuration).

Explanation: Config line 61 (no line division at output) is necessary that the //SEND command (which can be very long) within the masks is transmitted in one line.

For receiving channel:

```
line 59:      '888888888,      ackn. is sent after rec. of "break"
line 105:     ':FF FF FF 0D      conversion of ETX in Break
line 122:     '0,      no automatic reception
line 124:     ':02 03,      STX, ETX characters
```

Example: Set-up of received commands and control characters:

STX	02 (hex) corresponding to 1st pos. of config line 124	
..2LOGOFF,...	Causes an acknowledgment	Acknowledgments are not sent out according to config line 59 until receiving a "break" (last acknowledgment is stored)
..2LOGON,...	Causes an acknowledgment	
..2ESEITE,...	Causes an acknowledgment	
//2SEND,...	Causes an acknowledgment	
. .2LOGOFF,...	Causes an acknowledgment	
ETX	03 (hex) corresponding to 2nd pos. of config line 124	

According to the input code table the ETX character 03 (hex) is converted to 0D what means "break" (config line 105, 4th position). This "break" causes sending out the last stored acknowledgment (config line 59). This acknowledgment is used to terminate the send command of the sending channel which is configured for waiting for an acknowledgment. Config line 122 (no automatic reception) is necessary that internal commands are accepted as commands and do not cause the creation of an incoming document.

For both channels:

line 121: ≥:00, timeout for handshake

Explanation: A timeout must be defined (length depends on the application) when the lines are blocked with handshake (CTS, DTR,...). This timeout does not influence waiting for '100 OK' of the sending channel.

line 123: '2, or '3, call collision

Explanation: A connection between two KCS systems consists of two channels (sending and receiving) and a line. To guarantee perfect communication one of these channels must be configured to 2 and one channel to 3. Which one of these two does not matter.

Operating the Multiplexer

With the help of the multiplexer (MUX), various asynchronous terminals can be connected to an asynchronous interface. (Only one terminal at a time can carry out input or output). The Multiplexer will not be supported with a UAS on a model/1xx master.

During input, the active terminal is selected automatically by the MUX. In order to select a specific terminal for output, a MUX selection number corresponding to the MUX channel has to be specified within the send order.

Example: `..S,R=TEXT1,N=02:3` The document TEXT1 is sent via channel 02 to the MUX channel 3.

Receiver Format with MUX Operation

Below is an example for the allocation of the MUX selection number to the MUX channels with 2 cascaded multiplexers connected to channel 2.

MUX	MUX channel	Receiver (channel + selection number)
MUX1	1	02: or 02:0 or 02:1
	2	02:2
	3	02:3
	4	02:4
	5	02:5
	6	02:6
	7	for connecting the 2nd MUX
MUX2	1	02:7 or 02:8
	2	02:9

MUX	MUX channel	Receiver (channel + selection number)
	3	02:10
	4	02:11
	5	02:12
	6	02:13
	7	02:14 to 02:99

The MUX selection number has to follow the general rules for selection numbers as described in "Receiver." In addition, within the first two positions of the selection number, only digits apply:

- Thus, the following examples lead to the MUX channel 3:
`..S,R=TEXT1,N=02:3`
`..S,R=TEXT1,N=02:X33`
`..S,R=TEXT1,N=02:3TEST`
`..S,R=TEXT1,N=02:3x4711`
- Thus, the following examples do NOT lead to the MUX channel 3:
`..S,R=TEXT1,N=02:xx3` but to channel MUX-1-1
`..S,R=TEXT1,N=02:31` but to channel MUX-2-7

User Module for Transputer (UTX)

The UTX administrates telex lines that can be configured independently from one another. XD, Single current, double current and V.21 telex interfaces are supported. The following functions are available:

- Telex reception
- Telex transmission
- Sample printout on the tele printer
- Generation of system error messages

Telex Reception

Telex reception can be switched on or off by configuration. If reception is switched on, the system does the following:

- Waits until a minimum number of characters have been received, (telexes with fewer characters are not stored).
- Opens a received document.
- Writes a timestamp as first line of the document. If the time zone feature is active, the timestamp is in the system default time zone as defined in the routing directory A:rr99 with a line like
`**TIMEZONEDEFAULT,NAME=WET.`
- Converts the incoming text from ITA No. 2 to TCOSS code and writes it line for line into the received document.
- Stores the received text in configurable intervals on disk.
- Sends text or acknowledgments of TAM in the command mode (after `..CMDON` has been received).

- The end of the text or the reception of a configurable string of characters terminates the connection. The received document is closed and the partner's answer back, if one has been received, is entered as the author into the contents directory.

Reception also takes place when a telex is sent manually via the connected tele printer. If the distant correspondent's transmission stops during an incoming call for a period of more than the configured value, the TC system clears the call and reports error code 'TE'(= no received characters time-out) for the received document. The time-out supervision is only active after the configured minimum number of characters has been received.

The reception of sub-addressing digits in installations **without tele printer** is supported. To activate the feature, configure a delay after non-break detection (config line 73, 4th position) long enough to allow the reception of the sub-addressing information before the call confirmation is sent.

Example: line 73 :0C 05 00 28 gives 1000ms delay

As an additional feature, a figure shift received during the delay is converted into an asterisk. The usual sub-addressing information consists of a figure shift, up to three digits and a '+'. It will be received as '*xxx+' (where xxx are the sub-addressing digits, such as '*123+'). Use the '*xxx+' strings as keywords in the distribution directory to get a unique key for the distribution of incoming messages.

Inbound Routing of Telex Messages (UTX Module)

Inbound Telex messages may be distributed using the VV99 facility only. Additionally, the standard inbound routing of incoming Telex messages based on Telex sub-address is provided via rr99 facility just in the same way as with FAX DID/DDI.

Two config lines are used within the Telex module to support inbound routing:

Comparison of inbound distributions via VV99 and rr99

Config line 177 set to 0	Config line 177 set to 1-5 digits
The dialed sub-address is stored within the incoming Telex message, with a prefix '*' and suffix '+'. For example, the 3-digit sub-address '123' would be entered as '*123+' to the top of Telex message. String '*123+' may be handled by the VV99 facility afterwards.	The dialed sub-address is not entered to the Telex message and no prefix/suffix is being added. The dialed number is handled by the rr99 facility.

Configuration example

Assume the new KCS user "Smith" having the Telex sub-address 12345 and the answerback for incoming calls "Smith_TCUK." The Telex modules work with 5-digit sub-addressing, the Telex config line 176 uses prefix TXI\$, and the KCS service TXI exists with the prefix X:TXI.

Following actions are necessary:

1. Create KCS user "Smith" with an inactive address service TXI and 12345 as the number.
2. Insert line 12345,Smith_TCUK into the TX99 file.
3. Insert the following lines into the **INBOUND section of rr99 file: **INBOUND X:TXI~, Search inact.addr.type TXI and distr.to user X:TXI~,POSTMASTER:, No Telex match distribute to POSTMASTER.
4. Set Telex config line 73, position 4 to 28 hex (in order to activate the sub-addressing feature).

- 5. Set Telex config line 176 to 'TXI\$' and line 177 to 5.
- 6. Reboot all slaves with Telex interfaces.

The decision whether to take the answerback for the incoming message from TX99 file or from Telex config lines 156-175, is made upon the Telex config line 177:

Config line 177 set to 0	Config line 177 set to 1-5 digits
The new TX99 feature is switched off and answerbacks from the Telex config file are used. But please note that in this case the maximum number of sub-address digits is restricted to 3 digits (similar to previous TCOSS releases).	The new TX99 feature is used and answerbacks configured in the Telex config lines 156-177 are ignored.

Receiving with Variable Answerbacks

It is possible to have variable answerbacks on incoming calls. Therefore, the telex config has been expanded by a table of 20 answerbacks (config lines 156 to 175 in telex module). This feature can only be used if the 4th position of config line 73 (previous section) is configured for a timeout to receive sub addressing digits.

Each line is built as follows:

xxxxaaaaaaaaaaaaaaaaaaaaaa

Where

xxxx: 4 positions extension number (Wildcard ? is allowed)

aaaaa : 20 positions answerback (Wildcard ? is allowed)

Example:

Config line 156 is set to: ???_<>^111388???_ TCI

If 111388 123 is dialed, the answerback on incoming calls will be 111388-123 TCI.

Note To activate this feature, line 140 in the telex configuration must be set to "2" (variable answerback during reception) or "3" (variable answerback during sending and reception). You must always use 4 positions for the extension number in the configuration.

Variable Incoming Telex Answerbacks (UTX Module)

Depending on the sub-address dialed, the answerback for the incoming Telex message may be taken from the TCOSS system file "ATX99" located in the +MAIL5V folder. 1-5 digits Telex sub-addresses may be used with this feature. The maximum number of variable answerbacks within TX99 file is limited to 2000. If the TX99 file contains more than 2000 lines, the TE warning (and corresponding Windows NT Event Log entry) is generated on reloading the TX99 file.

The TX99 file is a flat text file with the following syntax:

nnnnn, aaaaaaaaaaaaaaaaaaaaaa
nnnnn, aaaaaaaaaaaaaaaaaaaaaa
...
nnnnn, aaaaaaaaaaaaaaaaaaaaaa

where "nnnnn" is the 1-5 digit Telex sub-address and "aaaaaaaaaaaaaaaaaaaa" is the associated answerback with max. 20 characters (shorter answerbacks than 20 characters are filled with blanks).

Two formats are available for the answerback. Both of them may be used in the same TX99 file simultaneously and are recognized automatically by the Telex module:

1. The standard KCS Telex "native" format for answerbacks as with config line 70, containing explicitly all necessary Telex control characters (letter/figure shift, carriage return, and others). The maximum length of such an answerback is **20 digits** (including Telex control characters). The first position of answerback with Telex format must be KCS ASCII code for Telex letter or figure shift ('_' or '^').
2. The ASCII format without Telex control characters. Necessary Telex control characters are added automatically by the Telex module. The maximum length of such an answerback is **16 digits** (excluding Telex control characters). The first position of the ASCII format must not contain ASCII '_' or '^' codes.

With both answerback formats, characters not supported by the Telex character set (ITA.2) are replaced by blanks within Telex module.

Different sub-address lengths within the same TX99 file are possible.

If the TX99 feature is switched on, the following functionality is provided by the Telex module:

- On incoming call, the Telex module attempts to get the sub-address.
- If the length of the sub-address is not greater than the length configured with the config line 177, Telex module attempts to find associated answerback in the TX99 file. If it succeeds, it makes a local copy of this answerback and uses it as own answerback during the whole incoming call duration.
- If the sub-address length does not match the configured length (config line 177), or the associated answerback could not be found within TX99 file (the corresponding TX99 line is missing or TX99 file does not exist at all), the default answerback configured in the config line 70) is used for such a call. Additionally, own default answerback sent the very first time may be expanded to 40 characters by defining an optional text such as INVALID ADDRESS in the config line 178 (see below). If no text is defined in line 178 (left blank), this feature is switched off. All other own answerbacks sent during or at the end of the telex reception are not influenced by config line 178.

Example

Assume default answerback (conf. line 70) "`<>^00000_topcall__`" and the config line 178 set to "`<>INVALID ADDRESS__`". If an incoming telex from distant teleprinter ("111111 test") is sent to a non-existent sub-address, following received document is created on KCS:

990311 1125

00000 topcall

INVALID ADDRESS

111111 test

stored message

990311/1124 nr. 0144

this is a test message.

00000 topcall

111111 test

The following config line is available within the Telex module to support "INVALID ADDRESS" feature:

Config line 178, 20 positions, additional text to be transmitted just (and only) after the very first transmission of the default answerback. By default, no text will be added (all 20 positions set to blank). This config line must contain all necessary Telex control characters in the same way the line 70 does (default answerback).

TX99 file error handling

On reloading TX99 file, the Telex module performs syntax checks of each line. If any line could not be interpreted or found to be incorrect, the self explanatory warning TE message is generated (and corresponding Windows NT event log is produced).

The corresponding line in the TX99 file can be found according to the extension information from the warning message.

All other TX99 lines without any syntax errors are immediately activated.

Example (Event Log)

Warning: TX99 line 20 extension 00019, answerback length (17) exceeds max. of 16 digits in TS0D(1.2)-02:UTX

If more than 10 lines in the TX99 being reloaded seem to be incorrect, the Telex module stops generating any further TE and Event Log warnings, and informs the Administrator that the TX99 seems to be wrong or corrupted by the Event Log warning:

Warning: TX99 file wrong or damaged (more than 10 lines wrong) in TS0D(1.2)-02:UTX

Solution:

1. Create a backup of the working TX99 before changes are made.
2. After changed TX99 has been reloaded, check the Windows NT event log for new entries. If any warning messages exist, immediately check the corresponding TX99 line, correct it and reload TX99 again.

Restrictions

- There is only one system-wide TX99 file valid for all Telex lines within the KCS system.
- After the TX99 file is changed (such as by editing it with TCfW), in order to activate changes for Telex modules, all nodes (slaves) with Telex modules must be either rebooted or at least one Telex module per slave must be reset (config reload).

Configurable Detection of Distant Answerback (UTX)

The distant answerback of an incoming telex message is normally taken from the second line after the "Who are you" character (received as #) requesting the local answerback. Some customers receive an additional date / time information line before the sender's answerback as in this example:

011113 1640	Date and time generated by the UTX module itself
-------------	--

#	Request from the sender to send him our answerback
TFC 540593FF	Our own answerback
317 1639	Additional information coming from the PTT, the day of the year and the time
petra b 560804f	Answerback of the sender
Message content	

A configuration flag, introduced with TCOSS 7.46.10, causes the telex module to skip the additional line when taking out the answerback from a received telex.

Telex module configuration, line 63, position 1, hexadecimal value containing 4 flags:

01 ... Greek characters for reception

02 ... received letters upper case

04 ... back-received letters lower case

10 ... skip additional line before distant answer-back in received telex

By default, the new flag is not set (answer-back detection compatible to releases before TCOSS 7.46.10).

Code Conversion During Reception

During the reception, the characters of the ITA No. 2 are converted to the corresponding characters of the internal TCOSS-code. This conversion table remains unchanged except for the following ITA combinations:

ITA no.2 combinations	TCOSS HEX	TCOSS symbolic
Comb.no.6 in figure case	7B	{
Comb.no.7 in figure case	7C	|
Comb.no.8 in figure case	7D	}

ITA combination no. 32 is interpreted as Greek letter shift. Combinations nos. 29 and 30 are used to shift to Latin letters and to figures. They are used in the telex module to perform the proper shift and are suppressed afterwards.

In such case that the received character is "{", "|" or "}" (ITA national combinations), an additional TCOSS-string to TCOSS-code input conversion (reception and back reception) is performed. This TCOSS-string to TCOSS-code conversion supports the national needs of different countries.

Example: "{o" to "ö" for reception and "{O" to "Ö" for back reception in Turkey.

The maximum size of an input TCOSS-string in the string to byte conversion table is one or two bytes.

The first byte is used in cases where national ITA no.2 combinations represent national characters directly without overtyping. The second byte is used in cases where national characters are created by overtyping on the tele printer.

The first character in the two-byte input TCOSS-string always defines the diacritical character. If a national ITA combination has been received, it is automatically considered as a diacritical character if it matches with the first defined character in one of the configured two-byte input TCOSS-strings.

After receiving a diacritical character, the telex module expects the second configured character to fulfill the input conversion (all in this state received diacritical characters are suppressed). If the second received character doesn't match with any character configured, the input is done without any conversion while the received diacritical character is suppressed!

Note As stated above, TCOSS-string to TCOSS-code input conversion is only performed after receiving one of the ITA no.2 national combinations. The exception is the ITA combination no.9 in letter shift during input conversion for reception which represents the "I" character. This feature is dedicated for Turkey where this ITA combination is used for reception to be converted into a small i without a dot (F1 HEX in TCOSS code page 1).

ITA Comb. No.	Letter	Figure	Greek Letter	TCOSS (hex)
1	a	-	Alpha	(DF)
2	b	?	Beta	(E0)
3	c	:	Psi	(FC)
4	d	#	Delta	(E3)
5	e	3	Epsilon	(E4)
6	f	config	Phi	(FA)
7	g	config	Gamma	(E2)
8	h	config	Eta	(E7)
9	i	8	Iota	(E9)
10	j	bell signal	Xi	(F0)
11	k	(	Kappa	(EB)
12	l	)	Lambda	(EC)
13	m	.	My	(EE)
14	n	,	Ny	(EF)
15	o	9	Omicron	(F2)
16	p	0	Pi	(F3)
17	q	1	gr. Q	(B0)
18	r	4	Rho	(F4)
19	s	'	Sigma	(F5)
20	t	5	Tau	(F7)
21	u	7	Theta	(E8)
22	v	=	Omega	(EA)
23	w	2	gr. W	(B1)
24	x	/	Chi	(FB)
25	y	6	Ypsilon	(F9)
26	z	+	Zeta	(E5)

ITA Comb. No.	Letter	Figure	Greek Letter	TCOSS (hex)
27	Carriage Return			
28	Line Feed			
29	Letters Latin			
30	Figures			
31	Space			
32	Letters Greek			

All TCOSS-lines get a LF2 as format control character.

The combinations ITA 6, 7 and 8 in figure shift are used differently by the countries. Therefore the corresponding TCOSS - code can be set by configuration. Also refer to the *TCOSS Configuration Manual*.

Error Codes upon Receiving

Error Codes	Meaning
TE	No received character timeout
TF	Error during storing of received document
TH	Ring buffer overflow during reception

Sending Telexes

The UTX supports all usual signaling types; single or multiple step selection are both possible. To meet the requirements of the postal administrations in different countries, a series of parameters can be set in the configuration file.

The following functions are available for sending telexes:

- Setup of the connection to the telex exchange and selection (stage 0)
- Further selection stages if required
- Answerback exchange with or without verification
- Text sending
- Delay based on the parameter STOP in the send command
- Disconnection
- Terminating message to TAM with break code, answer back or error message, duration of the connection, and
- Back reception
- Variable answer backs during sending without tele printer
- Different documents can be sent to the same destination in a single call (chaining feature)

Establishing the Connection to the Telex Exchange

This section describes how to establish connection to telex exchange.

Receiver Format with Telex

To send via Telex, the desired Telex receiver is entered in the send command by means of the number parameter. The receiver format basically corresponds to the general format described in "Receiver".

By indicating a channel which is configured to Telex, you determine that the receiver is a Telex receiver. You can enter the channel explicitly or it can be derived automatically from the selection number (see below).

Normally, the selection number of a Telex receiver contains not only the Telex number, but also a slash followed by the answer back of the Telex partner. This information serves to verify the correct receiver.

Example:

Telex number: 111388 TCINT a

..S,R=TEXT1,N=08:111388/TCINT

..S,R=TEXT1,N=X:111388/TCINT

..S,R=TEXT1,N=X:111388 If no channel is given and if the number contains a '/', the channel indication 'X:' is assumed. For example, : 111388/TCINT is synonymous with X:111388/TCINT.

Note ..S,R=TEXT1,N=111388 is not allowed.

Answer back verification

The character string after the slash in the selection number must be identical to a part of the answer back received on the Telex line. For this purpose, blanks are not considered and no difference is made between small and capital letters (this applies also to entries with //).

Within the answer back, it is possible to define question marks as "wild cards"; on those positions where question marks are defined, the received answer back may contain any characters. However, question marks are not allowed in the answer back's blanks.

It is possible to enter a question mark instead of an answer back or to leave the answer back out entirely (the question mark has to be on the first position; then the other characters are no longer considered).

Example:

complete Telex number: 135361 tpcal a

Selection numbers (as they appear in the send orders within a contents directory; after the input transformations) where the answer back comparison.

Will match	Will not match	
135361/tpcal	235361/tpcal	(wrong number)
135361/tpc	135361/tpcall	(wrong answer back)
135361/Tpca		
135361/361		

Will match	Will not match	
135361/61tpc	135361/61?tp	(? instead of blank)
135361/135361 tpcal a	135361/cal?a	
135361/?		(not allowed)
135361/tpc??		
135361		

Sending with variable answer backs

The Telex module can be configured to work with variable answer backs. This feature is used while sending a text via Telex without using a tele printer.

Therefore you have the possibility to define in config line 140 of the Telex module whether you want to work with or without variable answer backs.

If config line 140 is configured without using variable answer backs, then the program takes automatically the answer back defined in config line 70 of the Telex module.

If config line 140 is configured for using the variable answer back and the first line of a document to be sent contains the string **---answer back**, then the answer back defined in config line 70 is replaced by the one following the string **---** !

The answer back which follows the string **---** **must have** the same format as the one defined in config line 70.

The variable answer back is valid for documents which contains the string **---**. The line with the string sequence **---** itself is not sent.

If the Telex configuration contains the use of variable answer backs, but the first line of the sent document doesn't contain the string **---answer back**, the answer back configured in line 70 is taken automatically.

Note We recommend that you use the variable answer backs only with a special mask to avoid syntax errors during sending.

Receiver with private branch exchange

If the receiver is provided with a private branch exchange, it is possible to select the extension directly. However, the hyphens contained in the reference may not be entered. In such a case we recommend you do not use a part of the number as answer back but only the letter combination. This will enable the central exchange to accept the message if the extension is busy.

Example:

desired number: 22005-400 val a

receiver: 22005400/val

Signaling Types

The system has 4 different signaling types which can be modified by changing the parameters in the config-file.

Telex exchange type 'A' (similar to CCITT U.1 type A)

The following steps are carried out:

1. call
2. waiting for call confirmation
3. waiting for proceed to select (pts), call collision recognition
4. delay, recognition of a call collision (only the seconds without reception count in the delay)
5. selection with tele printer signals, recognition of call collision

The following functions can be set in the config-file:

- maximum waiting time for call confirmation
- maximum waiting time for pts (proceed to select)
- pts signal (can be empty, in such a case step c is skipped)
- duration of delay after receiving pts
- selection termination character
- character for recognition of call collision (a call collision is assumed, if this character is received during steps c - e).

Telex exchange type 'B' (similar to CCITT U.1 type B)

The signaling includes the following steps:

1. call
2. waiting for call confirmation (= proceed to select)
3. recognition of call collision
4. delay (only seconds without reception count for the delay)
5. dial selection
6. waiting for call connected signal

The following parameters can be configured:

- maximum waiting time for call confirmation
- duration of the delay prior to selection
- maximum waiting time for the call connected signal

Telex exchange type 'C'

The only difference between signaling to type "B" and "C" is that the use of telex characters for selection with "C" is allowed. In addition to the parameters mentioned under exchange type "B", it is possible to configure selection termination character.

Leased line

The procedure for establishing the connection:

1. check whether the state of the line is "connection established" (stop polarity on the receive line. +40 mA in case of single current). Otherwise, an attempt to establish the connection is made (similar

to call procedure with exchange type 'A': call, waiting for call confirmation (maximum waiting time: config- line 57).

2. sending of a letter shift
3. 1 second pause

The configuration of a telex module for operating a leased line differs from the standard telex configuration in the following lines:

config line 56: 'M, type of telex exchange

config line 85: :00, answer back exchange 00=no

Note Pay attention to following important settings:

- reception time-out
- number of characters incoming must be very low
- no answer back

To omit the selection procedure, the parameter NUMBER may not indicate a telex number and/or answer back after the channel indication.

To receive documents with a leased line, incoming documents must be closed by a break signal. If this is not the case, the text must contain an end string, which must be configured. If no break or end string is received - or if single characters are received - a standstill of the module occurs. In other words, the next document can only be sent after a break or end string has been received or after reception time-out has been expired.

Control characters (figure shift, letter shifts, line feed and carriage return) at the beginning of a received document will be suppressed. In consequence empty lines at the beginning are not stored in the reception file.

Further Selection Steps

A second selection step is assumed if the telex number contains a character which is not a digit. This check of a further selection step can be configured to begin at a certain point in the telex number or to be left out completely.

The following measures are required for the second and further selection steps:

1. waiting for proceed to select
2. delay (only the seconds without reception count for the pause)
3. selection with telex signals

The config-file contains the following parameters:

- pts character
- duration of the delay
- selection terminating character

If a non-digit character is found in the dialing number not assigned to a selection step, the last selection step will be repeated.

In addition to these, a number of different parameters can be variously set for other sending functions (such as answer back exchange, disconnection) depending on the most recently executed selection step.

Answerback Exchange

If the answer back exchange is on, the system will do the following:

1. wait for the partner's answer back (with recognition of service signals)
2. check if the received answer back matches the expected one (single hyphens and spaces in the received answer back are not considered)
3. send the local answer back, if the text does not begin with "--".

The following parameters can be configured:

- Maximum waiting time for answer back
- Maximum waiting time, before the answer back is called up
- Busy signal which is not followed by a disconnection
- Evaluation of a call-connected signal (yes/no)

The maximum waiting time for the answer back is extended if the service signal "MOM" is received. The reception of the service signal "DF" transmits the answer back.

Sending Texts

The sending function fulfils the following tasks:

- Byte-string conversion of characters not in the telex character set
- Code conversion TCOSS code to ITA No. 2
- Conversion of the character ";" (semicolon) to a pause of 2 seconds (only the seconds without reception are counted for the delay)
- Insertion of the telex head before the first line which does not begin with a hyphen ("--");
- If characters are received, sending is interrupted and a delay of 1 second is inserted.

Control Statements in the Text During Sending

If a text is sent via Telex, it is possible to control sending by means of certain symbols in the text. These control characters may or may not be contained in the Telex character set (for example, semicolon is not). They release control functions if they have a certain position in the text (such as a hyphen).

The control possibilities are, above all, provided to fulfill certain conventions during communication with various computers in the communication chain. This communication is carried out by a simple "delay and output" programming after the selection process, before the actual text.

If the first text line consists only of two hyphens ("--"), no separate answer back is activated. Within the '--' line at the beginning of the text it is possible to include semicolons (one semicolon causes a 2-second delay). The telegram dispatch via Radio Austria, for example, works with this feature.

Every line beginning with a single hyphen is transmitted before the message's head until the first text line not beginning with a hyphen is reached. The hyphen at the beginning of these lines is not sent.

The head comes after the first line which does not begin with a hyphen. From here on, all hyphens, including the ones at the beginning of lines, are transmitted in the usual way.

A semicolon affects a delay of 2 seconds during the output of texts. Any number of semicolons can be joined together.

If a string of 2 to 6 dollar signs (such as \$\$\$\$) is in a text to be sent, the string is replaced by the current document number (the same number as in the Telex head). If the \$-string is longer than the current number, enough blanks are inserted at the end of the current number to make it match the \$-string. If the number is longer than the string, the current number is shortened from the beginning to match the length of the \$-string.

Single dollar signs are converted to DLRS. The current number is inserted only during sending. With a local printout, all dollar signs are converted to DLRS.

Delay After Tele Printer Signals

During selection with tele printer signals it's possible to configure a delay of 1.3 seconds after each tele printer signal. This delay can be configured for all selection steps separately. For a detailed information refer to the configuration of the telex channel.

This 1.3 second delay can also be configured if the selection terminating character itself is not configured. In this case, the appropriate config value for the selection terminating character is 80 HEX.

Header

You can insert a header at the beginning of a Telex. The header contains information about:

- Message type
- Date and time
- Current number

You can configure whether a header is inserted and if so, what information it contains.

Code Conversion During Sending

The conversion from the internal TCOSS code to the Telex code ITA No. 2 occurs during sending. For this purpose, various special characters having no corresponding values in the Telex code are displayed in character combinations (such as ö - oe, \$ - dlrs). Because this conversion causes longer lines or changes the form of the lines (in tables), the system maintains the line length by omitting blanks.

The code conversion of the characters of the telegraph alphabet assigned for national use is controlled by configuration. Two different TCOSS codes can be converted into the same ITA2 combination to allow for upper and lower case letters.

An international network access number can be defined in Telex config line 141 and the TCOSS-code to TCOSS-string output conversion table was added to config lines 142 up to 151.

This output conversion table consists of three parts:

1. **General part:** This part is used for all conversions which are not using one of the three national defined characters on Telex, such as "%" to "o/o", or "\$" to "DLRS" and more.

2. **National part:** This part is used for all country-dependent conversions, such as "à" to "{" for use without diacritical characters on Telex, or "ö" to "{O" for use with diacritical characters (the character "{" is defined as one of three ITA's national character combinations).
3. **International part:** This part replaces the national part of the conversion table while making international calls via Telex (to avoid problems with national characters). This includes conversions such as "á" to "A", where the national characters are converted to appropriate standard characters. The decision whether the call is national or international is done by comparing the first digit of the selection number with the value configured in line 141. If both values are equal, the Telex call is international, else national.

With a TCOSS code to be sent, the following conversions are performed:

1. If the TCOSS code is found in the general part of the output TCOSS-code to TCOSS-string conversion table, the corresponding conversion is done.
2. If the TCOSS code is present in the national part of the output TCOSS-code to TCOSS-string conversion table (or respectively in the international part while making international calls), the corresponding conversion is done.

The following table contains all characters in the TCOSS code that do not have directly corresponding character in the Telex code. It also shows the allocated Telex code sequences. All TCOSS-codes which are not part of this conversion table are converted to " " characters (space) in ITA no.2.

Code conversion during sending (detailed)

TCOSS Hex	TCOSS symbolic	ITA No.2 symbolic
20	space	space
21	!	bell
23	#	comb. no. 4 in figure case
27	,	,
28	((
29))
2A	*	own answer back is sent
2B	+	+
2C	,	,
2D	-	-
2E	.	.
2F	/	/
30 - 39	0 - 9	0 - 9
3A	:	:
3B	;	2 sec. pause
3C	<	carriage return
3D	=	=

TCOSS Hex	TCOSS symbolic	ITA No.2 symbolic
3E	>	line feed
3F	?	?
41 - 5A	A - Z	A - Z
5E	^	figure shift
5F	—	letter shift
61 - 7A	a - z	A - Z
7B	{	comb. no. 6 in figure case
7C	|	comb. no. 7 in figure case
7D	}	comb. no. 8 in figure case
7F	small Khi	capital Khi
F8	°	comb. no. 32
05	small Alpha	capital Alpha
06	small Beta	capital Beta
07	small Gamma	capital Gamma
08	small Delta	capital Delta
09	small Epsilon	capital Epsilon
0A	small Zeta	capital Zeta
0B	small Eta	capital Eta
0C	small Theta	capital Theta
18	small Ny	capital Ny
19	small Xi	capital Xi
1A	small Omicron	capital Omicron
1B	small Rho	capital Rho
1C	small Sigma	capital Sigma
1D	small Tau	capital Tau
1E	small Ypsilon	capital Ypsilon
1F	small Phi	capital Phi
B0	small fin. Sigma	comb. no. 17 in Greek shift
B1	non printable	comb. no. 23 in Greek shift
B3	small Psi	capital Psi
B4	small Omega	capital Omega
C0	small Pi	capital Pi
C3	small Iota	capital Iota

TCOSS Hex	TCOSS symbolic	ITA No.2 symbolic
CB	small Kappa	capital Kappa
DF	capital Alpha	capital Alpha
E0	capital Beta	capital Beta
E2	capital Gamma	capital Gamma
E3	capital Delta	capital Delta
E4	capital Epsilon	capital Epsilon
E5	capital Zeta	capital Zeta
E6	small My	capital My
E7	capital Eta	capital Eta
E8	capital Theta	capital Theta
E9	capital Iota	capital Iota
EA	capital Omega	capital Omega
EB	capital Kappa	capital Kappa
EC	capital Lambda	capital Lambda
EE	capital My	capital My
EF	capital Ny	capital Ny
F0	capital Xi	capital Xi
F2	capital Omicron	capital Omicron
F3	capital Pi	capital Pi
F4	capital Rho	capital Rho
F5	capital Sigma	capital Sigma
F7	capital Tau	capital Tau
F9	capital Ypsilon	capital Ypsilon
FA	capital Phi	capital Phi
FB	capital Khi	capital Khi
FC	capital Psi	capital Psi
FE	small Lambda	capital Lambda

Special Hints

1. The character "*" (2A HEX in TCOSS) invokes sending of the current own answer back defined in config line 70 or the variable answer back defined for the current document (see "[variable Telex answer back](#)").

The character "*" itself is not sent.

In the default configuration of the Telex channel, the character "*" is suppressed (converted to space).

- The character "#" invokes calling the distant subscriber's answer back and the rest of the line behind the string "#" is automatically suppressed. Therefore it is recommended to use the character "#" only at the end of a document line.

The character "#" itself is not sent.

In the default configuration of the Telex channel, the character "#" is suppressed (converted to space).

- The UTX module fully supports 254 characters per line. But if the channel is configured to make up lines that are too long, characters may be cut off. This happens when the second line produced as extension of the first is too long again. In this case, the second line is cut off instead of being continued in a third line.

Code conversion during sending (overview of all TCOSS - codes)

TCOSS Code (Hex) ==> ITA No.2 symbolic

Used abbreviations in the code table.

2P	2 sec. pause	AD	as defined in the Telex TCOSS-
BL	bell		code to TCOSS-string output
CR	carriage return		conversion table
DL	dlrs	OA	own answer back
FC	TCOSS format control character	CN6	comb. 6 in figure case
FS	figure shift	CN7	comb. 7 in figure case
LF	line feed	CN8	comb. 8 in figure case
LS	letter shift	CN32	comb. 32
SP	space	grQ	comb. 17 in Greek shift
grW	comb.no.23 in Greek shift	WH	comb. 4 in figure case (who are you)

00H and FFH are non-valid characters

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
O		FC	SP	0	AD	P	AD	P	AD	AD	AD	grQ	P	AD	B	X
1	FC	FC	BL	1	A	Q	A	Q	AD	AD	AD	grW	AD	AD	AD	AD
2	FC	FC	AD	2	B	R	B	R	AD	AD	AD	AD	AD	AD	G	O
3	FC	FC	WH	3	C	S	C	S	AD	AD	AD	Y	I	AD	D	P
4	FC	FC	AD	4	D	T	D	T	AD	AD	AD	W	AD	AD	E	R
5	A	FC	AD	5	E	U	E	U	AD	AD	AD	AD	AD	AD	Z	S
6	B	FC	AD	6	F	V	F	V	AD	AD	AD	AD	AD	AD	M	AD
7	G	FC	'	7	G	W	G	W	AD	AD	AD	AD	AD	AD	H	T
8	D	U	(	8	H	X	H	X	AD	AD	AD	AD	AD	AD	Q	CN32
9	E	X	)	9	I	Y	I	Y	AD	AD	AD	AD	AD	AD	I	U
A	Z	O	OA	:	J	Z	J	Z	AD	AD	AD	AD	AD	AD	W	F

B	H	R	+	2P	K	AD	K	CN6	AD	AD	AD	AD	K	AD	K	C
C	Q	S	,	CR	L	AD	L	CN7	AD	AD	AD	AD	AD	AD	L	Y
D	FC	T	-	=	M	AD	M	CN8	AD	AD	AD	AD	AD	AD	AD	AD
E	FC	U	.	LF	N	FS	N	AD	AD	AD	AD	AD	AD	AD	M	L
F	FC	J	/	?	O	LS	O	C	AD	AD	AD	AD	AD	A	N	

Standard Input/Output Conversions for Telex

The following conversions are supported by the Telex standard configuration:

Sending	Reception	Back reception
"\$" to "DLRS"	"{" to "F"	"{" to "F"
"%" to "0/0"	"|" to "G"	"|" to "G"
"@" to "AT"	"}" to "H"	"}" to "H"
"#" to Space		
"*" to Space		
ü" to "UE"		
"Ü" to "UE"		
"ä" to "AE"		
"Ä" to "AE"		
"ö" to "OE"		
"Ö" to "OE"		
"ß" to "SS"		

Answerback Exchange at the End of Transmission

The answer back exchange at the end of the telex is similar to the answer back exchange at the beginning. In addition, it can be configured whether a verification of the answer back is desired or not, and in what order the answer back should be called.

Delay Corresponding to Parameter STOP

If the send command was entered with the parameter STOP, a delay of 1 to 9 minutes is inserted at this point. The partner can either reply or break the connection without causing the text to be sent again.

Disconnecting

The termination of a connection consists of:

1. Transmission of a character string
2. Delay (only seconds without reception are counted for the delay)
3. Break signal

The following parameters can be set in the config file:

- String of characters in step a) (if empty, steps a and b are skipped)

- Duration of the delay
- Duration of the break signal

Back Reception

It is possible to back receive documents during sending. For this purpose, a new document, the back-received document, is created. After transmission it contains the sent text in its original form.

By default, sent characters are stored as capital letters, and received characters as small letters. Digits and special characters stay the same. To avoid compatibility problems if an existing Telex machine is replaced by KCS Server, the configuration possibilities of the Telex module have been extended: The back-received document contains the reference of the sent document as author information.

The following problem occurs during sending with Telex interfaces type 0 (not single current): characters received during sending (when the partner is also sending or because of line disturbance) are garbled. To clearly designate such garbled messages in the back-received text, characters received during sending are marked by a trailing asterisk (*) followed by a new line.

Example:

Transmitted text:	ABCDEFGHIJKLMNOPQRSTUVWXYZ
Received text:	xyz
Text received back:	ABCDEu* FGHIJKLMNOPx* xxRSTU* VWXYZ

Sending is immediately interrupted when a character is received to facilitate the reception of further characters without them being mutilated. For this reason, usually only the first character received is marked.

If sustained incoming signals (at least 2 characters within a 1 second period) are detected during transmission, the call will be cleared. The number of incoming characters leading to a clear of the call can be configured.

The error message "incoming signals" and error code "TD" are reported in the contents directory. The call is not cleared, however, if incoming signals are received during a delay in transmission (semicolons in the text or parameter STOP <> '0'). On single current lines, there is no detection of incoming signals during transmission and therefore no clearing of the call. (see CCITT recommendation S.20).

Chaining of Telex Messages

Chaining means that two or more messages to the same Telex number are sent in one connection.

Chaining is activated by specifying the letter 'G' in the first position of the Telex number. If the Telex number does not start with the 'G' switch, no chaining will be done. The 'G' switch may be inserted into the Telex number using the rr99 functionality.

If a letter 'G' appears in the first position of the Telex number, it is interpreted as a chaining switch and removed from the number before dialing. Letter 'G' in any other position of the Telex number indicates a second selection stage. This behavior is incompatible to previous releases, which took 'G' at any position

in the number as a switch to a second selection stage. Most cases of two-stage selection require some digits to be dialed in the first stage, so the letter will not appear in the first position of the number and no compatibility problems will arise. Nevertheless it is possible to switch off the new feature by configuration.

If chaining of messages occurs, each message sent in the chain will still get a separate back-reception document.

If a TCOSS system is receiving chained Telex messages, make sure that:

- Sender inserts an appropriate separation string (like "NNNN") at the end of each message
- Receiving Telex module has this separation string configured (line 66 = 04, line 67 = "nnnn") as end of text string so that the received message chain is stored in separate documents that are distributed separately.

Note The separation string for reception configured in lines 66 and 67 has to be in lower case letters so that it matches the "nnnn" sequence in received Telexes, but not the "NNNN" sequence in back-received chained messages (assuming standard configuration of upper / lower case reception switches).

Printouts on the Tele Printer

The tele printer can be used for printing out texts just like a normal printer. This function is not provided on tele printers connected to leased lines.

The printing mode is assumed if no Telex number is specified in the send command.

Features:

- Text head containing reference, date, time and current number
- Code conversion as in sending
- Interruption of printing when a Telex is received and a restart after reception.

Abbreviations for Telex Communication

abf	Garbled reception of answer back
abd	Number in receiver's answer back does not match the selected national number
abs	Subscriber absent, connection switched off
ci	Conversation with this connection impossible
der	Connection disturbed
df	Connection successful
inf	Momentarily not reachable, call information
na	Communication with this subscriber not allowed (sometimes instead of occ, nc, der)
nc	All lines busy
nch	Number changed, call information
np	Selection number leads to no telex connection
occ	Desired connection busy
spp	Receiver was also writing, disconnected

usc	Non-interpretable character received
-----	--------------------------------------

Author Field Entries

The partner's answer back (or, in an error situation, an error message) is indicated in the author field, the contents directory and in the log file.

The error message consists of either an acknowledgment from the Telex exchange (see [Abbreviations for Telex Communication](#)) or one of the following messages created by the module in case of an error.

Error- code	Error message in author field	Meaning	Parameter BREAK
T1	'call collision'		1
T2	<busy signal>		2
T3	'no resp. after selection'		2
T4	<der> signal	configurable, standard config. =	3
T4	<np, na> signal		3
T5	'clear during transmiss.'		4
T6	<wrong answer back>		5
T7	'no call confirmation'		5
T8	'no proceed to select'		5
T9	'clear during selection'		5
TA	'clear without pts'	clear without 'proceed to select' signal	5
TB	'clear after pts'		5
TC	'incorrect Telex number'		5
TD	'incoming signals'		5
TE	<answer back>	time-out for reception	-
TF	<answer back>	error during storing of received doc.	-
TG	'disk full'	back reception file can't be stored	3
TH	ring buffer overflow during reception	-	

< >... received signal from Telex line

'...' text generated by the Telex-module(UTX)

Most error messages are self-explanatory.

Installation Without Tele Printer

Installations without a tele printer are possible with TS20, TS22, TS26 or TS28 interfaces. In config- line 52 (telex interface), a value of 02 is set and the local telex answer back has to be configured in line 70.

Note For connecting a TS20 to AGT 30 or AGT 40, cables with non-standard connector layouts are used.

In this case, an (asynchronous) printer has to be connected to get a printout of every sent and received document. If a Teletex-printer is installed, it can be used, too.

If you have an installation without tele printer, we recommend that you switch on telex reception; otherwise, some error conditions may occur during operation.

Note If you install only one channel of an interface, you have to configure channel A. Otherwise, the interface will not work.

Generation of System Error Messages

The telex module generates a system error message if the Telex line is out of order.

System error message number 001 (has to be entered in file 'SYMESSAGES') will be sent to the receiver '.ERRORx' (x for 1...5) and the "out of order" state will be shown in the system status.

See [System Error Messages](#) for further information.

The state "out of order" is detected if a send attempt fails with "no call confirmation" or if a false incoming call occurs.

Further send attempts on that Telex line will not be stopped.

A disconnected Telex line produces a false incoming call with a TS20 interface. With all other telex interfaces, the problem is detected only at the first send attempt.

The telex module will reset the "out of order" state in the system status after the Telex line has been found operational again.

Configuration Change for Euro Character

To have the Telex module convert the Euro character into the string "EUR" in outgoing messages, the following configuration changes are required:

In config lines 142 .. 147, after the last configured output conversion, add "B1 45 55 52 00"

Example (existing output conversion use config lines 142 ..145):

line 145 before : 28 00 5D 29 00 7E 2D 00 60 3F 00 00 00 00 00 00 00 00 00 00 ,

line 145 after : 28 00 5D 29 00 7E 2D 00 60 3F 00 B1 45 55 52 00 00 00 00 00 ,

For feature releases, it is planned to change the standard configuration of the Telex module accordingly. Existing configurations have to be adapted manually.

User Module for Transputer Fax (UTF)

The transputer FAX module operates FAX lines which can be configured independently from each other. The following functions are available:

- Sending of tele faxes
- Local printouts on an attached telefax unit (with TS29+TS2X only)
- Local printouts on an attached laser printer unit
- Back reception
- Receiving of tele faxes
- Routing of tele faxes

Since a lot of functions are the same both for the transputer fax and the ISDN fax module, these parts are described only in the current section. Functionally differences between UTF and UIF are mentioned explicitly.

Fax Communication Features

The Transputer fax module conforms to all mandatory functions of ITU-T recommendation T.30 and T.4. Additionally, many optional features are supported as described in this section. Most of them can be switched on or off by configuration or via switches in the number parameter. All features mentioned below are supported both for sending and for reception.

Optional features:

- Fine resolution
- Error correction mode
- Two dimensional coding
- Transmission rates from 2400 bps to 14400 bps

Error Correction Mode (ECM)

With ECM the transmitted page is divided into frames. These frames are sent with an additional check sum (CRC). The receiver checks the CRC and requests all wrong received frames again. After 3 unsuccessful attempts, further retries are made with a lower transmission speed. If the frame can't be transmitted with 4 attempts at 2400 bps, sending is terminated with error XQ.

When using ECM, the receiver can tell the transmitter that it is currently not able to receive further data. This condition is checked at the transmitter side by timeout (UTF module). In case of timeout, the transmission is aborted with the error code XG.

Transmission Rates

The transmission and reception speed 12000 bps and 14400 bps can be used with ECM. For these data rates, modulation V.17 will be used.

If the receiver supports V.17 modulation, it is used for 9600 and 7200 bps instead of V.29. Modulation V.17 has a lower bit error rate than V.29 with the same noise level.

Two-Dimensional Coding Capability

The following coding methods can be used for fax transmission.

Coding method	Refer	Compression	Remarks
One-dimensional T.4 coding	MH	standard	Mandatory for all fax machines
Two-dimensional T.4 coding	MR	high	Optional
T.6 coding (always 2 dimensional)	MMR	best	Optional, can only be used with ECM

Kofax Communication Server supports all three coding methods for sending and reception. MR coding can be used without ECM but a single error may cause errors in up to two (or four with fine mode) consecutive lines at the receiver.

Operation Mode

The operation mode is defined as the used protocol, modem speed and data compression. It does not affect the transmitted image.

A test mode can be activated by changing position 3 of config line 143 from 00 to 01. In this mode, the positions 21 to 23 of the author field are used to show the operation mode parameters both for sending and reception, as shown below:

Position 21, Send Mode

'N' normal resolution, without error correction

'E' normal resolution, with error correction

'n' fine resolution, without error correction

'e' fine resolution, with error correction

Position 22, Transmission speed (of last page)

'0' 2400 bps (V.27ter)

'1' 4800 bps (V.27ter)

'2' 7200 bps (V.29)

'3' 9600 bps (V.29)

'6' 7200 bps (V.17)

'7' 9600 bps (V.17)

'8' 12000 bps (V.17)

'9' 14400 bps (V.17)

Position 23, Coding

'0' standard one dimensional coding

'2' two dimensional coding (according to T.4)

'6' T.6 coding

Note Positions 22 and 23 are not written into log file if log file entries with a 10-character reference length are configured.

During reception, the selected mode depends on the transmitting station. The maximum reception speed can be changed and ECM can be disabled by configuration.

The operation mode for transmission will be taken from configuration (config line 55, positions 1 to 3) or it can be specified as send mode switch. This config value or send mode switch is a subset of the operation mode information as described above. Refer to the description of the number parameter in [Sending Faxes](#) for more details.

Receiving Faxes

This section describes about receiving faxes.

Supported Functions

- Reception of faxes and storage in TCI format of up to 14400bd
- Reception of faxes via DID or DTMF feature
- Suppression of empty lines at the top and bottom of a page (all empty lines which have to be sent to meet CCITT requirements)
- Lines received garbled will be ignored
- Rejected pages are stored on disk
- Support of fine and standard resolution
- Reception report

Note Some features are not implemented in the software for TS3x fax cards. Refer to Restrictions in the KCS release description for a complete list.

Reception Speed

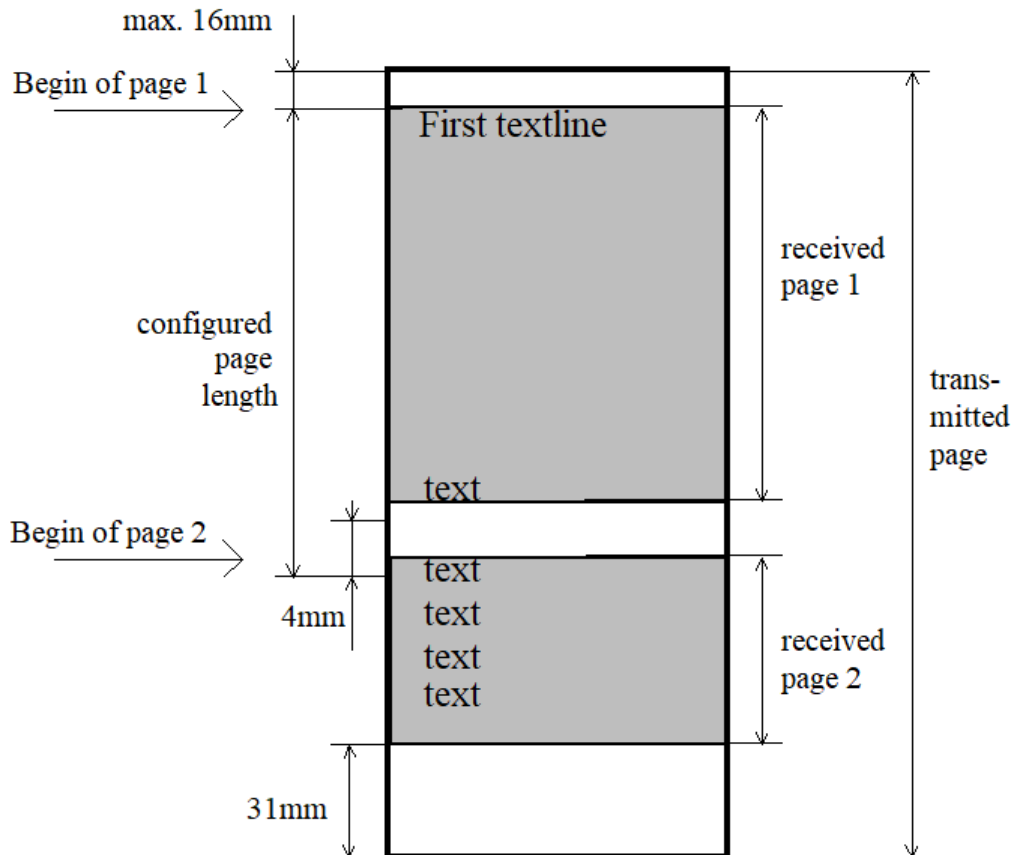
The maximum reception speed can be configured to 2400, 4800, 9600 or 14400 bits per second.

Log File Administration

If the transputer FAX module receives a valid identification from the distant station, it will create a reception document and an entry in the reception log file. The identification of the distant telefax is entered in the author field of the received document and in the reception log file entry.

Layout of Received Documents

Layout of a received transputer fax page



- The maximum page length is configured in config line 241 positions 5 and 6:

00 00	unlimited length of page
00 01 .. 3F FF;	page length = $(256 \cdot \text{pos5} + \text{pos6}) \cdot 1 \text{ mm} / 3.85$ standard value: 04 C0 (=315.84mm)

- Maximum 31mm at the bottom of every page (value can be configured in position 3 and 4 of configuration line 241) is removed. This is done because typically empty lines at the end of the page may lead to unwanted page breaks if the reception documents are printed or forwarded via fax.

Note These features may cause problems with TC/CCD. In that case, we recommend setting positions 3 and 4 of configuration line 241 to 0.

- If an empty pixel line is received within the last 4 mm before the configured page length, a search for a non-empty (text) pixel line is started. As soon as a non-empty pixel line is received, a new page is started. In this way, reception is prevented from receiving half of the line on one page and the second half of the line on the next page.

- If the received page exceeds the configured maximum page length, it is cut off at the configured page length. This happens only if there is no empty pixel line received within the last 4mm of the maximum configured page length.

Format of Received Documents

The received fax will be stored in TCI format (TCI lines). Every single page of a document is stored in a separate TCI block.

++FX1	Marks a received page with fine resolution
-------	--

OR

++FX2	Marks a received page with standard resolution
-------	--

Begin of a TCI block:

TCI block: TCI line 1 TCI line 2

End of a TCI block:

++TXT nn, bb cc Split page	Received page has been split at this position.
----------------------------	--

OR

++TXT nn, aa bb cccc EQ=d AGC=e	Normal end of page.
---------------------------------	---------------------

OR

++TXT nn, aa bb cccc EQ=d AGC=e Carrier lost	The V.27/V.29/V.17 carrier was lost within page.
--	--

OR

++TXT nn, aa bb cccc EQ=d AGC=e Overrun			A receiver overrun occurred
Where			
nn	Example: 834	Number of good received pixel lines (excluding bad lines)	
aa	00 .. 99:	Number of detected bad lines within this page	
bb	Example: 9600	Maximum number of consecutive detected bad lines	
cccc	00 .. 99:	Reception baud rate	
d	0 .. 255:	Noise value of last training sequence. This value is compared with the maximum noise values configured in config line 144 during training.	
e	Example: -9dBm	The calculated level of the received signal in dBm	
A receiver overrun occurred			

The ++FX1 line marks the beginning of each page received with fine resolution (acceptance of fine resolution can be configured in config line 146). It contains the form feed character for the A4 upright format.

The ++FX2 line marks the beginning of each page received with standard resolution. It contains the form feed character for the A4 upright format.

The ++TXT line terminates each single page and shows a reception report. This information can be used by other programs or are simply information about the signal quality. This can help to set up a proper configuration for the page acceptability limits.

The number of bad pixel lines (aa and bb) are generated during decoding the bad received data. It is a best guess value that may differ from the real number of bad pixel lines.

Received faxes do contain the number of pages in the DPNR field with the following format:

```
<3 blanks> + '-' + <3 characters for number of pages with leading zeros>
```

For example:

```
" -002"
```

Incoming Fax Number Conversion

The rules described below are valid for the variable originator part (configured as '*' in config line 42) if a service with address type fax is used, such as service FAX for incoming documents. In that case, the '*' is the answer back of the remote fax.

1. The alphanumerical answer back is detected as first letter after the number. It will be separated and appended to the converted number with '-' as delimiter. If the number starts with a letter, these letters are part of the number.
2. '+' at the beginning of the number will be converted into '*'. All other '+' characters are removed.
3. Single digits within parentheses are removed. The parentheses itself is always removed.
4. All special characters except '*', '#' and ':' are removed.
5. The fax operation mode characters (if pos. 3 of config line 143 if set to 01) are removed.

Example of conversion

Received TSI	Converted number	Applied rules
+43166133+21-TCINT	*4316613321-TCINT	1,2,4
0043.66 133-8/99xx	004366133899	4
0043166-133-??TC-INT	0043166133-TC-INT	1,4
++43(0)6613321TEST	*436613321-TEST	2,3,4
I45-Test	I45-Test	1,4
(0222)66133-21 E96	02226613321	3,4,5

Sending Faxes

The following functions are available:

- Transmission to another telefax subscriber with up to 14400bps
- Local transmission to connected telefax unit (with TS29+TS2X only)
- Transmission with form overlay
- Back reception
- Conversion of line and page formats
- Overprinting, underlining and bold printing of characters
- Compressed mode
- Answer back verification
- Connection to PBX (only to analog; earth button is not supported)
- Graphics capability
- Transmission of all TCOSS characters
- Support of fine mode sending
- Transmission of landscape pages
- Support of a fax bulletin board system.
- Message waiting signaling
- Error correction mode ECM)
- Two dimensional coding capability
- Support of carrier services
- Support of call-back services
- Different documents can be sent to the same destination in a single call (chaining feature)

Send Command

This section describes the send command.

Syntax of the NUMBER Parameter

N=<CC>:[+M] [<Options>]<number-field>['- '<answerback>]]

CC	Channel number
+M	Mask
Options	Send options as described below
number-field	Fax Number before conversion

The send options are defined is list of the following options. The order is not relevant. If a option occurs multiple times, the last occurrence is used. The end of the options list is defined by the first character that does not match any option below.

B	Suppress creation of back received document
D	Dial only

Exx	Set ECM mode (such as E96)
F	Resolution
H	Suppress generation of headerline
X	Extended dialing
Nxx	Set None-ECM mode (N30)
S	Suppress footer line (supported by ULL only)
L	Use letter format (supported by ULL only)
o	Send only first page (supported by ULL only)
G	Fax chaining

The number field is now converted via number conversion table. The result of the conversion is interpreted according to the following syntax:

Number-field for fax call:

```
[<originator>'%'] [<gateway-ip>'!'] ['I'] ['TI' | 'TN'] <Number1> ['U' <Number2>]
['t' <Dtmf1>] ['T' <Dtmf2>] ['s' <SubAddress>]
```

Number-field for control call:

```
[<originator>'%'] [<gateway-ip>'!'] ['I'] 'TC' <Control-
Cmd>';' [<MsgCenterID>]';' <ExtNumber>
```

CC	Channel number
+M	Mask
Options	Send options as described below
I	Insert the internal prefix before <number> (otherwise the configured prefix for external numbers is inserted)
Tx	Type of number where x is defined as: 'C' => Control call (such as the one used for Msg Wait on/off) 'N' => National number 'I' => International number
Number1	Fax Number part 1. Characters 0-9, # and * can be used as part of the fax number. Characters A, P and Q are reserved for optional dial stages with analog fax. This number is also used as scale factor with ULL.
Number2	Fax Number part 2. Characters 0-9, #, *, A, B, C and D can be used as part of the fax number
Dtmf1	Optional DTMF digits that are sent while receiver is in alerting state (ISDN only)
Dtmf2	Optional DTMF digits that are sent after the receiver has answered the call
SubAddress	Optional Fax Sub address (see Sending with Fax Sub-Addresses)
Control-Cmd	Control call command ("MWION" or "MWIOFF")
MsgCenterID	Message center ID for Message Wait indication
ExtNumber	Extension number for Message Wait indication

The table below provides a sorted overview about all characters and switches:

Number field parts	[field:] Description	UTF	UIF	UFI	ULL
0 .. 9	Part of number1 or number2	#	#	#	#
# and *	Part of number1 or number2	#	#	# ¹⁾	n/a
<originator>'%'	Originator	#	#	#	n/a
<gateway-ip>'!'	FoIP Gateway IP	#	#	#	n/a
'-<answerback>	Fax Answerback	#	#	#	n/a
'/'<answerback>	Fax Answerback (depreciated)	#	#	#	n/a
'='<answerback>	Fax Answerback (depreciated)	#	#	#	n/a
"A"	Number1: dial stage "A" (dail tone det.)	#	#	#	n/a
	Number2: number digit "A"	#	#	# ¹⁾	n/a
"B"	Option: No back-reception	#	#	#	#
	Number2: number digit "B"	#	#	# ¹⁾	n/a
"C"	Number2: number digit "C"	#	#	# ¹⁾	n/a
"D"	Option: Dial only	#	#	?	n/a
	Number2: number digit "D"	#	#	# ¹⁾	n/a
"Exx"	Option: ECM Mode	#	#	#	#
"F"	Option: Fine mode	#	#	#	#
"G"	Option: Fax Chaining	#	#	# ²⁾	#
"H"	Option: Suppress generation of headerline	#	#	#	#
"I"	Internal number prefix	#	#	#	#
"L"	Option: Use letter format	#	#	#	#
"Nxx"	Option: None-ECM Mode	#	#	#	#
"o"	Option: Send only first page	#	#	#	#
"P", "Q"	Number1: 1s/4s delay	#	#	#	n/a
	Dtmf1: 1s/4s delay	#	#	#	n/a
	Dtmf2: 1s/4s delay	#	#	# ²⁾	n/a
"s"<SubAddress>	Fax Sub address	#	#	#	n/a
"S"	Option: Suppress footer line	#	#	#	#
"TC"	Type of number: Control call	#	#	#	n/a
"TI"	Type of number: International number	#	#	#	n/a
"TN"	Type of number: national number	#	#	#	n/a
"t"<Dtmf1>	DTMF digits during alert	#	#	#	n/a
"T"<Dtmf2>	DTMF digits are call is answered	#	#	# ²⁾	n/a

Number field parts	[field:] Description	UTF	UIF	UFI	ULL
"U"<Number2>	Unrestricted number: Allows digits ABCD	#	#	# ¹⁾	n/a
"X"	Option: Extended dialing	#	#	#	#
"W"	Number1: Wait for any tone	#	#	#	n/a
	Dtmf1, Dtmf2: Wait for any tone	#	#	#	n/a

Legend:

Supported as described

Syntax will be handled but features is not supported

Module does not understand the syntax.

n/a Not applicable feature (Module may not understand the syntax)

? Handling is unknown

Note ¹⁾ After implementation of FR2665 (SPR176504)

²⁾ Planned for KCS 9.3 (ignored with KCS 9.2)

Refer to "Outgoing fax number conversion" for more details about the fax number, when using TCSI based applications (such as TCfW, TC/LINK-xx).

Explanation of the Switches

Channel number, Mask, Number, Answer back:

To send via the transputer fax module the desired FAX receiver is entered in the SEND command by means of the NUMBER parameter. The receiver format basically corresponds to the general format described in the Receiver section. See [Format of Received Documents](#).

By indicating a channel which is configured to FAX, you determine that the receiver is a FAX receiver. The channel must be entered explicitly (channel number or channel group). It cannot be derived automatically from the selection number. In case of using a mask (such as a fax logo) it must be specified directly after the channel indication.

Normally, the selection number of a FAX receiver contains not only the receiver number, but also a separation character ('-' or '/' or '=') followed by the answer back of the FAX partner to verify the correct receiver.

The expected answer back is entered after the selection digits. It is checked, whether the entered character sequence is contained in the called subscriber's answer back or phone number. Spaces are not considered.

Suppress creation of new header line:

In the page layout of a transputer fax page, the header line is separated from the text area. Each time a document is sent, a new header line may be generated which replaces an existing header line.

With the 'H' switch, the generation of a new header line can be suppressed. This is used to send messages without any header line or for the printout of (back)received documents.

Suppress creation of back received document:

With the 'B' switch the generation of a back received document can be suppressed. This is used for automatically created sending or reception copies. Otherwise, you have an endless loop.

Furthermore, it is useful for sending circular letters and only receiving one back received document.

Resolution:

In case this switch is not set, the document is sent with standard resolution. If the switch 'F' is specified, the document is sent with double vertical resolution. The horizontal resolution remains the same.

For details, see [Fine Mode Sending](#).

Dial only:

The switch 'D' causes dialing only and no sending of any message. If this switch is used in the number parameter, the line will be disconnected 4 seconds after dialing the last digit and no document will be sent. This can be used to switch on/off the message waiting indicator of some PBX systems.

Extended dialing:

This option can be used to ensure endless retries of send attempts by the Kofax Communication Server system. It should be used for the printout of received and back received documents to make sure that they do not get lost.

Operation mode:

This option can be used to enable/disable the error correction mode, two dimensional coding and higher data rates. It is described in [Mode Selection for Transmission](#).

Send internal:

This option suppresses the automatically seizing of a public line if a document should be sent within a PBX connection. It is part of the number itself and must be defined in front of the first digit.

Example

1. External sending (via PBX or sending via direct connection):

```
..S,R=TEST,N=F:0222676209
..S,R=TEST,N=F:0222676209-TCINT
..S,R=TEST,N=F:N300222676209
..S,R=TEST,N=F:676209-6209
..S,R=TEST,N=F:B6613321
```

2. Internal sending via PBX:

```
..S,R=TEST,N=F:I33
..S,R=TEST,N=F:HI45
..S,R=TEST,N=F:HBXI21
```

3. Sending to local FAX machines:

```
..S,R=TEST,N=F:
..S,R=TEST,N=F:HB
..S,R=TEST,N=F:B
```

4. The transputer fax module allows inserting of delays at any point during dialing. With the standard configuration, each letter 'P' in the dialing number causes a 1-second delay. With UIF, all delays are ignored.
 ..S,R=TEST,N=F:043**P**222676209-TCINT 1sec. delay after dialing '043'
 ..S,R=TEST,N=F:06**PPPP**1234**P**123 4sec.delay after dialing '06' and 1 sec. delay after dialing '1234'
5. Activating and deactivating message waiting indicators. The example shows a message waiting indicator of extension '1234' which can be switched on with the character combination ****#12341*** and switched off with ****#12340***.
 ..S,R=DUMMY,N=F:DI****#12341*** turns the indicator of extension 1234 on
 ..S,R=DUMMY,N=F:DI****#12340*** turns the indicator of extension 1234 off
6. Sending to number "022266133899" without ECM and two-dimensional coding. Maximum transmission rate is 9600 bps (V.29)
 ..S,R=DUMMY,N=F:**N300**22266133899

Fine Mode Sending

It is possible to send a fax with fine vertical resolution with the send switch character 'F'. This switch is automatically set if the document starts with an FX1 block (control lines like ++HLN, ++HLB, ++TXT, ++TSI and ++FF are not considered). If the receiver does not support the fine mode reception, the document is sent with standard resolution.

The following table shows how a graphic in standard ('++FX2' block) and in fine ('++FX1' block) resolution is handled when sending in fine ('F' switch set) or standard ('F' switch not set) mode.

Send command	Document contains	
'F' switch	'++FX1' block	'++FX2' block
Yes	Each pixel line is sent	Each pixel line is sent two times
No	Each second pixel line is sent	Each pixel line is sent

Back Reception

If the back reception feature is configured, a back received document is created that can be printed automatically. Normally the printout is done with the configured channel for the local telefax apparatus or a laser printer device.

If back reception mode '1' (text without graphics) or '2' (text with graphics) is used, a ++TXT format line is generated prior to the first text line and then prior to every text line with a new text format.

Back-reception of rendered text blocks is handled correctly by the fax module in full image back-reception mode.

Restriction:

In text back-reception by the fax module or back-reception by an asynchronous channel, the "++FX1 0,1" control line is stored like "++FX1", and the special information contained in the parameters "0,1" is lost. As a consequence, the top margin (image top margin instead of text top margin) and the page make up (image block may be broken at all white line) are incorrect.

Cost Center Parameter

The first "%" character within the number field has a special function. It is replaced by the content of the cost center parameter with the following rules.

- All blanks are ignored
- No digits are replaced by '0'

The rr99 file can be used to merge the '%' into a fax number to enable a PBX to do proper cost accounting.

Example:

The cost center should be given to a PBX as part of the destination number. This can be realized with UTF and UIF.

PBX needs:

```
58cccc9nnnnn (for external sending) and nnn (number for internal sending)
cccc = cost center identifier
nnnn = number
```

rr99 file:

```
**SENDMODES
**NORMALIZE
**ROUTE
F:I~,F:I~, Internal
F:~,F:I58%9~, External **NODES
```

Example:

```
..2s,r=t,n=F:66666,cc=12X45 => "5812045966666" will be dialed (X replaced by 0)
..2s,r=t,n=F:I45,cc=12345 => "45" will be dialed
```

Failure Counter

This function is required by the Austrian and German PTT. It is switched off by configuration in all other countries. There are separate counters for the failures '*busy*', '*no dial tone*', '*no FAX machine answered*' and '*no answer from distant telefax*'. After a failed send attempt, the appropriate counter (if any) is incremented. A successful send operation, or one which failed after detecting the answer tone from the distant telefax, resets all counters.

If one of the counters reaches its configurable end value, the telefax module stops sending. A system error message "FAX line out of order" is created and the channel status is set to "XW".

Instead it generates three short audible signals in intervals of about one minute. The telefax module leaves that state:

1. If the Telefax Reset Button is pressed or if the KCS unit is switched off.
2. After an incoming call from a telephone or FAX
3. After the next send attempt after setting the channel status to continuous
4. Automatically after two hours.

The meaning of **config line 134** is as follows.

Position	4 hex	failure counter end value (00 = default = counter not used)
pos. 1	00 .. 7F	Busy counter (error XU)
pos. 2	00 .. 7F	No answer counter (error XF)
pos. 3	00 .. 7F	No dial tone counter (error XJ)
pos. 4	00 .. 7F	No fax machine answered counter (error XL)

This feature can be used for "line fault detection" as described in the example below:

1. Set config line 134 to ":00 00 05 00" (sets no dial tone limit to 5).
2. Every XJ error (no dial tone) increases the counter.
3. An incoming call or an outgoing call to a fax machine (sent OK or errors XK, XM, XN, XO, XP, XQ, XR, XS, XT) will reset the counter.
4. If the counter reaches its limit (set to 5 in our example) a system error message as shown below is created:

```
TOPCALL System Error Message No. 002
***** Fax Line Out of Order *****
Date: 96-02-27 Time: 11:35 Topcall Channel: 04
```

5. The channel status is set to "XW" (X indicates line out of order; W (= waiting state) is used to stop sending) and the interface will start to beep.
6. If there no user invention, this error condition is reset after 2 hours and the channel continues to work.

Ring and Busy Tone Detection

The fax module can detect ring or busy signals within the CNG tone pause (3s). If a call is not answered within the first 10 rings and within 30 seconds after dialing, the transmission is aborted with error code "XF". For the different error situations *"No answer from the distant station"* and *"No fax machine at the distant station"* there are different error codes (XF and XL). XL occurs if the call is answered but no fax prompt has been received.

The standard configuration has been made according to recommendation ETS 300 001 (European telecommunication standard). So it should work in all European countries.

Ring and busy tone detection are supported with all types of DID configurations. The measured connection time (used for cost center accounting) starts after the call has been answered by the distant station. This makes the fee calculation more accurate.

Mode Selection for Transmission

The operation mode for transmission will be taken from configuration (config line 55, positions 1 to 3, or it can be specified as send mode switch. This config value or send mode switch is a subset of the operation mode information in the author field if the test mode is configured.

Format:

1st character, error correction mode

"N" Send without error correction mode

"E" Send with ECM if supported by distant station

2nd character, maximum transmission speed

"0" 2400 bps (V.27ter)

"1" 4800 bps (V.27ter)

"2" 7200 bps (V.29)

"3" 9600 bps (V.29)

"9" 14400 bps (V.17) (default)

"N" 33600 bps (V.34) (FoIP only)

3rd character, coding

"0" standard one dimensional coding (MH)

"2" two dimensional coding (MR)

"6" T.6 coding (MMR)

Note For transmissions without ECM:

1. The maximum speed will be limited to 9600 bps (V.29).
2. MMR coding will not be used.
3. If ECM is wanted but not supported by the distant station, MR coding can be prohibit by configuration.

These options can be used at any position between the channel specification (or mask) and the fax number (but before the "I" switch). It should not be used in the address book or abbreviation directory. This may cause problems if the rr99 normalize and routing functions are used.

It is indented to be used within rr99. Problem numbers can handled with an extra line after the "***ROUTE" line as shown in the example below.

Example:

Sending to fax number +43 662 12 34 56 works only with 4800 bps (normal mode).

rr99 file:

```
**SENDMODES
**NORMALIZE
F:*~,F:*~, already normalized
F:I~,F:*43166133~,internal sending
F:060~,F:*49~,Germany
F:00~,F:*~,international
F:0~,F:*43~,Austria
F:~,F:*431~,Vienna
',
**ROUTE
F:*43662123456,F:N100662123456, Send to 0662 123456 with 4800 bps
F:*431~,F:~,direct sending
F:*43~,F:0~
F:*~,F:00~
**NODES
```

Support of Carrier Services

Carrier services can be used to save transmission fees. For sending via carriers a prefix and an extension is needed. The used prefix includes a user ID, password and some dialing stages. To avoid problems with the restricted number length on the TAM/TUM interface the length of the automatic prefix (config lines 131 and 132) in the UTF has been extended from 4 to 40 characters. This means, the complete prefix required for carrier services can be configured.

Example:

Type of connection: PBX with dial tone, escape digit = "0"

Carriers service prefix: "0660 1234#QQ9876543210*" (external number)

Carriers service extension: "#123"

Carrier should be used for all international numbers.

rr99 file:

```
**SENDMODES
**NORMALIZE
F:*~,F:*~, already normalized
F:I~,F:*43166133~,internal sending
F:060~,F:*49~,Germany
F:00~,F:*~,international
F:0~,F:*43~,Austria
F:~,F:*431~,Vienna
'',
**ROUTE
F:*43166133~,F:I~, internal sending
F:*431~,F:I0A~, direct sending (Vienna)
F:*43~,F:I0A0~, direct sending (Austria)
F:*~,F:00~#123, use carrier for international numbers
**NODES
```

Configuration:

```
line 131 'PP ,
line 132 'PP0A06601234#QQ9876543210* ,
line 133 'I,
```

Example:

```
number 0049891234 will be converted to:
PP0A 06601234#QQ9876543210* 0049891234 #123
```

Chaining of Faxes

Faxes addressed to the same recipient number (incl. channel, mask, option answerback), will be sent in one call. This feature can be activated individually for some destinations with the send mode switch "G" (Group faxes to equal numbers).

Note Chained faxes may be sent 1 hour before the specified sending time if sending to the same number is currently active. This behavior is required to keep documents together, even if some call retries are required.

Implementation:

At the end of a document, a `..2CHAIN` command is executed. If successful, the next document is sent using the current connection to the distant station.

On the transmitter side, chained documents are handled like separated documents. This means that every send order will create its own back reception file, send order number, journal entry, active acknowledgment, and the rest.

The content of the chained document is the same as sent without chaining feature (page counter starts at 001, it gets a new document number, ..) but the transmitted TSI frame is always taken from the first document within a chain.

On the receiver side all chained documents are received as one large document with different document numbers in the header line.

Restriction:

If the cost accounting for ISDN (AOC) is used with chained documents, the last document within a chain will get the complete costs. All other documents are completed with zero costs.

Additional Channel Groups and the Chaining Feature

The chaining feature will only combine messages that are waiting in the same channel group. It works for all channel groups, main and additional, but it does not combine messages from different groups.

Example: A fax channel polling groups 'F' and 'G' will chain a message to "F:12345" with another message to "F:12345". It would also combine two messages routed both to "G:67890", but it will not chain a message to "F:54321" with another message to "G:54321".

The functionality to combine messages to the same number but from different channel groups is usually not required, because routing to different groups is done with the "rr99" routing directory based on the fax number so that messages to the same fax recipient are always routed to the same group.

For further information on additional channel groups, refer to the *TCOSS Application Module Manual*.

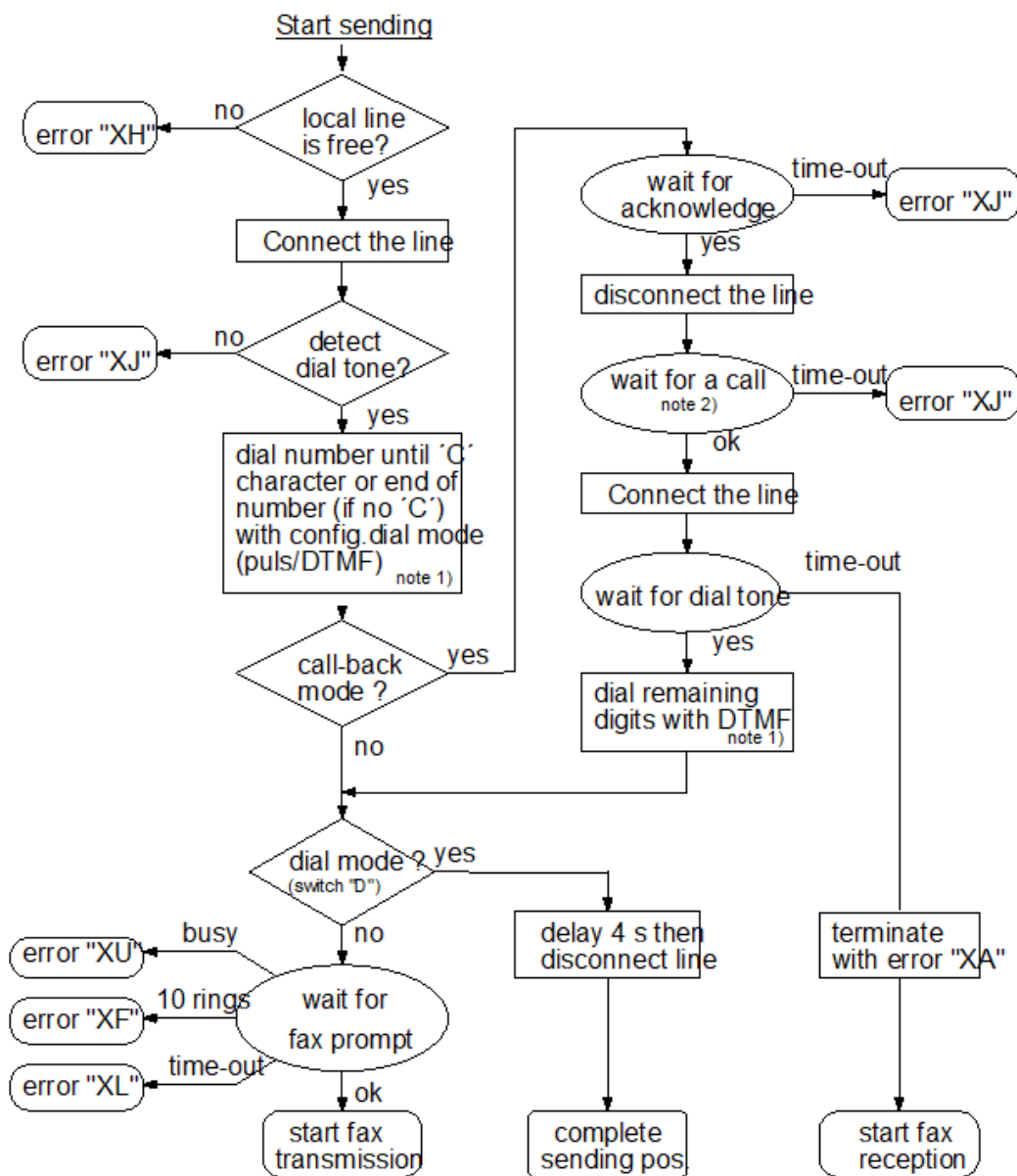
Call Back Service

This service is intended to save transmission costs for some international destinations. The service must be ordered from a "call back service provider". He will give you a call back service access number. If you dial this number, your own number (configured at the call back service provider) is called back.

It can be used by sending the fax to:

<call back service access number> + 'C' + <fax number>

The detailed description is shown in the flow chart below.



Note 1: If additional dial stages are used within a number (such as PBX configuration with dial tone check), the dialing procedure may be interrupted with error codes XI or XJ.

Note 2: The "call back" must always be given to the channel that initiated the call (problem if the same incoming fax number is used for more than one channel). The call-back time-out can be configured (standard value is 35s).

*) The call-back service is used if character 'C' occurs in the number field. KCS dials the whole number up to the 'C' and then waits for the first ring signal. The KCS disconnects the line and waits for an incoming call.

*) The call-back service then calls the KCS number. After KCS answers, it dials the final number after the 'C' character starting with dial tone detection. It is assumed that DTMF dialing is configured. If KCS does not detect the dial tone, the outgoing call is terminated with error code "XA" (Call collision) and the call is handled as an incoming call.

Note The call back service will be supported for the following connection types:

1. Standard a/b analog line with DTMF dialing. (After update from release 6.07.00 or lower, the DID standard config in the general parameters menu must be set to "normal.")
2. ISDN lines with PtMP connection and at least 2 different subscriber numbers (both channels must be configured with the MSN feature to different subscriber numbers).
3. All other ISDN connections (such as PtP with DDI) are supported if only one channel is configured (second channel remains unused in that case).

It will not be supported for any DID configuration.

Enhanced Fax Retransmission

If faxes with many pages are sent under bad line conditions, some call retries may be required. If every retry starts with the first page, many pages are sent multiple times.

What happens if enhanced fax retransmission is used:

In the retry case, transmission starts with the first page. All further acknowledged pages are skipped up to the first unacknowledged page where sending is continued. The first page is always sent, because it normally contains a cover information that is needed for correct distribution and collecting on the receiver side.

Configuration:

The enhanced retransmission feature must be activated by configuration.

Config line 56, retransmission mode

'0'	standard: retransmit the whole document (default)
'1'	enhanced: retransmit first and all non confirmed pages

Detailed description:

After a send attempt, the number of acknowledged pages is stored together with the document number using the format "ddd-ppp" (parameter DPNR on .. interface).

The last acknowledged page number (referred as "n" in the following text) is given to the fax module together with the response field (contains the answerback of the distant station). If "n >= 2" (two or more pages are already sent) and enhanced retransmission is configured, the following things happen:

1. The first page of message is stored as image in an additional form buffer (including all overlays and the header line). The %T% header line field is filled with the TSI received with the last prior send attempt.
2. All confirmed pages (2 .. n) are skipped.

3. The connection to the distant fax machine is established (dialing, ...).
4. The first page is sent from the form buffer.
5. All further pages (starting with page number n+1) are sent as usual.

Note

1. The retransmission form buffer has a fixed size of 100 KB. If the first page plus cover is larger, it is truncated without an error message.
2. If retransmission is aborted before page n+1 has been acknowledged, the DPNR of the send order is not changed.
3. Retransmitted pages get the same page number in the header line, as they would get if the page had been sent with the first send attempt. This means that page n+1 (which is the second page for the receiver) gets page number n+1.
4. The answerback of the first sent attempt is used in the header line of all call retries even if the received answerback changes between retries. But answerback verification is still performed as usual.
5. Upon the first send attempt with a new alternative number, the response and DPNR field of the send order is initialized with blanks. This means that if a new alternative number is taken, acknowledged pages (with the previous number) are sent again.

Back reception:

Every call retry creates a new back reception file (with the corresponding automatically generated send orders). Each file contains only the pages sent in this retry. The DPNR field of the back reception file does always show the last acknowledged page number.

Restrictions:

1. Enhanced retransmission will not be supported with chained documents (may cause error codes XL or XM if the documents are very big and the system is busy).
2. Enhanced retransmission cannot be activated/deactivated number dependently.
3. Due to memory restrictions, enhanced retransmission is not supported on TS29.

Example:

The following document is sent with enhanced retransmission mode.

```
Page 1
++A4H
Page 2
++A4H
Page 3
++A4H
Page 4
++A4H
Page 5
```

This mask is used:

```
Fax Cover
$PRetransmission of $Document $$
```

First send attempt:

It fails after Page 2. The back received file (which corresponds to the pages received at the receiver is shown below (++HLB line is not shown completely). The DPNR of the send order and the back reception document is set to "123-002".

Sendorder: DPNR=123-002

Back reception file: TR0001 (DPNR = 123-002)

```
++HLB .. at:97-05-22-12:35 Doc: 123 Page:001
Fax Cover
Retransmission of Document 123
-----
Page 1
++A4H
++HLB .. at:97-05-22-12:35 Doc: 123 Page:002
Page 2
```

Second send attempt:

It fails after the first page has been transmitted. Note that DPNR remains unchanged.

Sendorder: DPNR=123-002

Back reception file: TR0002 (DPNR = 123-002)

```
++HLB .. at:97-05-22-12:36 Doc: 123 Page:001
Fax Cover
Retransmission of Document 123
-----
Page 1
```

Third send attempt (successful):

Sendorder: positive terminated

Back reception file: TR0003 (DPNR = 123-005)

```
++HLB .. at:97-05-22-12:40 Doc: 123 Page:001
Fax Cover
Document 123
-----
Page 1
++A4H
++HLB .. at:97-05-22-12:40 Doc: 123 Page:003
Page 3
++A4H
++HLB .. at:97-05-22-12:40 Doc: 123 Page:004
Page 4
++A4H
++HLB .. at:97-05-22-12:40 Doc: 123 Page:005
Page 5
```

Second Dialing Stage with DMTF (Enh. 3856)

The Kofax Communication Server fax recipient number has been extended to the following format:

Number: [<SendOptions>]<Number1>['t'<Number2>]['T'<Number3>]['-'<Answerback>]

Number1 is dialed via ISDN call control as usual. The two optional parts Number2 and Number3 have been added. Number2 may be used with ISDN lines only. It contains a number that is dialed via DTMF after an alert message (means that the other telephone is ringing) is received. Number3 is dialed via DTMF digits after the connection to the distant station could be established.

Both Number2 and Number3 may contain "P" or "Q" as pause characters. "P" represents a 1 second and "Q" a 4 second delay.

Example:

```
N=F:12345TQP1234#5678Q*1-test
```

The following things happen:

1. Connection to number 12345 will be established
2. 5 second delay (Q(4s) + P(1s) = 5s)
3. DTMF digits "1234#5678" are send on the established connection.
4. 4s delay
5. DTMF digits "*1" are send on the established connection.
6. "test" is used as answerback test string within the fax transmission.

Notes:

- The feature is available for LS1 and TC20 only. It has not been implemented for UTF/UIF of TS29/32/33 and must not be used with these interfaces (will lead to error XI or additional dialed digits during call setup).
- It is indented to be used with ISDN lines. If it is used on analog lines, the DTMF digits (Number3) are send immediately after dialing Number1. This means the UTF does not wait until the call is answered. Number2 is ignored with analog lines.
- DMTF parameters are taken from configuration line 61 - 64. Therefore the feature cannot be used with analog lines using pulse dialing.
- If the second dialing stage (both "T" and "t") is used with dial mode (send mode switch "D") no DTMF digits are generated.
- The outgoing number conversion table can be used to automatically add a 2nd dialing stage is shown in the example below:

```
245 '800~=1234TQ12345*00~*6789
```

Send all international numbers to 1234 then dial "Q12345*" < number > "**6789" via DTMF

Sending with Fax Sub-Addresses

Fax sub addresses can be used like DDI/DID/MSN/DTMF to specify digits that can be used for routing of received documents. More details about Fax Sub Addresses can be found in [Sending with Fax Sub-Addresses](#).

To use this feature with outgoing fax calls, you have to specify a Fax Sub Address by using a small "s" as delimiter between the fax number of the sub address. Some examples are shown below.

Examples for specifying a fax sub address for outgoing calls.

N=F:1234s555	Fax number = 1234, Sub Address = 555
N=F:1234s555-123	Fax number = 1234, Sub Address = 555, Answerback = 123

Error Handling:

If the receiving fax machine does not support the fax sub address, the send order will be terminated with error code "Y0". If the specified sub address exceeds 20 digits, the send order is terminated with error code "Y1".

Carrier Support

When using the 2nd dialing stage with the DMTF and Extended fax number conversion table it is possible to use carrier services (such as MCI) as described in the example below.

Example

To send a fax with carrier, do the following things.

1. Dial number "9" to get a connection to the carrier provider (assume that the carrier access number is stored in the PBX).
2. Dial the destination number.
3. Wait until you will get a 4s prompt from the carrier. This happens in the alerted state, where you typically hear the ringing tone of the distant station.
4. Dial an authorization code with DTMF. This code depends on the user and should be stored in the cost center field of the user profile.
5. After successful authentication, the connection to the distant fax machine is established.

Set-up

This functionality can be set up in the following way.

1. Use the following routing line in the **ROUTE section of rr99:

```
F:~,F:%%~
```

The first percent is required to insert the cost center field into the number.

The second percent acts as delimiter for the fax module, to detect to the end of the cost center field.

2. Use the following number conversion rule in the fax channels

```
8[~1]%[~2]=9[~2]tQPP[~1]
```

[~1] is used for the cost center field.

[~2] is used for the destination number.

"t" is the separation character between the first and second dial stage

QPP is used as 6s pause. Waiting for any tone is currently not implemented.

How it works

Assume that the user with cost center "1234" wants to send a fax to number "098765"

1. The send order is created with N=F:098765.
2. In the rr99 route section, the number is converted to F:%%098765.

3. The application module (TAM) removes the channel and replaces the first percent character by the cost center field. This means that the fax module will get the number "1234%098765".
4. In the outgoing number conversion table, this number is converted into "9098765tQPP1234".
5. Then the Fax Module dials "9098765" via ISDN call control.
6. After the alerting state is signaled, it waits 6 seconds and then sends "1234" via DTMF tones.
7. The fax module waits until the connection to the distant fax machine is established.
8. Standard fax transmission protocol is started.

Transmitted Fax Page Layout

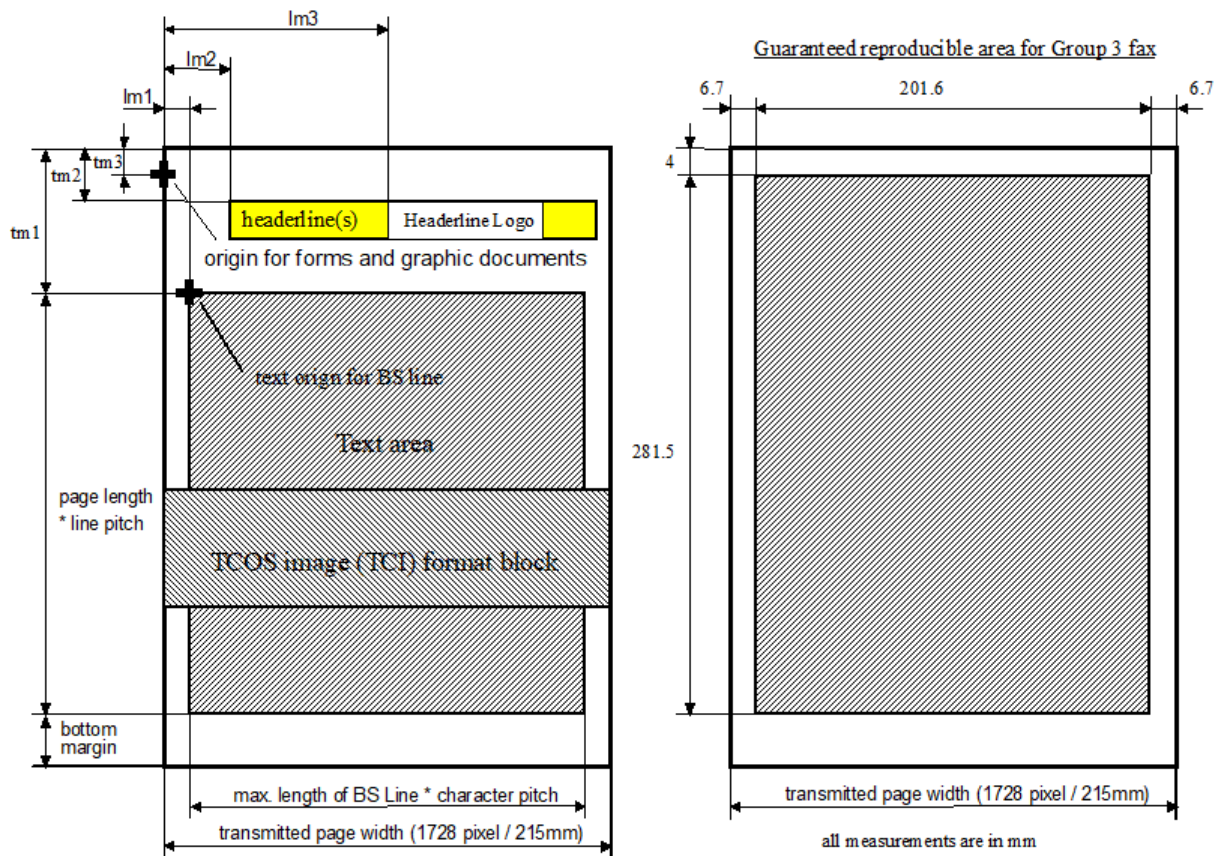
This section describes the page layout of a transmitted fax.

Page Layout

Note Additional information about the transmitted fax page layout can be found in the *TCOSS Configuration Manual*.

Portrait Sending

- The layout can be set by configuration to various formats (for detailed information see "Setup of TCOSS fax pages" in the *TCOSS Configuration Manual*).
- If a transmission error occurs before the last page has been transmitted, an extra page may be sent before disconnecting (only when the break page is configured).
- The header line is placed on a configurable position on every page as an overlay. This means it can be mixed with printed text or graphics. If a new header line is created during sending, all existing header lines in the document (such as a back received document) are removed.



Note According to CCITT recommendation T.4, all information outside the guaranteed reproducible area may not be printed by the receiving fax machine. To get this reproducible area also for the ULP module, it increases all top margins by 2,7mm.

Ref.	Config Lines		Position	Unit	Standard value	Description
	UTF	ULP				
tm1	136-139	131-134	2	1/3.85mm	-	Top text margin of current page layout
lm1	136-139	131-134	4	0.124mm	-	Left text margin of current page layout (can be changed with ++TXT line)
tm2	140	135	1	0.1mm	4mm	Top margin of header line and header line logo
lm2	140	135	2	1mm	17mm	Left margin of header line
tm3	140	135	3	0.1mm	0mm	Top margin for graphics and forms
lm3	140	135	4	1mm	130mm	Left margin of header line logo

Position 1 of config line 142 (or 137 for ULP) is used for the header line type. The following values are possible:

00	Old header line format; use large font (12cpi, 6.11 lpi)
----	--

01	Use small font for header line (17cpi, 8.15 lpi)
02,03	As 00,01 but header line will be printed bold
10-13	As 00-03 but header line can be modified (see variable header line option)

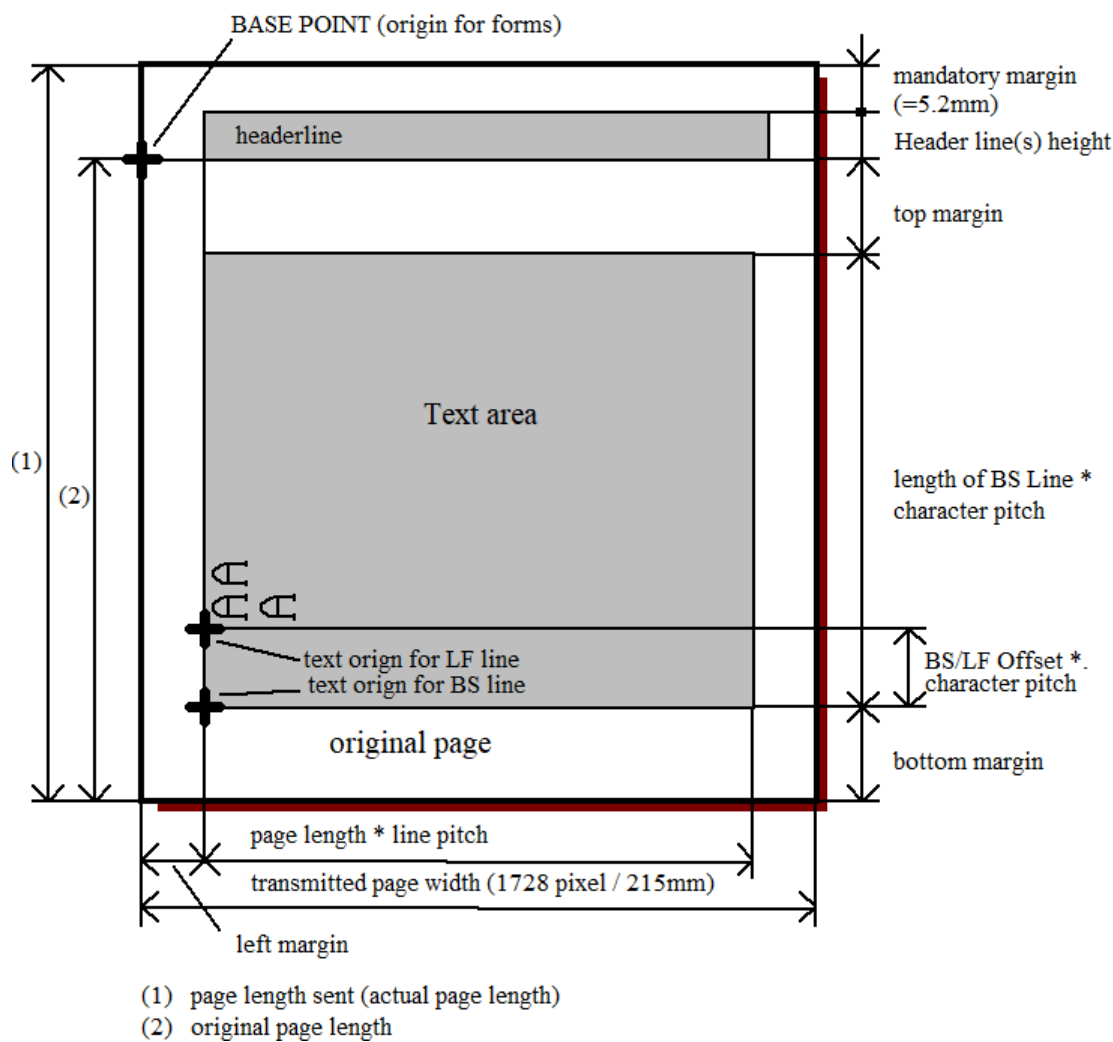
Standard value: 13

The top margin of all standard page layouts has been changed to the following values.

Page format	Previous standard value	New standard value
A4H	2A (h) = 10.9mm	4E (h) = 20.26mm
A4Q	06 (h) = 1.56mm	2A (h) = 10.9mm
BDH	0A (h) = 2.6mm	2A (h) = 10.9mm
BDQ	00 (h) = 0mm	24 (h) = 9.35mm

Landscape Sending

With release 5.20 and higher it is possible to send a full page in landscape mode. In this mode, the text is rotated 90 degrees counter-clockwise so that every line starts at the bottom of the page.



- The Landscape format will be used if font 10(hex) or font 11(hex) is configured in the used page format.
- Fonts 10(hex) and 11(hex) have approximately the same character size as fonts 00(hex) and 01(hex).
- As with a manual fax machine, the header line is always printed in portrait orientation. It is always printed with font 1, character pitch 11(hex) and line pitch 10(hex).
- The header line always starts at the left margin (even if it's a LF2 line).
- TCI graphic blocks within a landscape page is ignored.
- Forms can be used but they are not rotated during sending.
- The length of the transmitted page depends on the length of BS-line and the character pitch. The actual page length (in mm) with one header line can be calculated as follows: $(36 + \text{top margin} + \text{length of BS line} * \text{character pitch} + \text{bottom margin}) / 3.85$
- The used page width depends on the number of lines and the line pitch.
- The overprinting of lines (++LF0, ++BS0 lines) is supported.
- BS1/LF1 or BS3/LF3 lines are treated as BS2/LF2 lines.

- The whole landscape page must fit into a conversion buffer. This buffer has 20 KB. Every text line needs (8 + number of character in the line) bytes of memory. For example, a page with 100 lines and 160 characters per line needs 16800 bytes. If the conversion buffer gets full, the page will be split.

Standard Settings

The following table shows the default values for the configuration of the transputer fax module.

Page format		Font	Top margin	Bottom margin	Left margin	Line pitch	Character pitch	Length of page	Length of BS-line	BS/LF offset
A4H	conf. val.	01	4E	78	37	10	11	3B	5F	05
	meaning		20.26mm	31.2mm	6.8mm	6.11 lpi	12.0cpi	59 lines	95 characters	5 characters
A4Q	conf. val.	11	2A	2D	A0	21	08	2E	84	05
	meaning		10.9mm	11.7mm	2cm	6.19 lpi	12.2cpi	46 lines	132 characters	5 characters
BDH	conf. val.	00	2A	38	37	0C	0C	57	86	05
	meaning		10.9mm	14.5mm	7mm	8.15 lpi	17.0cpi	87 lines	134 characters	5 characters
BDQ	conf. val.	10	24	2D	A0	19	06	3D	B1	05
	meaning		9.35mm	11.7mm	2cm	8.17 lpi	16.3cpi	61 lines	177 characters	5 characters

The following table shows the dimension of the different fonts.

Font (hex.)	Character height (dec.)	Character width (dec.)	Description
00	12*PH = 3.12mm	12*PW = 1.49mm	Font 0 portrait
01	16*PH = 4.16mm	16*PW = 1.99mm	Font 1 portrait
10	25*PW = 3.11mm	6*PH = 1.56mm	Font 0 landscape
11	33*PW = 4.11mm	8*PH = 2.08mm	Font 1 landscape

PH Pixel height (1/3.85 millimetres)

PW Pixel width (215/1728 millimetres)

Variable Header Line

Note The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device, including fax machines, to send any message unless such message clearly contains certain elements. The elements must include in a margin at the top or bottom of each transmitted page or on the first page of the transmission, the date and time it is sent and an identification of the business or other entity or other individual sending the message, and the telephone number of the sending machine or such business, other entity, or individual. (The telephone number provided may not be a 900 number or any other number for which charges exceed local or long-distance transmission charges.)

To configure the Transputer Fax Module with this information, complete the following steps:

1. Configure the own fax number and own answer back with the wconfig submenu "Parameters for transmission 2" or directly with the line editor (lines 51 and 52)
2. If you change the header line as described below, take care that the following fields are part of the header line:
 - Own fax number (parameter %T%)
 - Own answerback (parameter %A%)
 - Date and time (parameter %D%)

The content of the FAX header line is taken from the configuration. This is an easy way to use customer-specific header lines. It is also possible to change the header line (see [Modify Header Control Line](#)) or the answerback (see [Modify TSI Control Line](#)) during sending.

The header line is always defined as one or two text lines. It may contain the following fields.

%C%	CSI (called subscriber identification) - subscriber ID of the called FAX machine, maximum length is 24 characters.
%A%	Own answerback - the content of config line 51.
%T%	TSI (transmitting subscriber identification) - Own tele fax number, the content of config line 52, maximum length is 20 characters, transmitted to the receiver as TSI frame.
%N%	Number of the sent document, 3 digits filled with zeros.
%P%	Page number; at least 3 digits filled with zeros.
%Q%	Total number of pages; at least 3 digits filled with zeros; blanks are used if the total number of pages is not available.
%D%	Date and time, 14 or 16 characters depending upon the configured data format.
%U%	Time zone offset of %D% from UTC in hh:mm (such as "+01:00").
%Z%	Time zone name (such as "CET").
There are two possible ways to define a field in the header line:	
%X%	Insert field with variable length, and %X% is replaced by the content of the field without blanks at the end of the field.

%X__%	Insert field with fixed length, and the field is replaced left-justified and with the same length as the field description uses (including both % characters). The resulting length is defined as the number of underline characters + 3. Exception: Page count values (%P_% and %Q_%) are never truncated (relevant only if the page count exceeds 9999 pages).
-------	--

If the length of the resulting line exceeds 130 characters, the remaining part is printed in a second header line below the first one.

Default Header line

The default header line is configured in config lines 243 to 247 (179 to 182 for ULP). Each line contains 65 characters. The content of these 4 lines is used for the header line.

Example:

The new standard configuration uses header line with small font, bold and can be modified.

```
'To:%C_____ % From:%A_____ % Fax:%T_____,
'_____ % at:%D% Doc:%N% Page:%P% _____,
',
',
',
```

Example of a sent FAX header line:

```
To:+43-1-6613321 From:Kofax Fax:+43166133835 -TC logo- at:95-07-24-17:05 Doc:123
Page:001
```

Modify Header Control Line

If this option is enabled by configuration, this line redefines the beginning of the used header line for the current document. It must be placed immediately after the ++FF / ++TSI or before a ++A4H, ++BDQ....line or at the beginning of a document. If the "new header line" is shorter than the previously defined header line, the end of the line remains unchanged.

Syntax: ++HLN <new header line>

Example:

The original header line looks like the following:

```
To:+43-1-6613321 From:Kofax Fax:+43166133835 -TC logo-
at:95-07-24-17:05 Doc:123 Page:001
```

The string "**++HLN To: Mr. Testuser**" at the beginning of the document changes the content of the header line to the following:

```
To: Mr. Testuser From:Kofax Fax:+43166133835 -TC logo-
at:95-07-24-17:05 Doc:123 Page:001
```

Modify TSI Control Line

This line replaces the default own telefax number (config line 52, field %T%) and the default answerback (config line 51, field %A%) for the current header line. It must be the first line of the document.

Syntax: ++TSI <new TSI>,<new answerback>

Where

<new TSI>: Should contain only digits, "+" and blanks. (truncated after 20 characters)

<new answerback>: May contain any character (truncated after 79 characters).

Example:

The original header line looks like the following:

```
To:+43-1-6613321 From:Kofax Fax:+43166133835 -TC logo-  
at:95-07-24-17:05 Doc:123 Page:001
```

The string "++TSI +43-1-66133-899, Mr. Demo" at the beginning of the document changes the content of the header line to the following:

```
To:+4316613321 From:  
Mr. Demo Fax:+43-1-66133-899 -TC logo- at:95-07-24-17:05  
Doc:123 Page:001
```

It is also possible to use a combination of the ++HLN and ++TSI control lines for one header line. ++TSI +43-1-66133-899, Mr. Demo

++HLN To: Mr. Test

These two control lines at the beginning of the document change the header line to the following setup:

```
To:  
Mr. Test From:  
Mr. Demo Fax:+43-1-66133-899 -TC logo- at:95-07-24-17:05  
Doc:123 Page:001
```

Header line with Back Received Documents

If the back reception mode "text only" or "text and graphics" is used, the header line will start with ++HLB followed by the header line as it was sent. If this back received document is sent again, the ++HLB line is printed at the configured header line position, or it will be ignored if the document is sent with a new header line.

With "full image" back reception, the header line is part of the back received document. The mandatory top margin (space between top of page and header line) is now also part of the back received page.

Kanji Characters in Fax Header line

It is possible to send faxes with a header line composed of both Kanji and TCOSS 0 characters. All cover and header line variables may be used to define this header line in a cover sheet.

The described functionality is achieved by a combination of two features:

- A standard header line defined with a ++HLN control sequence in TCOSS code page 0 containing header line variables resolved by the fax module such as %P% or %N%
- A new overlay line stored in a text block with code page 932 containing cover sheet variables such as \$Name\$ or \$Dept\$

The new overlay line is put into a text block with code page 932 in the following way (example):

++FX1 0,38,1,,1

to: \$Name\$, \$Dept\$

The format of the ++FX1 and ++FX2 control lines has been extended by an **additional parameter**:

++FX1 x-position,y-position,startpage,pages,layer

Note The layer parameter for overlays is supported by the Fax module for TC20 only. It cannot be used with TS29/32/33 interfaces.

The layer parameter is a number in the range 0..3, default value is 0. It specifies the layer number in the fax module's page layout. The layer number 0 is the standard overlay image, which is overwritten by the ++HLN header line (so it might be called an "underlay"). Layers numbered 1.. 3 are real overlays not overwritten by the ++HLN header line. The final fax image consists of all black pixels defined in any of the layers 1.. 3 or the ++HLN control line. The layers 1.. 3 and the ++HLN control line are actually "ored" together.

The example above uses an overlay image with layer number 1. The image contains the text given in the following line ("to: \$Name\$, \$Dept\$") and produced by the rendering capability of the application module during sending. So this "trick" works only in combination with rendering of a code page other than TCOSS 0 or 1.

Example - A Simple Kanji Header line

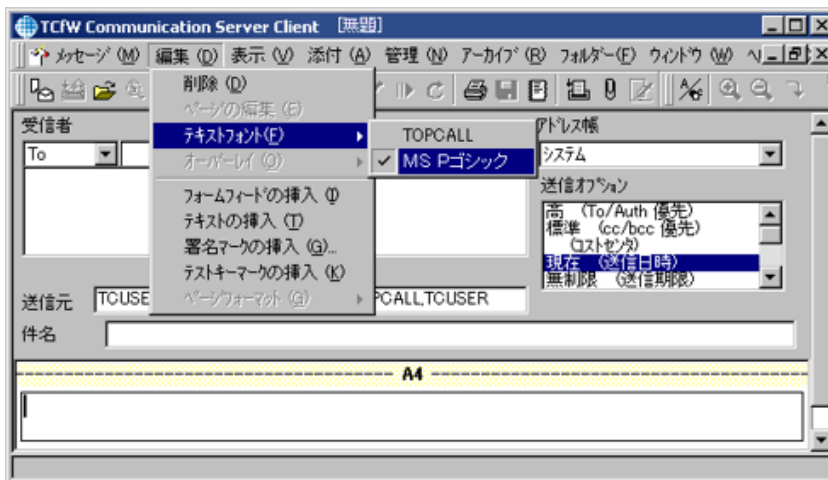
1. Be sure that the TCOSS system code page is set to the country-specific Windows code page (932 for Kanji, 850 for Western, and more). The TCOSS system code page is set in line 10 of common config parameter (SYSCONF). Line 10 is in hexadecimal format, for 932 (hexadecimal 3A4) position 3 = 03 and position 4 = A4.
2. Use TCUAS to create a document with a text format line allowing longer lines. This is to prevent wrapping of the header line.

```
..2t,r=F:140CPL
++TXT ,,,,140,,
..2end
```

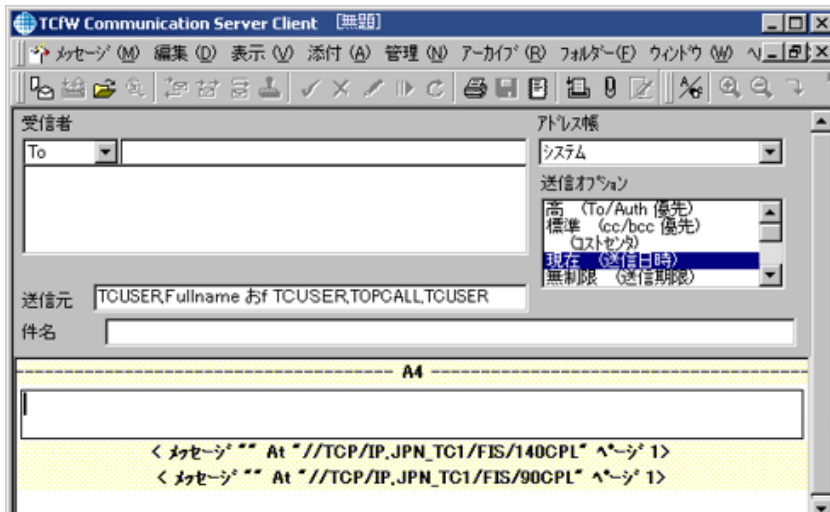
3. Create another document using TCUAS with a text format line setting back the allowed line length to 90 characters per line (BS line)

```
..2t,r=F:90CPL
++TXT ,,,,90,,
..2end
```

4. Create a new Message in TCfW, and verify within the send options that no cover is selected.
5. Set the cursor into the textbox and set the used font to Kanji as shown below:

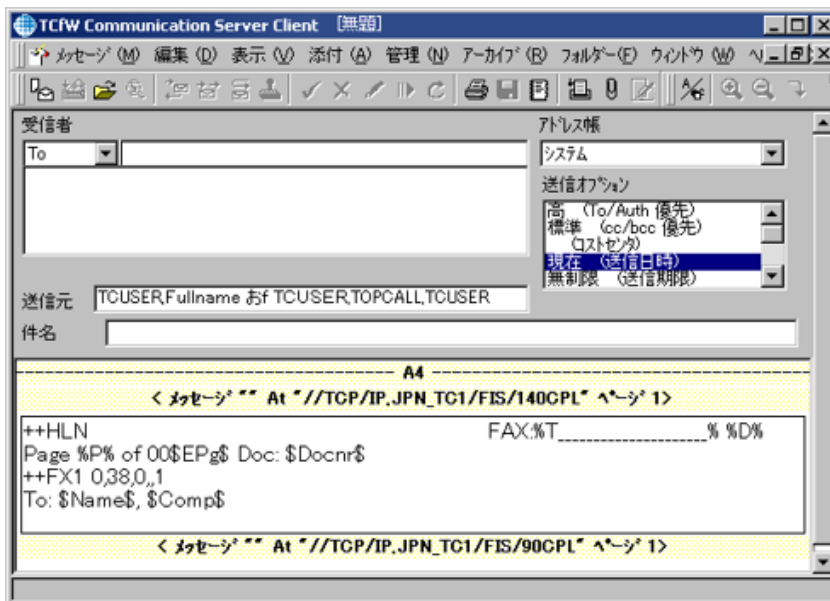


6. Attach the 2 messages 140CPL and 90CPL from the FIS folder using menu "Attach - File."



7. Drag the textbox to the middle of both attachments and enter the following lines into the textbox:
Make sure that there is no CR/LF within the ++HLN-line. It is just wrapped around by the TCfW-view.

```
++HLN                      FAX:%T_____ % %D%
Page %P% of 00$EPg$ Doc: $Docnr$
++FX1 0,38,0,,1
To: $Name$, $Comp$
```



8. Save the message as Cover into the FIS Folder, and do not forget to select the check box.
"Save as coversheet."

名前を付けて保存: 無題

☐ デフォルト ☒ フォルダー

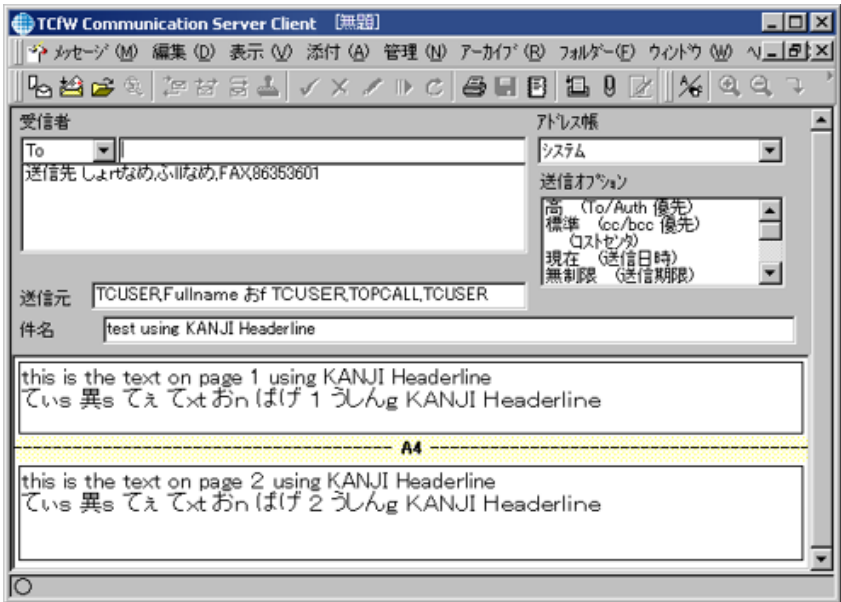
☒ 表紙ページとして保存 ☐ デフォルトテンプレート

フォルダー: FISフォルダー メッセージ名: KJHDR 検索基準 リフレッシュ

メッセージフォルダー	メッセージ名	件名	作成	ファイルサイズ
FISフォルダー	140CPI		01/06/	28
メッセージフォルダー	140CPL		01/06/	28
システムフォルダー	90CPI		01/06/	28
でst おおr	90CPL		01/06/	28
	ALLVAR		98/08/	290
	ALLVAR.CVR		98/08/	3014
	CP932		98/08/	32
	CP932CV		01/06/	59
	FISATTACH		98/09/	21472
	KJHDR.CCVR		01/06/	808

ドライブ: c: [JPN_CL1] *.* (すべてのファイル) OK キャンセル

9. Test the new cover by creating a new message and setting the cover within the Send options. Enter a receiver with Fullname and Company.



Send options with the selected cover.

The screenshot shows a Windows-style dialog box titled '送信オプション' (Send Options). It has several sections: 'To/Auth 優先度' (To/Auth priority) with a dropdown set to '高' (High); 'cc/bcc 優先度' (cc/bcc priority) with a dropdown set to '標準' (Standard); '配信の通知' (Distribution notification) with a dropdown set to '否定' (Deny). Below these are two checkboxes: '送信日付と時刻' (Send date and time) and '送信期限(日付と時刻)' (Send expiration (date and time)). Both have date and time pickers set to '2001年 6月 18日 月曜日' and '午前 11:39:11'. There are radio buttons for '絶対的な' (Absolute) and '相対的な' (Relative). A 'カスタム' (Custom) text field is empty. Below that are 'エンコード' (Encode) and '解像度' (Resolution) dropdowns, both set to 'すべて' (All) and '高' (High) respectively. There are checkboxes for '登録メッセージ' (Registered message) and 'ファックスヘッダーライン' (Fax header line). At the bottom, there are buttons for 'OK' and 'キャンセル' (Cancel).

The sending copy document for this message looks like:

To: ふ い い な め , こ ん ぱ ん y FAX: +43 1 66133 62 TOPCALL 18-JUN-2001-11:05 Page 001 of 002 Doc: 147

this is the text on page 1 using KANJI Headerline
て い s 異 s て え て x t お n ば げ 1 う し ん g K A N J I H e a d e r l i n e

Date Format

It is possible to select from different date formats. The following date formats can be defined with config line 147.

Date format:92	02	24
24	FEB	1992
FEB	24	1992

Sending Graphics

The transputer FAX module supports the TCI format (TCOSS Image Format). This feature includes sending of graphics with unlimited vertical length.

Layout of TCI Block

++FX2 lines in TCI format : : ++TXT

- A graphics block in TCI format can be created with TCfW or the program TIFtoTCI that is part of the service disk PC-SV.
- A graphics block in TCI format must not be edited.

Restrictions

- If a graphics block exceeds the page limit, the bottom margin is reduced. If the over length is greater than the bottom margin, the transmitted page length is increased.
- All other modules handle the complete TCI block including the '++FX2' and '++TXT' lines like ordinary text.
- Sending of an altered TCI block may cause errors (error code XB).
- TCI graphic blocks within a landscape page are ignored.

Support of Rendered Image Blocks

The application module may generate rendered image blocks, if a text block with code pages other than 0 or 1 has to be sent. If rendering is enabled in config line 3, text can be passed to the user module as a separate image block (fine mode) using:

++FX1 0,1

TCI code lines

++TXT

These blocks have the following special properties (compared with standard image blocks):

1. If a ++FX1 0,1 block appears at top of page, it starts at the configured top margin for text. A ++FXn block would use the configured top margin for image in that case.
2. Automatic insertion of page breaks is disabled for ++FX1 0,1 image blocks.

Fax Forms

With the transputer fax module it is possible to send fax documents with a form overlay. The form does not affect the page layout of the transmitted data. The fax forms are stored in KCS memory. During sending, the specified fax form and the transmitted document are mixed together (pixels are ored together).

Syntax of Fax Form Specification

For the fax form feature, you must specify some additional parameters to the control line ++FX1 or ++FX2 (following only the usual control line ++FX2 is mentioned). The extended syntax of this line is as follows:

```
++FX2 [x-pos., y-pos., startpage [, pages]], layer  
<TCI-lines>  
++TXT
```

x-pos.	Horizontal offset to physical page size in 1/10mm (with this release this value has to be 0)
y-pos.	Vertical offset from the top of the physical page size in 1/10mm startpage page position relative to the current page
pages	Number of pages which should use the fax form (optional)
layer	Number in the range 0 ..3, default value is 0. (See Kanji Characters in Fax Header Line for details)

Note All blanks after the string "++FX2" will be ignored automatically. If no parameter is specified after "++FX2" or if there is an error inside the string definition, the "++FX2" is treated as normal ++FX2 string without parameters.

Explanation

- If the start page parameter is specified, the following block is treated as a fax form. Forms do not cause an immediate action. They are stored in a memory buffer and do not affect the current transmission of data. If desired, the content of the fax form buffer is mixed with the following texts or images according to the definition of the control line "++FX2".
- If a form is redefined by another form, the used memory is immediately free, so the same memory can be used for different forms within one document.
- Fax forms can be stored either directly on the KCS system as mask definitions (+A ... +Z is allowed) or can be part of the transmitted document. If fax forms are part of the document, they should be defined at the beginning of the document, otherwise the error message XT can occur during transmission.
- If the parameter "pages" within the "++FX2" definition is not specified, the fax form is used from the first page up to the last page of the transmitted document. All format control characters within a fax form are ignored and therefore not used.
- If two or more forms are defined for the same page, only the last defined form is used on this page. With release 5.20 and earlier, all pixel lines before and after the form block were mixed with prior forms defined for the same page.

Example:

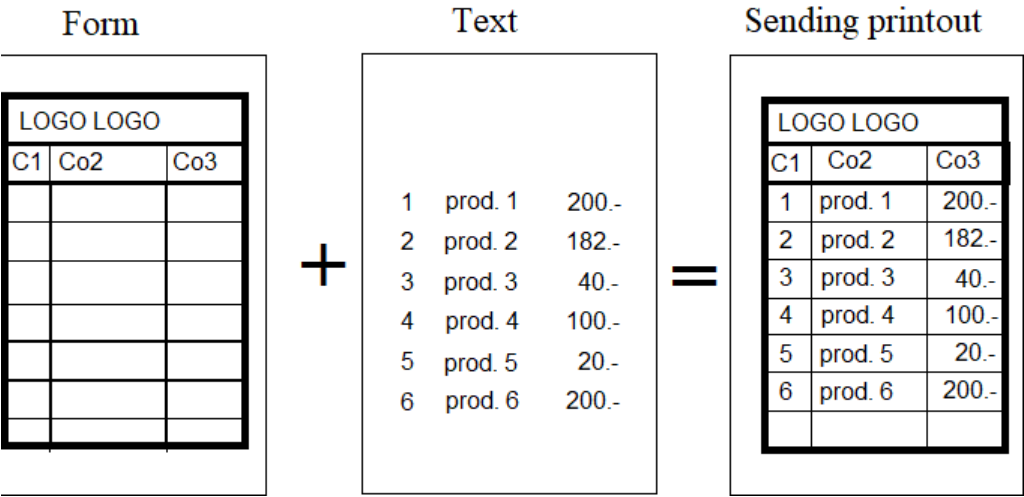
++FX2 0,0,1 use form from next page on
....
++TXT
first page
++FX2 0,0,2,1 delete form for page 2
TZq,
++TXT
++A4H
second page

Note Fax forms used for landscape format sending can be used, but they are not rotated during sending.

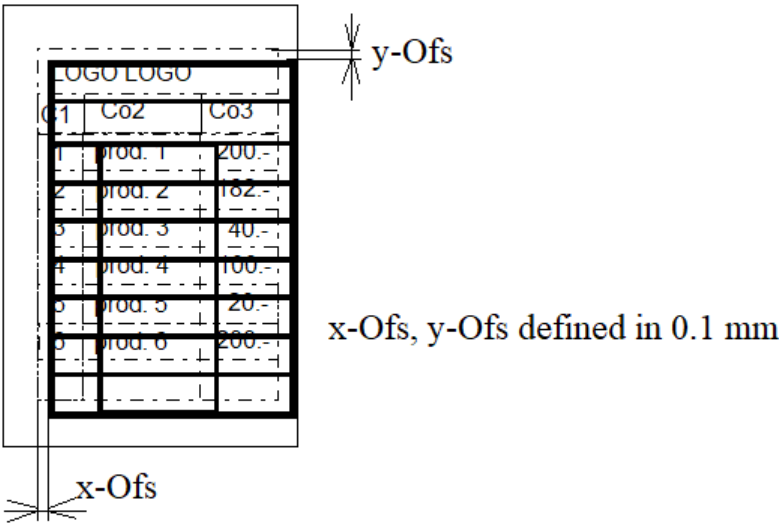
Examples

++FX2	Graphic block, printed at the current paper position
++FX2 0,0,0,1	Use form for this page only
++FX2 0,0,0	Use form from this page on

++FX2 0,0,1,1	Use form for next page only
++FX2 0,0,1	Use form from next page on



++FX2 0,20,2,3 Form block, the form is used for the page 2, 3 and 4. The form is shifted 2 mm in vertical direction (see figure below):



Using a Form

All form definitions have to be done at the beginning of the document (also the logo has to be defined afterwards). The following table shows three ways of using fax forms.

Form definition within document	Form definition by using masks such as +E	Form definition by using the include command
<pre> ++FX2 0,0,0,1 <Form for page 1> ++TXT ++FX2 0,0,2 <Form for page 2 & follow.> ++TXT ++FX2 <Normal TCI - LOGO> ++TXT Text </pre>	<pre> ++FX2 0,0,0,1 <Form for page 1> ++TXT ++FX2 0,0,2 <Form for page 2 & follow.> ++TXT ++FX2 <Normal TCI - LOGO> ++TXT \$P\$ \$X\$ end of message - end of telefax </pre>	<pre> ++FX2 0,0,0,1 ++INC FORM1 ++TXT ++FX2 0,0,2 ++INC A:FORM2 ++TXT ++FX2 ++INC B:LOGO ++TXT Text </pre>
Disadvantage: Transmission time	Disadvantage: Only 26 masks available	Disadvantage: Administration

Creation of Fax Forms

Forms can be created with any graphic editor storing the graphics data in Kofax Communication Server-compatible TIF format.

Possible Error Conditions

- If a TCI block (form or graphics) contains either an invalid TCI character, an uncompleted TCI line or an invalid TCI line length, the transmission is interrupted with the error code message "XB".
- If the run length of a TCI line is not correct, the line is ignored within a graphics block or treated as an empty line within a FAX form.
- The number of FAX forms is not limited, but the total needed memory for all forms must not exceed 60 KB on a TS29 and 150 KB on a TS32, TS33, TC20. An error code "XC" is generated if the storage of FAX forms exceeds this memory limit on KCS. The needed memory of a FAX form is about 80 percent of its size in TCI format.

LF0 Operation

To support the generation of underlined and bold characters, every LF0 and line is shifted right by one pixel. So it is possible to produce underlined and bold characters by overprinting. The operation of LF1, LF2 and LF3 is unaffected.

Example: Text:

This line is bold printed

++LF0

This line is bold printed

This line is underlined

++LF0

Sending printout:

This line is bold printed

This line is underlined

Page Control Line

This control line generates a new page during sending with all settings of the previous page (all parameters remain unchanged).

Syntax: ++FF

Note This line has no effect in the following cases:

- If it is the first or last line of the document
- If it is defined before a new page control line starts (++A4H, ++BDQ, ...)

Text Format Line ++TXT

If the ++TXT line appears outside any graphic block it is interpreted as a text format line (with release 5.20 and earlier, the line is ignored in this case). It can be used to change the current text format information.

The meaning of the ++TXT line at the end of any graphic block has not been changed. For details, see [Sending Graphics](#) and [Format of Received Documents](#).

Syntax of the Text Format Line

++TXT font_type, left_margin, lpi, cpi, line_length, BS-offset, txtcp

font_type	'1' is large font, '0' is small font
left_margin	Left margin of the first character of a BS Line in 1/10mm
lpi	Lines per inch
cpi	Characters per inch
line_length	Max. length of BS Line (must be greater than 0)
BS-Offset	Number of characters (must be less than line_length)
txtcp	Code page of the text block

Examples:

++TXT ,,,,932	Starts a text block with code page 932, no other parameter set
++TXT ,,,80,,1	Starts a text block with line length 80, code page 1

Explanation

The parameters are part of the page layout configuration. Only the values for top margin, bottom margin and length of page cannot be changed.

Note The values for configuration are entered in hexadecimal code. The values for the text format line are entered in decimal code ('.' must be used as decimal point character such as: 12.34).

- All blanks after ++TXT are ignored and all parameters are optional (Example: ++TXT ,, ,3, 4 is allowed)
- The parameters left_margin, lpi and cpi are rounded to multiples of the transmitted pixel size for standard resolution (integer).
- The parameters font_type, line_length and BS-Offset are rounded to integers. If an illegal value is specified for one of these parameters, the corresponding current value is not changed.
- If any parameter is specified, the current text format values are replaced. Unspecified parameters do not change the current values. All text format information remains unchanged until the next ++TXT line (except for end of graphics) or the end of document, even if a new page with any page format (+A4H, ... ++BDQ) is started.
- If no parameter and no comma (that means ++TXT only) is specified, the text format info is replaced by its default value configured for the current page format. It is updated with every new page (changes remain unchanged for following pages).
- The left_margin is always measured from the physical left paper margin, also for landscape pages.
- Switching between different page formats does not work correctly if the message is created with TC/LINK-FI. In that case, the fax module gets a ++TXT line where the code page is specified (example: ++TXT ,,,,1). Even this line does not have a text format info it caused that the text format was not changed when starting a new page with an other page format. The fax module now ignores a ++TXT line that specifies the code page without any other information.

Restrictions

- The header lines and the length of the original page are never affected by the ++TXT format lines.
- If the font_id, left_margin, lpi and cpi are changed after the first text line on a landscape page, the new values are used for the following pages and do not affect the current page.
- If the last text line before the ++TXT line is a ++BS0,BS1 or ++LF0,LF1 line, it is handled as ++BS2 or ++LF2 line.
- If the text format line is not used, release 5.21 and higher is absolutely compatible with release 5.20 and earlier.
- Any text format line (even if it contains a new page format control character) is ignored when used with release 5.20 and earlier.

Example

The standard configuration is assumed. Only font_type, cpi and line_length are considered. The document is listed in the same way as you have to enter it with an UAS module.

Begin of page 1

This text is sent at the beginning of page 1 with the configured values for A4H (font_type = 1, cpi = 12, line length = 95)

...

++TXT 0,,,16

This text is sent with font_type 0 and 16 characters / inch

...

++FX2

...

++TXT

The text format info is not changed by any graphics block. (font_type = 0, cpi = 16, line_length = 95)

...

++A4Q

Begin of page 2

This page is sent in landscape mode. (font_type = 0, cpi = 16, line_length = 95)

...

++A4Q

++TXT

Begin of page 3

This text is sent with the configured values for A4Q.

(font_type = 1, cpi = 12.2, line_length = 132)

Transputer Fax Code Pages

In the transputer FAX module, there is an additional conversion code table that converts the internal single byte TCOSS code to the 2-byte internal FAX character code. This feature is located in the config lines 143 up to 174.

It consists of 256 entries and every entry consists of 2 bytes. The first entry corresponds to the TCOSS code 00H, the second entry to TCOSS code 01H, and so on. The last entry in this code table defines TCOSS code FFH.

The first 6 bits of each entry denote the diacritical mark of the characters. For characters without a diacritical mark, the first 6 bits in the FAX code page contain the value 0. The next 10 bits are the local character numbers within the transputer FAX module.

The table is organized in 32 lines with 16 HEX positions per line. Each line contains eight 2-byte internal FAX character codes. For a description about the code pages, refer to the configuration of the transputer FAX channel.

Fax Drawing Characters

Character '|' (7C Hex, 124 Dec) uses the maximum possible line height and represents a continuous vertical line now. By connecting this character over multiple lines, an uninterrupted vertical line can be drawn if the max. line pitch does not exceed the values listed below.

	Font0 (small)	Font1(large)
Portrait	12	16
Landscape	24	32

There are 2 new characters available. They represent a continuous vertical line (such as the '|' character) on the right side (character code 01) and on the left side of the character box (code 02). These characters can be used instead of any other character by changing the code conversion table (config lines 143 to 174 with ULP or lines 148 to 179 with UTF).

Example:

If config line 163 (or 158 with ULP) is changed as shown below, the character '{' is replaced by '|' and character '}' is replaced by '|'.

```
:00 78 00 79 00 7A 00
01 00 7C 00
02 00 7E 00 7F,
```

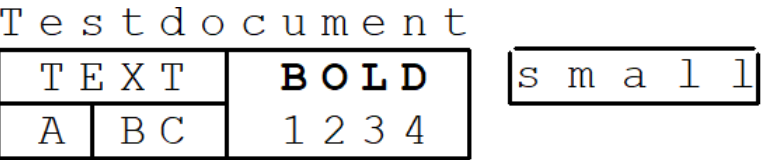
Now, it is possible to draw boxes and tables. The following example shows a way to get an optimal printout.

```
++TXT 1,,6,12.8
Testdocument

{TEXT} BOLD} }small{
++LFO
BOLD
++LFO

{A|BC} 1234}
++LFO
```

This example produces the following output.



Note This feature may not be supported by some clients.

OCR Forms (Not Supported)

It is possible to send OCR frames and OCRB characters. Therefore, the control line "++OCR" is used. If this line appears, the next line is interpreted as an OCR line as follows:

- The characters 0 .. 9, A .. Z, +, -, . (digits, capital letters, plus, minus and dot) are printed with the OCRB font.
- The character 's' starts painting an OCR frame around the following characters. With 'n', 'm' or 'a' the OCR frame is closed. 'n' is used for numeric, 'a' for alphabetic and 'm' (mixed) for alphanumeric fields.
- All other characters are treated as blank. (After 's', underline or blank can be used to make the ground line of the frame)

- The OCR line is not affected by the current text format, the page layout and the code page configuration. The line always uses the following format.

	Pixels	Points	Millimeters	
Character height	50 * PH	36.8	13mm	1.96 lpi
Character width	48 * PW	17.3	5.97mm	4.25 cpi
Left paper margin	55 * PW	19.4	6.84mm	
BS/LF offset	-	-	-	0 characters

PH ... Pixel height (1/3.85 millimeters)

PW ... Pixel width (215/1728 millimeters)

- The OCR line is mixed with the following text lines as shown in the example below.

Restrictions

- It is not possible to mix the OCR line with a TCI graphic block or a new text block starting with the text format line "++TXT".
- If a new page is started manually, such as with ++A4H (after the ++OCR line) or the end of page is reached immediately after the OCR line, unpredictable results can occur.
- The ++OCR control and the OCR line are handled as standard text on landscape pages.
- If a makeup - line accidentally starts with "++OCR," it is interpreted as an OCR control line.
- If the OCR line is longer than the current max. number of characters per line, the make-up lines are printed with the standard font.

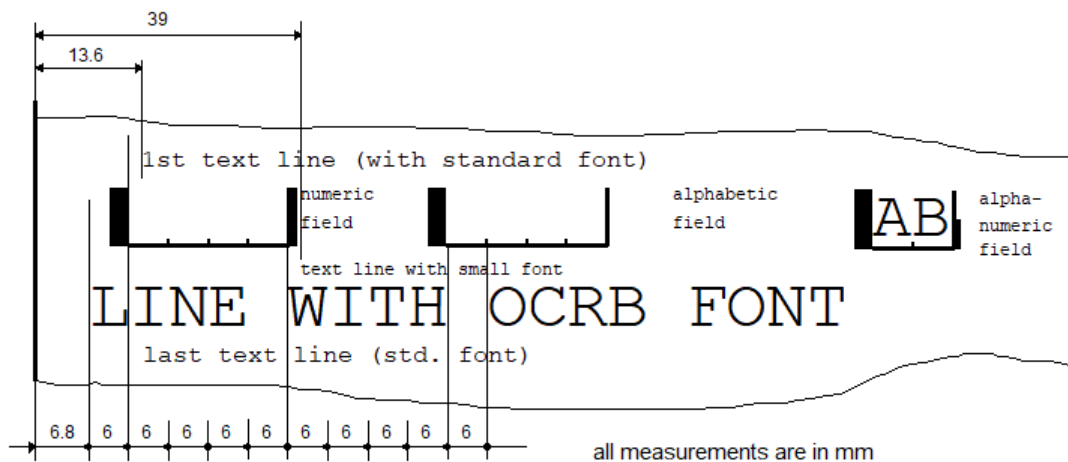
Example

```
Text as it would be entered with an standard asynchronous module.
1st text line (with standard font)
++TXT 0,390,8.15,17,,0
++OCR

s____n s a sABm
numeric alphabetic alpha
field field numeric

field
text line with small font
++OCR
LINE WITH OCRB FONT
++TXT
last text line (std. font)
```

This example will produce the following output.



Advanced RTF Conversion

Users want to have Rich Text (RTF) on the cover sheet of messages transmitted via Fax without this leading to oversized Fax pages. Oversized Fax pages are not supported by many receiving machines.

With **Advanced RTF Conversion** a solution is provided where automatic page breaks are inserted in the converted RTF content.

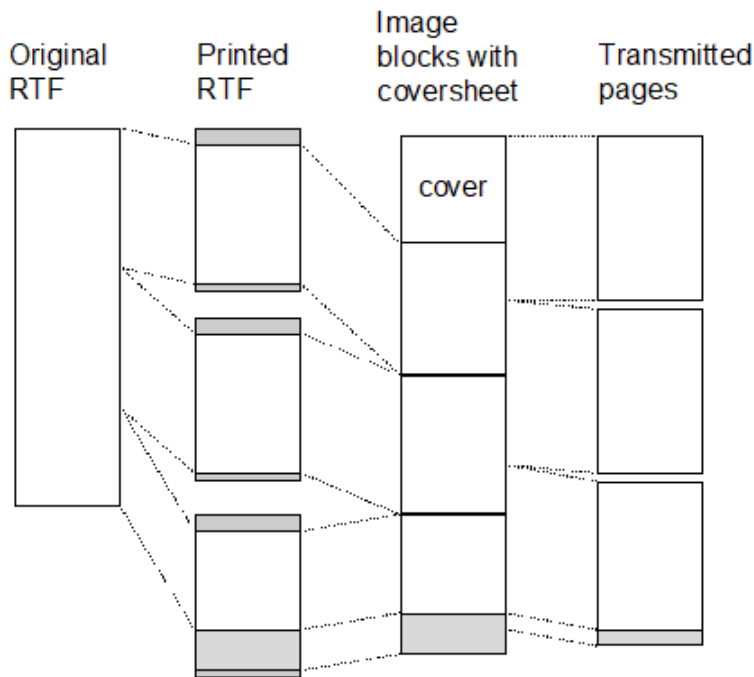
To support this feature automatic page breaks are inserted into image blocks that do not start at top of a page. Images starting at the beginning of the document or after a page break (like reception documents) are not affected by these changes.

Advantage, Strengths

- Small rich text messages can be sent having the actual message on the coversheet page
- Page breaks for multipage RTF messages are done automatically

Functionality

- The enhancement requires TC/LINK version 1.04.01 or higher.
- TCDC converts the RTF content to single images separated by page breaks. Depending on the link configuration, a top and bottom margin is cut from each image and page breaks are removed. The result is one stream of image blocks without page breaks, that corresponds to the original RTF content.
- TCOSS inserts a cover sheet in front of the image blocks
- The Fax module inserts page breaks within the image blocks to make sure that no oversized pages are transmitted. The Fax module does not insert page breaks within character lines. Page breaks are only inserted when an empty image line is detected. Scanning for empty lines starts at the for the Fax module configured bottom margin. If no empty image lines are detected 3 mm before the end of page is reached, a page break is forced. Empty lines due to underlining or other formatting could result in unwanted page breaks.



- The Fax module does not transmit empty space of the last image block of a page. Depending on the size of the first image block in the message, this could result in the cover and the RTF content to fit on one page.
- The height of the top and bottom margins that are cut can be configured separately for every link. The actual size of the top and bottom margin depends on the configuration of the Mail client used for RTF conversion.
- This feature does not change sending of attachments. A form feed still always separates them from the cover page and all following RTF pages from the message content.

Note Restriction: If enhanced RTF sending is used the "number of pages" cover sheet variable may not be correct!

One Page Delivery Notification (SO 300)

It is now possible to print out delivery notifications of outgoing faxes that contains a mask and a part of the first transmitted page. To enable this feature the following 2 independent enhancements were implemented.

- Send only the first page of a document.
- Generate back-reception files without leading page breaks.

Both enhancements are described below:

Sending Only the First Page of a Document

Since TCOSS 7.46.05 it is possible to use the send mode switch "o" (one-page-only switch) in the UTF/UIF/ULP/ULL recipient number. This switch truncates transmission of a document after the first page. It

is intended to be used for printout of delivery notifications that should contain only the first page of the transmitted document.

Restrictions:

- If the one-page-only switch is used together with the fax chaining switch, then the fax chaining switch is ignored.
- The feature is not supported by UTF/UIF/ULP/ULL on TSxx interfaces.

Note Since a capital "O" can be easily misinterpreted as zero, a small "o" has been chosen as one-page-only switch.

Generate Back-Reception Files Without Leading Page Breaks

Up to TCOSS 7.46.04 all back received file starts with a page break. Since TCOSS 7.46.05 it is possible to configure if back received files with full image back reception mode should have the leading page break or not. Therefore the back reception mode (in config line 53) has been extended by the new value 4. A complete description of configuration line 53 is shown below:

Config line 53, back reception

'0,	no back reception
'1,	back reception without graphics and forms (graphics will appear as "++FX2" and "++TXT" line only in the back received document, forms will be suppressed).
'2,	back reception with graphics but without forms (forms will be suppressed completely).
'3,	back reception as full graphics. With this mode every page will be back received as a graphics block which contains all transmitted data (Header lines, top margin, bottom margin, text, graphics and forms). Each page (even the first) starts with an ++A4H page break.
'4,	back reception as full graphics without leading page break. This mode is the same as mode 3 with the exception that the first page does not start with an ++A4H page break.

Restrictions:

- The feature is not supported by UTF/UIF/ULP/ULL on TSxx interfaces.
- Back reception mode 4 cannot be set via WCONFIG menu. You have to use the line editor in WCONFIG to change configuration line 53 to '4'.

Inward Dialing Functions

There are basically two different methods for receiving any number information upon incoming calls. They are called DID and DTMF and result in a received number that can be used for the distribution of incoming faxes (inbound) or various other commands (server functions).

ISDN Note: The UIF supports a DID equivalent feature. It is called DDI (Direct dialing in) or MSN (Multiple subscriber number). In the following description DID is used for DDI and MSN too.

The processing of the received number is based on some config values. These values can be set independently for DID and DTMF numbers. Since all functions are available for all number types the following description may use the term **incoming number** instead of DID or DTMF number.

If there is a config line reference, both line numbers are specified, separated with "/":

Example: "235/238" means that line 235 is used for DID and 238 for DTMF.

DID Operation with KCS

Direct Inward Dialing (DID) is an operational feature optionally available in some PBXs that provides for direct dial access to PBX stations from public switched network stations. Direct Inward Dialing requires transmission of address signals from the serving central office to the PBX. This signaling may involve a register-sender interface, requiring PBX supervisory compatibility with either wink start or immediate start dial supervision.

For DID connection, the FAX interface has to be connected via E&M (E&M - Ear & Mouth is a protocol between two independent PBX stations) and a special line interface to the PBX. With this line interface, it is possible to receive either DTMF or pulse-dialed numbers from the PBX.

Process: You dial into KCS as normal.

Advantages: Dialing into KCS is only one stage dialing. The digits dialed after the real number can be given with PULSE or DTMF.

Disadvantages: Connection to KCS is only possible via PBX using a certain protocol and hardware. The PTT must be able to transport a certain number of DID digits. This number is always restricted.

Important Belgian, French and Eastern European PTTs restrict this number to the main telephone number only, and no direct access to extensions of PBX is possible.

DTMF Operation with KCS

Dual Tone Multi Frequency (DTMF) address signaling is a method of signaling using the voice transmission path. This method employs twelve distinct signals, each composed of two voice band frequencies.

The input of DTMF signals is possible by using the second dial stage provided by the KCS system and **any** FAX line interface. DTMF can be activated by configuration. When using the fax number conversion table, it is possible to activate a DTMF input for some special DID/DDI numbers only.

Process: You dial into KCS. You hear a fax prompt. After this prompt you enter the further dial information (digits).

Advantages: No restriction, how many digits can be transported (because of 2 stage dialing). Functions are supported with every hardware and protocol.

Disadvantages: 2-stage dialing: External persons are not able to process this procedure which is for company internal use only. The digits dialed after the real number **MUST** be given with DTMF.

Note If DID and DMTF is used, the DID input will be ignored if a DMTF input follows.

Handling if No DTMF Number Is Entered

Assume the following scenario:

1. A fax channel with DID/MSN is used.

2. A special number (such as "00") is defined to activate a DTMF prompt (such as with 20s timeout) that can be used to input any number via DTMF. This must be configured in the fax number conversion table as shown in the example below: configuration line 254 '100=T20.
3. The distant user dials DID/MSN 00, waits for the DTMF prompt and does not enter any DMTF digit (or enters "#" to abort DTMF reception).

In that case, the fax module up to TCOSS 7.47.05 uses "T20" as incoming DID number, which is not expected. Since TCOSS 7.47.06, an empty number is used instead of a number such as "T20" (see correction of error 9541). If required, it is possible to convert this empty number with a number conversion rule into any other DMTF number. See the following example:

Example

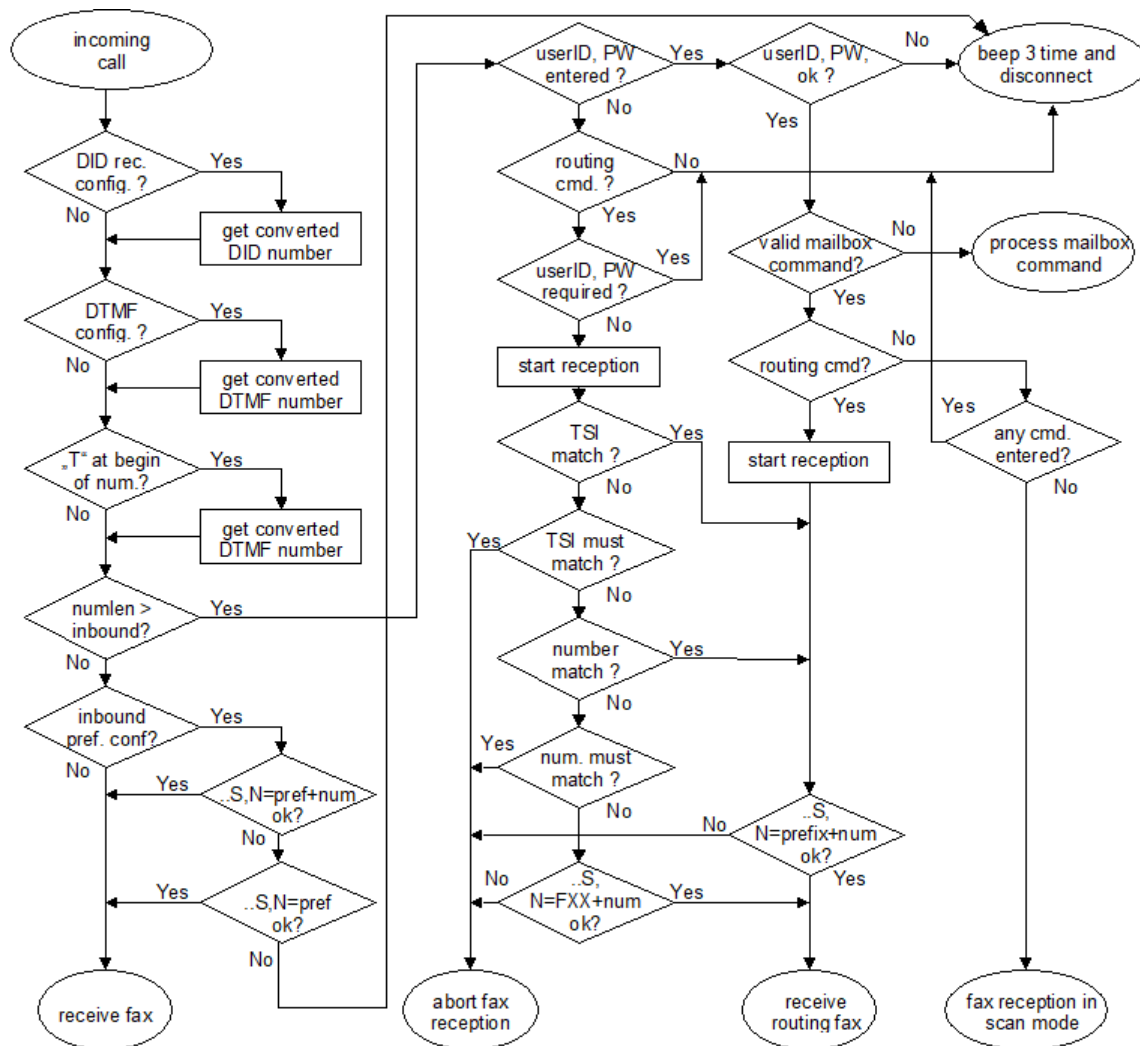
```
config line 254 '100=T20
config line 255 '2?~=?~
config line 256 '2~=12345678
```

- If DID/MSN "00" is dialed, a DTMF prompt is generated and DMTF reception with 20s time-out is started.
- If at least one digit is received via DMTF, conversion line 255 matches. The DTMF input is used without modification.
- If no DMTF digit is received with a time out, conversion line 256 matches. This case is handled like DMTF input "12345678".

Tip The description above does not apply to the case that DTMF input is activated in the general parameters of the fax configuration and no DTMF digit is received. In that case, the previously received DID/MSN is used as a received number. If no DID/MSN is received, an empty DID/MSN number is used. This behavior does not depend on the TCOSS release.

Flow Chart of DID/DTMF Number Operation

If a call is received by the transputer fax module, the following actions are taken:



Description

The following description gives an overview about all incoming number specific functions performed by KCS upon reception. Refer to appropriate sections for more details.

Any incoming call starts with the reception of a DID or DTMF number. The first two steps can be activated by configuration and the third step (2nd DTMF input in flow chart) can be activated depending on the number received in a previous step.

All three steps are optional. The DID input requires special hardware and a special kind of line to work. The DTMF input can be used with all interfaces and every line. The result of these steps can only be one received number. For example, if a DID number is received, and a DTMF input follows, it replaces the DID number. If no DTMF input follows, the DID number remains unchanged (except: DMTF input via number conversion table (step 3) will always discard the previously received number).

Every received DID or DTMF number can be modified during reception with the "number conversion table". Furthermore, the implementation of a numbering plan and detecting the end of a received number without need to fall into time-out is possible.

After reception and conversion the incoming number should be an empty number, an inbound number, or a valid server and routing command as shown in the overview below.

Syntax	Description
Empty number or nnn	Inbound message to User "nnn" or distributor. (Working of inbound send order must be activated by configuration. Different prefixes for DID and DTMF can be configured. An empty number always uses the prefix for DID).
8uu or 8uupp	Scan command (uu=Fax PIN, pp=Fax password)
8uupp 7xxx or 8uupp 7xxx 0nnn	Mailbox commands. One or more destination numbers can be specified using routing commands (0..5). Multiple destinations must be separated with "***".
8uupp 0nnn or 0nnn	Routing send order (commands 0..5). Depending on security configuration, routing without specified user ID and password may be allowed.

If an inbound send order can't be created with the specified number, a retry without number is made. If the received number exceeds a configured length, it is treated as fax server and routing command as shown above.

Routing commands (send or distribute a fax via KCS) can be used with different security levels. With standard configuration, routing commands require a user ID and password. The most tolerant configuration may allow to route faxes without user ID to destinations (or area codes) specified in the rr99 directory. The details are shown in the flow chart.

If the destination number is less than 5 digits, it is used as an abbreviation code (such as N=.123 - can be used for predefined user or user groups). Otherwise, it is appended to the prefix taken from the user profile (or fixed prefix FXX). Up to 5 destination numbers can be specified using "***" as separation character.

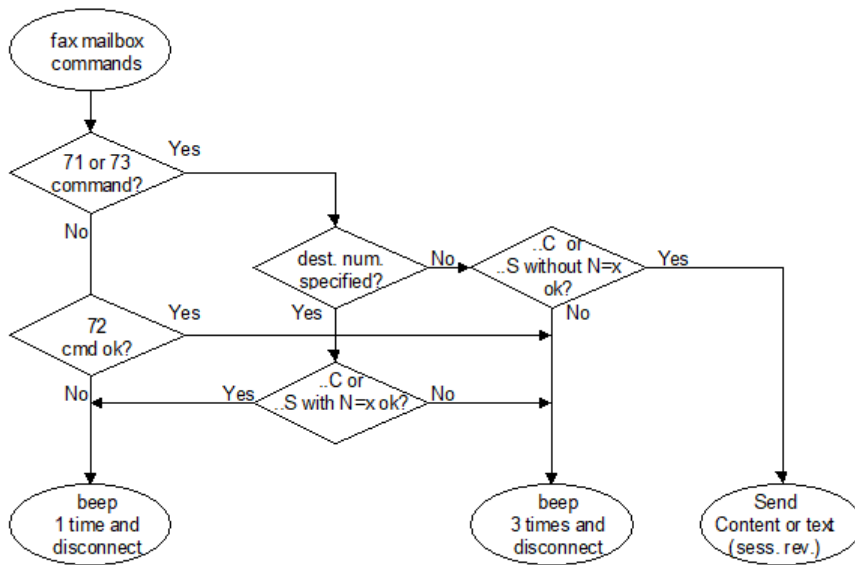
Mailbox functions

Mailbox commands are used to show mailbox (command 71), empty mailbox (command 72) or to deliver any text from the FIS (fax information system) folder (73xxx command). The destination number is taken from the default-address field of the user profile or from routing commands (command 0..5) if specified.

The commands 71 and 73 can be used with "Session reversal." If an empty destination number is specified, KCS immediately starts sending the requested document. In that case, no stored send order is created. The document is examined. This means that the sending journal, masks and cost accounting are not used.

An empty destination number can be specified as follows:

1. Default address is empty and no routing command is specified;
2. A routing without destination number is used (such as command "8uupp 71 0")



Restrictions when using 71xx or 73xx commands with session reversal:

1. The variable TSI (first part of ++TSI command) is ignored for documents transmitted via session reversal. For normal sending, ++TSI is fully supported.
2. Manual session reversal works only if the calling fax machine is started after the KCS fax prompt is sent.

Fax Sub Addresses

Fax sub addresses are specified in recommendation ITU-T T.30. This feature may also be known as the F-Code function in some countries.

Fax sub addresses such as DDI/DID/MSN/DMTF can be used to specify digits for routing of received documents. The table below gives you an general overview about these different methods.

	DID/DDI/MSN	DMTF	Fax sub address
Transport of digits	Numbers are transported (out-band) as part of the dialed number within the signaling part of the network	Numbers are sent as DTMF tones in-band from the originator device to the receiver device using the speech channel.	The number is transferred within the fax training using the T.30 handshake (V.21)
Typical action required at the sender side	Most simple. The sender just has to dial the complete number including the fax extension.	<ol style="list-style-type: none"> 1. The sender must dial the number. 2. Wait until the connection has been established and you can hear an appropriate prompt. 3. Send additional digits using DTMF tones. 	<ol style="list-style-type: none"> 1. Enter the Fax Sub Address in your fax machine. 2. Send the fax to the telephone number of the receiver.

	DID/DDI/MSN	DMTF	Fax sub address
Special requirements for fax machine on the sender side	None	The 2-stage dialing procedure as described above must be supported.	Fax machine must support Fax Sub Addressing
Special requirements for the telephone line on the receiver side.	It must support DID/DDI/MSN	None	None
Maximum number of digits that can be used for routing	Depends on country of the telephone line. But anyhow the maximum number of inbound digits is typically restricted due to maximum length of the complete number (including DDI/DID/MSN part)	No restriction	Up to 20 digits are supported.

The KCS-specific implementation when [Sending with Fax Sub Addresses](#) differs from KCS-specific handling of Fax Sub Address on the receiver side as described below.

Receive Fax with Sub Addresses

The reception of Fax Sub Addresses will be enabled if the received number ends with a small "s". This means that an appropriate entry in the number conversion table (configuration lines 254 to 283) is required. In that case the number without "s" is used to make the early routing decisions. This means that the following decisions can't be made depending on the received Sub Address.

- Decide if the call should be handled as a Voice or Fax call.
- Decide (according the length of the received number) if the number should be used for inbound reception or as fax server routing command (such as a Scan command).
- Fax User ID and Password for fax server commands.
- The check if the command or inbound number is valid is always done without the sub address.

In other words, the Fax Sub Address should be used for inbound routing only and you should define a valid default receiver for inbound routing. Otherwise, the fax communication may be started and aborted later if the provided sub address is not valid.

Some configuration examples are shown below.

Configuration Example 1

The simplest configuration is shown below:

```
254 '3=s , Do always receive Fax Sub Address
```

It should be used if your telephone line does not support DDI/DID/MSN. In that case the KCS will always receive the Fax Sub Address and use in for inbound routing (using rr99).

Configuration Example 2

The configuration below assumes that you have at least some different DID/DDI/MSN numbers available. In that case you can use the DID/DDI/MSN to decide if the Sub Address should be used.

```
254 '180=T10 ,
```

```
255 '181=s ,
256 '1~==~ ,
```

If you dial extension 80, then you get a DTMF prompt. The entered DTMF Number is then used for input routing or as fax command.

If you dial extension 81, the fax is received with the Fax Sub Address, where the Fax Sub Address is used for inbound routing.

If you dial any other extension, it is used as an inbound number or fax command. Reception of the Sub Address is not enabled in that case.

Inbound

KCS recognizes inbound faxes due to the fact that the number of the incoming number does not exceed a configured value such as 3 (this value can be configured separately for DID and DTMF). All DID/DTMF information with a number of digits exceeding this configured value is treated as a FAX command.

Additionally, an inbound prefix must be defined. If the inbound prefix is set to blank (standard value) no inbound send order is created (The DID/DTMF information will be lost in that case).

Note If no number is entered, the inbound prefix for DID (config line 235) is used.

Inbound faxes are sent to the configured prefix, which is extended by the dialed number. Depending on the configured prefix, two different kinds of inbound functions are supported.

Inbound Distribution via NN99

The inbound prefix is assumed to be ".FX". The maximum inbound length can be set according to your requirements.

Example:

```
Config Line 235/238: '.FX ,
Config Line 236/239: :10 ,
NN99:                FX,DIST:
                    FX123, SMITH:
```

If a fax is received with the dialed number 123, a send order is created with NUMBER=.FX123. According to NN99, this number is resolved to "SMITH".

If this send command could not be accepted (for example, if the abbreviation number does not exist), a retry with the prefix only (".FX") is made. Normally, this number is defined as a distribution user or address of a printer.

If this retry fails again, the line is disconnected. In that case, faxes with an undefined inbound number are not accepted.

The required entries are updated in the NN99 file after changes in the User Profiles with TCfW.

Advantages: Easy to use. Incoming faxes can be distributed to multiple users.

Disadvantages: This solution is not designed for a large number of users. The "System files update" with TCfW is time-consuming. Since entries in NN99 are search sequentially reading the whole file, fax

communication problems may occur with a large NN99 file. Conversion of incoming documents to image formats (such as TIFF) with TC/DC is not supported.

Restriction: Since the length of abbreviation codes is restricted to 8 characters, inbound routing via NN99 cannot be used if the extensions are longer than 6 digits.

Hint: If the distribution user with more than 2 characters length (such as DIST:) is used, it must exist as a user on KCS.

Tip For additional copies of the received faxes (such as on a laser printer or archive system), the receiver for automatic printout of received documents can be used together with inbound distribution.

Inbound Distribution via Routing Directory (rr99)

The inbound routing is controlled by the recipient definition of a KCS user.

The recipient definition is expected to contain at least one active address and optionally, one or more inactive addresses. (The active address will normally be the TOPCALL address; further inactive addresses may be of type FAX, X.400, etc.)

Routing takes place in the inbound section of rr99. If a conversion line has an empty right side and the left side matches, the routing via inactive addresses in the recipient store is called. If there is a match in the recipient store, the first active address from the recipient store is used. If two or more addresses are active, they are taken as alternative addresses in the given order. All services have to be defined in the service store (and not set manually in the **SENDMODES section of system file Arr99).

This kind of inbound routing is activated by default in positions 1 to 4 of configuration lines 235/238 of the fax module. The maximum inbound number length is defined by config line 236/239.

Default configuration:

```
Config Line 235/238: 'FXI$ FXI$ FAX$,
Config Line 236/239: :10 ,
```

Two different configurations are supported. They are distinguished by the format of the proxy address. In the following description, it is assumed that user SM has DID number 39 and the telephone number of (such as E&M) fax line is 661338. Inbound faxes with an invalid DID number should be sent to user DIST. An overview of both methods is provided below.

	Method 1	Method 2
Proxy address of user SM	FXI,39	FAX,661338-39
prefix of services (type of services is fax address)	prefix of FAX = F: prefix of FXI = FXI:	prefix of FAX = F: prefix of FXI = F:661338
Example of routing directory (+MAIL5V\Arr99)	<pre>**SENDMODES **NORMALIZE **ROUTE **NODES **INBOUND FXI:~, , FXI:~,DIST:FaxDID~</pre>	<pre>**SENDMODES **NORMALIZE **ROUTE **NODES **INBOUND F:661338~, , F:661338~,DIST:FaxDID~</pre>
Required memory	Low	High

	Method 1	Method 2
Looping if rr99 is missing or wrong	No	Yes
User profiles compatible with NN99 routing	No	Yes

Whenever possible, method 1 should be used. If inbound faxes with invalid DID numbers should not be accepted, the replacement string "DIST:FaxDID~" is changed to "invalid".

Note

1. The fax address must be inactive for the proper working of the inbound fax routing.
2. The Fax channel used for receiving a fax that should be distributed to an inbound user must have DDI or MSN service activated (UTF/UIF configuration line 252).

See the section on the routing table / inbound routing for more details.

Example of Method 1

(address definition of user "Schmid"):

Active	No.	Service	Number
x	1	INT	SM
	2	FXI	39

The fax module receives a fax and generates a send order with N=FXI\$39.

The number is resolved to: N=FXI:39

Since line "FXI:~," in the inbound section matches, the first address of SM is taken: N=INT\$SM

The final (localized) number is: N=SM:

Example of Method 2

(also working but not recommended):

Active	No.	Service	Number
x	1	INT	SM
	2	FAX	66133839

The fax module receives a fax and generates a send order with N=FXI\$39.

The number is resolved to: N=F:66133839

Since line "F:661338~," in the inbound section matches, the first address of SM is taken: N=INT\$SM

The final (localized) number is: N=SM:

The second example is not recommended because of the following reasons:

1. The complete local number is required to be entered for each user.
2. The extension is not clearly separated from the rest of the number.

3. It uses up more memory for storing the routing information (10 bytes would be necessary for the first example, 16 for the second).

Restrictions (compared with inbound distribution via NN99)

The personal reference "(full name)", which could be accessed with the mask parameter `B`, is not provided.

The old fax router (TCFR) works with the NN99 entries generated by TCfW. It can no longer be used, unless the (otherwise unnecessary) KCS system files update after user profile changes is still done.

It might be necessary to adopt cover sheets. If the originator's address is accessed with a cover variable of the form `$UAddnSERVICE$`, insert the new service and the local number if necessary.

Example:

Change `$UAdd1FAX$` to `+43-1-66133-$UAdd1FXI$`

Advantages: Routing is performed completely in the memory. Since user profiles are directly accessed, an update of system file (NN99) is not required any more.

Disadvantages: Inbound distribution to multiple users is not possible.

Tip For additional copies of the received faxes (such as on a laser printer or archive system) the receiver for automatic printout of received documents can be used together with inbound distribution.

Variable CSI for Inbound Messages

If a sender transmitted a fax to KCS using fax inbound distribution, the CSI (called station identifier) transmitted back to the sender was taken from the fax configuration. This result on the sending journal of the person faxing to KCS was confusing because even though they send to different numbers, the received CSI is always the same.

It is now possible to override the configured number, by defining appropriate entries in the number conversion table (config lines 254 - 283). The new behavior is described below:

1. If there is a conversion line of type 4 (first character equals "4") that matches with the original received number (before conversion), the corresponding replacement string is returned as CSI.
2. The replacement string of type 4 conversion lines may contain the same characters (and wildcards of course) as allowed for TSI/CSI in config line 52. According to recommendation ITU-T.30 only '+', numbers and blanks are allowed in that case.
3. If there is no conversion line (or no match) => the content of config line 52 is used as CSI.
4. As with prior releases, the CSI is empty if a scan or routing command is entered. This made sense, because otherwise the numerical password (8uupp command) could be mirrored as part of the CSI, which would cause security problems.
5. When a DID number is routed to the operator, the dialed extension and not the operator extension is mirrored back.

Example 1

This is a typical example when using E&M lines (number is +31 1 1234 585) for inbound distribution. A received DID extension of 85 will result in a CSI sent as +31 1 1234 585.

KCS should always (even no extension is used), use the dialed fax number as CSI.

```
config line 254 '4~+=+31 1 1234 5~
```

Note As all numbers are matching, the number configured in config line 52 is never used as CSI.

Example 2

This is a typical example when using ISDN with MSN. Depending on the local exchange, it is possible, that no incoming number is received, if the main number (first line in table below) of the line is called.

Dialed number	Received MSN	Inbound send order	CSI
... 6621042	none	FXI\$00	+43 1 6621042
... 6621516	6621516	FXI\$16	+43 1 6621516
... 6621517	6621517	FXI\$17	+43 1 6621517
... 6621518	6621518	FXI\$18	+43 1 6621518
... 6621519	6621519	FXI\$19	+43 1 6621519
... 6621520	6621520	FXI\$20	+43 1 6621520

Configuration:

```
config line 52 '+43 1 6621042
config line 254 '166215~==~
config line 256 '1~=00
config line 255 '466215~+=+43 1 66215~
```

Note If the main number (6621042) is dialed, the CSI is taken from config line 52. The variable CSI can be used with inbound routing via NN99 too.

Server Functions

With release 5.20 and higher, the server functions have been added to the transputer fax module. With these server functions, it is possible to distribute documents that are sent to the KCS system or to request information about documents stored on the KCS system.

The use of the server functions is possible with either DID or DTMF (via PBX or directly) connection. With a DTMF connection, you have to use DTMF-signaling to enter the commands (pulse-signaling is not supported).

The server functions are executed by entering special commands before sending a document to the KCS system. For some commands, it is not necessary to send a document afterwards. Commands are entered by dialing a number into the KCS system.

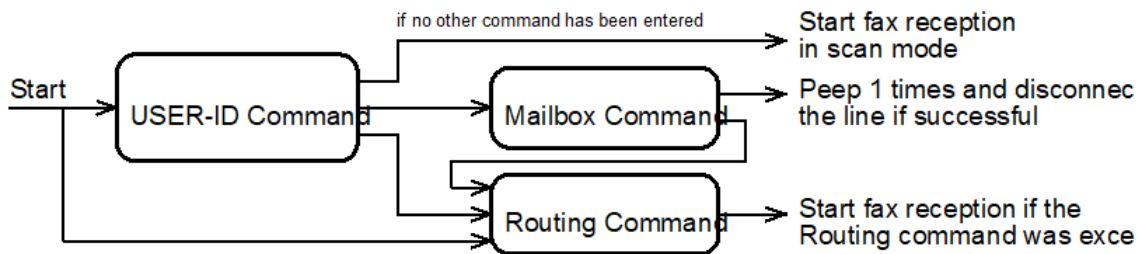
By using these commands, everybody (also external persons) have access to the KCS system. Therefore a list of defined users with password must exist on the KCS system (File uu99 or KCS user profiles). This list must contain an address, where delivery and non-delivery notifications should be sent to (originator-address).

The transputer fax module decides from the length of the entered number if it is a command or an inbound fax that has to be routed in the normal way.

There are three groups of commands:

- Routing Used for message routing.
- Mailbox Used for mailbox showing and text query.
- User-ID Set user identification and password.

Command syntax overview



Meaning of special characters:

*	Only used to separate multiple numbers; otherwise ignored. It can also be used to separate commands.
**	Clear DTMF entry
#	End DTMF entry
a,b,c,d	These DTMF codes are ignored

Explanation:

- If the command is wrong, 3 beeps are sent.
- If the command is OK and a FAX is expected to follow, the FAX prompt will come.
- If the command is OK and no further command is expected to follow, or no FAX is expected, the line is cleared after one beep.
- If the command is OK and a document is requested to be sent immediately (Session reversal), KCS starts sending with CNG ton.

User ID Commands

User-ID command:	8uuuupppp
TCOSS command:	..USER,RC=uuuupppp
Function:	Set user-ID and password uuuu User-ID pppp Password

Note The user ID must be a unique string and only once defined within the user profiles. For this reason, it is recommended to define all user IDs with the same length.

Tip For details, see 'User profile' and the internal command '..USER'.

Fax Scan Command

The command 8 (enter user ID and password) can be used for scanning. If **8uuuuu** (user ID only) or **8uuuupppp** (user ID and password) is entered, the FAX module expects the pages to be scanned for the user with the numerical user-id uuuu. The password must not be specified.

Note The FAX scan command must be longer than the max. length of inbound numbers set in config line 237 or 240.

If the message is received in the scan mode, the first 10mm of the FAX are automatically cut off to avoid the header line which is created by the scanning FAX machine. The pages are sent to the number **+ENVELOP:** with the originator <user ID> (taken from user profiles).

So take care that the user +ENVELOP has to be defined in TCfW as "user"; otherwise, scanned FAX messages are rejected by KCS.

Routing Commands

Command	Function
0nnnnnnn	Send fax to receiver nnnnnn, return only NON-delivery notification.
1nnnnnnn	Send fax to receiver nnnnnn, return delivery and non-delivery notifications.
2nnnnnnn	as 0, High priority.
3nnnnnnn	as 1, High priority.
4nnnnnnn	as 0, Low priority, low tariff time.
5nnnnnnn	as 1, Low priority, low tariff time.

Explanation:

- The parameters 'prefix', 'originator', 'user-id' and 'low-tariff-time' are set according to user profiles. See [Summary About Routing and Mailbox Commands](#) for details.
- If the number within a routing command is shorter than 5 digits, the received document is routed to ".nnnn". This means that short numbers are always treated as an abbreviation number. If the abbreviation number does not exist, the command is not accepted.

Example: It is assumed that the prefix in the user record is "F:+LB"

Routing command	Used NUMBER parameter for routing
01234	N=.1234

266133	N=F:+LB66133
--------	--------------

- If a routing command "0...5" is used, the priority parameter is set accordingly. If low priority is used (command 4 or 5), the sending time is set to "2200" ("low tariff time" field in the user record).

Note This low priority time cannot be changed if the user profiles are directly accessed. It can be changed when using the uu99 file, but all changes are lost if the TCfW updates the system files.

- If you do not want to send low priority faxes at 20:00, you should set the *sending time mapped to low priority* (config line 12) in the fax channel to "2200". In that case, the sending time is chosen according to the *Cost Optimization Feature* (see the *TCOSS TAM Manual* for details.)
- If both mailbox and routing command are used, the priority and delivery notification mode specified by the routing command is used.

Security

The access to the KCS server is controlled by configuration and by the user profile.

Following levels of access can be controlled:

1. User-ID and password entered (command 8)

1a: User-ID and password are correct - fax entry is possible

1b: User-ID and password are incorrect - Clear line or 2:

2. User-ID is taken from term-ID which is the name of the sending FAX

2a: Term-ID found in user profile - fax entry enabled

2b: No match found - Clear line or 3:

3. User-ID is not entered and no term-ID matches Check receiver number in user profile (registered receiver!)

3a: Receiver number found in user profile (registered receiver) - Accept fax for delivery. No notifications are delivered.

3b: No match found - Clear line or send to "FXX" + number (this number can be routed to any number by using the rr99 feature; FXX can be converted within the first part of the rr99 - **SENDMODES).

Note

- 1: and 2: are used from registered users.
- As no other than PBX users can enter fax numbers (because of registered term-IDs), mode 2: is the most recommended one for them.
- If mode 2 is used, the (test-) feature "show transmission parameters in the author field" must not be activated (see *TCOSS Configuration Manual*).
- 3: can be used from any fax if sending is done only to registered receivers.
- The term ID of KCS is left blank to avoid confusion with term IDs on faxes sent.

Mailbox Commands

Mailbox commands always expect the setting of a user ID command before.

Mailbox command: 71

TCOSS command	..C,C=user-channel-group,M=2,N=default-address (only on drive A:) or ..C,C=user-channel-group,M=2,N=prefix-nnnnnnnnnnn
Function	Show mailbox: The contents (list of all documents on drive A:) of the mailbox specified by 'user-channel-group' (note: only the positions before the ':' are used) is sent to the 'default-address' or to any number if a routing command is entered.
Example	8xxxxxx71 or 847110815 71 06613321 | must be a valid routing command (0..5)

Mailbox command: 72

TCOSS command	..RR,OR=user-channel-group,N=default-address (only on drive A:) or ..RR,OR=user-channel-group,N=prefix-nnnnnnnnnnn
Function	Empty mailbox: The contents (all documents on drive A:) of the mailbox specified by "user-channel-group" (note: only the positions before the ':' are used) is sent to the default address or to any number if a routing command is entered.
Example	8xxxxxx72 or 847110815 72 06613321 | must be a valid routing command (0..5)

Mailbox command: 73nnnn

TCOSS command	..S,R=reference-of-files nnnn,N=default-receiver or ..S,R=reference-of-files nnnn,N=prefix-nnnnnnnnnnn
Function	Deliver text nnnn: The text with the reference "reference-of-files" from the user record ('?' characters are replaced by nnnn where the number of '?' and number of 'n' must match) will be sent to the default-address or the any number if a routing command is entered. If multiple documents are requested, all 73er commands must be terminated with '*'. Direct sending of multiply documents is not supported.
Example	8xxxxxx732320 or 847110815 732320 06613321 | must be a valid routing command (0..5) Example for multiply document delivery. 8 47110815 73123 * 733124 * 006613321

Explanation:

- The following parameters are set in the user profile: user-channel-group, default-address, prefix and reference-of-files.
- If an empty number is used with command 71 or 73xxx the requested document is sent immediately without stored send order (session reversal). Example: "81010 71 0"
- Every mailbox command assumes that a correct User-ID command has been entered.

SEQ Kapitel \hLog-File Entries for FIS Documents

Fax commands 8uupp71 or 8uupp73xxx with session reversal (immediate send) are executing a "..2L,R=xxx" command. All these documents can be entered into a separate log file. This log file must be an activated configuration (see log file for examined documents in the *TCOSS Configuration Manual*, configuration parameters for application module).

Note

1. Only reference, date, time and sending channel are entered into the log file. All other fields are set to blanks.
2. All examined documents are entered, even those that could not be sent due to any transmission error.
3. The drive of log file is the same as configured for the sending log file.
4. Automatic sending and cyclic erasure of the new log files is supported.

Example of fax channel configuration:

Config line 16 'JAF,

Config line 17 'A,

1. All send attempts are entered into log file +MAIL5V/AJyymmdd.
2. Documents sent with commands 71 or 73 and session reversal are entered into log +MAIL5V/AFyymmdd.

Configuration

The UserID and password specified with the UserID command (8uupp) are searched either in the "uu99" system file or direct in the user profiles.

UserID and Password from uu99 File

To use this function, positions 6 to 9 of config lines 235/238 must be set to "+ " (= default value). All 8uupp commands directly access the "uu99" system file. In that case, the cost center is not inserted into send orders. The uu99 file must be kept up to date with TCfW.

UserID and Password from User Definition

The following description assumes that Inbound distribution via number normalization is used.

The fax pin code is not selected in the manual fax section of the user profile. For compatibility with the current TCfW release (2.00), the fax pin code should still be entered with the other manual fax parameters, as it is used to display the instructions for scanning an attachment. ("Go to your FAX Machine and send xxxx to nnnn").

The fax pin code may be equal to the fax extension used for inbound routing (case A), or different (case B).

Case A

The fax command prefix of the fax module (new config line) is set equal to the inbound prefix (such as "FXI\$"). The fax extension already defined in the address section of the user profile will then be used as

the fax pin code. All fax addresses of users who work with fax commands must be defined with that same service.

Note Only users with at least one parameter of the group {fax password, FIS prefix, default fax number} set are considered for fax server commands. This means that a user with all manual fax parameters left empty (= default setting) cannot work with fax server commands although a fax extension (= fax pin code) had been allocated for the inbound routing.

The manual fax section of the default recipient for the inbound routing should be left empty, or its fax password set to a value difficult to enter in a fax server command (such as containing letters). This is to avoid that fax server commands with a wrong or no pin code work with the default recipient's user profile.

Case B

A new service (such as "FXC") has to be defined and configured as the fax command prefix in the fax module (such as "FXC\$"). The service is defined with an unused channel group (such as "C:"). The user's fax pin code is now set in the address section of the user profile as an inactive address with this service.

Example: (address definition of user "Schmid", fax extension 39, pin code 47):

Active	No.	Service	Number
x	1	INT	SM
	2	FXI	39
	3	FXC	47

Service FXC prefix definition: "C:"

Restrictions

The address field "full name" will no longer be included in the originator produced by fax server commands.

Summary About Routing and Mailbox Commands

Situation	Command	N=	OR=	CC=	TE=	P=	TIME= (low-, high prior.)
Inbound Send order	//2S	inbound-prefix+xxx					
Scan Send order	//2S	+ENVELOP	UsrName		30300		
Routing with 8xxxx or routing with TSI-match	//2S	prefix+xxx	OrigAddr.	UsrCostc	-x---	0,1,2	Low-tariff-time, -
Routing with matched number	//2S	prefix+xxx	OrigAddr.	UsrCostc	-x---	0,1,2	Low-tariff-time, -
Routing without uu99	//2S	FXX+num			-x---	0,1,2	Low-tariff-time, -
8xxx+71	//2C,M=3,C=UsrChan	DefAddr.	OrigAddr.	UsrCostc			
8xxx+72	//2RR,C=UsrChan	DefAddr.	OrigAddr.	UsrCostc			

Situation	Command	N=	OR=	CC=	TE=	P=	TIME= (low-, high prior.)
8xxx+73xxx	//2S,R=xxx	DefAddr.	OrigAddr.	UsrCostc			
8xxx+71+0xxxx	//2C,M=3,C=UsrChan	prefix+xxx	OrigAddr.	UsrCostc	-x---	0,1,2	Low-tariff-time, -
8xxx+72+0xxxx	//2RR,C=UsrChan	prefix+xxx	OrigAddr.	UsrCostc	-x---	0,1,2	Low-tariff-time, -
8xxx+73xxx+0xxxx	//2S,R=xxx	prefix+xxx	OrigAddr.	UsrCostc	-x---	0,1,2	Low-tariff-time, -
Notes			2	2	3		2

Note 2) If the UsrOrig, UsrCostc or Low-tariff-time field in the user record is empty, the corresponding parameter is not used in the command.

3) "x" in the termination parameter is replaced by "2" for routing command 0,2,4 and "3" for commands 1,3,5. "-" means that this position of the termination parameter is taken from the configuration.

Example

Configuration: Standard configuration with DTMF, no password required, TSI need not match, number match not required.

The following uu99 file is assumed:

```
4711\0815\LANIK\+43-1-66133-21\F:004316613321\F:0043166133815\F:+OB\2200\C2:Lanik
\TF????
3837\277\Theiner\022266133-13\03:LAN(THEINER)\F:0043166133815\F:+OBH\2200\C3:\TF????
0000\\02226613323\NO
\\00416168????\F:+OBH\2200
```

The following rr99 file is assumed:

```
**SENDMODES
FXX0041~,F:BH0041~, every fax can send to 0041..
**NORMALIZE
**ROUTE
**NODES
```

1. A Fax machine with the terminal-id "002266133-13" routes a fax to number "02226613321". The non-delivery notification is sent to "03:LAN(THEINER)" (2nd line of uu99).
dial DTMF: 00226613321#
2. Send fax to number "02226613321" as user 4711 with password 0815, return only non-delivery notification (1st line of uu99).
dial DTMF: 847110815*00226613321#
3. Send contents of mailbox from user 4711 to the default receiver (1st line of uu99).
dial DTMF: 847110815*71#
4. Send contents of mailbox from user 4711 to number 6613321 with high priority, send delivery or non-delivery notification to "004316613321" (1st line of uu99).
dial DTMF: 847110815*71*3004316613321#

5. Send text TF0066 from user 4711 to number "02226613321", return only non-delivery notification (1st line of uu99).
dial DTMF: 847110815*730066*00226613321#
6. Send fax to number "004161681234" with an unknown term-id. Delivery or non-delivery notifications is never sent because no originator is specified in the user record (4th line of uu99).
dial DTMF: 0004161681234#
7. Send a fax from a fax machine with terminal ID "02226613323" to number "004316613321" with low priority; return only non-delivery notification (3rd line in uu99).
dial DTMF: NOT POSSIBLE !
8. Following command has been entered:
dial DTMF: 00418152745 Sending is possible because a send command to "FXX00418152745" is generated which is converted within the rr99 to the receiver number "F:BH00418152745".

DID Protocols

The following DID protocols are supported:

1. E&M protocol: Seizure acknowledge (requires TS32 + standard TS2Z or TC20/TC31)
2. E&M protocol: wink start / delay dial (requires TS32 + standard TS2Z or TC20/TC31)
3. E&M protocol: immediate start (requires TS32 + standard TS2Z or TC20/TC31)
4. E&M protocol: BELL DID (requires TS32 + modified TS2Z or TC20/TC31)
5. Sopho DID protocol (requires TS29 + TS2X). In this configuration the PBX sends the DID digits right before the ringing signal. A normal TS2X interface can be used.

Refer to the *TCOSS Configuration Manual* for more details about DID protocols.

Transputer Fax Interfaces

TS29 with TS2X	This hardware combination supports 1 a/b line (connected to public line or PBX) and one transputer link (fast link or laser printer). The local printout on a fax machine is also supported.
TS29 with TS2Z	This hardware combination supports 1 E&M line (connected to PBX) and one transputer link (fast link or laser printer).
TS32 with TS2Z	This hardware combination supports 2 E&M lines (connected to PBX) and one transputer link (fast link or laser printer).
TS32 with TS3Y	This hardware combination supports 2 a/b lines (connected to public lines or PBX) and one transputer link (fast link or laser printer).

TC20 based interfaces:

The TC20 is the base module of a modular fax interface solution for PC ISA-Slots. The TC20 Quad Line Processor Board is used to connect TC Model 2xx via analog, E&M or ISDN Line Interface modules to PSTN respectively to PABX.

On the TC20, two of the following line interface modules can be located in any combination:

1. TC31 E&M Analog Modem with two fax modem chips and E&M interface
2. TC32 Dual Analog Modem with two fax modem chips and two analog line interfaces
3. TC33 Dual ISDN Analog Modem with two fax modem chips and one ISDN S0 interface

Note TC20 interfaces are not supported on TC Models/125 and 145.

Number Conversion Facility

*)	<p>The UTF/UIF can modify any incoming number (via DID, DDI, DMTF) with a configured number conversion table before it is interpreted as inbound number or command.</p> <p>Some typical applications of this feature:</p> <ul style="list-style-type: none"> • Removing some unwanted characters at the beginning or end of number that may be sent by some PBXs • Abbreviations of often used commands • Implementation of a numbering plan for incoming DID or DDI number. Then KCS may answer an incoming call immediately after the received number is complete without falling into a timeout.
*)	<p>The reception of DID/DDI or DTMF digits is completed in one of the following cases:</p> <ul style="list-style-type: none"> • A "#" digit with DTMF or a sending complete info element with ISDN has been received. • A match with search string in the number that do not ends with "" occurs. • Timeout occurs. <p>The received number is searched in the conversion table beginning with the first line. If a match is found, the number is converted according to the specified replace string and all further lines are ignored. If no match is found, the number remains unchanged.</p>
*)	<p>If the incoming number is converted to a number starting with "T", an additional DTMF input prompt is used. If there is a numeric value after the "T", it is taken as a DTMF input timeout in seconds. Otherwise, a 10s timeout is used. This feature is dedicated to be used for installations with DID, DDI or MSN where the number length is limited. (A DTMF prompt can be activated with a specific extension.)</p>
*)	<p>If the incoming number or the caller Id is converted to a number that ends with "<T>", this "<T>" is detected is the option to activate the binary trace for the current call. This features is useful for activating binary traces for some specific originators or recepients only. It has no effect to the functional operation of the channel.</p>
*)	<p>If the incoming number or the caller Id is converted to a number that ends with "s", this "s" is used to enable reception of fax sub address information.</p>
*)	<p>An Outgoing number can be converted. This conversion is done with the number part of the receiver. It may include a '1' character for internal numbers and the numerical value for the cost center (automatic inserted if an '%' is found in the number). It do not contain the channel, send options and answerback.</p>

Syntax of number conversion line:

```
<number type> + <search string> + '=' + <replace string>
```

<number type>	<p>1 character that specifies the type of incoming number for which the conversion should be used. This allows a different handling of numbers received from different sources. The following values are allowed.</p> <p>'1' line is valid for DID or DDI numbers only</p> <p>'2' line is valid for DTMF numbers only</p> <p>'3' line is valid for DID/DDI and DTMF numbers</p> <p>'8' line is valid for outgoing calls only</p> <p>'@' converts the received called ID (may include the number type switches "I", "TI" or "TN") before it is used as originator or for originator based routing</p> <p>'A' Redirecting number conversion Rule</p> <p>'C' Outgoing caller ID (Calling Party Number) conversion Rule</p> <p>'L' Used for loop detection with call rerouting numbers</p>
<search string>	<p>If the number type is ok, then the number is compared with the search string. It may contain '?' or '*' as wildcard characters. The number of wildcards is not restricted.</p> <p>'?' replaces any single character</p> <p>'*' replaces a variable number of characters (or none). If it is followed by any character sequence (until '?', '*' or '=') all characters until the sequence are matched by the '*'. If the following sequence does not occur in the number the compare will be continued with the next number conversion line. '?' or '*' immediate after '*' is not allowed.</p>
<replace string>	<p>May be any character sequence without restriction. The matched parts of the search string are inserted at the '?' of '*' position in the replace string. (the nth wildcard in replace string is replaced by the nth matching part of the search string).</p>

Example:

Assume the following number conversion table:

```

'1~AD#~=                               , get DID/DDI numbers if within "A" and "D#"
'1199=T                                 , generate DTMF prompt for DID number "198"
'11??=??                               , inbound message for user '??' (DID reception
                                     will be completed after the 3rd digit)
'18??=8??                               , Scan command for user '??'
'^1~=                                   , all other DID/DDI numbers remains unchanged
'2~A=80000*0*73~                       , Use DTMF command Axxx for immediate sending
                                     of text xxx
'80~0=0~0#                             , PABX needs # after every internation number

```

*)	DID number "A1234D#" is converted to "1234"
*)	DID number "199" activates an additional DTMF prompt.
*)	DID number "142" is converted to "42" (reception starts after the 3rd digit without delay).
*)	DID number "1234" remains unchanged
*)	DTMF number "A100" is converted to "80000*0*73100" (immediate sending of text 100)

Note See description of ISDN fax module for installations with DDI or MSN.

Example of Numbering Plan

Definitions:

uu	2-digit numerical user ID of KCS User. Used as Inbound code and Fax PIN code in 8xxxx command. range: 10 .. 69, 90 .. 99
pp	Password (variable length is possible but not recommended)
nn	2-digit abbreviation number (range: 10..99)
nnn	3-digit abbreviation number (range: 100..999)
fff	3-digit FIS folder document number (range: 000..999)

Numbering plan:

Number	Function
00	Activate DTMF prompt for further input (DTMF input is not converted)
0nn ¹⁾ 0nnn	Can be used from fax machines with a registered terminal ID (in uu99) to route faxes to abbreviation number ".10" to ".999".
10 .. 69	Inbound fax for user "10" to "59"
70 .. 72	Reserved
73fff	Get document "fff" from FIS folder (session reversal)
74uu	Scan a document for user "uu"
75 .. 79	Reserved
8uupp xxx ¹⁾	Enter any KCS command starting with User Id/Password command (such as 84242 => Scan command; 84242 73123 06613321 => send FIS document "123" to fax number "6613321")
88xxx ¹⁾	Enter any KCS server and routing command "xxx" without restriction, such as 88 84242 71 => show mailbox content)
90..99	Inbound fax for user "90" to "99"

1) The end of the number is detected by timeout.

UTF or UIF configuration

```

235 'FXI$ FXI$ FAX$,
236 :02 ,
237 :00 01 01 ,
238 'FXI$ FXI$ FAX$,
239 :02 ,
240 :00 01 01 ,

254 '100=T15
255 '10???=0???
256 '10??~=0??~
257 '173???=8000073???*0
258 '174??=8??
259 '188~=~
260 '18~=8~
261 '1??=??
262 '
263 '

```

Note Config line 256 is used for proper working of "0nn" commands (otherwise, "0n" would be handled as an inbound number by config line 261).

uu99 File

The terminal ID of faxes that can use the 0n .. 0nnn commands, must be registered in the uu99 file as shown below:

```
\\SU:\+43166133838\SU:Monika Schuberth\\FAX$
\\XX:\+43166133800\XX:Testfax\\FAX$
```

User Profiles:

A special user with Fax PIN code "00", password "00" and reference of files = "IS???", is used for the FIS command "73fff".

All other users are defined with an inactive address using service "FXI" and her fax PIN code.

Example:

Scan commands can be entered as:

1. 74uu (recommended)
2. 8uu or 8uupp (compatibility with old syntax)
3. 888uu or 888uupp
4. 00 => wait DTMF prompt => enter 8uu or 8uupp

Example of Outgoing Number Conversion

All fax numbers without the "I" switch and a length of up to 4 digits should be handled as internal numbers.

Configuration:

254 '8I~=I~ ,	Do not change numbers with I switch
255 '8????~=????~ ,	This is an external number (4 digits or more)
256 '8~=I~ ,	Insert 'I' switch

Conversions:

```
I234 => I234
234 => I234
2345 => 2345
```

Extended Fax Number Conversion Table

The number conversion table, which is defined by configuration lines 254 - 283, has been enhanced to use up to 10 different named variables for replacement. With this enhancement it is possible to:

- Skip variable parts of the number
- Use any variable part more than one time

- Change the order of variable parts

To use this feature, the syntax "[~n]" must be used instead of "~" (and "[?n]" instead of "?"). "n" represents any number between "0" and "9" (=variable name). The variable parts are inserted in the generated string at matching variable names as shown in the following example.

Example:

Conversion Rule (x=Type)	Before conversion	After conversion	Hint
x12[~1]555=12	123456555	12555	Variable part is removed
x12[~1]555=[~1]0[~1]	123456555	345603456	Use variable part multiple times
x[~1]%00[~2]=[~2]#[~1]	1234%005678	5678#1234	Change the order of variable parts

The old functionality with used just "~" or "?" is still available. The new feature is not available for TSxx interfaces.

Number Conversions Overview

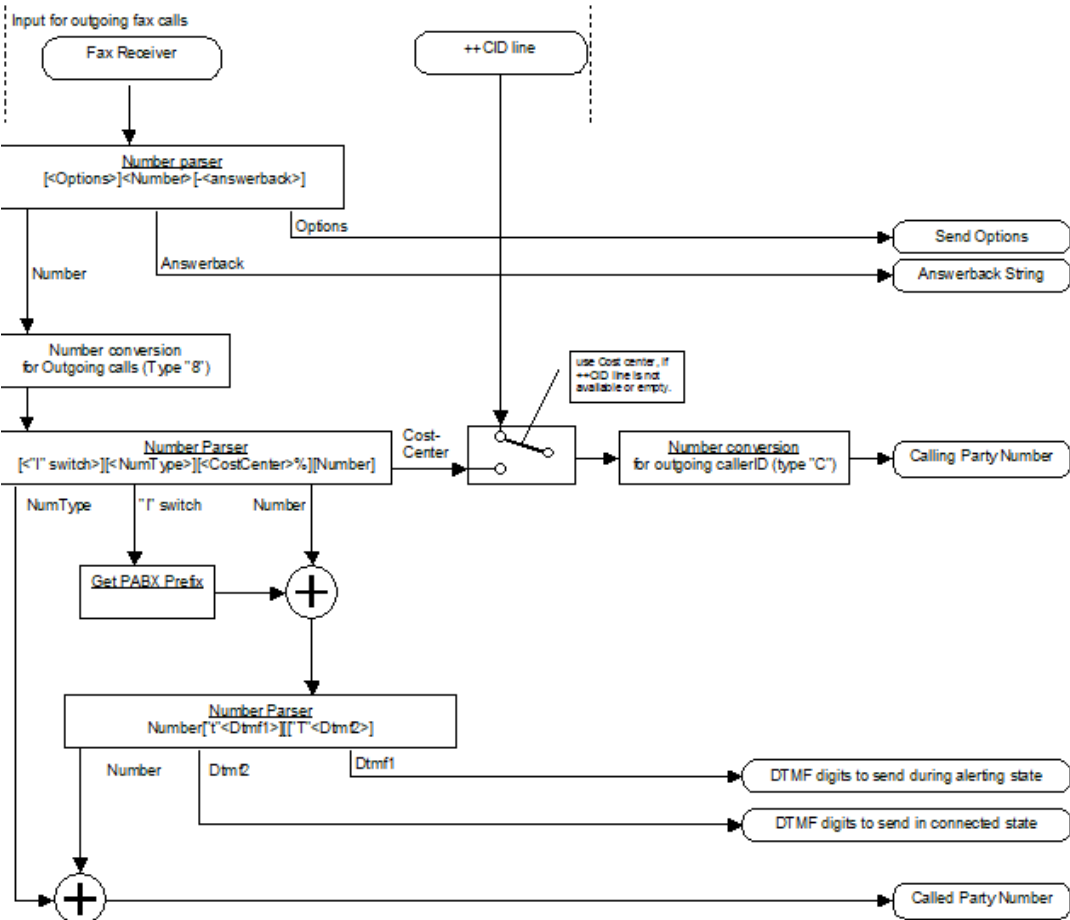
The description is splitted into the different scenarios.

- Fax transmission
- Outgoing voice call
- Fax reception (such as inbound Fax) or incoming voice call.

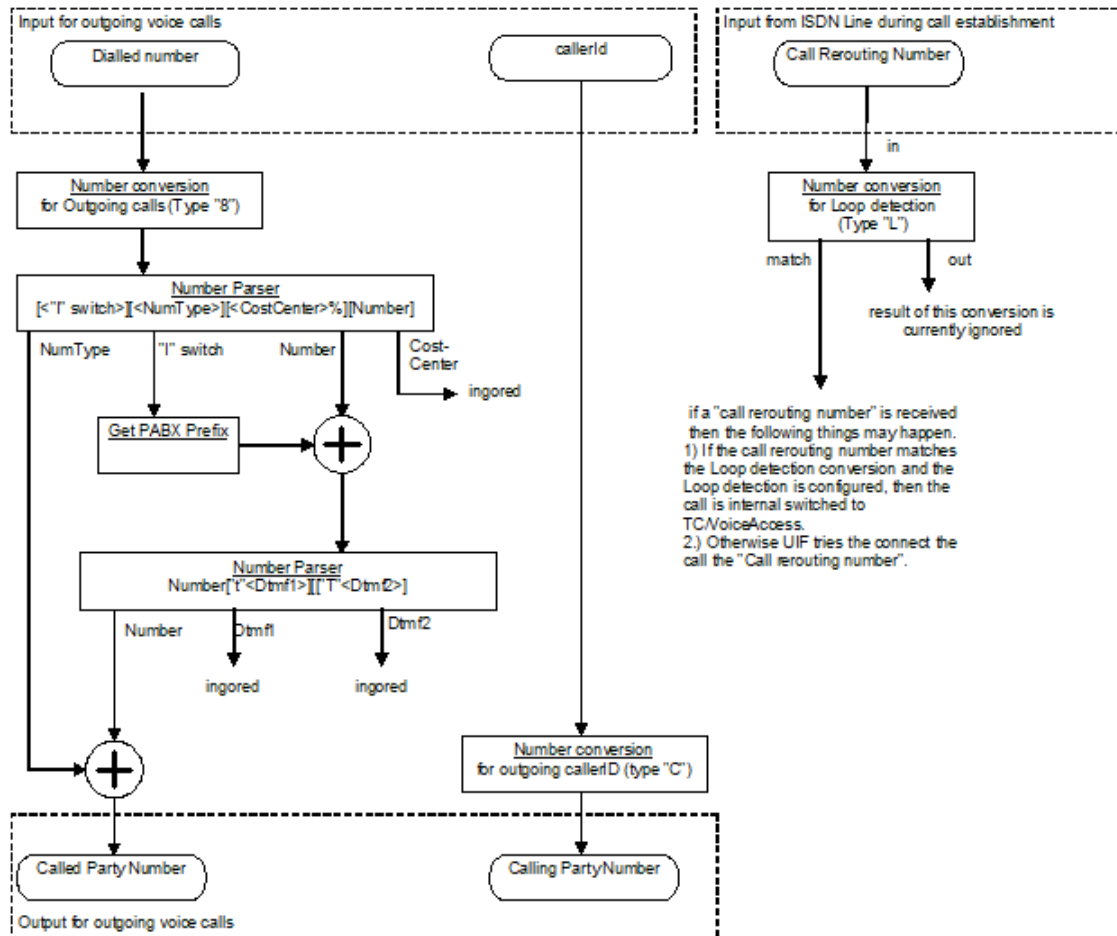
The table gives you an overview about all conversion types supported by the fax number conversion table (see description of configuration lines 254 to 283 in the *TCOSS configuration manual*).

Number Type	Conversion is used for
'1'	Received DID/DDI or MSN number
'2'	DTMF input
'3'	DID/DDI/MSN number and DTMF input. (It has the same effect as one line with type "1" and the same line with type "2")
'4'	Conversion of DID/DDI/MSN or DTMF number to fax CSI (Called Station Identification)
'8'	Outgoing fax or voice numbers
'@'	Calling party number (for incoming calls)
'A'	Redirecting number (for incoming calls)
'C'	Calling party number (for outgoing calls)
'L'	Call Rerouting number (for Loop detection with outgoing calls)

Fax Transmission

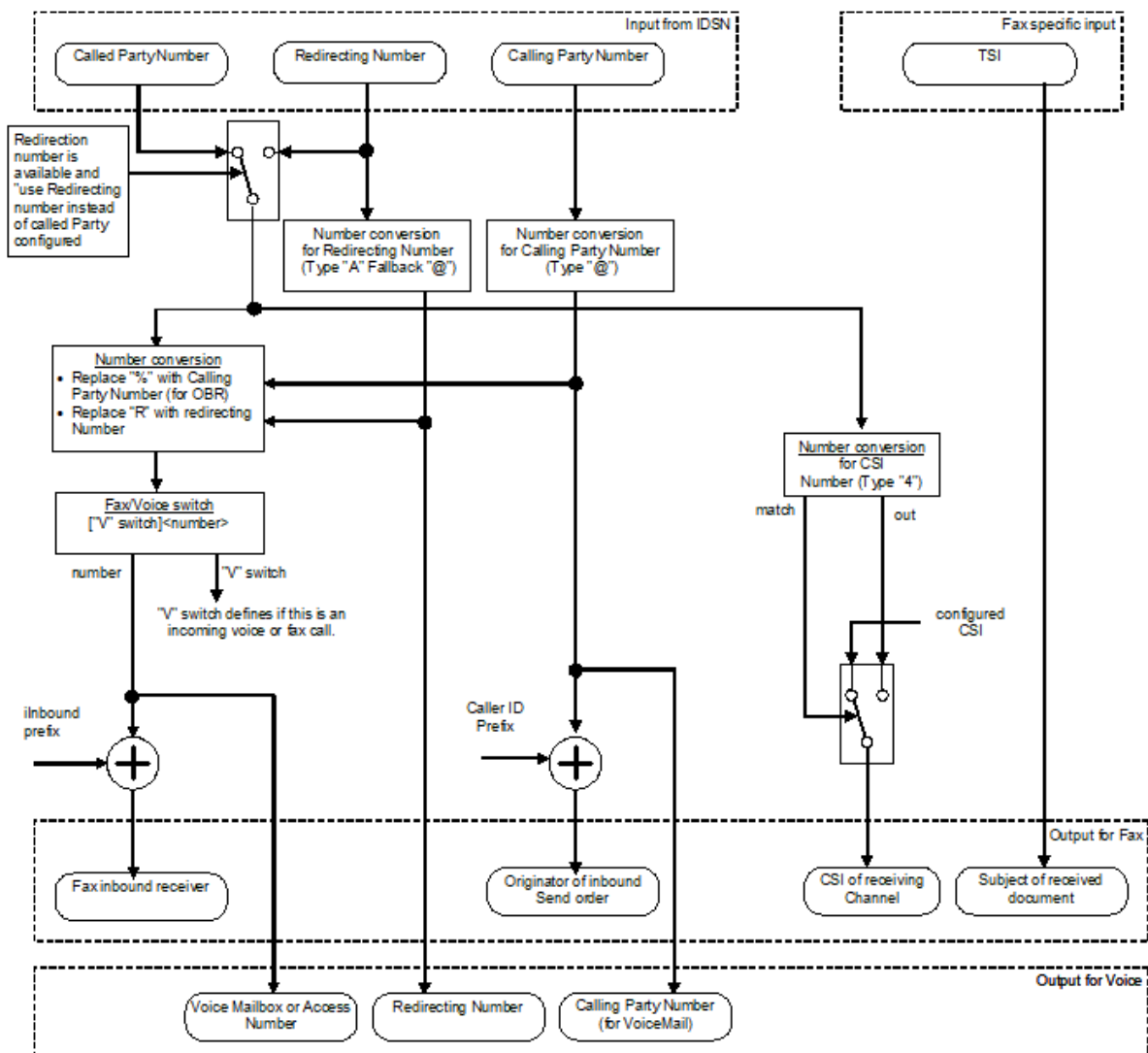


Outgoing Voice Call



Note It is assumed that Fax PABX prefix (configuration lines 131 to 133) are used for outgoing voice calls. This has to be enabled by setting position 2 of configuration line 295 to 01.

Fax Reception or Incoming Voice Call



Note Optional DTMF input is shown in the drawing above.

Logging of Calls (Enh. 8908, 9317 and 12910)

In earlier versions, sometimes an incoming call would not create a log entry in the short-term archive. This would then lead to missing information, such as when using TC/Report for statistics. These cases are described below:

1. Case 1: Incoming fax call (such as to fax inbound number) if no fax connection is established. This used to happen if an inbound number was dialed via telephone.
2. Case 2: Any mailbox command (7x such as FIS service) was used.
3. Case 3: The call is handled by TC/VoiceAccess.

Since version 7.47.04, the TCOSS fax module can generate user-defined log entries for all incoming calls. Since version 7.68.00, logging of outgoing calls has been added. The main reason for using log entries is to provide information that can be used by TC/Report for customer-specific reports. But since these log entries can be viewed with TCfW, they may even be used without TC/Report to provide more information about incoming calls for technicians or administrators. A sample output from TCfW is shown here.

Source	Logging Time	Type	Performance count...	Performa...	Performanc...	Performance counter /...	Performance counter /...	Performance...	Performance counter /...	Performance...	Performance...
11	FAK 10.12.2002 20:22	Fax In	Result = 'Ok (Rx)'	Ch = '10'	Duration = 28	Called = '142'	Caller = '80'	User = 'HR'	FaxId = '*111111111111'	Pages = 1	FaxEC = '00'
11	FAK 10.12.2002 20:19	Fax In	Result = 'Ok (Rx)'	Ch = '10'	Duration = 28	Called = '142'	Caller = '80'	User = 'HR'	FaxId = '*111111111111'	FaxEC = '00'	
11	FAK 10.12.2002 20:16	FIS Command (SR)	Result = 'Ok (Tx)'	Ch = '10'	Duration = 45	Called = '8142p731230'	Caller = '*4318635340'	User = 'HR'	Reference = 'F:IS123'	FaxEC = '00'	
11	FAK 10.12.2002 20:16	FIS Command (SR)	Result = 'Ok (Tx)'	Ch = '10'	Duration = 35	Called = '8142p731230'	Caller = '*4318635340'	User = 'HR'	Reference = 'F:IS123'	Pages = 1	
11	FAK 10.12.2002 20:14	Fax In	Result = 'Ok (Rx)'	Ch = '10'	Duration = 36	Called = '142'	Caller = '80'	User = 'HR'	FaxId = '*111111111111'	Pages = 3	
11	FAK 10.12.2002 20:07	FIS Command (SR)	Result = 'Ok (Tx)'	Ch = '10'	Duration = 42	Called = '8142p731230'	Caller = '*4318635340'	User = 'HR'	Reference = 'F:IS123'	FaxEC = '00'	
11	FAK 10.12.2002 20:06	FIS Command (SR)	Result = 'Ok (Tx)'	Ch = '10'	Duration = 35	Called = '8142p731230'	Caller = '*4318635340'	User = 'HR'	Reference = 'F:IS123'		

Description of Log Entries

The log entries are primarily characterized by the type of incoming call (field "Type") and its success (field "Result"). The content of these fields can be used as filters to flexibly adjust which log entries should be created. See [Configuration](#) for more details about filters.

The result value gives basic information about the success of an incoming call. Its values are shown in the table below.

Result	Description
Error	Error in command, password, userid, ...
No Fax	Fax machine at distant side was expected, but not found.
Ok	A Command that does not require communication with a fax machine executed correctly.
Ok (Tx)	This is the positive response for any session reversal command or outgoing fax call. A connection to the distant fax machine could be established. The result of the transmission can be found in the fields "FaxEC" and "Pages".
Ok (Rx)	At least an empty reception document is created. In that case, an entry in the incoming journal (if configured) is created. The result of the reception can be found in the fields "FaxEC" and "Pages".

The table below lists all possible types with its possible result values.

Type	Description of type	Result	What happened / Error
Fax In	Fax (with or without inbound received).	Error	What happened / Error
		No Fax	Wrong inbound number
			No inbound or inbound number ok, but no sending fax machine.
		Ok (Rx)	Reception file is created
Fax Routing	Receive a fax and forward it as routing command	Error	Error in destination number
		No Fax	UserId, Password and Command is correct, but no sending fax machine
		Ok (Rx)	Reception file is created

Type	Description of type	Result	What happened / Error
Fax Scan	Scanning a document	No Fax	Correct Scan command, but no sending fax machine
		Ok (Rx)	Reception file was created
Fax Command	Mailbox commands 71 (without session reversal) or 72	No Fax	Wrong UserId, Password or command syntax
		Ok (Tx)	Successful Mailbox command
Fax Command (SR)	Show Mailbox command (71) with session reversal	No Fax	No fax machine detected
		Ok (Tx)	Mailbox content send to connected fax machine
FIS Command	73xxx command with destination number	Error	Wrong Text number. Error in destination number
		Ok	Send command created
FIS Command (SR)	733xxx command with session reversal	Error	Wrong Text number.
		No Fax	No fax machine detected
		Ok (Tx)	Text send to connected fax machine
Voice In	Call handled by TC/VoiceAccess	Ok	Currently no further error information is implemented.
Fax Out	Ongoing Fax Call	Ok (Tx)	Connected to fax machine could be established
		Ok	Operation completed without connection to distant fax
		Error	Connection to fax could not be established
Voice Out	Outgoing voice call	Ok	No further information is available

If the CalledId (DDI/DID or DTMF number) contains an 8uupp command, the following rules are applied to keep the numerical password private.

- a) If UserId and password are correct, then the password is replaced by a single "p" character.
- b) If UserId or Password are not correct, the CalledId is set to "wrong user or password".

If the UserId or Password in a 8uuuppp command is wrong, it is not possible to interpret the following command. In that case, the Type "Fax Command" is assumed. This can mean, for example, that an invalid FIS or routing command is interpreted as the wrong fax command.

Each log entry may have parameters as shown in the table below.

Field	Type	Description
Source	String	Fixed set to "FAX".
Date/time	Date	End Date/time of connection.
Type	String	Type of incoming fax connection. See extra table above.

Field	Type	Description
Result	String	Basic information about the success of the incoming call. Possible values are described in an extra table above.
Ch	String	TCOSS Channel number.
Duration	Integer	Duration of connection in seconds. With outgoing calls, this value includes the call setup and alert time.
LocalNumber	String	Local number used for the outgoing call without channel number, mask and send options (but including number type, answerback verification).
Called	String	Call DDI/DID/MSN or DTMF number after incoming number conversion.
Redirect	String	Redirecting number (after incoming number conversion). This field appears if the call is redirected by the number "Redirect". The redirecting number is typically used to forward voice calls to KCS Voice/Access.
Caller	String	Caller number (DDI/DID or DMTF after incoming number conversion) if available.
User	String	User ID from 8uu command in inbound user id. When using inbound fax in an ASP system, this field is filled with the user ID from the selected storage server.
Reference	String	Name of file that is sent/received.
FaxId	String	Fax Called Station Identification (if available)
Pages	Integer	Number of successfully received pages or confirmed transmitted pages. If case of reception errors, the additional appended break page is not counted.
FaxEC	String	2 digit Fax error code

The parameters are always created in the sequence shown below, but parameters Duration, LocalNumber, CalledId, User, Reference, Pages, FaxId and FaxEC are only optional. If the content is not available or empty, it is not stored in the log entry.

The logging function uses the //LOG command described above. In the very unlikely case that the maximum line length is exceeded, some parameters (from the bottom of the table below) are discarded without an error message.

Additional Notes:

- Log entries are created by the fax module (running on TC22 or TC20) after closing the connection. In case of fatal errors (due to power failure, shutdown, node reboot, crash), the log entries for the current active connection are not created.
- In an ASP system all log entries are created on the media server. This allows easier creation of line usage statistics in an ASP system.
- Fax Log entries are supported by TC20 based fax and Line Server Model 305 only. They are not supported by TSxx based fax cards (=TCOSS_TS).
- The fields Caller, Redirect and Called contain the number after conversion through the number conversion table. In the case of incoming voice calls, the called field contains the leading "V" character.

Configuration

By default, no logging entries are generated by the fax module. The content of the Type and Result field can be used as a filter to adjust which log entries should be created. Note that **both filters must match** in order to create a log entry.

Configuration Line 296

Position	Meaning	
1	Type filter for logging entries (incoming calls) The Type filter is a set of bits. One bit is received for each type value described above. If the corresponding bit is set, Logging entries with that type are possible.	
	bit 0: filter for type	" Fax In"
	bit 1: filter for type	"Fax Routing"
	bit 2: filter for type	" Fax Scan"
	bit 3: filter for type	" Fax Command"
	bit 4: filter for type	" Fax Command (SR)"
	bit 5: filter for type	" FIS Command"
	bit 6: filter for type	" FIS Command (SR)"
	bit 7: filter for type	" Voice In"
2	Type filter for logging entries (outgoing calls) The Type filter is a set of bits. One bit is received for each type value described above. If the corresponding bit is set, Logging entries with that type are possible.	
	bit 0: filter for type	" Fax Out"
	bit 1: filter for type	"Voice Out"
3	Result filter The Result filter is a set of bits. There is one bit for each result value described above. If the corresponding bit is set, Logging entries with that result value are possible.	
	bit 0: filter for result	" Error"
	bit 1: filter for result	"No Fax"
	bit 2: filter for result	" Ok"
	bit 3: filter for result	" Ok (Tx)"
	bit 4: filter for result	" Ok (Rx)"
	bits 5-7	Reserved for future result values

Example for position 1 & 2

00 00 means that no log entries are generated (=default)

40 00 means that only FIS calls with session reversal may generate log entries.

FF 00 means that all incoming calls may generate log entries.

FF 03 means that all fax/voice calls may generate log entries.

Examples for position 3

00 means that no log entries are generated. (=default)

0F means that all incoming calls, that does not create a reception document should be logged.

FF means that all result values may generate log entries.

Examples

The table below shows you some recommended configuration examples.

Config line 296	Description
:00 00 00 ...	No logging. This is the configuration default.
:68 00 FF ...	Log all FIS commands and Fax Commands. This is useful to get a complete statistic of FIS access including those with the wrong UserID or password.
:FF 00 17 ...	Log all incoming calls that do not lead to a reception document. This is useful to get a complete line static with TC/Report with a minimum number of log entries.
:FF 00 FF ...	Log all incoming calls.
:FF 03 FF ...	Log all incoming and outgoing calls

Transputer Fax Error Codes

X0	Call collision in layer 7	1	1
X1	Attempt to send an empty document	5	5
X2	Error when opening back-received file	5	5
X3	Error in back reception	5	5
X5	Error during reception	y)	y)
X8	At least one received page has not been confirmed	y)	y)
X9	Failed to send chained document (G send switch)	2	1
XA	Call collision in layer 6	1	1
XB	Data error within TCI-block	5	5
XC	Form buffer is out of memory	5	5
XE	Error during 2nd dial stage with DMTF	3	3
XG	Receiver not ready timeout	4	4
XF	No answer from the distant station	2	1
XH	Line occupied by local telefax unit	1	1
XI	Error in selection number	5	5
XJ	No dial tone	2	1
XK	Answer back mismatch	5	5

XL	No answer from distant telefax	5	1
XM	Illegal identification of called station	4	1
XN	Illegal response during training phase	4	1
XO	Three learn attempts unsuccessful	4	1
XP	Illegal page confirmation	4	1
XQ	Page transmitted incorrectly	4 ¹⁾	4 ¹⁾
XR	Illegal frame received	4	1
XS	Unable to find appropriate baud rate	4	1
XT	No response received	4	1
XU	Busy or no dial tone on PBX connection	2	1
XV	Unexpected end of document	y)	y)
XW	Too many line distortions at training sequence	y)	y)
XX	Illegal identification received	y)	y)
XY	No command received	y)	y)
XZ	Illegal command received	y)	y)
Y0	The receiving fax machine does not support fax sub-addresses	5	5
Y1	The specified fax sub address is too long (a maximum of 20 digits are allowed)	5	5

1) break code for transmission
2) break code for extended dialing mode (switch x)
y)...error code for reception only

1) Fax channels on TC29/32/33 hardware uses break code 3 instead of 4 if error XQ occurs.

User module for ISDN FAX (UIF)

Since most parts of UIF are the same with UTF, they are described with UTF. This section covers the ISDN-specific functions only.

Overview

ISDN is a completely digital network that can provide both voice and data services to a user.

ISDN comes from analog telephone network as its transmission and switching parts have made the move from analog to digital technology.

ISDN Standards

Defines the interface between the *user* and the *network*. A *true ISDN* offers services in conformance with these standards to ensure compatibility with different vendors, ISDN terminal equipment. On the other hand, the fact that a network would offer integrated voice and data services does not necessarily imply that it is ISDN.

ISDN Standards Organizations

This section describes ISDN standards organizations.

CCITT (ITU) Standards

The first set of recommendations (I-series) was published in 1984 (Red Books) under the direction of Study Group XVIII (Digital networks include. ISDN) , CCITT. Updated to Blue Books in 1988.

Organization of CCITT I-series ISDN recommendations:

I.100 General ISDN concepts/Structure of I-series/Terminology/General Methods

I.200 Service aspects

I.300 Network aspects

I.400 User-network interface aspects

I.500 Internetwork interfaces

I.600 Maintenance principles

As also some other study groups of CCITT participated in the ISDN standard process, several I-series recommendations are also assigned Q-, X- or other series. For example, Q.931 and Q.921 series for ISDN signaling on the D-channel.

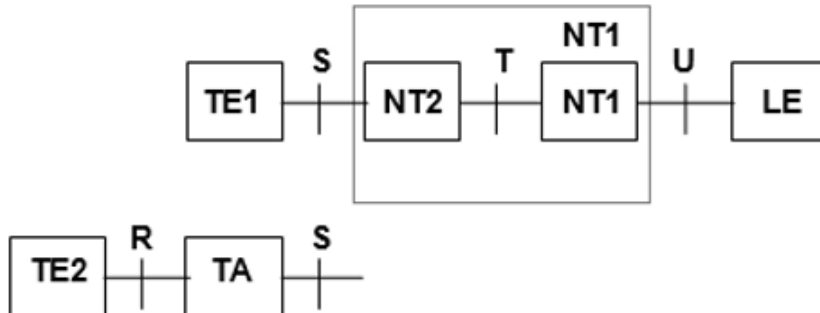
ETSI (European Standards)

On 6.4.1989 the *Memorandum of Understanding on the Implementation of European ISDN Services by 1992* was accepted, where the most European PTT's declared to implement the ISDN based on European standards since the end of 1993.

European standards are *ETS* (*European Telecommunication Standard* recommendations created by *ETSI* (*European Telecommunications Standard Institute*).

Generally, they are based on CCITT/ITU recommendations, most important are described in subsequent sections.

ISDN Functional Devices



- LE: ISDN local exchange
- NT1: Network termination type 1 represents the termination of the physical connection between the customer site and the LE.
- NT2: Network termination type2 provides customer site switching, multiplexing and concentration, which includes for example, PBX. NT2 can be absent (for example with the basic access without PBX).
- NT12: One device performing NT1 (local loop termination) and NT2 (customer site switching) functions (for example PBX).
- TE1: Terminal equipment type 1 are those devices that use the ISDN protocols and support ISDN services (for example, ISDN telephone).
- TE2: Terminal equipment type 2 are non-ISDN devices (such as analog telephone).
- TA: Allows non-ISDN devices to use the network; converts conventional analog protocol (a/b) to ISDN protocols.

ISDN Reference Points

The ISDN reference points define the communication between the different functional devices. Different protocols may be used at each reference point.

There are three reference points commonly defined for ISDN by CCITT (ITU), called R, S and T. Since the CCITT recommendations do not address internal network operations, the connection between NT1 and LE is being referred to as *transmission line*. On the other hand, the US Federal Communications Commission (FCC) considers the local loop (NT1 - LE) as being the user-network interface and that is why the ANSI described it in a public standard as the U reference point.

R	Reference point between non-ISDN terminal equipment (TE2) and a terminal adapter.
S	Reference point between the ISDN user equipment (TE1 or TA) and the network termination NT1 or NT2.
T	Reference point between customer site switching equipment (NT2) and the local loop termination (NT1). In the absence of NT2, the user -network interface is usually called the S/T reference point. S and T reference points are physically identical.
U	Reference point between NT1 and LE, in CCITT referred to as transmission line.

ISDN Channels

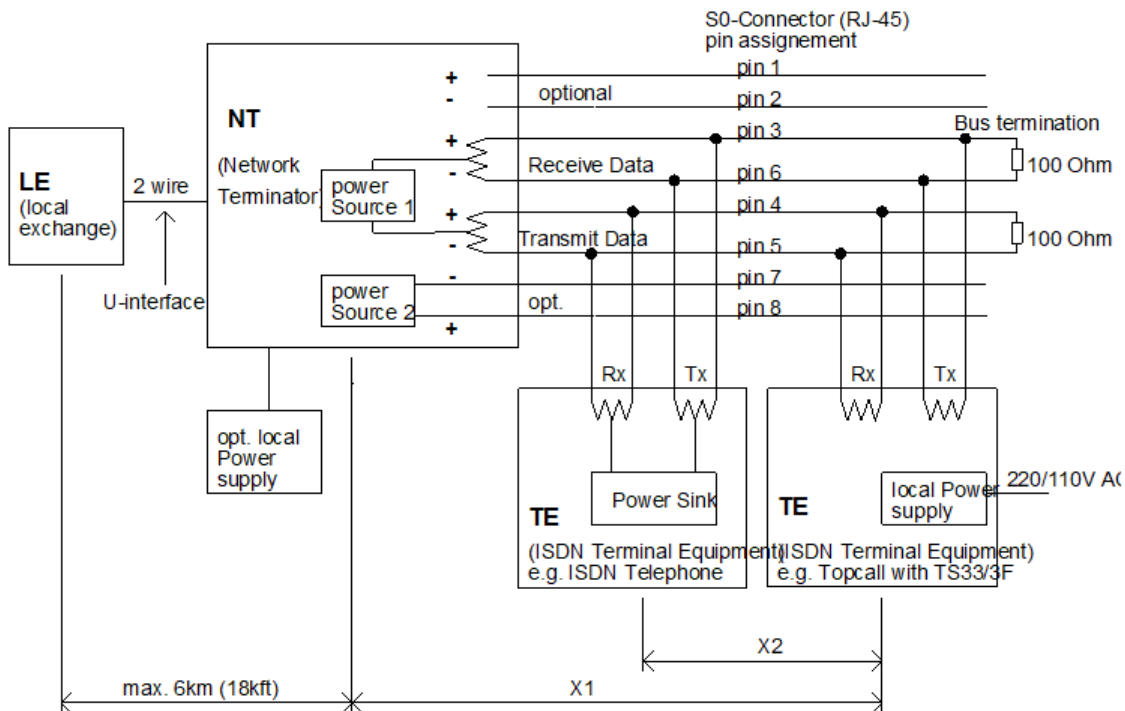
In today's analog telephone network, the *local loop* connection between the user and central office provides a single analog channel, used to carry the signaling and also user data.

In an ISDN, the local loop carries only digital signals. Furthermore, it comprises several *logical channels* for signaling and user data.

Three basic types of channels are defined for ISDN communications, differentiated by their function and bit rate.

D-channel	Carries signaling messages between the user and the network; since the exchange of signaling messages is unlikely to use all of the available bandwidth on the D-channel, it may also carry user data packets (secondary function of the D-channel). It operates at 16/64 kbps rate.
B-channel	Carries information for user services, including voice, audio, video and digital data. Operates at 64 kbps rate.
H-channel	Same function as B-channels, but operates at bit rates above 64 kbps.

ISDN Physical Layer Architecture



LE:	Local exchange. Uses a standard 2 wire twisted pair cable for communication with NT. The twisted pair is referred to as U interface.
------------	--

NT:	Network Termination. It is sometimes divided into 2 parts called NT1 and NT2. It converts the U interface into S0 interface. It supplies the TEs via power source 1 (phantom power) or power source 2 from a local power supply or from the U interface.
TE:	ISDN Terminal equipment: Is directly connected to the S0 interface like a KCS with TS33/3F interface or an ISDN Telephone.
TA:	Terminal adapter: Not shown in the figure. Converts the S0 interface into an a/b interface for an analogue apparatus.
X1:	Max. distant between NT and any TE.
X2:	Max. distant from any TE to any other TE.

Three bus configurations are possible:

Bus type	max. no of TEs	max. length X1	max. length X2
Point to Point	1	1.5km	-
Point to Multipoint short passive bus	8	150m	150m
Point to Multipoint long passive bus	8	500m	35m

ISDN Services and Attributes

ISDN services are categorized based upon their scope and the source of the service.

Bearer Services

Bearer services allow the user to send information from one device on the network to another. They allow information transfer and involve only lower layer functions. Having chosen the specific bearer service, the users may agree between each other to use any higher-layer protocols across the requested connection. Use of higher layers is transparent to the ISDN and the network makes no effort to assure compatibility between the higher layers.

Most important bearer services are:

- Information transfer mode (circuit or packet)
- Information transfer rate (64 kbps, 2x64 kbps etc. with circuit mode, packet/sec with packet mode)
- Information transfer capability (Speech, 3.1kHz audio, 7 kHz audio etc.)

Teleservices

Value-added services provided by the network. Teleservices can provide end-to-end (user-to-user) communication and they are characterized by their lower-layer attributes (the bearer service) and higher-layer attributes (the value-added service).

What really separates Teleservices from bearer services are the higher-layer, end-to-end functions.

Note A Teleservice may be offered to a user by another user of the network or by the network itself.

Examples: facsimile, videotext, and X.400

Supplementary Services

Allow the network to provide a service to the user above and beyond the mere transport of bits. These services are based upon the information already known to the network, such as the address of the calling party, and do not involve any conversion or modification of user-supplied data by the network. Therefore, supplementary services are not considered a value-added service nor do they provide end-to-end communication.

Examples: Direct Dialing In (DDI), Multiple Subscriber Number (MSN), Call Waiting, Advice of Charge, and more.

General About UIF

The ISDN FAX module operates FAX lines which can be configured independently from each other by using the ISDN B-channel.

The following functions are available:

- Sending of faxes
- Local printouts on an attached laser printer unit
- Back reception
- Routing of faxes
- Receiving of faxes

ISDN Number Length

The maximum length of ISDN numbers (inbound and outbound) is 40 digits.

The following restrictions apply:

- The number length when using service FAX is still 32 digits.
- In TCfW inbox and outbox view, only part of the number is displayed.
- A journal entry has 40 positions minus the length of the prefix:
- Journal Inbound starts with "FXI:", that is, maximum 36 digits.
Example: FXI:123456789012345678901234567890123456
- Journal Outbound starts with "F:" / "IO:+F", max 35 / 38 digits.
Example: IO:+F12345678901234567890123456789012345

Cost Center Parameter, Caller ID

There are three options for setting the Caller ID for outgoing calls.

- Use a fixed Caller ID (see [Configuring Own Telephone Number](#)).
- Use the cost center parameter as Caller ID (see [Using Cost Center as Caller ID](#)).
- Use the control line ++CID" to set Caller ID (see [Setting the Caller ID of Outgoing Faxes](#)).

Additionally, a number conversion table can be used for further modification of the number. This is described in [Number Conversion Facility](#). The figure in Fax Transmission shows how and when number conversion occurs in the fax transmission scenario.

Configuring Own Telephone Number

If you want to use a user-independent calling party number, the special rr99 routing directory is not necessary. You just need two lines in the number conversion table as shown in the example below.

config line 254	'8I~=I839%~	,Calling Party number = 839
config line 255	'8~=839%~	,Calling Party number = 839

If you do not use internal sending, you do not need the first conversion line.

Using Cost Center as Caller ID

The first "%" character within the number field has a special function. It is replaced by the content of the cost center parameter with the following rules:

- All blanks are ignored
- Non-digit characters are replaced by '0'

The rr99 file can be used to merge the '%' into a fax number to enable a PBX to do proper cost accounting.

Within an ISDN FAX module, it is possible to send the cost center identification within an extra info element. Therefore, a second "%" is required. All digits until this second "%" (except character "I") are sent as the "calling party number" (called: origination address with 1TR6). This info element may be presented (after verification by the network) as caller ID to the called user. The remaining part is used as a destination number.

rr99 file:

```
**SENDMODES
**NORMALIZE
**ROUTE
F:I~,F:I%%~      Internal
F:~,F:%%~,      External
**NODES
```

Example:

..2s,r=t,n=F:66666,cc=12X45 => "066666" will be dialed, calling party = 12045

..2s,r=t,n=F:l45,cc=12345 => "45" will be dialed, calling party = 12345

To use a Caller ID that is a combination of a fixed prefix and the user-specific cost center, either of the following configurations can be used.

Configuration option	(1) Insert the fixed prefix with rr99 routing	(2) Insert the fixed prefix with the caller ID conversion rule
Arr99 sample	<pre>**SENDMODES **NORMALIZE **ROUTE F:I~,F:I 123456%%~ Internal F:~,F: 123456%%~, External **NODES</pre>	<pre>**SENDMODES **NORMALIZE **ROUTE F:I~,F:I%%~ Internal F:~,F:%%~, External **NODES</pre>

Configuration option	(1) Insert the fixed prefix with rr99 routing	(2) Insert the fixed prefix with the caller ID conversion rule
Number conversion table (Configuration lines 254 - 283)	8I~=I~ 8~==	8I~=I%~ 8~=%~ C~= 123456~

Setting the Caller ID of Outgoing Faxes

It is possible to set the ISDN Caller ID for outgoing calls with the line control line "++CID". This line must appear as the first line of the document. Otherwise, it will be ignored. Note that you usually have to specify the extension number only.

Syntax of ++CID line:

```
++CID <CallerId>
```

Where CallerId is truncated after 24 characters. Only digits ('0' .. '9') are sent on the ISDN line. Other characters are ignored.

The previous method to specify the caller ID as part of the dialed number (using "%" as delimiter) is still supported. If both the "%" character appears in the number and the ++CID line is used, the CallerId from the ++CID line takes precedence.

Example:

A document send by user with fax extension "1234" may look like this:

```
++CID 1234
++TSI +43 1 86353 1234,Mr. Demo
This is my message
```

ISDN Protocols

This section describes ISDN protocols.

Support of Basic Rate ISDN Channels

Supported protocols are *EDSS1* (European Digital Subscriber Signaling N0. 1), *1TR6* (German national protocol) and *ECMA QSIG*.

Protocol "*ECMA QSIG*" is described in European recommendation ETS 300 172 and designed mainly for inter-exchange signaling between PBX.

It is based on the Euro-ISDN protocol (EDSS1) with some slight differences. That's why it can be configured in the same way as Euro-ISDN protocol for point-to-point connection.

The only difference is the config line 266.

Protocol	Config line 250	Config line 286
EURO ISDN PtMP (= standard)	:01 00 FF,	:01 00 00 00,
EURO ISDN PtP	:00 00 00,	:01 00 00 00,

Protocol	Config line 250	Config line 286
1TR6 PtMP	:01 01 FF,	:01 00 00 00,
1TR6 PtP	:00 01 00,	:01 00 00 00,
ECMA QSIG A-Side	:00 00 00,	:02 01 01 00,
ECMA QSIG B-Side	:00 00 00,	:02 01 01 01,

Special remarks on ECMA Q.Sig configuration:

The ECMA QSIG (Layer 3) protocol is symmetrical with the exception that A-side will have priority in case of a call collision. So the PBX should be defined as A-side and KCS as B-side or vice versa. Kofax Communication Server is restricted to support only the Slave side of the used data link layer protocol (ETS 300 170).

Service Identification with protocol 1TR6:

With 1TR6 protocol, an outgoing call must contain a service identification (SI). This SI can be used by the receiver (or a PABX) as information to decide if the call should be answered or not. This feature can be used to use the same number for different devices (with different services, such as fax and telephone). The SI used by Kofax Communication Server can be configured in config line 251. The following values are allowed:

Config value	Service group	Service
:11,	Telephone	ISDN Telephone 3.1kHz
:12,	Telephone	analogue Telephone
:22,	a/b services	fax group 3

The default value is set to :00, which is handled as :22, (fax G3). Since Kofax Communication Server is a fax G3 machine, this should be the appropriate setting. But practical tests shows that you cannot reach every wanted destination (such as digital telephones, faxes via wrong configured PABX or terminal adapter). In that case, it is preferred to use the SI ":11" as an ISDN telephone will normally get the connection to both digital faxes and analog lines.

ISDN Configuration for Japan

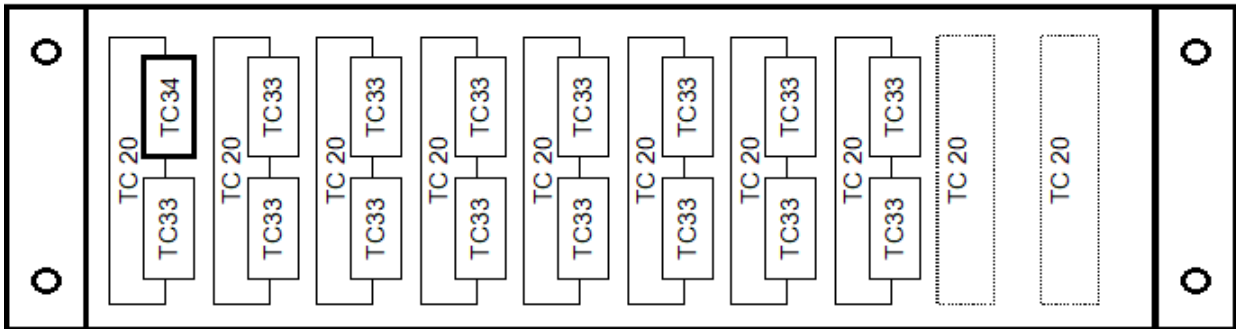
The recommended Japanese BRI configuration is listed here:

- Configure Euro-ISDN protocol (Menu-driven by the Config program)
- With the Config program's line editor, perform the following three changes manually (with All ISDN fax channels):
 - - conf. line 250, pos. 5 to 01 (u-law coding)
 - - conf. line 286, pos. 5 to 01 (don't use the sending complete indicator)
 - - conf. line 286, pos. 6 to 01 ("unknown" numbering plan)

Support of Primary Rate ISDN Channels

A primary rate ISDN line (E1) supports up to fax 30 channels.

Model 205 Line Server with 30 line primary rate connection



The TC34 interface is required for primary rate ISDN access. It is directly connected to the primary rate line. An internal flat cable bus connects up to 15 TC33 interfaces with the TC34. This bus is used for B-channel data (fax protocol, voice) exchange between all TC33 interfaces and the primary rate line via TC34 interface.

Furthermore, the TC34 is responsible for call control of all fax channels (Q921, Q931, ...) accessing its primary rate line. The call control information between all TC33 interfaces and the TC34 is transferred via serial Transputer communication links (KCS routing protocol).

For further information about the TC34 interface, see the *HW-documentation*.

Configuration Rules

- The TC34 interface can be used in position 1 (near back plane) of TC20 only. It must be used together with a TC33 interface in position 0 (near processor) of the same TC20. This TC20 should be used in slot L0 only.
- The TC34 cannot be explicitly configured. Its slot/position is implicitly configured by the position of the reference channel. Therefore, the reference channel must always be configured on the TC20 with TC34 interface.
- Start configuration with the first UIF on channel A of the TC20 interface used for TC34. This is the reference channel of primary rate line.
- Configure UIF modules for all other TC33 interfaces connected to the primary rate line. The channel number of the reference channel (configured before) must be specified. These channels must have a higher channel number than used for the reference channel.
- For optimum distribution of processor performance on the TC20 interfaces, it is recommended to start configuring all a-slots, following by all b-slots, c-slot and d-slots as shown in the example below.
- Configure the reference channel with Configure Single Channel. Refer to the next section for configuration details. Upon exit, you are prompted to either copy this configuration to all channels that belong to this reference channel, or to copy only ISDN-specific details of the configuration (below line 249) to all channels that belong to this reference channel.

Note Unlike Configure all Channels, this will copy the entire configuration (or the configuration below 249, respectively) to all the channels and not only the changes made.

- If attempting to perform configuration changes on a non-reference primary rate channel, the Config program displays the warning, "You are going to configure a UIF channel that is not a reference channel." Despite the warning, you may configure all config lines except those below line 249 on a non-reference primary rate channel (such as setting a different channel group on a sub-group of channels, etc.).

ISDN config part (lines below line 249) must be identical for all channels sharing the same physical line.

Example :

Primary Rate ISDN configuration with 30 channels.

Channel	Slave.Slot	Hardware	Line 249 (ref. ch.)	Channel	Slave.Slot	Hardware	Line 249 (ref. ch.)
04	1.1.L0	TC33-A	'04'	19	1.2.L2	TC33-B	'04'
05	1.1.L1	TC33-A	'04'	20	1.1.L1	TC33-C	'04'
06	1.1.L2	TC33-A	'04'	21	1.1.L2	TC33-C	'04'
07	1.1.L3	TC33-A	'04'	22	1.1.L3	TC33-C	'04'
08	1.1.L4	TC33-A	'04'	23	1.1.L4	TC33-C	'04'
09	1.2.L0	TC33-A	'04'	24	1.2.L0	TC33-C	'04'
10	1.2.L1	TC33-A	'04'	25	1.2.L1	TC33-C	'04'
11	1.2.L2	TC33-A	'04'	26	1.2.L2	TC33-C	'04'
12	1.1.L0	TC33-B	'04'	27	1.1.L1	TC33-D	'04'
13	1.1.L1	TC33-B	'04'	28	1.1.L2	TC33-D	'04'
14	1.1.L2	TS33-B	'04'	29	1.1.L3	TC33-D	'04'
15	1.1.L3	TC33-B	'04'	30	1.1.L4	TS33-D	'04'
16	1.1.L4	TC33-B	'04'	31	1.2.L0	TC33-D	'04'
17	1.2.L0	TC33-B	'04'	32	1.2.L1	TC33-D	'04'
18	1.2.L1	TS33-B	'04'	33	1.2.L2	TC33-D	'04'

ISDN Protocol and Access Types Combinations Supported

ISDN Protocol Access Type	Euro-ISDN	ECMA Q.SIG	1TR6	AT&T (4ESS switch)
Basic Rate Access (BRI)	Supported	Supported	Supported	No
Primary Rate (PRI) E1	Supported	Supported	No	No
Primary Rate (PRI) T1	No	No	No	Supported

Configuring Primary Rate Protocols

- Configure the UIF channel with the lowest TCOSS channel number on the TC20 with TC34 interface and enter its **TCOSS channel number** as the **reference channel** when prompted for by the Config program.

- Add all other desired UIF modules for the same physical line and always enter the same reference channel number: the lowest TCOSS channel number assigned with this line.
- See [Advanced configuration - Allocating B-channels](#) and set B-channels in use via config line 287, positions 1 - 4.
- Change those config lines as shown in the tables below on the reference UIF channel.

After you have done this, let the Config program copy the configuration to all other UIF modules assigned with this reference channel (either the whole configuration or only its ISDN part).

Euro-ISDN and ECMA Q.SIG

Outgoing B-channel allocation: "preferred" and B-side (start selecting Bn, Bn-1, Bn-2, ...B1, n is the number of the highest B-channel available).

If "fractional," E1 is used, which requires setting B-channels used explicitly via config line 287, pos. 1-4 (with "full" E1 line with 30 channels this is not necessary).

Line	Configuration
250	:00 00 00 01 00,
286	:02 01 02 01 00 00 00 00 00 00 00 00 00 00 00,
287	:ZZ ZZ ZZ ZZ 00 00 00 00 00 00 00 00 00 00 00,
289	:00 07 00 00 00 00 00 00 00 00 00 00 00 00 00,
291	:00 00 00 00 00 00 00 01 3C 00 00 00 00 00 00 00,

(ZZ) - B-channels used, see [Advanced configuration - Allocating B-channels](#).

00 00 00 00 for E1 line with 30 B-channels

AT&T (4ESS)

Outgoing B-channel allocation: "preferred" and B-side (start selecting Bn, Bn-1, Bn-2, ...B1, where n is the number of the highest B-channel available).

If "fractional" T1 is used, it requires setting B-channels used explicitly via config line 287, pos. 1-4 ("full" T1 line with 23 channels is not necessary).

line	Configuration
250	:00 02 00 02 01,
252	: 1
254	'8011~=TI~
255	'8~=TN~
286	:02 01 02 01 01 00 0x* 00,
287	: ZZ ZZ ZZ ZZ 00 04 04 04 04 01 00 00 00 00 00 00,
289	:00 07 00 00 00 00 96 00 00 00 00 00 00 00 00,
291	:00 00 00 00 00 00 01 3C 00 00 00 00 00 00 00,

(ZZ) - B-channels used, see [Advanced configuration - Allocating B-channels](#).

00 00 00 00 for T1 line with 23 B-channels

Note

1. **0X** * - Configure the service type (such as MEGACOM) that has been provisioned for the T1 trunk on the *call-by-call basis* (such as MEGACOM = 03).
If the service has been provisioned for all channels (*trunk-based service*), leave this position unchanged (00).
2. AT&T ISDN network must be told during call establishment, whether the dialed number is *national* or *international*. This task is accomplished by config lines 254 and 255: the first one removes the international prefix "011" commonly used in the USA and inserts the prefix TI instead. The second inserts the prefix "TN" for all other national numbers.
The prefixes "TI"/"TN" instruct the ISDN module to mark the dialed number to be international/national. The prefixes themselves are removed before dialing.
If any customer would like to use a different international prefix instead of "011" (such as "00"), change line 254 similar to the following:
'8011~=TI~ -> '800~=TI~
3. By default, the layer 1 is set to drive a cable length of 0 - 35m. Dependent on the type and length of the cabling, it may be necessary to increase the output levels. To increase the levels, change positions 3 and 4 in line 291 equally. For this TCOSS release, the default value (00 00) corresponds to decimal values of 20 (hex 14) which causes an output level of 3 Vpeak according to ANSI T1.408. These values could be increased to decimal 31 (hex 1F) but the levels must not exceed 3.6 Vpeak at the receiving side (NI). Levels set to high may cause line crosstalk, which produces excessive errors.
In general, a high amount of CRC errors or code violations indicates a wrong output level.
Future versions of WCONFIG will have appropriate menu options to set the line length.
4. If you install (in the US and Japan) a primary rate with DDI it is recommended to set line 252 to "1" MSDN instead of "2" DDI. This may sound confusing now, yet seems to be a local requirement due to protocol differences between these countries and European standards.

Japanese ISDN PRI

Outgoing B-channel allocation: "preferred" and 'B'-side (start selecting Bn, Bn-1, Bn-2, ...B1, where n is the number of the highest B-channel available).

If "fractional" T1 is used, it requires setting B-channels used explicitly via config line 267, pos. 1-4 (with a "full" T1 line with 23 channels, this is not necessary).

line	Configuration
250	:00 00 00 02 01,
286	:02 01 02 01 01 01 00 00,
287	: ZZ ZZ ZZ ZZ 00 04 04 04 04 01 00 00 00 00 00 00,
289	:00 07 00 00 00 00 96 00 00 00 00 00 00 00 00,
291	:00 00 00 00 00 00 00 01 3C 00 00 00 00 00 00 00,

(ZZ) - B-channels used, see "Allocating B-channels"

00 00 00 00 for T1 line with 23 B-channels

Note See remark on configuring T1 output levels at AT&T (4ESS) configuration.

Japanese INS-Net 1500 (ISDN PRI) protocol

In order to support Japanese ISDN PRI protocol (INS-Net 1500), the supported channel information element formats were extended to support also its *slot-map* coding variant. So far, our ISDN implementation used only the so-called *channel number* format.

Two variants are available to support the slot-map coding:

1. Old "long channel identifier information element" format is extended to evaluate also incoming *slot-map* based messages correctly, while continuing to use the *channel number* format for outgoing D-channel messages.
2. New "long channel identifier information element" format is implemented to use only slot-map coding in both directions.

Channel information element format can be configured in the UIF module:

Config line 286, 2nd position:

00 -	Short channel identifier information element format (using channel number coding) to be used for EuroISDN BRI
01 -	Long channel identifier information element format (using channel number coding) to be used for EuroISDN PRI, AT&T 4ESS PRI, NI2 PRI, QSIG BRI and PRI (but may work also for Japanese INS-Net 1500 (PRI)*)
02 -	Long channel identifier information element format (using slot map coding) to be used for Japanese INS-Net 1500 (PRI) if 01 does not work
(*):	Future tests in Japan with NTT PRI line will show which of the coding variants is the most suitable. Tests done by former TOPCALL Japan with a PRI line emulator showed that both coding variants (line 286, pos. 02, value 01 or 02) worked fine.

Advanced configuration: Allocating B-channels

This section describes advanced configuration for allocating B-channels.

Negotiating B-channels between network and the user

With every ISDN access, a pool of logical B-channels (bearer-channels) may be used for (fax) transmission. The standard number of B-channels used depends on the type of ISDN access:

- With basic rate interface, there are two B-channels: B1 and B2
- With primary rate running via the E1 line, there are 30 channels: B1 through B30
- With primary rate running via T1 lines, there are 23 channels: B1 through B23

The B-channel used for specific (fax) transmission is being negotiated between the user and the network side during the call establishment phase.

Each of the sides may request:

- **Any of the available B-channels from its peer side**

This is the simplest negotiation method and is being used with basic rate interface: the B-channel allocation and assignment is done completely by the network side. There is no risk of B-channel assignment collision.

Note This method is supported ONLY with Euro-ISDN and 1TR6 protocols running via basic rate interface.

- **Specific B-channel "preferred" from its peer side (any alternative channel acceptable)**

The call originator requests specific B-channel that is currently not used by another call, such as B10.

If the requested channel is free also at the peer side, it is allocated for this call.

If the requested channel has already been allocated at the peer side, it allocates any other free B-channel available for this call.

If there is no free B-channel available at the peer side, the call is cleared.

- **Specific B-channel "exclusive" from its peer side (an alternative channel NOT acceptable)**

The call-originator requests specific B-channel that is currently not used by another call, such as B10.

If the requested channel is free also at the peer side, it is allocated for this call.

If the requested channel has already been allocated at the peer side, the peer side clears this call as the channel is not free.

Handling the B-channel assignment collision problem

When both sides at the user-network (ISDN) interface request the same B-channel at the same time, the B-channel assignment collision occurs. In a worst case scenario, such as if both sides have requested the same B-channel as "exclusive," both calls may be cleared even though a couple of other B-channels may be free.

To avoid unnecessary collisions and subsequent call clearings, channel-selection parameters '*exclusive-no alternative acceptable / preferred*' - *any alternative acceptable* (config line 286, pos. 3 and *A'-side / B'-side* (config line 286, pos. 4) should be properly configured.

The *preferred*' selection method is recommended for KCS configuration as it is not so restrictive like *exclusive*: the network side may allocate any other channel currently free instead of clearing the call due to the requested channel busy status.

A/B side parameter states the direction of selecting the requested B-channel for an outgoing call:

The A-side of interface always starts selecting from the lower end (B1, B2, ...) and the B-side from the upper end (B30, B29, ...). Additionally, the A-side of interface should be awarded the channel with higher priority during "symmetrical" requests for the same channel at the same time:

- **A-side "preferred" and B-side also "preferred"**

The channel should be awarded to the A-side of the interface, the B-side should be awarded any other free channel if available.

- **A-side "exclusive" and B-side also "exclusive"**

The channel should be awarded to the A-side and the call request from the B-side should be cleared.

However, during "non-symmetrical" channel requests at the same time, the "exclusive" should always be awarded the channel ("exclusive" overrides the A-side priority):

- **A-side "exclusive" and B-side "preferred" or A-side "preferred" and B-side "exclusive"**

The channel should be awarded to the side that requested the channel "exclusive". The other side should be awarded any other free channel available.

To minimize the risk of channel assignment collision, both sides of the interface should have both parameters set differently: the most appropriate configuration is **network side "exclusive" / A-side and user side "preferred" / B-side**, as it handles incoming calls from the network with higher priority.

Unfortunately, most network administrators at customer sites typically have limited knowledge on these settings. The network side of the interface will typically be:

A-side (network always start allocating B-channels from the lower end (B1, B2, ...))

"Exclusive" or "preferred" (there is no typical network setting used for this parameter).

Recommended KCS configuration

Independent of network settings, the KCS configuration should handle incoming calls with priority:

B-side (KCS always starts allocating B-channels from the upper end (Bn, Bn-1, ..., B1, where n is the number of the highest B-channel available).

"Preferred" (KCS would also accept a different channel selected by network).

Configuring B-channels with "fractional" E1/T1 lines

Note Primary rate ISDN interface running via standard E1/T1 lines supports 30/23 B-channels. But in the field also, restricted E1/T1 lines are very common: they provide only a limited number of active B-channels (such as 10, B1-B10).

There may be several reasons for restricting the number of B-channels:

- The customer does not need the full E1/T1 line (not so heavy message traffic) and it is cheaper to order one restricted E1/T1 line as to order several distinct a/b lines.
- The same E1/T1 line may be shared by different applications (such as T1 channels B1-B10 for telephone calls and B11-B23 for fax calls).

Such a restricted E1/T1 line is being referred to as a "fractional" E1/T1 line

Having a restricted E1/T1 line for KCS system, two important parameters should be known:

- Maximum number of active B-channels
- Specific B-channels to use (such as B1-B10, or B10-B23, or others) or whether only the number of concurrently used B-channels is limited (such as a maximum of 10 B-channels, any of the standard E1/T1 channels)

There is a possibility to explicitly configure B-channels used via the E1/T1 line by the config line 287, pos. 1 - 4.

By default (all 4 of these config positions set to 0) all standard B-channels available via E1/T1 lines (30/23) may be used. This may be the proper and the easiest configuration for fractional E1/T1 lines

where only the number of concurrently used B-channels is restricted, but with no specific B-channel restriction.

If there is also a restriction on using specific B-channels (such as only B1-B10), B-channels allowed must be configured via config line 267, pos. 1 - 4.

Requested B-channels are configured bitwise according to the following tables.

E1 and T1 B-channels follow a different configuration scheme: there are separate E1/T1 configuration tables.

Both tables provide also some examples on configuring a specific B-channel range.

Configuring E1 B-channels

Config line 287 Position	1								2								3								4							
Bit (0-LSB) *	7 0	6 x	5 x	4 x	3 x	2 x	1 x	0 x	7 x	6 x	5 x	4 x	3 x	2 x	1 x	0 x	7 0	6 x	5 x	4 x	3 x	2 x	1 x	0 x	7 x	6 x	5 x	4 x	3 x	2 x	1 x	0 x
E1 B- channel	-	1	2	3	4	5	6	7	8	9	10	11	12	12	14	15	-	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
B1-B30 conf. Hex	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B1-B10 conf. Hex	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
B10-B19 conf. Hex	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	
B...-B... conf. Hex																																

(*) x - stands for 0 or 1, 0 deactivates and 1 activates the corresponding B-channel 0 - this bit may not be used, must be always set to 0

Note The default configuration (config line 267, pos. 1 - 4 set to 00 hex) is the same as explicitly allowing all 30 channels (config line 267, pos. 1 - 4 set to 7F FF 7F FF).

Configuring T1 B-channels

Config line 287 Position	1								2								3								4							
Bit (0-LSB)*	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

T1 B-channel	-	1	2	3	4	5	6	7	8	9	10	11	12	12	14	15	16	17	18	19	20	21	22	23	-	-	-	-	-	-	-
B1-B23 conf. Hex	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
B1-B10 conf. Hex	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B10-B19 conf. Hex	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
B...-B... conf. Hex																															

(*) x - stands for 0 or 1, 0 deactivates and 1 activates the corresponding B-channel 0 - this bit may not be used, must be always set to 0

Note The default configuration (config line 287, pos. 1 - 4 set to 00 hex) is the same as explicitly allowing all 23 channels (config line 267, pos. 1 - 4 set to 7F FF FF 00).

Correct handling of upper 15 QSIG PRI E1 B-channels

There is a difference in the B-channel numbering scheme between public network ISDN protocols (such as DSS1) and private network QSIG protocols that are running over the PRI E1 trunk. While public ISDN protocols use the physical E1 trunk timeslot number in the B-channel negotiation procedures (timeslots 1-15, 17-31 for B channels 1-30), the QSIG lines use the logical B-channel number during their negotiation (1-30).

On the other hand, there is no problem with B-channel numbering using the BRI access type or using the PRI T1 trunk type.

Therefore, the value for the QSIG protocol in the ISDN configuration was introduced to solve this problem **for both BRI and PRI access types**, to identify exactly the ISDN protocol stack configured:

Config line 250, 2nd position: 03 - QSIG protocol

If this position is set to QSIG protocol, the QSIG B channel numbering scheme is being used by default.

This position must be entered manually via line editor with Wconfig for all fax and voice QSIG PRI E1 lines and is entered automatically by Wconfig for all QSIG BRI lines (for new QSIG BRI channels and also for updates).

Note It is still possible in the real world, that some PBX systems may use the DSS1 numbering scheme even though the QSIG protocol is in use. For example, Alcatel OmniPCX 4400 PBX with releases 3.2 and 4.2 has a configuration parameter "Logical channels" that may be set to 1__30 or 1__15 & 17__31).

In order to interconnect via QSIG protocol and E1 trunks, also with those PBX systems that eventually do support only the non-QSIG conforming B-channel numbering scheme (using the physical E1 trunk timeslot number instead of logical B channel number), this channel numbering scheme can be enforced per configuration now:

Config line 286, 8th position, bit 3 (0th bit is the LSB bit, 7th the MSB bit) Bit 3: 0 - B-channel numbering scheme using logical channel number (default) Bit 3: 1 - B-channel numbering scheme using E1 timeslot number (this bit is relevant only for QSIG and E1 configurations, ignored for any other configuration type).

Note This configuration bit is only a workaround for PBX systems using QSIG wrong B-channel numbering scheme. Please use it as the last possibility after it has been proven that the particular PBX can't be reconfigured to use the correct numbering scheme.

How to test whether the same numbering scheme is used on both sides:

1. Set up KCS to be the QSIG B-side (in order to force KCS to use the B30 channel for the first outgoing call)
2. Make one outgoing fax or voice call to any telephone
3. Answer the phone and check whether you hear the fax tones or voice data stream: if so, everything works fine
4. **If you hear silence or terrible noise**, KCS and the PBX use different B channel numbering schemes.
5. Verify whether the PBX is really set up for QSIG and whether there is any parameter defining the B-channel numbering scheme to be used (such as "Logical channels" parameter with Alcatel 4400). If it really looks like that the PBX uses wrong B channel numbering scheme, try to change it also on the KCS side using the bit 3 in the config line 286, position 8 (see above).

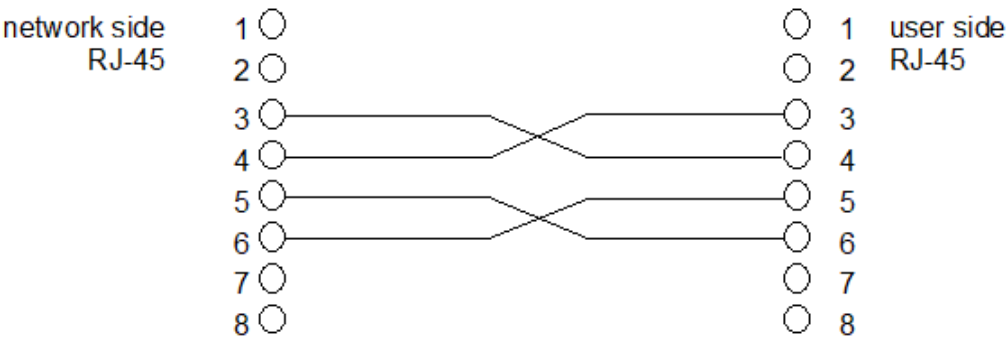
RJ-45 Pin Assignment

- 1 ○
- 2 ○
- 3 ○ + Transmit
- 4 ○ + Receive
- 5 ○ - Receive
- 6 ○ - Transmit
- 7 ○
- 8 ○

E1 Loop-Back Configuration (With Euro-ISDN Protocol)

For testing purposes, the E1 loop-back configuration can be used, as described below.

Therefore, configure two primary rate lines and connect both lines with a crossed RJ-45 cable.



Line	Network side	User side
250	:00 00 00 01 00,	:00 00 00 01 00,
286	:02 01 01 00 00 00 00 00,	:02 01 02 01 00 00 00 00,
287	:00 00 00 00 00 00 00 00 ... 00,	:00 00 00 00 00 00 00 00 ... 00,
289	:01 07 00 00 00 00 00 00 ... 00,	:00 07 00 00 00 00 00 00 ... 00,
291	:01 00 00 00 00 00 00 01 ... 00,	:00 00 00 00 00 00 00 01 ... 00,

Ordering T1 Line (in the USA)

1. Technical specification

T1 circuit : AT&T ACCUNET ISDN T1.5 dedicated access line, compliant with AT&T TR62411 and ANSI T1.403

Frame mode: ESF or SF (D4), ESF is preferred (ESF compliant with AT&T TR54016)

Line coding: B8ZS or AMI (B8ZS is preferred)

CSU: Not required, as TC34 interface meets all physical, electrical and logical requirements to connect directly to the T1 circuit (maintenance functions, line loopbacks)

Signaling: ISDN PRI (primary rate), compliant with AT&T TR41459

Robbed-bit signaling NOT supported

ISDN features/services: Delivery of Dialed Number

AT&T services: suitable AT&T service for outgoing and incoming calls on call-by-call basis (such as MEGACOM).

Note The outgoing AT&T service must be configured with the config line 266.

2. Ordering the T1 circuit

ISDN PRI interface is available from AT&T via ACCUNET T1.5 dedicated access lines.

There are two basic possibilities how to access the ACCUNET T1.5 network:

- a. It may be switched by your local telephone company to AT&T
- b. Your access may be dedicated and directly connected from your business to AT&T.

Both access options are compatible with each other. With both access scenarios, contact AT&T's or your local telephone company account agent/representative and provide them with technical specification above.

Note The first order of business is to find someone who knows what ISDN is.

While your usual account agent will be the normal entry point, you will probably be talking to a number of telco people before you find one who understands your needs. Don't forget to point out, that you need the T1 circuit with ISDN PRI signaling, and NOT robbed-bit signaling.

Ordering E1 Line

Technical specification

Standard E1 (2048 Mbit) line for primary ISDN access.

Frame mode: CRC4 or double frame, CRC4 is preferred.

Line coding: HDB3

Note Even though both framing modes (CRC4 and double frame as well) are supported by TC34's E1 driver, CRC4 is highly recommended for its better reliability. Typically CRC4 mode is the default framing mode with E1 lines in the most of European countries, but there are also exceptions (such as Sweden).

Always ask the network administrator for framing mode used and insist on using the CRC4 mode.

ISDN Reference Channel

To simplify creation and maintenance of UIF channels the following features exist:

- When creating a new UIF channel you will be prompted for a reference channel (after selecting slave/slot). The input is stored in config line 249. If the field is set to blanks, no reference channel is used. This means that WCONFIG behaves as with prior releases.

A reference channel is specified by its channels number, such as 04. It must share the same physical ISDN line with the new UIF. The configuration of the reference channel is used instead of the standard configuration.

The WCONFIG program remembers the last entered value and offers the same value as default next time. Thus, when creating a lot of UIF channels for a primary rate ISDN line this is simply a matter of pressing OK there.

- After doing a "Single Channel" configuration of a primary rate ISDN reference channel you will be asked if you want to copy this configuration to all channels that belong to this reference channel or if you want

to copy only ISDN specific details of the configuration (below line 249) to all channels that belong to this reference channel.

Note unlike a "Configure all Channels" this will copy the entire (or the configuration below 249, respectively) to all the channels and not only the changes made!!

- There may be only one reference channel for a group of channels sharing the same physical line and it must always be the one with the lowest channel number.
- Use of reference channel is optional with basic rate ISDN and mandatory for primary rate ISDN configuration.

Troubleshooting Hints

This section describes troubleshooting information.

Verifying E1/T1 line

Line status signals

ISDN PRI standards define following signals between network and user side:

Normal operational frames, RAI (Remote Alarm Indication), LOS/LOF (Loss of Signal/Frame Alignment) and AIS (Alarm Indication Signal). Further, these status signals may be accompanied by CRC error information.

Two LEDs on the TC34's back plane give currently the only information on the E1/T1 line status.

Note The behavior with E1 and T1 lines is basically the same. The only difference is that with E1 lines, the line status change almost immediately leads to TC34 LED status change, while with T1 lines, it may last up to 10 seconds until LEDs change their status after line status has changed.

Line status description:

1. **Normal operational frames** (the only OK condition on the line)
2. **RAI (Remote Alarm Indication) - "YELLOW ALARM"**
If user or network detects loss of layer 1 capability towards himself, it sends RAI to the peer side.
If TC34 is sending RAI or receiving RAI, its RED LED is ON.
3. **LOS/LOF (Loss of Signal/ Loss of Frame Alignment)**
Indicate bad receiver signal quality on either network or user side. Whenever receiver (user or network) detects LOS or LOF, it responds by sending RAI signal to the peer side.
If TC34 receives LOS, its GREEN LED is OFF. If no LOS is being received, GREEN LED is ON.
4. **AIS (Alarm Indication Signal) - "BLUE ALARM"**
Sent (only) by network to the user to indicate loss of layer 1 capability in the network to user direction on the **network side** of the network to user interface (network problem).
User responds by sending RAI signal.
If TC34 receives AIS, its RED LED is ON.

5. CRC error information

If the receiver (user or network) detects CRC errors within received frames, it sends the CRC error information to the peer side.

Verifying E1/T1 line status by checking TC34 LED status

Note Start TCOSS and check status of LEDs on the TC34's back plane.

- **Only GREEN LED is ON**

OK Status, "Normal operational frames" status on the line

- **Only RED LED is ON**

TC34 is receiving LOS (GREEN LED is OFF) - obviously no signal on the line.

TC34 is sending RAI signal to the network (as a response to LOS).

Recommended actions:

Verify that the E1/T1 cable, pin assignment, cable length do not exceed about 250 meters (820 feet). (TC34 RJ45 pins 4,5 are KCS receiver pins and must be interconnected with network transmitter pins; network receiver pins with TC34 RJ45 pins 3,6)

- **Both RED and GREEN are ON**

GREEN LED is ON: NO LOS received signal on the line

RED LED is ON:

TC34 is sending RAI as response to LOF (framing, synchronization problem)

TC34 is sending RAI as response to AIS (network reports problem by sending AIS).

TC34 is receiving RAI from network: network detects LOS or LOF from TC34.

Recommended actions:

1. Verify the E1/T1 mode, config line 271, position 1:
E1...0 - CRC4 framing, 1 - double frame
T1...0 - ESF framing (extended super frame), 1 - SF framing (super frame)
2. Verify the line coding (for T1 ONLY), config line 271, position 2
3. Verify the output signal level (for T1 ONLY), config line 271, positions 3 and 4. Increase output level step by step and observe LEDs on TC34.

- **Network reports CRC errors or code violations**

This may also indicate wrong output signal level.

Verifying the TC34 by local loopback test

Start TCOSS and interconnect TC34's transmitter (RJ45 pins 3, 6) with receiver (pins 4, 5). The polarity does not matter.

Check the TC34 LEDs: only GREEN LED may be ON.

If GREEN LED is OFF or RED LED is ON, TC34 does not work properly or you have a wrong configuration. Check especially config line 250, whether E1 or T1 is configured. Change the TC34 interface.

Verifying the TC34 and cabling by loopback at Network terminator

After TC34 has been verified by a local loop test, you may verify also the cable to the local Network Terminator. Disconnect the cable from the NT and interconnect transmitter and receiver pairs together.

Only the GREEN LED on TC34 may be on.

If GREEN LED is OFF or RED LED is ON, there is most probably problem with the cable between TC34 and local Network Terminator.

Testloop for Bit Error Rate Tests

Since TCOSS 7.49.00, it is possible to make Bit Error Rate Tests (BERT) with an LS1 or TC20. Therefore any incoming number has to be converted with the number conversion table in the fax module into the string "LOOPTEST". If you are dialing the "LOOPTEST" number, you will get a loop test confirmation prompt (1s 880Hz followed by 1s 700Hz). Then the LS1 will echo all received data on this channel without modification. You can try it with a simple telephone and you will hear your own voice with a short delay. But, of course for real bit error rate tests, it will be required to use any ISDN test device (such as Eurora Tester) that supports BER-Tests.

The BER-Test is terminated if the caller disconnects the call, or after a timeout on KCS side. This KCS timeout has a default value of 4000s. If you need any other value, you can specify it in the number conversion table as an integer value immediately after the LOOPTEST. See examples below:

Example of number conversion table:

```
'100=LOOPTEST ,
'199=LOOPTEST60 ,
```

If number "00" is called, a test loop with the default time-out (=4000s) is activated.

If number "99" is called, a test loop with a time-out of 60s (1min) is activated.

Note

- During a test loop, the corresponding channel cannot be used for fax/voice operation. In the line statistics overview, the channel indicates an incoming call during the test loop.
- The test loop is not supported with TS29/32/33. With TC20 it is supported with primary rate ISDN lines only. It is fully supported with LS1.
- If you do not have any free DDI/MSN number, you can configure a DTMF Prompt and you can define any DTMF number that activates the Loop test. See example below:

Example for loop test activation via extra DTMF prompt:

```
'100=T10 ,
'24711=LOOPTEST ,
```

If you make an incoming call to number "00," you will get a DTMF prompt. If you then enter number "4711," a loop test is started.

QSIG protocol variants ISO/ECMA-QSIG and ETSI-QSIG

The QSIG protocol family is being standardized by 3 standardization bodies (ETSI, ECMA and ISO) and therefore PBX vendors usually support different QSIG protocol variants for their PBX systems. They are most often being referred to as ETSI-QSIG, ECMA-QSIG and ISO-QSIG. While ECMA and ISO QSIG variants are normally compatible with each other, the ETSI variant is not compatible with the ECMA or ISO variants.

That is why also KCS QSIG implementation supports 2 protocol variants that are configurable with the following configuration line:

Config line 286, 8th position, bits 1 and 2 (0th bit is the LSB bit, 7th the MSB bit)

Bit 2: 0 bit 1: 0 - ISO/ECMA QSIG (default)

Bit 2: 0 bit 1: 1 - ETSI-QSIG

The preferred QSIG protocol variant for KCS is the (default) ECMA/ISO one.

See the *Model305_PBX_Integration Manual* for the information on which QSIG protocol variant is to be used for any particular PBX system that has already been validated by KCS.

If the PBX system has not been validated yet, ask the PBX technician to set up the PBX for ISO or ECMA QSIG variants and test the interconnection. Only if it does not work and the PBX supports also the ETSI-QSIG, setup ETSI QSIG variant on both sides and test again.

ISDN Access Configurations

Both possible *point-to-point* and *point-to-multipoint* configurations are supported by TCOSS and the UIF module.

Differences between these configurations

	Point-to-multipoint	Point-to-point
TEI value	Automatic TEI assignment	Non-automatic TEI assignment (value 0)
MSN/DDI addressing	MSN addressing	DDI addressing

Bearer services and Teleservices (Euro-ISDN, ECMA-Q.Sig)

ISDN bearer services are coded in the (mandatory) *bearer capability* information element and Teleservices in (optional) *higher layer compatibility* information element.

Bearer services

3.1 kHz audio or Speech for outgoing calls (coded in the outgoing SETUP message)

3.1 kHz audio and Speech for incoming calls. If the incoming SETUP contains bearer capability other than this one, the call is rejected.

Note *Speech* bearer service is forbidden for use with facsimile terminals. Nevertheless, it was added due to problems in the field while not supporting it (mostly with PBX devices).

Teleservices

For **outgoing calls** by the default configuration, no HLC information element is coded in the outgoing SETUP.

Facsimile terminals should use HLC information element coded *Facsimile G3* for outgoing calls. A list of used HLCs can be optionally configured with config line 251. It was made configurable because there

are wrong configured PBX or ISDN a/b terminal adapter (TA) that will reject calls with the fax G3 HLC information element.

Facsimile G3 Teleservices for **incoming calls**; if HLC information element available in the incoming SETUP. If HLC is available but coded differently, ignore the call. If not available, not checked at all. Accept the call only according to the bearer service compatibility.

	Bearer services	Teleservices
Incoming call	3.1 kHz audio Speech	Facsimile G3 or Telephone
Outgoing call	kHz audio Speech	None (by default) or Fax G3 (config) or Telephone (config)

Service Indicators (1TR6)

ISDN services with 1TR6 are coded differently as with EURO-ISDN. The only (mandatory) information element (called W-Element) *Service indicator* is used. Services are not explicitly divided into bearer- and Teleservices. Service indicator information element consists of two parts: *Service group* and *Service*.

Service Indicator Coding

Service group *a/b Service, Fax Group 3* for **outgoing calls** (by default).

Note Service indicator for outgoing calls can be optionally configured with config line 251 due to problems in the field with this default setting.

Service group *a/b Service, Fax G3* or Service group *speech, Service speech analog or speech, 3.1 kHz audio* for incoming calls. If the incoming SETUP contains the Service indicator with different coding, the call is ignored.

	Service indicator
Incoming call	a/b Service/Fax G3 a/b Service/Speech analogue a/b Service/Speech 3.1 kHz
Outgoing call	a/b Service/Fax G3 (default)

Services

TCOSS supports the following ISDN services:

- Multiple subscriber number (MSN)
- Direct dialing in (DDI)
- Advice of charge (AOC)

Other services like ISDN sub-addressing are not supported.

None of the above described supplementary services may be available by default for the ISDN access. It may be required to order them separately at the PTT.

If two UIF modules are configured for one TS33 interface, config lines 249 and later for both UIF modules must be the same. The only exception is the lines 254 - 283 if the MSN supplementary service is being used. In this case, it is possible to configure both UIF modules to different subscriber numbers. On the other hand, also with MSN, both UIF modules can be configured for the same subscriber number.

It does not make sense to configure both UIF's to different basic access types or for different supplementary services (for example) to check the kind of the access or supplementary services provided for the specific access, if the customer himself does not have any information on it.

Multiple Subscriber Number (MSN)

MSN is generally supported only with point to multipoint ISDN access, where more different subscriber numbers can be configured for each UIF module. Normally, up to 10 numbers with a last digit variable are used, such as 5158610, 5158611, ..., 5158619. With 1TR6 protocol, this service is called "Endgeraete Auswahl Ziffer (EAZ)" or "end terminal selection number".

With Euro/ISDN, it is possible to use completely different numbers for one access, such as 5158610, 66133, etc.

If MSN is configured for specific ISDN point-to-multipoint access, the whole number or at least the variable part of the own number dialed by the originating user, is given to the destination user in the incoming SETUP message.

If configured in the line 252 ('1'), config lines 254-283 must contain at least one of the several valid numbers for the access. During the incoming call, the own number provided by the PTT in the incoming SETUP message is compared with those configured in lines 254-283. The incoming call is accepted only if a match occurs. Otherwise, it is ignored. See "Number conversion table" in the description of "Transputer Fax Module" for a more information about these config lines.

However, this compare is made only if the own number is present in the incoming SETUP message. If not, such an incoming call would be accepted.

The received number can be converted into any inbound number or Server command as described for UTF.

Example:

The own ISDN number is 5158610 .. 5158619 (last digit is variable). If the local exchange sends the complete number, the configuration 1 must be used. Otherwise, if only the extension is sent, configuration 2 must be used.

```
config line 235 '.FX
config line 236 :03 ,
               configuration 1               configuration 2
config line 254 '15158611=1               , '11=1
config line 255 '15158612=2               , '12=2
config line 256 '15158615=3               , '15=3
config line 257 '15158616=T10             , '16=T10
...
```

KCS answers incoming calls to extensions '1', '2', '5' and '6' only. They are distributed to number ".FX1", ".FX2" and ".FX5". Upon calling extension "6," a DTMF prompt is activated (value after "T" is time-out in seconds). This allows input of any inbound code or server command without restrictions.

The decision if the whole or only the variable part of the number is provided is made by the LE.

Direct Dialing In (DDI)

DDI is generally supported only with *point to point* ISDN access, dedicated mainly for PBX devices to be able to switch the incoming call to one of the connected terminals (telephones).

For this reason, by the incoming call, the whole own number or at least the DDI part of the number is sent to the destination user in the incoming SETUP message.

Note The PTT has to provide the information how incoming calls are handled. However, two countries are known:

1. Germany: the complete number (own number +DDI) is sent
2. Austria: only DDI number is sent

The functionality of the DDI (Direct Dialing In) supplementary service is the same as with DID (Direct Inward Dialing) used with the conventional UTF module. But DDI is easier to use; it could be ordered by PTT for each point to point basic access. There are no additional requirements (such as special PBX or E&M protocol as for DID).

With DDI, the following config lines are of interest.

Config lines	Meaning	
235, 236	Same functionality as with DID	
252	To be set to '2' (to switch DDI feature on)	
285	1. pos.	DDI timeout in seconds. Time to wait for the next DDI digit (default 5 sec.). If this timer expires, so far received DDI digits are handled according to config lines 235, 236 and the following digits (possibly received) are ignored.
	2. pos.	Maximum count of DDI digits (default 10 hex). Only the configured count of digits is awaited and if received (including own number if it will be delivered), handled according to settings in config lines 235, 236. The next DDI digits are ignored.

Example:

The "basic" own ISDN number is 6621045, 3 digits DDI number is used (123). If the local exchange sends the complete number, the configuration 1 must be used. Otherwise, if only the DDI is sent, configuration 2 must be used.

```
config line 235      '.FX ,
config line 236      :03 ,

                        configuration 1      configuration 2
config line 254      '1662104~5~=          ,          '~1~=
config line 255      '          ,          ,
...
```

KCS answers all incoming calls. Incoming calls to numbers 6621045123, 6621045124 and 6621045125 are distributed to numbers ".FX123", ".FX124" and ".FX125, respectively".

The decision if the whole or only the DDI part of the number is provided is made by the LE.

Advice of Charge

For the advice of charge counting both the D and E variants (AOC-D and AOC-E) with charging units and currency units are supported by TCOSS.

The UIF has the possibility to use the fee information (advice of charge =AOC) from the local exchange for cost center accounting.

Requirements:

1. The AOC must be provided by the local exchange.
2. Cost accounting with AOC for UIF cannot be used together with cost accounting for UTF and UTT channels. In that case, costs for the UIF channels must be calculated in the same way as with an UTF channel.

Configuration steps:

If both UTF and UIF should be used with cost accounting, user module type for the UIF must be changed. This will be done by setting config line 3 to 'T'. (Remark: In that case - Cost accounting must not be used with UTT and all lines in the kk99 for UTT must be removed.)

Cost accounting must be activated with config line 8.

The actual type of received charging unit information depends on the local exchange (or PABX). The following list gives an overview. But for clearance, the used type should be checked with your local PTT or PABX technician.

Exchange or PABX transmits	Behavior of UIF module
No AOC information	Zero costs are reported
Charging units	Charging units are reported
Currency units	Currency units scaled by config are reported
Both currency and charging units	Undefined

1. Currency units are not supported with 1TR6 protocol
2. In Austria, only currency units are available
3. In Germany, both currency and charging units are supported with EURO-ISDN lines. Since only one type can be used on a line, the required type can be configured at the local exchange.
4. If both currency and charging units are available, currency units should be preferred.
5. KCS expects that either currency or charging units are received on the same line. Therefore, it is not required to configure the AOC type. But currency values are scaled with the content of config line 253.

Config line 253, 1 pos, Currency units scaling:

- '0' report value in 1/1000 units of currency

- '1' report value in 1/100 units of currency
- '2' report value in 1/10 units of currency
- '3' report value in units of currency
- '4' report value in 10 units of currency
- '5' report value in 100 units of currency
- '6' report value in 1000 units of currency

With each send attempt, the count of charging units or scaled currency units reported by the local PTT during the call clearing phase is returned as the count of 64-byte frames transmitted. That is why the calculation of fees for UIF module in kk99 should be based only on the parameter P4.

P4 = (costs for 1 (AOC) unit) x 1600.

Example for charging units:

1 charging unit in Germany costs 0.23 DM. Costs should be shown in the kkxx file as multiples of 1/100 DM (=1pfennig)

1. Set config line 3 to 'T'.
2. Config line 253 will be ignored for charging units.
3. kk99 File:

```
1,0,0,1,0,36800 p4 = 23 * 1600 = 36800
0=1
1=1
2=1
3=1
4=1
5=1
6=1
7=1
8=1
9=1
```

Example for currency units:

Costs should be shown in kkxx files as multiples of 1/100 DM (=1pfennig).

1. Set config line 3 to 'T'.
2. Set config line 253 to '1'.
3. kk99 File:

```
1,0,0,1,0,1600 P4=(cost for 1 AOC unit) * 1600
0=1
1=1
2=1
3=1
4=1
5=1
6=1
7=1
8=1
9=1
```

Message Waiting Indication for the QSIG Protocol

It is now possible to control the Message Waiting indicator (MWI) via ISDN FAX module using the new *Temporary Signaling Connection (TSC)* send mode. The TSC connection is a special type of connection that is dedicated for controlling some features in the PBX system.

It can be activated using the following send number syntax:

```
N=<CC>;TC<Command>; [<MsgCenterID>];ExtensionNumber
```

CC	Channel number
TC	Send switch for the Temporary Signaling Connection
Command	MWION or MWIOFF to switch MWI on/off
MsgCentreID*	An identifier for the Message Center/VoiceMail Server, optional
ExtensionNumber	Telephone number where the MWI should be switched on/off

(*) MsgCentreID is per QSIG standard definition an optional parameter but may be mandatory for some PBX implementations. Therefore it may have to be configured properly in the PBX configuration (as for example Hicom 300/Hipath 4000). Please note that if the MWI has been activated using a particular MsgCentreID, the PBX may require that the MWI deactivation request is issued with the same MsgCentreID.

How to use TCOSS MWI Functionality

The most convenient way to use MWI is to create two KCS services for MWI ON and MWI OFF.

Example for service MWION (MsgCentreID is 79699)

Address type FREE, prefix F:TCMWION;79699;

Example for service MWIOFF

Address type FREE, prefix F:TCMWIOFF;79699;

Example for service MWION (without MsgCentreID)

Address type FREE, prefix F:TCMWION;;

Generally there are two possibilities on how to use MWI functionality:

1. Using MWI for TCOSS users

Setup Message wait On/Off events to
MWION,UserExtension
MWIOFF,UserExtension

2. Using MWI for different Mail Platforms (Notes, Exchange, Groupwise)

Specialized MWI MailServer Agent is necessary to generate MWI control send orders using services MWION/MWIOFF to the user's extension.

Prerequisite

1. QSIG protocol running via BRI or PRI interfaces, TC20/TC33/TC34 or Model 305 Line Server with TC23/TC24 interfaces (TSxx interfaces not supported)
2. The PBX system must support the QSIG MWI supplementary service. For detailed requirements, see the "PBX Requirements" document
3. The MWI must be configured properly in the PBX configuration

The following table lists all PBX systems known to support MWI supplementary service via the QSIG protocol.

PBX Type/ SW release	PBX configuration parameters/Comments (if already tested with KCS)
Hicom 300 Rel. 2.08	<p>COT Parameters:</p> <p>PROTVAR=ECMAV2, SEGMENT=1</p> <p>Configure a route for the Voicemail server:</p> <p>ADD-RICHT:MODE=PM, IDX=< n >, SAN=< MsgCentreID >, NAME="TOPCALL", STYPE=OTHER</p> <p>Where</p> <p><n> is the number of the VoiceMail server, 1, 2, 3, ...</p> <p>< MsgCentreID > is the same parameter as used with KCS send order for MWI ON/OFF. It is recommended to use the VoiceAccess number for it, and include the trunk prefix if defined in the PBX routing.</p> <p>Once MWI is activated using a particular MsgCentreID, it must be deactivated using the same MsgCentreID.</p> <p>Example: VoiceAccess number: 699 Voice trunk prefix: 79 (you dial 79699 to reach TC/ VoiceAccess) MsgCentreID: 79699</p>
Hipath 4000 Rel.1.0	Currently not tested by Kofax. Should work in the same way as Hicom 300
Meridian M1 X11 Rel. 25.40	Currently not tested with Kofax
Tenovis Integral 33XE Rel. E06	Currently not tested by Kofax
Hicom 150 Rel. 3.0	Currently not tested by Kofax

Handling MWI Error Codes

If the MWI send order fails for any reason, it will report one of the error codes listed in the following table.

Error code	ISDN cause	Description	Break code	Possible reason and recommended action
IA	301	Call collision	1	Call collision with an incoming call. Dedicate one channel for MWI only to avoid it.

Error code	ISDN cause	Description	Break code	Possible reason and recommended action
IJ	202 200	No connection to local exchange (layer 1 or lower layer protocol problem)	2	ISDN line problem (cable disconnected, line deactivated, etc.)
IS	29 69 79	Service or function not supported by network or user	5	Protocol problem with the particular PBX, most probably MWI not supported or incompatible with KCS (make an ISDN Trace file and report the problem to TCINT)
IP	95 111	Procedural error	5	

MWI ON/OFF events are generated by the email system when the user receives the 1st new message in the mailbox or listens to the last unread message, respectively. It is important that the MWI is delivered almost immediately to the PBX system. But if one of the MWI send orders gets lost (such as if line is disconnected), it can easily happen that the status of the MWI lamp on the telephone would not be synchronous with user's inbox. Therefore, it does not make sense to make repeated retries after a MWI send order hasn't succeeded, as the user's mailbox status may change in the meantime.

For installations with more than 500 users, it is a good idea to dedicate one fax module for MWI signalization and change the number of retries for break codes 1, 2 and 5 similar to the following:

Config line 43, new send status after unsuccessful send attempt for BREAK=1

'87-----0,

Config line 44, new send status after unsuccessful send attempt for BREAK=2

'87-----0,

Config line 47, new send status after unsuccessful send attempt for BREAK=5

'-----0, errors IS/IP indicate a fatal protocol problem, no sense for retries

Note The problems with the MWI status synchronization between the user's mailbox and the MWI lamp are not QSIG MWI specific. The same problem may occur if using some proprietary MWI signaling method (via V.24 asynchronous line, via DTMF signaling using fax module's dial mode).

How to test MWI

The easiest way to test the MWI signaling is to use a TCOSS user.

1. Install KCS Server Model 305 and set up one or more UIF modules for QSIG protocol. Activate usage of the redirecting number for voice calls (UIF config line 295, pos. 3 = 01)
2. Set up the MWI functionality on the PBX side.
3. Set up TC/VoiceAccess. Set the VoiceAccess number, such as '9999'.
4. Create KCS services MWION and MWIOFF (as described above) with the MsgCentreID parameter set to according to the PBX setup (see the table PBX Parameters for MWI).
5. Set up one TCOSS user with defined voice extension, such as '2222'. Activate any type of call forwards (CFU, CFNR or CFB) on the telephone '2222' to the destination '9999'.
6. Set up the MWI ON and MWI OFF events for the user '2222' to MWION,2222 and MWIOFF,2222 respectively.

7. Call the extension '2222'. Let the call be redirected to the KCS server (or call the KCS server directly) and leave a message for the user with extension '2222'.

The MWI lamp on the telephone '2222' must be switched ON: **If so, MWI ON works OK.**

8. Call the VoiceAccess number '9999'. Login as the user '2222' and listen to the new message(s). Hang up the line.

The MWI lamp on the telephone '2222' must be switched OFF: **If so, MWI OFF works OK.**

If the test fails, it could be for the following reasons:

- KCS MWI implementation is incompatible with the PBX.
- Currently QSIG-MWI support is provided for Siemens Hicom 300/Hipath4000. For any other PBX type software, changes may be necessary.

Corrective Actions

The following actions should be performed in the case of problems:

1. Configure TCOSS ISDN trace module before you start any testing with MWI.
2. Verify that the PBX supports MWI signaling via QSIG protocol and it is properly set up on the PBX side, especially the *MsgCentreID* number.
3. Try to use MWI with an empty *MsgCentreID* (such as using the prefix F:TCMWION;; for the MWION service).
4. Save the ISDN trace file and send it to Kofax for evaluation.

Different Call Diversion Scenarios Supported

With TCSP 7.46.20, the QSIG call diversion services for voice calls were implemented. It was not fully documented how it interacts with older KCS "redirecting number" functionality for fax calls that support the EDSS1 supplementary service Call diversion according to the ETS 300 207 standard.

At the "lowest" ISDN D-channel protocol level, KCS supports all redirected voice and fax calls for both QSIG and EDSS1 Call diversion services. It means that our QSIG and also EDSS1 protocol implementation is able to extract the "redirecting number" (the number that redirects the call) and use it as described in the following.

Redirecting number functionality - General

Config line	Meaning		
286	The ISDN module simply replaces the called party number ("DDI") by the redirecting number, and then performs a lookup in the ISDN number conversion facility and uses the converted number for inbound routing. It is possible to use this configuration for both redirected fax and voice calls, however, the full range of voice redirecting numbers would have to be entered into the number conversion facility to mark them as voice numbers (by "V" prefix).		
	8 th position	bit 0 (0 th bit is the LSB bit, 7 th the MSB bit)	
		Bit 0: 0	Redirecting number is disabled (default)
		Bit 1: 1	Redirecting number used instead of DDI for incoming calls

Redirecting number functionality - For voice calls

Config line	Meaning		
295	<p>This configuration is dedicated for voice calls only (and with the USN functionality for fax calls, too). The ISDN module performs a lookup into the ISDN number conversion facility with the called party number ("DDI") at first, and then routes the call to the corresponding fax or voice module. With a fax call (no "V" prefix for this number), the redirecting number is always ignored. With a voice call, the voice module tries to perform a lookup into the ISDN number conversion facility with the redirecting number (using conversion lines for originating numbers), and then uses the converted redirecting number to route the voice message to the appropriate user's voice box.</p> <p>The advantage of this method is that it would be necessary to mark only one number in the number conversion facility as a voice number with a "V" prefix: the voice access number that would be used as call forward destination for all telephone extensions company-wide.</p> <div>Note Only one of these two redirecting number function variants should be configured at the same time.</div>		
	3 rd position		
		00	Redirecting number is disabled (default)
		01	Redirecting number enabled

Originator Based Routing

The converted received number may use the following special placeholders:

- The first percent character (%) is replaced by the calling party number. If no calling party number has been received, the percent is removed.
- The first capital "R" is replaced by the redirecting number. If no redirecting number has been received, the first "R" is removed.

Note This feature is not supported by KCS FoIP.

Example 1:

Faxes should be routed according to the calling party number to KCS users. If there is no matching user defined, the fax should be routed to the manual distributor user DIST.

Services:

Service	Description	Document class	Prefix	Address type
FXI	Fax inbound	TI	FXI:	Fax
TOPCALL	KCS user	RTIB		TOPCALL

Addresses of Users:

User	Active	Service	number	Used if
USER1	X	TOPCALL	USER1	
		FXI	66133899	Incoming call from 66133899
		FXI	66133800	Incoming call from 66133800

User	Active	Service	number	Used if
USER2	X	TOPCALL	USER1	
		FXI	6621045	Incoming call from 6621045
DIST	X	TOPCALL	DIST	No matching user could be found

Routing directory rr99:

```

**SENDMODES
**NORMALIZE
**ROUTE
**NODES
**INBOUND
FXI:~, , Inbound routing via proxy addresses of users
FXI:~,DIST:FXI~, default inbound receiver

```

Configuration of ISDN Fax channels: (based on standard DDI configuration)

config line 236	:20 ,	Maximum length of inbound numbers
config line 254	'1~=% ,	Use calling party number for inbound

Example 2:

Inbound faxes to DDI number 9x (where x is a digit between 0 .. 9) should be routed according to "x" and the calling party number to KCS users. If there is no matching user defined, the fax should be routed to the manual distributor user DIST.

See Example 1 above for definition of Services and rr99.

Addresses of Users:

User	Active	Service	Number	Used if
USER1	X	TOPCALL	USER1	
		FXI	166133899	66133899 dials DDI 91 (x=1)
		FXI	266133800	66133800 dials DDI 92 (x=2)
USER2	X	TOPCALL	USER1	
		FXI	16621045	6621045 dials DDI 91 (x=1)
		FXI	36621045	6621045 dials DDI 93 (x=3)
DIST	X	TOPCALL	DIST	no matching user could be found

Configuration of ISDN Fax channels: (based on standard DDI configuration)

config line 236	:20 ,	Maximum length of inbound numbers
config line 254	'19?=?% ,	Use Calling Party number if DDI starts with 9x

Additional Notes:

The calling party number is never used instead of TSI (shown in subject of received faxes). The abbreviation directory NN99 cannot be used for originator-based routing due to restricted number length.

Since maximum length of inbound number has to be set to a high value, Fax Server and routing commands are not possible when using Originator based inbound routing.

Routing can be defined either via inactive addresses of KCS users (case A) or direct in rr99 (case B) as shown below. Case A is recommended because it is more efficient.

Routing via Inactive Addresses (Case A)

When using inactive addresses of KCS users, around 30 addresses are the maximum per user. If more originators need to be routed to the same user, additional users with the same active address, each holding 30 more originator addresses, can be created.

If you consider this restriction, you can create the rr99 and your user profiles as defined for the standard inbound routing via rr99 (used in the example above).

Routing with Direct Entries in rr99 (Case B)

Routing entries can be entered directly into the rr99 routing directory. In that case, the maximum added length of all conversion strings in rr99 (including commas, excluding comments) is restricted to 100.000. This means that the maximum number of entries for originator routing is restricted to about 5000.

If you have many inbound routing entries in rr99, you have to use some additional conversion lines, in order to skip these lines for all non inbound numbers, as shown in the example below. Otherwise, system performance is greatly reduced.

Routing directory rr99:

```
**SENDMODES
**NORMALIZE
**ROUTE
FXI:~,F~,      inbound numbers starts with F+<number>
~,X~,         all other numbers starts with X
**NODES
X~,~
F166133899,USER1:
F266133800,USER1:
F16621045,USER2:
F36621045,USER2:
F~,DIST:FXI~
```

Note

1. Numbers in the NODES section have to start either with "X" (non inbound) or "F" (inbound number).
2. The conversion of inbound prefix from "FXI:" to "F" is used to optimize performance and memory usage.
3. This routing directory has an equivalent functionality compared to the routing table in the originator based routing example.
4. **Comments are not supported in the NODES section.**

Using Caller ID Instead of TSI

Basic information about Caller ID:

When receiving faxes on an ISDN line, it is possible to get the Calling Party Number (Caller ID) which provides the number of the calling fax machines. Since this number is verified by the PTT network, it is protected against manipulation or miss-configuration by the distant user, as it is possible with the TSI.

The number type of the Caller ID is included as a prefix as shown in the following table.

Number type	Used prefix
Internal number	I
National number	TN
International number	TI
Unknown number type	

Switch "I" is well known from the number parameter. Switches "TN" and "TI" are introduced since TCOSS 7.27.01. But they are used in the outgoing number conversion table for AT&T primary rate configuration only.

Even though switches TI and TN could be used in the number parameter of any UIF module, they should not be shown to the user. Therefore, these switches are converted with the number conversion table using the filter character "@" as shown below:

```
'@TI~=*~ => use "*" as prefix for international numbers
'@TN~=0~ => use "0" as escape digit for national numbers
'@I~=I~ => keep "I" switch for internal numbers
'@~==~ => do not change unknown numbers
```

Number table conversion lines with type @ are used to convert the received caller ID before it is used as the originator or for originator-based inbound routing.

If the called ID is an internal PABX extension, the switch "I" is not removed by default. In that case, "I" may be normalized and routed using the routing directory rr99.

When using Caller ID, you should be aware of the following restrictions:

- The caller ID may not be available. With ISDN (and Mobile Telephones), the Caller ID may be suppressed by the caller (anonymous call). On analog lines, it depends on the local network provider (in Austria, PPT does not provide caller ID for calls from analog lines).
- If the distant station uses ISDN with MSN, the telephone network ensures that a valid number for this physical line is presented as the caller ID. It is the responsibility of the connected devices (such as fax machine or PBX) to provide the correct calling party number. If the calling party number is not correct or missing, the telephone network may use the main telephone number instead.
- If the distant line uses ISDN with DDI, the telephone network ensures that the telephone number of the line (without extension) is correct. The correct extension must be provided by the distant PBX. It is not verified or changed by telephone network.
- The caller ID is never used with ISDN protocol 1TR6, independent of the configuration setting.

Requirement:

If present, KCS should use Caller ID as the originator instead of the TSI.

Implementation:

The new feature is activated by the new positions 11 to 14 in config line 235 and 238.

Config line 235, 14 positions, prefix for inbound, userID command and originator.

pos 1..4,	Inbound prefix (unused positions filled with blanks)	
	' '	Do not use inbound distribution
	'FX '	Inbound distribution via NN99
	'FXI\$'	Distribution via number normalization
pos 5,	Reserved (set to blank)	
pos 6..9,	Prefix for fax commands (used with 8xxxx command)	
	'+'	Get userID and password from uu99 (default)
	Example: 'FXI\$'	UserID and password taken from user profile
pos 10,	Reserved (set to blank)	
pos 11..14,	Prefix for originator, if caller Id is available	
	' '	Do always use the TSI as originator (prefix is configured in config line 42)
	Example: 'FAX\$'	If available, use caller Id as originator of inbound messages

Config line 238, 14 positions, same as config line 235, but used for DTMF.

The default value of positions 11 to 14 is set to "FAX\$". The subject of the message always contains the TSI. However, note that this subject field is not shown in the TCfW In/Out-Box or if the message is transferred to any KCS Link. It is only visible in the system folder.

Note This feature is activated after update from 7.26.xx to 7.27.00. From 7.27.00 onwards, the Caller ID is used as originator if it is available. If you wish to deactivate this feature, set positions 11..14 of config lines 235 and 238 to blanks.

Overview:

The following placeholders are used in the table below.

<TSI> received TSI (and optionally alphanumerical text and operation mode indicator)

<CallerId> Calling party number as received by UIF module.

<OrigPrefix> prefix for originator, if caller ID is available.

Send order type	Caller ID available?	OrigPrefix configured?	Inbox			System folder subject
			From	Normalized sender	Subject	
	yes	yes	<OrigPrefix><CallerId>	<CallerId> 1)		<TSI>

Send order type	Caller ID available?	OrigPrefix configured?	Inbox			System folder subject
			From	Normalized sender	Subject	
Inbound	no	don't care	FAX,<TSI>	F:<TSI> 1)		<TSI>
	don't care	no	FAX,<TSI>	F:<TSI> 1)		<TSI>
Automatic reception	don't care	don't care	FAX,<TSI>	F:<TSI> 1)		<TSI>

Note

1. Service prefix "F:" and no rr99 routing directory is assumed.

Caller ID Number Type and Conversion

If you receive a fax message via ISDN, the Originator number may be built according to the received caller ID. This causes a problem if the called ID was received as an international number or national number, because the number does not have an international or national prefix. Since UTF ignores the number type, the number prefix is missing in the resulting number as shown in the example below:

Example:

- FAX received from ISDN line in Vienna: caller ID = 16621042 (1 is the city code of Vienna)
- FAX received from ISDN line in Germany: caller ID = 4921117462 (49 is the country code of Germany, 211 is the city code of Düsseldorf)

The FAX module generated the send orders to FAX\$2226621042 and FAX\$4921117462 which caused- with a standard rr99 file being used-normalized fax numbers, such as: FAX\$*4312226621042 and FAX \$*4314921117462 respectively, which made reply to these numbers impossible.

Solution:

The number type is now included as prefix to the received caller ID as shown in the following table.

Number type	used prefix
internal number	I
national number	TN
international number	TI
unknown number type	

Even if switches TI and TN could be used in the number parameter of any UIF module, they should not be shown to the user. Therefore, these switches are converted with the number conversion table using the new filter character "@" as shown below:

```
'@TI~=*~ => use "*" as prefix for internation numbers
'@TN~=0~ => use "0" as escape digit for national numbers
'@I~=I~ => keep "I" switch for internal numbers
```

```
'@~== => do not change unknown numbers
```

Number table conversion lines with type @ are used to convert the received caller ID before it is used as originator or for originator-based inbound routing.

If the called ID is an internal PABX extension, the switch "I" is not removed by default. In that case, "I" may be normalized and routed using the routing directory rr99.

Prevent LLC Information Element from Transmission

Since there are problems with some Spanish fax numbers, when using the optional Lower Layer Compatibility (LLC) information element with EURO-ISDN, it has been removed by default. To avoid the very unlikely case that LLC is needed, it can be switched on with position 5 of config line 266.

Config line 266, 8 positions, protocol deviations

Pos. 5 use sending complete indicator and/or Lower Layer Compatibility in outgoing setup.

Value	Sending complete indicator	Lower layer compatibility
00 (=default)	yes	no
01	no	no
02	yes	yes
03	no	yes

Note The sending complete indicator informs the network that the dialed number is complete. Even KCS always inserts the complete dialed number into the setup message. Some ISDN networks don't support this indicator (currently AT&T and ISDN in Japan).

ISDN Additional Info Codes for Failed Sending Attempts

Processing of the send order in the UIF module can be divided into two subsequent steps.

At first, ISDN's D-channel is used to send the signaling information to the local PTT (out-band signaling). If the send attempt is accepted by the PTT, the ISDN's B-channel connection to the distant telefax is made and the conventional (fax G3) part of the UIF module proceeds to run the fax G3 protocol via the transparent ISDN's B-channel.

During the first step, the signaling information sent to the local PTT can be rejected for some reason (distant user busy, distant user not responding, wrong dialed number, none of two B-channels free, and more) and the appropriate clearing message with the so-called cause value is returned from the PTT. In such a case the unsuccessful send order is rejected with the following additional string in the author field:

ISDN info nnnn,

where 'nnnn' is the value of the ISDN cause value returned from the local PTT.

Further, this ISDN cause value is mapped to one of the (appropriate) conventional telefax error messages (XU, ...).

If some problem occurs during the second step of the communication (after the B-channel connection to the distant fax had already been made), the send order is rejected with one of the transputer fax error messages without any additional info in the author field.

Extension of Charging Information Evaluation

UIF module supports the Euro-ISDN supplementary service "Advice of Charge" with both D and E variants (AOC-D and AOC-E).

With AOC-D, the networks sends the charging information during a call as a cumulative charge incurred so far, and when the call is terminated, the network sends the final charge recorded for the call once more with the first call-clearing message.

With AOC-E, the network sends the charging information indicating the recorded changes for a call only when the call is terminated with the first call-clearing message.

So far, KCS has evaluated only the final charging information with both AOC-D and AOC-E variants provided when the call is terminated.

Some PABX devices, such as Siemens Hicom 300, seem not to provide the final charging information with AOC-D service when the call is terminated. Therefore, KCS also evaluates charging information sent during the call now and does not require the call-termination charging information anymore. **This feature works automatically and does not require any configuration changes.**

Note When Currency Units variant of AOC is used, the right currency scaling factor must be configured by the config line 253. It is recommended to set it to the same scaling factor that is used by the network to submit the charging information.

Typical scaling factors used in the field are:

1. Germany: 1/100 DM (1 pfennig)
Recommended conf. line 253: '1' (report value in 1/100 currency units)
2. Austria: 1/1000 ATS
Recommended conf. line 253: '0' (report value in 1/1000 currency units)

If you are not aware of the scaling factor used by the network, do the following:

1. Set config line 253 to '0' (report value in 1/1000 currency units).
2. Send one short local outgoing message that would cause 1 charging unit and check the costs by TCfW (such as in Germany, one charging unit costs 12 pfennig, you would see 120 within your outbox. You may increase the scaling factor to 1/100 in order to get the cost as 12 pfennig).

If you would set the scaling factor "too high" (such as conf. line 253 to '3' in Germany) some amount of charging information could be lost since KCS uses simple integer division on converting the charging information. For example, one local call in Germany that costs 12 pfennig would be converted to $12/100 = 0$ charging units.

If you try a local outgoing call and after the call has been terminated you see costs set to 0 within your TCfW outbox, there are two possibilities:

1. The network (PTT or PABX) does not provide charging information

2. You have set the scaling factor too high with conf. line 253. Try the value '0' (1/1000 currency units).

Using Particular UIF Channels for Inbound and Outbound Calls

It may be interesting for installations using the same digital trunk (PRI or BRI) for both incoming and outgoing calls to have a possibility to split incoming and outgoing traffic to distinct UIF channels. For example, one of the reasons to do so could be to avoid or minimize call collision.

Relationship between UIF channels and B-channels

B-channels and UIF channels are independent from each other: the B-channel for a call is being allocated according to the B-channel allocation procedures that run between KCS and the PBX/public switch.

For outgoing calls, KCS starts requesting B-channels either from lower or from upper end (B1, B2, ... or B30, B29, ...) according to the A-side or B-side configuration (line 286). The network side must either accept the same channel if it is free (if KCS has requested it as "exclusive") or may assign the different one for that call (if KCS has requested it as "preferred").

For incoming calls, the network side normally requests the B-channel as "exclusive" and therefore KCS usually have to accept its request.

It is not possible to assign a particular B-channel with any of the configured UIF modules, or with incoming or outgoing calls only. But it is possible to reserve a couple of UIF channels to be used either exclusively for incoming or outgoing calls, or to be "shared" for both (for incoming and outgoing as well).

Using UIF channels for outgoing calls only

Follow these rules:

1. Assign a unique channel group for the outgoing fax channels only
2. Enable outgoing voice calls for these channels (config line 295, pos. 01). Use this channel group for sending faxes.
3. Disable reception for these UIF channels (config line 143, pos. 01) This will disable reception for both fax and voice calls.
 - a. Outgoing calls are distributed more or less randomly via all outgoing UIF channels
 - b. **Using UIF channels for incoming calls only**
 - c. Follow following rules:
4. Assign unique channel group for the incoming fax channels (such as G:) and don't use it for sending, or simply set these UIF channels to the Waiting state.
5. Disable outgoing voice calls for these channels (config line 295, pos. 01).
6. Enable reception for these UIF channels

The way that incoming fax and voice calls are distributed to reception enabled UIF channels depends on the line server hardware.
7. For TC20/TC33, the idle UIF channel with the lowest TCOSS channel number is chosen.

8. For the LS1, the inbound routing of incoming calls depends on the configuration:
Config line 286, 5th position, bit 7 (0th bit is the LSB bit, 7th the MSB bit)
Bit 7: 0 - circular incoming call distribution via reception of enabled channels (default)
Bit 7: 1 - route calls to the idle channel with the lowest TCOSS channel number

Example

On one E1 trunk using the LS1, reserve 10 channels for incoming calls only, 10 channels for outgoing only, and 10 as shared channels for both incoming and outgoing calls.

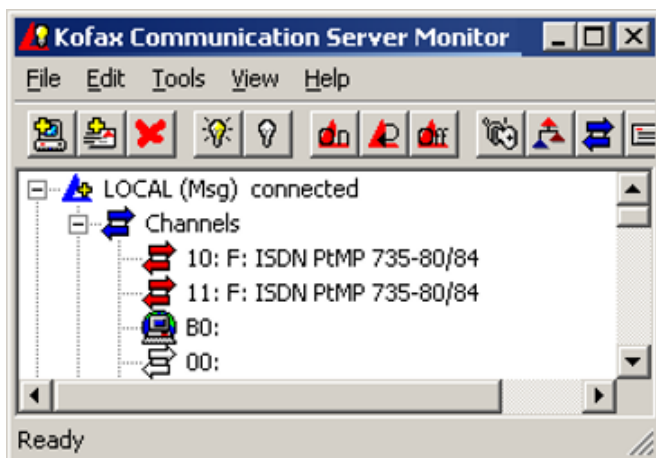
9. Choose the highest 10 TCOSS channels for **outgoing calls only** and switch off their reception, and define a unique main group for sending (such as G:) and enable outgoing voice calls.
10. Choose the lowest 10 TCOSS channels for **incoming calls only**, and switch on their reception and set them to Waiting state or assign at least a different channel group (not G:) Also disable outgoing voice calls. Switch off circular incoming call distribution (config line 286, pos. 05) in order to force routing of incoming calls primarily to these lowest channels. Incoming calls would be routed to shared channels only if all exclusive incoming UIF channels are occupied.
11. **For shared channels**, switch reception on and define blank main group and additional group G: with about 1-2 minutes time overdue. In this way, shared channels would get send orders just after all exclusive channels are occupied. Enable outgoing voice calls.

Indication of Interruptions on BRI/PRI Lines

A line fault detector supervises the ISDN Layer 1. If it detects that Layer 1 is lost, an error message as shown below will be created.

Type: Error
TCOSS Error Level: 3 (send to .ERROR3)
Module: TCOSS
ID: 16046
Description: Line for TCOSS Channel %3 has been disconnected.
Corrective action: Check if the ISDN line is correctly connected with the KCS Line Server.
Parameter: %3 TCOSS Reference channel that is affected by the line fault.

Additionally all channels that are affected by the line fault will be set to an error state and stop sending. They are shown with red arrows within the TCMON Message server.



The channels automatically recover from the error state if the layer 1 connection will be re-established. The following info message indicates the reconnection.

Type: Info
 TCOSS Error Level: 1 (send to .ERROR1)
 Module: TCOSS
 ID: 16047
 Description: Line for TCOSS Channel %3 is reconnected.
 Parameter: %3 TCOSS Reference channel affected by the line fault.

Note

- The error message will be created once for each line on the reference channel with the following exception. If BRI is configured without reference channel (if configuration line 249 is set to blanks) the error message is created on both channels.
- The feature is supported with both basic rate and primary rate ISDN lines (on LS1 and TC20).
- The line fault condition is detected within 10 seconds. Except when using BRI with PtMP, the detection time is increased by the Supervision of BRI/PRI line status timeout. It can be set in position 9 of configuration line 291 (See "Supervision of BRI/PRI line status" in the *TCOSS ISDN Manual* for more details). By default this timeout is set to 60s. This means that the absence of a BRI PtMP line is detected within 70s (by default).
- If Supervision of BRI/PRI line status is disabled (position 9 of configuration line 291 is set to 00), the line fault condition is not detected.
- The fax error counters are still available as with prior releases.
- The feature is not supported for UIF modules on TS33.
- In an ASP system, the feature is available if the media server version is 7.61.03 or higher. A storage server upgrade is not required.
- The feature is not available for Fax Over IP (UFI) channels.

Voice Integration

This section describes features that are used for KCS Voice integration only.

Using the Same ISDN Line for Both Fax and Voice Calls

With LS1 servers, we have the possibility to handle both fax and voice calls via the same physical ISDN line. The only configuration requirement is that voice calls must use separate extensions (extension ranges) and they must be explicitly marked as "Voice" extensions using the "V" prefix in the UIF module configuration, lines 254 - 283, such as:

```
'11~=V1~ line 254 , (mark extensions 1000-1999 to be a voice number)
```

The PBX must be set up in a way to route all fax and voice numbers to the same ISDN trunk (BRI or PRI).

Several configuration scenarios are available on the PBX side to accomplish this goal:

1. Use the "redirecting number" for voice calls

All user's fax extensions are routed to the KCS ISDN trunk as usual, and all voice calls are handled via one single number reserved for all voice calls: the Voice Access Number (see [Redirecting Number Functionality](#)).

2. Using distinct number range for voice calls

If the PBX does not support the redirecting number, each user has to be assigned two distinct extensions: one for fax and one for the voice mailbox.

For example, assume that the number range 1xxx are normal voice extensions, 2xxx are fax extensions, and 3xxx would be voice box extensions. The PBX must be set up to route both ranges 2xxx and 3xxx to the same KCS lines. The voice box extensions must be marked as voice numbers in the UIF number conversion config lines:

```
'13~=V3~ , (mark extensions  
3xxx to be voice numbers)
```

Further, the call forward destination would be different for each user (each user 1xxx would have to set up the call forward destination to 3xxx).

Disadvantage:

Each user would occupy 3 different extensions in the PBX.

3. Using different trunk prefixes to differ distinct number range for voice calls

This is very similar with 2) and may be used in countries without the fixed telephone number length (Germany and Austria).

For example, assume that the number range 1xxx are normal voice extensions and the prefix '8' marks fax extensions (81xxx).

The 1st possibility would be to define another prefix in the PBX for voice boxes (such as 89) and route all such calls to the same KCS line. In addition, the PBX must pass also the trunk prefix to KCS in the dialed number (but note that by default, such trunk "prefixes" are suppressed by PBX devices and only digits dialed behind the prefix are delivered).

Set up UIF number conversion config lines similar to the following:

```
'189~=V~ , (mark extensions 89xxx to be
```

```
voice and remove prefix 89) '18~== , (remove prefix 8 for fax calls)
```

The call forward destination would be different for each user (each user 1xxx would have to set up the call forward destination to 89xxx).

The 2nd possibility would be to define an additional prefix to be dialed just after the leading "fax" prefix ("8"), for example "9", but **without changing anything in the PBX**.

As the PBX by default suppresses the prefix number, in this case "8", the PBX would pass only "xxx" for fax extensions and "9xxx" for voice box numbers.

Set up UIF number conversion config lines similar to the following:

```
'19~==V~ , (mark extensions 9xxx to be  
voice and remove prefix 9)
```

The call forward destination would be different for each user (each user 1xxx would have to set up the call forward destination to 89xxx).

Unique Single Number for Fax and Voice (USN)

This section describes unique single number for fax and voice.

How it Works

In most countries in the world (except for Austria and Germany) the public telephone numbering plan is very restrictive. Telephone numbers have a fixed length and even local extensions in the companies are the real part of the public numbering plan (such as the well known 10-digit numbers in the USA).

For example, if any company needs 000 extensions for its employees, it must order (and pay for) 1000 numbers from the local PTT. Therefore, companies are often rejecting to order distinct fax extensions for employees, because it is very cost intensive. They ask for a solution that would make it possible to receive both voice and fax calls for each user via a single number/extension.

KCS provides a simple "entry-level" solution for this problem, the "Unique Single Number" (USN), which works as follows:

1. Each user receives all voice and fax calls via the same extension. All voice and fax calls are routed by the PBX to the user's telephone at first.
2. **If the user does not answer the call** (Cfu, Cfnr or Cfb condition), it is forwarded to KCS UM server that performs automatic fax detection and handles the call as applicable (receives the voice mail or the fax).

In the case that the fax is being sent from a "manual" fax machine without the dialer (such a fax machine does not generate typical fax tones and cannot be recognized automatically), the caller would hear KCS voice menus advising to press 9 to send a fax: after pressing 9, the user would hear a KCS fax prompt and then press the start button on the fax machine.

3. **If the user answers the call** and hears any fax-like tones, or if the caller is just sending a fax (in the case of "manual" fax machine), the user would transfer this call to the single company-wide "Fax Access Number" (this function may be set to one of the telephone's programmable buttons) and hang up the line. The PBX will at first make a second call to KCS UM server, and after the user has hung up, connect the calling fax with KCS directly.

This solution is suitable for companies with low fax traffic, because once the user has answered an incoming fax call, he/she will have to transfer it manually to the KCS server's Fax Access Number.

Prerequisites

1. LS1 server connected via QSIG BRI or PRI trunk to the PBX using the same physical for both voice and fax call.
2. TCOSS and Voice server must be used (in other words, all used channels must support fax and also voice).
3. PBX must support call diversion supplementary services ("redirecting number") (For the exact PBX requirements, refer to the PBX Requirements Technical Manual.)

Note The reason why call diversion service is required for USN functionality is that it is the only possibility to route all redirected voice and fax calls to the KCS server via one single Voice Access Number. If call diversion service would not work, the USN would not make any sense as distinct fax and voice number ranges would have to be assigned for KCS lines. On the other hand, QSIG protocol is recommended as it is known to support call diversion services with most PBX systems.

Configuration

1. Usage of redirecting number for voice calls must be configured within the UIF module:

Config line 295, 3rd position:

00	Redirecting number disabled
01	Redirecting number enabled (default)

2. Automatic fax detection must be configured within the UIF module:

Config line 295, 4th position:

00	Fax detection disabled (default)
05	Fax detection enabled

This is the time in seconds that KCS tries to detect an incoming fax after the call is answered.

3. Two distinct extensions must be allocated in the PBX to be routed to the KCS server:
 - a. The Voice Access Number (such as 999; see the *TC/Voice Access Manual*) Set up this extension as the call forward destination for each user.
 - b. The Fax Access Number (such as 998)

Set up a programmable button on each user's telephone to make a second call to this extension or at least publish this extension in the company's telephone list so that each user would know that each incoming fax must be transferred to this unique extension.
4. Set up the Voice Access Number in the UIF module's number conversion facility to be a Voice number:

```
'1999=v999 line 254 , (mark extension 999 to be a voice number)
```

5. If the Fax Access Number has been dialed, the incoming fax is routed to the inbox of the user who is originating the fax call transfer (originator based routing), as this is the only possibility to identify the fax inbox:

```
'1998=% line 255 , (mark extension 998 to be a fax access number)
```

6. Switch off using the callerID as originator of inbound faxes, and use the TSI instead.
Config line 235, 11th - 14th position: ' ' - do always use the TSI as originator

Note Without this setting, all incoming faxes transferred manually to the KCS server via the fax Transfer Number would have their own extension as originator.

7. Activate the Unique Single Number function for the Voice server. Refer to *TC/VoiceAccess* documentation.

Redirecting Number Functionality

If an incoming fax-call is routed to the KCS server by one of the *call diversion services* (CFU - *Call Forwarding Busy*, CFU - *Call Forwarding Unconditional*, CFNR - *Call Forwarding no Reply*), the (ISDN) network may provide the originally dialed number with the incoming call (the number from which the call diversion was invoked) by the means of the *Redirecting Number* functionality.

KCS ISDN fax supports the *Redirecting Number* according to the ETS 300 207 standard (that defines *Diversion supplementary services* for ISDN network).

This feature may be useful for customers with their own PABX network that interconnects several offices. In such a scenario, the KCS server may be connected to one of the PABX devices via any type of ISDN line providing one unique fax destination number for KCS. All other PABX will set up the CFU function for all local user fax numbers to the same fax destination number: as such, an incoming call arrives at KCS, the ISDN fax module recognizes the Redirecting Number (in other words, the user's local fax number) of that call and uses it for inbound routing instead of the called number (DDI) that may even be the same for all incoming calls.

The redirecting number functionality can be activated by setting the config line 286, position 8 to 01. Refer to the *TCOSS Configuration Manual* for details.

Number Conversion Rules for the Redirecting Number

Up to TCOSS 7.49.xx the number type "@" in the fax number conversion table was used both for converting the calling party number party (Caller ID) and the redirecting number. During tests with various PBX systems, we found that different conversions may be required for the caller ID and redirecting number.

Since TCOSS 7.50.00, the additional conversion type A has been added. This type is used for conversion of the redirecting number. If there is no matching Type A line in the conversion table, there is a fallback to the Caller ID conversion (Type "@"). The fallback has the following advantages:

1. The new release is fully compatible with old releases.
2. In most cases, the same rules can be used both for the redirecting number and caller ID. The type "@" can be used to convert both types.

Note No V prefix is necessary for redirecting number conversion lines even for redirected voice calls.

Example

Assume the following (complex) scenario: customer is using TC/VoiceAccess running via LS1 server, but the PBX does not support QSIG MWI signaling (like Alcatel OmniPCX 4400 3.2/4.2/5.0). Therefore, a

dedicated TC20 HW-based line server sends MWI messages via a/b line (with extension "1234") towards the PBX (using DTMF signaling).

1. Once the user has received a message, the Message waiting lamp is switched on.
2. User can press a "VoiceMail" button on the phone to listen to messages.
3. Upon pressing this button, the PBX automatically calls an extension where the MWI message came from: the "1234" (typical PBX VoiceMail access functionality).
4. The "1234" is redirected (by CFU) to the KCS Voice Access number (such as 9999).
5. The KCS server recognizes that this is a redirected call ("1234" being the redirecting number), and attempts to leave a message for the user "1234" **but this user does not exist**.

How to solve this problem?

Convert the redirecting number "1234" to the VoiceAccess number "9999" (without the "V" prefix):

```
'A1234=9999          ,254 convert the redirecting number
'19999=V9999        ,255 identify call to 9999 as voice calls
```

QSIG Call Diversion Supplementary Service for Voice Calls

This section describes QSIG call diversion supplementary service for voice calls.

How to use the "redirecting number"

Unlike incoming fax calls, incoming voice calls that lead to *leaving a voice mail* on the KCS UM Server are not direct calls, but they are *forwarded* to KCS by the PBX if the originally dialed extension was not reachable. Typically PBX devices support three kinds of call forwarding:

1. **Call forward unconditional (cfu):** The incoming call is forwarded immediately without ringing at the forwarded extension.
2. **Call forward on busy (cfb):** The incoming call is forwarded if the extension is busy.
3. **Call forward on not responding (cfnr):** The incoming call is forwarded if the user is not responding after a predefined number of rings.

The destination (number) for such a call forward is being entered during setup/activation by the user or centrally for all users by the PBX administrator. Further, this destination number must be one of the local extensions that is routed by the PBX to the KCS server.

There are two possibilities how to assign *call forward* destination numbers:

A unique extension for every user

For example, for users with telephone extensions 1000, 1001, ... call forwards may be set up to extensions 2000, 2001, ... assuming the 2xxx number range is routed to the KCS server. The KCS server will receive this "forward to" extension as the *called party number*, (calledID) and perform inbound routing according to this number (calledID is the inactive voice number in the user's profile).

This method is technically simple but not suited very well for the real world: a unique number range would be occupied in the PBX for internal voice boxes.

Using the "redirecting number" (call diversion supplementary service)

If the PBX supports call diversion supplementary services, all call forwards for all users in the PBX can be activated to the same unique extension that is being routed to the KCS server ("rrrr"). If a voice call from

the number "aaaa" to the extension "bbbb" would be forwarded to KCS, the PBX delivers the following three numbers to KCS:

1. *calling party number* (callerID) – "aaaa" (provided it is available)
2. *called party number* (calledID) – "rrrr" (this is the call forward destination)
3. *redirecting number* – "bbbb" (the originally dialed extension)

The KCS recognizes the *redirecting number* and performs the inbound voice call routing according to it.

Advantages:

- No separate number range necessary for voice boxes on the KCS server
- Call forwards activated to the same single extension – easy administration

Prerequisites for the "redirecting number":

- QSIG protocol supporting call diversion supplementary services for the BRI or PRI line must be configured on the PBX side. The following information on PBX devices to support QSIG call diversion services is available:
 - Siemens Hicom 300 (already tested with KCS)
 - Alcatel 4400
 - Ericsson MD110
 - Nortel Meridian
 - Tenovis Integral 33 XE

Note For the exact PBX requirements, see the *PBX Questionnaire* document.

- Usage of redirecting number for voice calls must be configured within the UIF module: Config line 295, 3rd position: 00 - redirecting number disabled 01 - redirecting number enabled (default)

How to test the "redirecting number" functionality:

1. Set up both TCOSS and Voice servers, and don't forget to check whether the redirecting number is activated (UIF config line 295, position 3 must be 01 and QSIG protocol must be setup on both the KCS and PBX side).

During the Voice server setup, define a unique extension as the "Voice Access number" (this is the number dedicated to access any voice mailbox, such as 999. For details, see the TC/VoiceAccess documentation).

Set up this number to be a Voice number in UIF module's number conversion lines (254-283), such as for the number

```
"999": Config line 254:  
1999=V999,
```

2. Try to call the Voice Access Number directly from any other local extension or from an external phone, and verify whether the voice server responds with the proper prompts requesting the number of your mailbox:
("This is TOPCALL Voice mail, please enter the number of your mailbox ...").
3. Activate the call forward destination, possibly for all 3 forward types (cfu, cfb and cfmr) for one extension (for example "111") to the Voice Access Number ("999").

4. Set up the user profile for the extension "111" (inactive voice address with the service VOICE, and others; refer to the *TC/VoiceAccess User Manual*.)
5. Call the extension "111" from any other phone and let the call be forwarded to KCS (for example, do not answer the call - cfmr).

Now you can simply judge whether the redirecting number works or not:

- If you hear the voice prompt asking you to leave a message for user "111" (or hear the private greeting), the **redirecting number WORKS**.
- If you hear the previous prompt (that prompts you to enter the number of your mailbox), the **redirecting number DOES NOT WORK**. The redirecting number was not delivered to KCS and that is why KCS interpreted it as a call to access one user's messages).

What to do if the redirecting number does not work:

1. Double-check that the QSIG protocol is configured on the PBX side with the required version of call diversion services (see the "PBX Questionnaire" for exact PBX requirements).
2. Configure the Trace module with the WCONFIG and trace several call forward attempts (as described above) and send them to Kofax for evaluation.

Call Transfer for the QSIG Protocol

Call transfer (CT) is a supplementary service that enables user A to transform two of calls (with users B and C) into a new call between users B and C.

So far, KCS server has been able to switch two of its calls together using so called *tromboning* technology. For example, if the TC/VoiceAccess caller decides not to leave a voice message but to connect to the operator (TC/Attendant functionality), KCS server establishes the second outgoing call to the operator and then switches both calls together. The disadvantage of tromboning is that two lines towards PBX are occupied for one caller.

Now KCS server is able to transfer any of its voice calls to another destination number via the PBX: for example, if user B calls TC/VoiceAccess (user A) and decides to be connected to another destination number (user C), KCS server initiates Call Transfer via the PBX. As a result, the PBX interconnects users B and C internally and disconnects both original calls towards KCS server. The advantage is that no lines are occupied between KCS server and the PBX.

There are two variants of QSIG CT supplementary service: **CT by join** and **CT by rerouting**.

CT by join

With CT by join KCS server at first joins (=interconnects) both calls together (and thus occupies still both lines towards PBX). But after the successful CT by join, the PBX will typically initiate the Path Replacement supplementary service to optimize the route of the new call. As a result, the PBX will interconnect two other users B and C internally and disconnect the calls towards KCS. There are two CT by join variants:

1. **CT by join into ringing:** With this variant, KCS invokes CT procedures just after the 2nd call (to user C) has proceeded to the ringing state (the C's telephone is ringing). The advantage of CT into ringing is that the user C immediately sees the number of the user B on the telephone display as the phone starts ringing.
2. **CT by join into connected:** With this variant, KCS invokes CT procedures just after the 2nd call (to user C) has already been connected (the user C has already answered the call). The disadvantage

of CT into connected is that the user C only sees the number of the KCS server on the telephone display as the phone starts ringing. That is why the "CT by join into ringing" is the preferred variant. The "CT by join into connected" is only supported if the PBX does not support the CT into ringing. If PBX is not able to initiate Path Replacement after CT by join, the CT by join brings almost no improvement compared to tromboning, as two lines are still occupied for one transferred call.

CT by rerouting

With CT by rerouting KCS server does not have to join both calls together: instead, the CT by rerouting procedures require the PBX immediately to make a new connection between users B and C and to disconnect both previous calls towards KCS server.

Note With this TCOSS release KCS does not support "CT by rerouting".

CT and Call HOLD

Some PBX systems require that the 1st of the two calls involved in the CT must be put on HOLD before the CT activation. But this is not required by the CT supplementary service and therefore this option may be configured separately on the KCS side.

Prerequisites

1. QSIG protocol running via BRI or PRI interfaces, TC16/TC23/TC24 interfaces (KCS Server Model 305)
2. The PBX system must support the QSIG CT by join and Path Replacement (PR) supplementary services. The PBX must be able to invoke Path Replacement (route optimization) after successful CT by join. For detailed PBX requirements, see the "PBX Requirements" document.
3. The CT and invocation of PR after successful CT by join must be configured in the PBX.

The following table lists all PBX systems known to support CT and PR supplementary services via the QSIG protocol.

PBX Type/ SW release	PBX configuration parameters/comments (if already tested with KCS)
Hicom 300 Rel. 2.08	<p>Call HOLD prior to CT requested If the switchboard is involved in one of the two calls before CT; the PBX does not activate PR after CT.</p> <p>COT parameters: PROTVAR=ECMAV2, SEGMENT=1</p> <p>Activate the Path Replacement (route-optimization):</p> <p>AMO ZAND: branch ALLDATA, NODECD=<nodeNr></p> <p>AMO WABE: < nodeNr>, .. EIGENKZ</p> <p>AMO RICHT: ROUTOPT=YES</p> <p>AMO TDCSU: <cotNr> :</p> <p>AMO COT: ROPT</p> <p>AMO ZAND:branch ALLDATA, ROUTOPTD=N,ROUTOPTP=N</p> <p><nodeNr> is the own NodeCD number, such as 3020</p> <p><cotNr> is the COT number of the QSIG trunk</p>
Hipath 4000 Rel.1.0	Not tested by Kofax, but should work in the same way as Hicom 300

Meridian X11 Rel. 25	
Tenovis Integral 33XE Rel. E05/E06	
Alcatel OmniPCX 4400 Rel. 4.2	

Configuration

Following configuration options are available for Call Transfer:

Config line 295

5 th position	00 - Call Transfer via PBX disabled (=tromboning) 01 - Call Transfer by join "into ringing" (preferred CT variant) 02 - Call Transfer by join "into connected"
6 th position	00 - Call Transfer without Call Hold 01 - Put the 1 st call on HOLD prior to the CT

Use Cases for Call Transfer

Call Transfer is a basis technology for Voice applications that transfer a call to other destination numbers. With this TCSP release, the only applications for Call Transfer are the TC/Attendant and CallSender functions of TC/VoiceAccess. Further applications will follow with the next TCSP feature release.

There is one major functional difference between Call Transfer via PBX and the tromboning ("Local switching, local Call Transfer").

After the call has been transferred via the PBX, it does not occupy any lines between KCS and PBX, but the KCS loses control of this call. For example, suppose the caller is listening to voicemails and chooses to be connected with one of the voicemail senders. After the call is established and the voicemail sender disconnects from the call, the caller is also disconnected and has to eventually call KCS server again to listen to more messages.

After the call has been transferred locally via tromboning, it occupies two lines between KCS and PBX, but the KCS keeps control of the call. For example, suppose the caller is listening to voicemails and chooses to be connected with one of the voicemail senders. After this call is established and the voicemail sender disconnects from the call, the caller is reconnected to the mailbox and may continue to listen to more messages without making a next call.

It is clear that both scenarios have their advantages and disadvantages, and applications themselves should decide which Call Transfer method to use.

How to Test Call Transfer (by Join)

The crucial problem with CT by join is whether or not the PBX initiates the PR after the successful CT by join. If not, even with a successfully performed CT by join, two lines between KCS and PBX would still be occupied and thus the CT would not bring any improvement in comparison with tromboning.

The easiest way to test the CT+PR is to use the TC/Attendant function (see *TC/VoiceAccess* documentation).

1. Install KCS Server Model 305 and set up one or more UIF modules for QSIG protocol; set up CT by join + Call HOLD in the UIF config line 295 and the ISDN Tracer Module.
2. Set up TC/VoiceAccess with TC/Attendant, set the TransferNumber to any internal telephone extension available (such as 1111) and the VoiceAccess number (such as 9999).
3. Set up one TCOSS user with a defined voice extension (such as 2222).
4. Call the extension 222' from another internal phone (either directly or via call redirection of the telephone 2222'. You hear the welcome prompt for the user 2222 and press 0 to be connected to an operator.

The telephone 1111 starts ringing and you should hear the PBX HOLD music and may observe 2 active calls with TCMON (Message Server, Channels view).

5. Answer the call on the telephone 1111.

Now you should be connected with the telephone 1111 and after a few seconds, both active calls should have disappeared from TCMON (Message Server, Channels view).

If so and you are still connected with telephone 1111, **everything works OK**.

If not, please see the next section.

Possible problems:

1. You are connected with telephone 1111, but TCMON still indicates 2 active connections.
The CT itself has worked but the PBX has not activated PR (route optimization) afterwards.
2. After you press 0 for the operator, your call is disconnected and also TCMON (Message Server, Channels view) doesn't show any active calls.
There may be a more difficult CT-related protocol problem between KCS and the PBX. Perhaps a different protocol is configured on the PBX side, or there is QSIG, but it is not properly set up for CT +PR.
3. After you press 0 for the operator, you haven't heard the PBX HOLD music, switch call HOLD off (UIF config line 295) and try again.

Restrictions

- The only reasonable application for Call Transfer, the TC/Attendant, does not really work with the Hicom 300 (the only PBX tested with CT so far) due to the Hicom 300 restriction that Path Replacement is not activated after the CT if the switchboard (operator) is involved in one of the calls to be transferred. As a consequence, 2 lines per transferred call would still remain occupied. But this is only an implementation restriction in the Hicom 300 and may not necessarily be a restriction for different PBX platforms.
- Currently, the application would always use that Call Transfer method as configured in the config line 295 even though it would be not the optimal one. With the next release, applications would select the proper Call Transfer method (such as TC/Attendant CT via PBX and the CallSender function via the internal CT - tromboning).

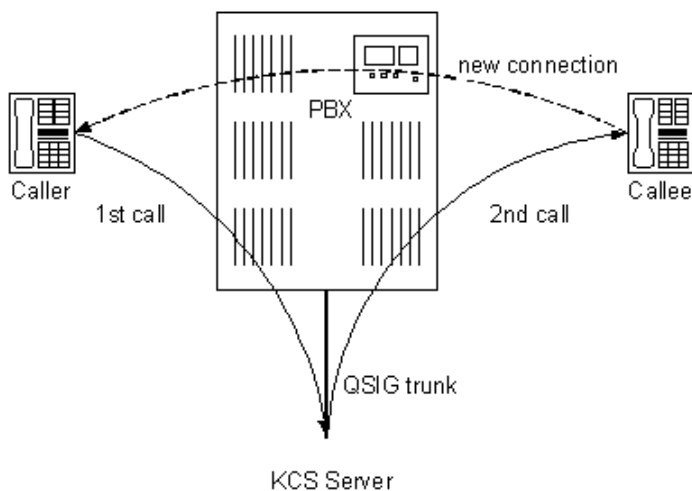
Call Transfer Loop Detection for QSIG protocol

This section describes call transfer loop detection for QSIG protocol.

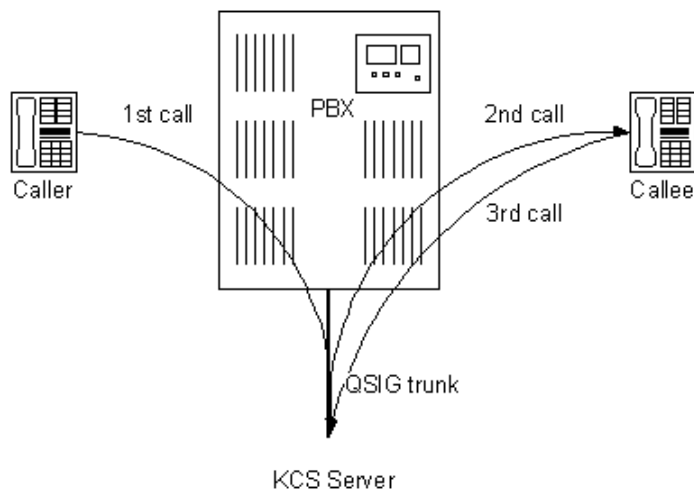
How It Works

If using advanced TC/VoiceAccess functions like TC/Attendant, Call Sender or Dial by Name, the caller who dialed himself into the KCS Voice server may choose to be transferred to another internal or external number (like personal operator, sender of the voice mail etc, see TC/VoiceAccess documentation). In order to do so, KCS server at first makes a second call to the new destination number and after this call has been answered, performs the call transfer to connect the caller with the new destination.

If KCS server is interconnected via the QSIG protocol and the PBX supports Call Transfer and Path Replacement supplementary services, the PBX recognizes the loop, interconnects the caller and the new destination number via the new connection internally and disconnects both 1st and 2nd calls towards KCS server.



However, the PBX is only able to optimize the call route after the 2nd call has been answered. If the 2nd call would not be answered but would be forwarded back to the KCS Voice Server (due to call forward on busy, not responding or unconditional), the 3rd call towards KCS server would be established and the caller would be connected to the called person's mailbox while effectively occupying 3 lines towards KCS server. And the situation may easily escalate if the caller decides to be connected to another extension. In this way, one caller may easily occupy 3, 5, 7 or even more lines between KCS server and the PBX.



The **Call Transfer loop detection mechanism** prevents such looping. After the KCS server has recognized that the PBX attempts to forward the 2nd call back to the own line (which would result in connecting the caller with called person's mailbox), it disconnects the 2nd call and switches the caller to the called person's mailbox internally while using the same line that was occupied for the 1st call.

Prerequisites

- QSIG protocol running via BRI or PRI interfaces, TC16/TC23/TC24 interfaces (KCS Server Model 305).
- The PBX system must support the QSIG Call diversion supplementary services (for a list of PBX devices that support this requirement, see the *Model 305 PBX Integration Manual*).
- The PBX system should support the QSIG CT by join and Path Replacement (PR) supplementary services. The PBX must be able to invoke Path Replacement (route optimization) after successful CT by join (this is necessary for the PBX to optimize the call route after the 2nd call has been answered).
- All telephone extensions must be forwarded to the same unique KCS Voice Access number (this is necessary to recognize the loop on the KCS side).
- TC/VoiceAccess version 3.02.02 or later.

Configuration

The KCS Voice Access number must be configured with the line type 'L' in the UIF number conversion facility (config lines 254-283):

```
'Laaaa=Vaaaa ,254 aaaa is the Voice access number
```

For the TC/VoiceAccess configuration, refer to the *TC/VoiceAccess User Manual*.

How to Test Attendant Loop Detection

The easiest way to test the Attendant loop detection is to use the TC/Attendant function (see the *TC/VoiceAccess* documentation).

1. Install KCS Server Model 305 and set up one or more UIF modules for the QSIG protocol.
2. Set up TC/VoiceAccess with TC/Attendant, set the TransferNumber to any internal telephone extension available, such as 1111, and the VoiceAccess number, such as 9999.

3. Set the TC/VoiceAccess registry key AttendantLoopDetection to SBOX (this means that the caller should be switched to the operator's mailbox after the Attendant loop has been detected).
4. Configure the call forward on the telephone 1111 to Voice access number 9999.
5. Set up one TCOSS user with a defined voice extension, such as 2222.
6. Set up the Voice Access number in the UIF number conversion facility: 'L9999=V9999, 254 Voice Access number for loop detection.
7. Call the extension 2222 from any other phone (either directly or via call redirection of the telephone 2222). You will hear the welcome prompt for the user 2222 and press 0 to be connected to an operator.
8. When telephone 1111 starts ringing, don't answer the call, but let it be forwarded (due to not responding) to the KCS server.

Now you should be connected with the user's 1111 mailbox and only one active call should be indicated in the TCMON: if so, **everything works OK**. If NOT (you see 3 calls in the TCMON), see the next section.

Possible problems:

1. The PBX does not support QSIG Call Diversion supplementary services, or a different protocol is being used (not QSIG).
2. KCS Server has not recognized the loop, due to the following reasons:
 - TC/VoiceAccess version older than 3.xx.xx being used
 - The Voice access number was not set up with L-line type in the numb. conv. facility
 - The telephone 1111 was not forwarded to the KCS Voice Access number
3. There is a different problem - Please make an ISDN trace of this test procedure and contact TCINT.

LS1 UIF Configuration for Call Sender Functionality

If the TC/VoiceAccess Call Sender functionality is to be used with the LS1 server (call the sender of the received voice mail, see *TC/VoiceAccess* documentation), the following changes in the standard UIF number conversion facility (config lines 254-283) are necessary:

1. For the callerID of an incoming call (`@` lines) and for the outgoing (dialed) number (`8` lines) the prefix ``*` must be replaced by the proper digit sequence for an international call (in an example below, `00`). This is necessary as TC/VoiceAccess does not support the ``*` prefix (see the example below).
2. It may be necessary to suppress the country code for a caller calling from the same country. For example, if a caller from Austrian mobile 06641234567 is leaving a voicemail in Vienna, the caller number 436641234567 with an international number type (`TI`) is delivered by the Austrian PTT (43 is country code for Austria). Because it is not permitted to dial any number starting with an Austrian country code in Austria, the number conversion facility must remove its own country code either in the caller or in the outgoing call section (see example below).

Note The PBX escape digit for the public line for an outgoing Call Sender voice call is being inserted by the TC/VoiceAccess application (and the same applies also for the TC/VoiceLink and TC/Player). In other words, outgoing voice calls don't use the public line escape digit configured with the UIF module.

Example of the UIF number conversion facility

Removing local Austrian country code `43` from the callerID:

```
'@TI43~=0~ , 274
```

Standard UIF Config Changes for Call Sender (assuming international prefix `00`)

```
'8*~=TI~ '800~=TI~ , 276
'80~=0~ , 277
'8I~=I~ , 278
'8~=~ , 279
'@TI~=*~ '@TI~=00~ , 280
'@TN~=0~ , 281
'@TS~=I~ , 282
'@~=~ , 283
```

ISDN Error and Info Codes

This section describes ISDN error and Info codes.

ISDN Error Codes

The series of error codes "I0" to "IZ" is reserved for ISDN D-Channel problems. The following codes are used by TCOSS.

Error code	Description	Similar UTF error codes	Break Code	
			Normal	Ext. dialing
IA	Call collision	XA	1	1
IC	No channel available (temporary problem)	XU	2	1
IF	No answer from distant station (time-out = config line 264)	XF	2	1
II	Error in selection number	XI	5	5
IJ	No connection to local exchange (layer 1 or lower layer protocol problem)	XJ	2	1
IN	Wrong number (number changed, call barred, ..)	XL,XU	5	5
IP	Procedural error	-	5	5
IR	call has been disconnected (normal call clearing)	-	2	1
IS	Service or Function not supported by network or user	-	5	5
IU	User Busy	XU	2	1
IX	Unknown error	-	2	1

The reference to the UTF error code is used as additional information only. It shows the error code that would be reported by the UTF in the same error situation.

Info Code for EURO ISDN and ECMA QSIG

The process of verifying an ISDN connection consists of three main steps.

1. Check the ISDN line (E1/T1 with primary rate, S/T interface with basic rate).

- **With ISDN PRI**, start TCOSS and check both LEDs on the back plane of TC34: if the line is OK, only the GREEN LED must be ON. If not, the line is not working properly. Follow the advice in the Troubleshooting table below.
- **With ISDN BRI**, there are no line status indications on the TC33/TS33 interfaces. Try to make an outgoing send attempt. If you get an error code, follow the advice in the troubleshooting table.

2. Check the outgoing connections.

Once the E1/T1 line (with PRI) is working properly, you may try to send a fax. Consider that processing of the ISDN send order consists of two subsequent steps:

- a. The ISDN connection to the distant fax machine is established.
- b. The conventional analog fax G3 transmission occurs via established ISDN connection.

If there is a problem during ISDN connection establishment, the send order breaks with the ISDN error code lx (IA, IC, and the rest) and in the author field of the send order, a more detailed error explanation can be found:

ISDN Info nnnn, where the 'nnnn' is the ISDN error cause value returned from the network side (PTT or PABX), or generated locally by KCS due some specific error situations.

Please check the cause and find out in the Troubleshooting Table below what to do.

If the ISDN send order breaks with any of analog fax errors such as XL, the ISDN connection is already been established, but the subsequent fax transmission has failed for some reason.

Please refer to the Troubleshooting table below for explanation.

3. Check the incoming connections.

- a. If the ISDN line is subscribed for both incoming and outgoing calls, it is a good idea to try to send a fax via the ISDN line to the own number so that the network side (PTT or PABX) would route the call back into KCS via the same line. If problems occur during this "loop" test (your outgoing send order breaks with any error), refer to the outgoing call section of the Troubleshooting table. But note that although this "loop" test works with most configurations, there may be situations where sending in a loop is not permitted at network site by some reason and you will get corresponding ISDN Info code. With PABX connections, you may try the "loop" test internally and also externally via PTT. Thus the "loop" test is a very good first test step, but when it fails, it does not necessarily mean the KCS system has malfunctioned.
- b. With a pure incoming KCS system, take an analog or ISDN phone set and try to dial into the KCS system. When everything works, you should hear the fax prompt for at least several

seconds. Now you can proceed to send an incoming fax from another available manual fax machine.

If you cannot hear the fax prompt, see the incoming call section of the ISDN Troubleshooting table for solutions.

Getting the dialed number on incoming calls

All supported ISDN protocols are able to deliver either the whole dialed recipient's number or at least its variable part (extension) to the KCS. This number is used by the KCS inbound routing mechanism to route incoming faxes to KCS recipients.

The corresponding ISDN feature with point to point lines is referred to in Europe as DDI (Direct Inward Dialing). On the other hand, with ISDN networks in the USA and Japan, this feature is referred to as "Delivery of Dialed Number".

Both methods (European, US and Japanese) are handled in the same way by the KCS system: simply by activating DDI through configuration.

The similar feature with point to multi-point lines is referred to as MSN (Multiple Subscriber Number). If you activate MSN via configuration, you may also route incoming faxes according to the MSN numbers.

The common problem on configuring DDI/Delivery of Dialed Number/MSN is that you sometimes will not know the length of the dialed recipient's number you get from the network. Basically, the network may provide you with the whole dialed number ("base" number + variable extension) or only a variable extension. Try at first to get this information from the network administrator. If you don't succeed, follow the Troubleshooting table to learn the length of the delivered number.

ISDN Troubleshooting table

The ISDN Troubleshooting table describes the most typical error situations that may occur in the field and proposes solutions that should resolve the problems. It can be used for all supported ISDN protocols supported except for 1TR6.

The table is universal for both primary rate (PRI) and basic rate (BRI) interfaces as most error situations/error codes are the same. Proposed solutions that makes sense only for the PRI interface are marked as "only for PRI" (checking E1/T1 line status, B-channel configuration, and others)

The first column denotes three important facts:

1. **Direction:** Outgoing call, Incoming call or both

2. Error class: The general nature of the error situation, which includes the following error classes:

- Line problem (E1/T1 with PRO or S/T with BRI)
- Normal error (such as user busy, wrong dialed number, etc.)
- Resource unavailable (at the network side)
- Service or option not available (at the network side)
- Service or option not implemented (at the network side)
- Invalid message (may indicate serious ISDN protocol problem)
- Protocol error (may indicate serious ISDN protocol problem)
- Interworking (network problem during internetworkings with another transit network)
- Miscellaneous
- Analog fax errors (error during outgoing fax transmission)
- Incoming errors

3. Error source: Which side of the user-network interface reported the problem

Direction Error class Error source	Problem	Short explanation	Solution
Line problem Error source: KCS	TC34 LEDs: Only RED is ON	Line alarm condition And no signal on the line	See "Verifying E1/T1 line" (only with PRI).
	TC34 LEDs: RED and GREEN ON	Line alarm condition Any signal on the line	See "Verifying E1/T1 line" (only with PRI).
	ISDN Info 202 Error code: IJ	Line not activated	See "Verifying E1/T1 line" (only with PRI). Verify the configuration (especially lines 250 and 266) Let the network administrator verify the network interface (reset, activate etc.) Change the hardware (TC34-only with PRI, or TC33/TS33 with BRI).
	ISDN Info 200 Error code: IJ	Layer 2 problem	Line active, but layer 2 could not be established. Verify layer 2 config parameters, config line 269, especially pos. 1 (user/network side). Try to change this setting (user->network or network->user) Let the network administrator verify whether layer 2 is active.
Outgoing call: Normal error Error source: Network	ISDN Info 1 Error code: IN	unallocated (unassigned) number	The dialed number is wrong, or currently not assigned. Try another one.
	ISDN Info 2 Error code: IN	No route to specified transit network	Either wrong number or a network problem to reach the destination. Try another number and report the problem to the network administrator.
	ISDN Info 3 Error code: IN	No route to destination	

Direction Error class Error source	Problem	Short explanation	Solution
	ISDN Info 6 Error code: IC	Channel unacceptable	<p>The B-channel selected for this call is unacceptable for the network. Verify (only with PRI):</p> <ul style="list-style-type: none"> Which B channels are active on the line and whether you properly configured them (A/B-side, bitwise B-channel map config line 267, pos. 1-4). Whether you did not configure more UIF modules than the number of active B-channels with this line. <p>If this error persists for a longer time (and your configuration is OK), the network side may become unresponsive.</p> <p>Try to reconnect the line and restart the TC20/TC34 interface.</p> <p>Report the problem to the network administrator.</p>
	ISDN Info 7 Error code: IC	Call awarded and delivered in an established channel	Should not normally occur. If it occurs very often, indicates an ISDN protocol problem. Make an ISDN trace and report the problem to Kofax.
	ISDN Info 16 Error code: IP	Normal call clearing	<p>The call has been cleared most probably by the destination user.</p> <p>This error may rarely occur during normal operation, but may indicate a problem: when the network or destination users want to clear the call, they should use a more detailed error code.</p> <p>If this error occurs very often, verify:</p> <ul style="list-style-type: none"> If it occurs only with a specific number, the problem lies with the destination user or by the user's supporting network. If all send orders break with this error, it indicates a probable ISDN protocol problem on the network side. <p>Report the problem to the network administrator.</p>
	ISDN Info 17 Error code: IU	User busy	The destination number is busy, try another one.
	ISDN Info 18 Error code: IF	No user responding	The user does not respond to the call; problem on the destination side.
	ISDN Info 19 Error code: IF	No answer from user (user alerted)	

Direction Error class Error source	Problem	Short explanation	Solution
	ISDN Info 21 Error code: IF	Call rejected	<p>The destination user does not wish to accept the call but could have accepted it, because user is neither busy nor incompatible with fax G3.</p> <p>The KCS system may also return this error when:</p> <ul style="list-style-type: none"> • Just after TCOSS start (equipment not yet ready) • During normal operation when it becomes not ready for receiving faxes (such as not configured for incoming operation, disk full)
	ISDN Info 22 Error code: IN	Number changed	The dialed number is wrong or currently not assigned, or most likely it has changed. Try another number.
	ISDN Info 26 Error code: IX	Non-selected user clearing	Should not occur normally. If so, make an ISDN trace and report the problem to Kofax.
	ISDN Info 27 Error code: IU	Destination out of order	The destination equipment is not working properly (switched off, cable disconnected, etc.). This error is reported by the network serving the destination equipment. Try another number.
	ISDN Info 28 Error code: II	Invalid number format	<p>The dialed number is wrong and most likely incomplete. Try another number.</p> <p>Verify whether you have properly configured the numbering plan used (conf. line 266, pos. 6). In Japan you need "unknown"; with all other protocols, use the "ISDN/ Telephony numbering plan".</p>

Direction Error class Error source	Problem	Short explanation	Solution
	ISDN Info 29 Error code: IS	Facility rejected	<p>The requested facility cannot be provided by the network. Verify:</p> <ul style="list-style-type: none"> Whether the network (PABX) supports bearer capability "3.1 kHz" or at least "Speech", consult with the network administrator. Whether the network (PABX) supports unrestricted ("clear") 64 KBit circuit mode B-channels, consult with the network administrator. ISDN services (config line 251)-all possibilities With T1 line and AT&T protocol, verify whether the proper AT&T service has been provisioned for outgoing calls. If the service has been provisioned on a call-by-call basis, you must configure it in config line 266. A-law/u-law configuration (conf. line 250, pos. 5 (A-law used in Europe, u-law in the USA and Japan). Which B channels are active on the line and whether you properly configured them (A/B-side, bitwise B-channel map config line 267, pos. 1-4, only for PRI). Whether the line is configured for fax G3 (voice-band data). With PABX try both external and internal sending. If internal works and external does not, you may have no rights for external sending. With BRI and Euro-ISDN protocol, try conf. line 266 pos. 3 to 01. <p>Report the problem to the network administrator.</p>
	ISDN Info 30 Error code: IP	Response to status inquiry	Should not normally occur. If it occurs very often, indicates an ISDN protocol problem. Make an ISDN trace and report the problem to Kofax.
	ISDN Info 31 Error code: IP	Normal, unspecified	The same as ISDN Info 16.

Direction Error class Error source	Problem	Short explanation	Solution
Outgoing call: Resource Unavailable Error source: Network	ISDN Info 34 Error code: IC	No circuit/channel available	<p>The B-channel selected for this call is not available. Verify (only with PRI):</p> <ul style="list-style-type: none"> Which B channels are active on the line and whether you properly configured them (A/B-side, bitwise B-channel map config line 267, pos. 1-4) Whether you did not configure more UIF modules than the number of active B-channels with this line. <p>This error may:</p> <ul style="list-style-type: none"> Occur temporarily due to the call collision problem. If it occurs too often with PRI, see "handling B-channel assignment collision". Persist for a longer time if network becomes unresponsive. Try to reconnect the line or restart the KCS system. Report the problem to the network administrator.
	ISDN Info 38 Error code: IC	Network out of order	Network side is not functioning correctly and this condition is likely to last for a longer period of time. If it occurs very often, report the problem to the network administrator.
	ISDN Info 41 Error code: IC	Temporary failure	Network side is not functioning correctly and this condition is not likely to last for a longer period of time. It may occur very rarely during normal operation. If it occurs very often, it may indicate the equipment (PABX) congestion. Report the problem to the network administrator.
	ISDN Info 42 Error code: IC	Switching equipment congestion	The switching equipment (PABX) is experiencing a period of high traffic. It may occur rarely during normal operation. If it occurs very often, report the problem to the network administrator.
	ISDN Info 43 Error code: IP	Access information discarded	Some access information could not be delivered to the destination user. As KCS does not use any kind of user-to-user signaling, it should not occur normally. If so, make an ISDN trace and report the problem to Kofax.
	ISDN Info 44 Error code: IC	Requested circuit/channel not available	The same as ISDN Info 34
	ISDN Info 47 Error code: IC	Resources unavailable, unspecified	Self-explanatory, perform similar actions as recommended with ISDN Infos 29 and 34.
Outgoing call: Service or option not available Error source: Network	ISDN Info 49 Error code: IS	Quality of service unavailable	Similar to ISDN Info 29, see actions there. There seems to be an authorization problem. With PABX, especially check both external and internal sending.
	ISDN Info 50 Error code: IP	Requested facility not subscribed	Report the problem to the network administrator

Direction Error class Error source	Problem	Short explanation	Solution
	ISDN Info 57 Error code: IS	Bearer capability not authorized	
	ISDN Info 58 Error code: IC	Bearer capability not presently available	
	ISDN Info 63 Error code: IS	Service or option not available, unspecified	
Outgoing call: Service or option not implemented Error source: Network	ISDN Info 65 Error code: IS	Bearer capability not implemented	Verify whether network side supports "3.1kHz" audio or at least "Speech" bearer capability; consult with network administrator. For possible actions, see also ISDN Info 29.
	ISDN Info 66 Error code: IP	Channel type not implemented	Verify whether the network provides for unrestricted ("clear") 64 KBit circuit mode B-channels; consult with network administrator. For possible actions, see also ISDN Info 6 and 29.
	ISDN Info 69 Error code: IS	Requested facility not implemented	See ISDN Info 29
	ISDN Info 70 Error code: IS	Only restricted digital information bearer capability is available	Request unrestricted ("clear") 64 KBit circuit mode B- channels from the network administrator.
	ISDN Info 79 Error code: IS	Service or option not implemented, unspecified	See ISDN Info 29
Outgoing call: Invalid message Error source: Network	ISDN Info 81 Error code: IP	Invalid call reference value	Improper configured call reference length (config line 266, pos. 1) <ul style="list-style-type: none"> • PRI interface needs CR length 2 • ECMA Q.SIG protocol needs always CR length 2 (also with BRI) • BRI needs CR length 1 (except for ECMA Q.SIG)
	ISDN Info 82 Error code: IP	Identified channel does not exist	The B-channel selected was not activated for the line at the network side. See ISDN Info 34.
	ISDN Info 83 Error code: IP	A suspended call exists	Should normally not occur, as the KCS does not support call

Direction Error class Error source	Problem	Short explanation	Solution
	ISDN Info 84 Error code: IP	Call identity in use	Suspend/resume functionality. If so, make an ISDN trace and report the problem to Kofax.
	ISDN Info 85 Error code: IP	No call suspended	
	ISDN Info 86 Error code: IP	Call having the requested call identity had been cleared	
	ISDN Info 88 Error code: IS	Incompatible destination	The destination equipment is not compatible. Check and extend the ISDN services config line 251. Probably you had only fax G3 service configured. Add also service without any HLC indicator. Try another number (this error should be destination number dependent). If it persists with all numbers, it indicates a problem on the network (PABX side).
	ISDN Info 91 Error code: IN	Invalid transit network selection	Should not occur as KCS does not indicate any transit network. If so, make an ISDN trace and report to Kofax.
	ISDN Info 95 Error code: IP	Invalid message, unspecified	See ISDN Info 96.
Outgoing call: Protocol error Error source: Network	ISDN Info 96 Error code: IP	Mandatory information element is missing	Network side claims that one of KCS ISDN messages misses one of the mandatory parts or even does not recognize KCS messages themselves. This error indicates a serious ISDN protocol problem. Verify the configuration: <ul style="list-style-type: none"> • Especially config lines 250 and 266 • With BRI and Euro-ISDN protocol, try conf. line 266 pos. 3 to 01 If the problem persists, make an ISDN trace and report to Kofax.
	ISDN Info 97 Error code: IP	Message type non-existent or not implemented	
	ISDN Info 98 Error code: IP	Message not compatible with call state of message type non-existent or not implemented	

Direction Error class Error source	Problem	Short explanation	Solution
	ISDN Info 99 Error code: IP	Info Element non-existent or not implemented	
	ISDN Info 100 Error code: IP	Invalid information element contents	
	ISDN Info 101 Error code: IP	Message not compatible with call state	
	ISDN Info 102 Error code: IJ	Recovery on timer expire	Our outgoing send attempt (SETUP message) is ignored by the network/PABX side. <ul style="list-style-type: none"> • ISDN service compatibility: try another ISDN services (config line 251) • Verify the configuration, especially lines 250 and 266. • Try sending to another number (local and external). • With T1 line and AT&T protocol, verify whether the proper AT&T service has been provisioned for outgoing calls. If the service has been provisioned on a call-by-call basis, you must configure it in the config line 266. • Please make an ISDN trace and report the problem to Kofax.
	ISDN Info 111 Error code: IP	protocol error, unspecified	See ISDN Info 96.
Outgoing call: Internetworking Error source: Network	ISDN Info 127 Error code: IP	Internetworking, unspecified	There was an internetworking problem with a network that does not support more precise error cause values. Try another destination number. Report the problem to the network administrator.
Outgoing call: Miscellaneous Error source: KCS	ISDN Info 128 Error code: IX	cause info element with zero length received	Should normally not occur. The call was cancelled with invalid cause information. Make an ISDN trace and report to Kofax.
	ISDN Info 129 Error code: IX	no cause value (=ISDN info code) has been received	Should normally not occur. The call was cancelled without any cause information. Make an ISDN trace and report to Kofax.

Direction Error class Error source	Problem	Short explanation	Solution
	ISDN Info 201 Error code: IJ	Restart procedure invoked by the network during the call	The network side invoked RESTART procedures during the call establishment phase. This may occur rarely during normal operation. If it occurs too often, it may indicate an ISDN protocol problem. Make an ISDN trace and report to Kofax.
	ISDN Info 300 Error code: IF	Connect request timeout	Destination user alerted but hasn't accepted the call before the connect request timer expired (config line 264). There are several possibilities: <ul style="list-style-type: none"> • The destination number was a telephone number and no one picked up the phone. Verify the number. • ISDN problem occurs at destination side (PABX). Try to extend ISDN services config line 251 and increase the connect request timer config line 264.
	ISDN Info 301 Error code: IA	Call collision in Layer 4	The send attempt was cancelled due to the call collision (the incoming fax is handled with priority). May occur during normal operation.
Outgoing call: Analog FAX errors Error source: KCS	Fax error XL	No answer from distant telefax	ISDN connection has already been established, but there is no fax machine at the destination number.
	Fax errors X0,XA	Call collision in fax module	The send attempt was cancelled due to the call collision (the incoming fax is handled with priority). May occur during normal operation.
	Other FAX errors	Problem during fax transmission	Refer to UTF errors description in <i>TCOSS System Manual</i> .

Direction Error class Error source	Problem	Short explanation	Solution
Incoming call Error source: Unknown (Network or KCS)	KCS does not respond to incoming call	You hear ring tone until network fails to timeout and breaks the call	<p>Most probably the network does not route the incoming call to KCS. Disconnect the ISDN cable from KCS and try again:</p> <ul style="list-style-type: none"> If you now immediately hear the busy or number not available tone, the call has really been routed to KCS, but its ISDN interface seems not to work properly. Try to reboot. If the problem persists after reboot or occurs too often, it may indicate a serious KCS problem. Please make an ISDN trace and report it to Kofax. If you still hear the ring tone for a longer time, the call has really not been routed to KCS. Report to network administrator.
	KCS responds with busy tone to phone call	KCS not ready/ not configured for incoming operation	<ul style="list-style-type: none"> All KCS lines are busy with other incoming calls. Wait for several minutes and try again. You have tried the incoming call just after TCOSS startup and UIF modules may not yet be ready for incoming calls. Wait for several minutes and try again. KCS rejects the call because its UIF module is not configured for incoming operation. Check the configuration with config program. You work with MSN but don't have any of your own numbers configured with conf. lines 254-283. To accept all MSN numbers, you may set conf. line 254 to '1~==~ KCS cannot accept incoming calls due to a disk full condition. KCS rejects the call as it believes it comes from incompatible equipment. Try another telephone set/fax machine. Make an ISDN trace and report to Kofax.

Direction Error class Error source	Problem	Short explanation	Solution
	KCS responds with 3 short beeps followed by busy tone to phone call	DDI/MSN misinterpreted as fax command (send attempt from another KCS breaks with XL or XU error)	The received DDI/MSN is longer than the maximum DDI/MSN length conf. by line 236. Maybe the network sends complete dialed number instead of only the extension. See DDI/MSN "not working properly" section.
	KCS responds with fax prompt to phone call but incoming fax doesn't work	DDI/MSN not working properly (send attempt from another KCS breaks with XN error)	<ul style="list-style-type: none"> You use DDI/MSN (conf. line 252 is 2 or 1) but get DDI/MSN with a different number of digits than expected (some networks may send the whole dialed number and some only the variable extension as DDI/MSN). You have invalid inbound prefix (conf. line 235). NN99 or rr99 does not route the call to existing KCS users. <p>Verify whether the problem lies in DDI/MSN - Switch DDI/MSN off (conf. Line 252 to 0), clear the inbound prefix (conf. line 235) and try the incoming fax.</p> <ul style="list-style-type: none"> If incoming fax is accepted now, the problem lies in DDI/MSN. If not, KCS may have a problem with this fax equipment. Try another one or if possible, send an incoming fax from another KCS. <p>If config without DDI/MSN works, verify what kind of DDI/MSN you get:</p> <ul style="list-style-type: none"> Switch DDI or MSN on again (conf. line 252 to 2 or 1) Delete conf. lines 254-283 and set line 254 to '1~== Set maximum inbound number length conf. line 236 to 14 (hex) Set proper inbound routing via rr99: - define service FXI with prefix FXI (as configured in conf. line 235) - enter line FXI:~,DIST:~ into the INBOUND section of rr99; create KCS user DIS; send an incoming fax with proper DDI/MSN <p>Check the inbox of DIST user for the dialed number:</p> <ul style="list-style-type: none"> There is only prefix FXI, but no additional digits. You don't get any DDI/MSN/dialed number from network. This feature is probably not activated on the network side. Report the problem to the network administrator. There is a prefix "FXI" and some additional digits that came as a DDI/MSN/dialed number from the network. Adjust your DDI/MSN configuration to support provided DDI/MSN length (conf. lines 254-283, 235, 236, rr99 or NN99).

Direction Error class Error source	Problem	Short explanation	Solution
	Incoming fax accepted but not properly routed	Inbound routing not working	<p>You use DDI/MSN (conf. line 252 is 2 or 1) but:</p> <ul style="list-style-type: none"> • Don't get any DDI/MSN digits from the network. DDI/MSN must be activated on the network side. Contact your network administrator. • Wrong NN99/rr99: all incoming faxes are routed to default recipient. <p>You have forgotten to conf. DDI/MSN (conf. line 252 to 2 or 1).</p>

Info Code for 1TR6

info code	Error code	Meaning
1	IP	Invalid call reference value
2	IX	Unknown error
3	IS	Bearer service not implemented
4 .. 6	IX	Unknown error
7	IP	Call identity does not exist
8	IP	Call identity in use
9	IX	Unknown error
10	IC	No channel available
11..15	IX	Unknown error
16	IS	Requested facility not implemented
17	IP	requested facility not subscribed
18..31	IX	Unknown error
32	IN	Outgoing call barred
33	IU	User access busy
34..52	IX	Unknown error
53	IN	Destination not obtainable because of wrong destination address or incompatible destinations
54..55	IX	Unknown error
56	IN	Number has been changed
57	IU	Out of order
58	IF	No user responding
59	IU	User busy
60	IX	Unknown error
61	IN	Incoming call barred

info code	Error code	Meaning
62	IU	Call rejected
63..88	IX	Unknown error
89	IU	Network congestion
90	IP	Disconnect initiated by remote user
91..111	IX	Unknown error
112	IP	Local procedure error
113	IP	Remote procedure error
114	IS	Remote user suspended
115	IS	Remote user resumed
116..126	IX	Unknown error
127	IP	User info discarded locally
128	IX	Cause info element with zero length received
129	IX	No cause value (=ISDN info code) has been received
200	IJ	Layer 2 problem (wrong configuration, ..)
201	IJ	Restart procedure invoked by the local PTT during the call
202	IJ	Layer 1 problem (interface out of order, cable disconnected, line not active)
300	IF	Connect request timeout (distant user alerted but hasn't accepted the call before the connect request timer expired (config line 264)
301	IA	Call collision in Layer 4

User Module for Laser Printer (ULP) (Not Supported)

Important The user module for Laser Printer (ULP) is not supported any more. If you currently use a ULP, use ULL+TCLANPRT instead.

The documentation has not been removed from the manual because ULL (User Module for LAN Laser Printer) refers to this section.

Overview

The ULP (user module Laser printer) is a TCOSS module designed to connect the KCS system to common laser printer devices. This enables the user to print both standard text documents (as received via TELEX) and graphic documents (received via FAX) using a laser printer or any other PCL5 compatible printer devices.

The KCS operating system handles this module like all the other modules in the system. The ULP module represents only a channel where a document can be sent. Thus, a send order can be generated manually

by the user or automatically (direct channel allocation or via the NN99 file) such as when receiving FAX documents. When using an automatic FAX printout, the local FAX machine is not necessary any more.

One laser printer module (ULP) can run with a fax module (UTF or UIF) in parallel (on TS29, TS32 or TS33). But not more than three ULP modules can run in one KCS cabinet, because there are only three link paths from the main board to which a fax interface can be connected. When the ULP module runs at the fax interface, the remaining link which could be used to connect another transputer interface is used for the centronics adapter (TS83 or TS8K). Due to this fact, the interface with the ULP module is always the last interface in the chain of boards connected to one of three different available links for the KCS slots.

Features of the ULP Module

The following functions are supported by the ULP module:

- Any PCL5 compatible printer can be connected to the KCS system.
- The connection between the KCS system and the printer can be realized with a standard centronics interface. A PC cable may be used.
- Fine and standard resolution are supported.
- It is possible to scale the page size between 70% and 100%.
- The resolution and scale factor can be configured as default values or set by an individual send order.
- Letter and A4 page formats are supported
- Every printed page contains a footer line that comprises information about the KCS filename, date, time and the current page number. The last page is marked as the "last page". The footer line can be suppressed.
- The printing speed is up to four pages per minute.
- The TS8K "remote connector" allows the printer to be up to 500 meters away from the KCS system. In this case, data is transmitted via a silica fiber cable. Otherwise, the standard centronics cable may not exceed 3 meters (40m only with special centronics cable; ask your computer dealer).
- The KCS contents directory and the journals contains the text information "Laser Printer" as answer back in the appropriate field when a document has been sent to the laser printer.
- All functions of the ISDN fax module are supported.

Requirements of the ULP Module

The following requirements must be fulfilled; otherwise the ULP module does not work.

- Any KCS model can be used to work with the ULP module. However, it's not possible to use more than 3! ULP modules in one KCS cabinet.
- An ISDN or Transputer fax interface is required to use the ULP module. It may have an UTF or ISDN fax module running in parallel to the ULP printer module at the same UTF or ISDN fax card.
- One of the interface cards TS83 or TS8K connects the board via a centronics cable with the printer.
- A PCL5 compatible printer (such as HP Laser Jet III) is needed to print the PCL5 data stream.

Sending to the ULP Module

This section describes sending to the ULP module.

Send Command

This section describes the SEND command.

Syntax of the NUMBER Parameter

```
..2S,R=TEST,N=CC:[H][B][X][F][N][S][L][70..100]
```

Where

CC	Channel number
H	Suppress creation of new header line
B	Suppress creation of back received document
X	Extended dialing
F	Use fine fax resolution for data conversion (intern)
N	Use 150dpi printer resolution (default is 300dpi)
S	Suppress footer line
L	Use letter page format (default is A4)
70..100	Scaling factor

Explanation of the Switches

Default settings

A default value for the scaling factor and switches F, N, S and L of the laser printer module is configured in config line 84 of this channel. To overwrite this setting, the NUMBER parameter of the SEND command (including the new value) must be specified. The NUMBER parameter is only valid for the specified send order.

Pay attention to the fact that if option is specified in the default send mode configuration (line 84 ULP), it is no longer possible to reset it by defining a different switch in the command line.

Resolution (switches N and F)

If N is specified, the document is printed with low printer resolution (150 dpi). If F is specified, the data is prepared internally with fine fax resolution.

Scaling factor

A value between 70 and 100 (percent) following the character for the printing resolution defines the scaling factor of the printed page.

Suppress footer line

If S is specified, no footer line is created.

Paper format

If L is specified, letter paper format (8.5 x 11 inch) is used. If not specified, A4 (210 x 297mm) is used.

For details of switches H, B and X, see [User Module for Transputer Fax \(UTF\)](#).

Examples

```
..2S,R=TEST,N=02:H90
```

Sends the document TEST to channel 02 (must be a ULP channel) with standard resolution, scaling factor of 90 percent and suppresses the creation of a new header line.

```
..2S,R=TEST,N=02:BFN70
```

Sends the document TEST to channel 02 (must be a ULP channel) with fine resolution, scaling factor of 70 percent and suppresses the creation of a back received document. Printer resolution is 150 dpi.

```
..2S,R=TEST,N=02:BHSL100
```

Sends the document TEST to channel 02 with scaling factor 100%. Creation of new header line is suppressed. There is no back reception and footer line. Paper format is "letter".

Page Layout

For details of the page layout, see "Page layout" of UTF and the *TCOSS Configuration Manual* chapter "Setup of TCOSS code pages." The following table shows only the default values for the configuration of the laser printer page.

Page format		Font	Top margin	Bottom margin	Left margin	Line pitch	Character pitch	Length of page	Length of BS-line	BS/LF offset
A4H	conf. val.	01	2A	78	37	10	11	3B	5F	05
	meaning		10.9mm	31.2mm	6.8mm	6.11 lpi	12.0cpi	59lines	95char.	5char.
A4Q	conf. val.	11	06	2D	A0	21	08	2E	84	05
	meaning		1.6mm	11.7mm	2cm	6.19 lpi	12.2cpi	46lines	132char.	5char.
BDH	conf. val.	00	0A	38	37	0C	0C	57	86	05
	meaning		2.6mm	14.5mm	7mm	8.15 lpi	17.0cpi	87lines	134char.	5char.
BDQ	conf. val.	10	00	2D	A0	19	06	3D	B1	05
	meaning		0mm	11.7mm	2cm	8.17 lpi	16.3cpi	61lines	177char.	5char.

Centronics Adapter for the ULP Module

The ULP module runs in parallel to an ISDN or Transputer fax interface and is connected via a KCS centronics interface adapter to the laser printer. This interface board converts the transputer link protocol to the signals for the printer's centronics interface.

Two models of centronics interfaces are available: the TS83 and the TS8K. Both interfaces have basically the same functions and distinguish only by the maximum distance allowed to transmit data to the laser printer.

The **TS83** is a small PCB mounted at the rear panel inside the KCS cabinet to connect the printer to the KCS system via a centronics cable. This allows a maximum cable length of three meters.

The **TS8K** "remote connector" is a standalone box up to 500 meters distant to the KCS system and this box uses an optical link (TS81) for data transmission at the KCS side. The other side of the box is the centronics connector as described with TS83. The TS8K has an external power supply.

Description of the ULP Error Messages

Error	Error message in	(1)	(2)
code	author field	1	1
P0	printer time-out	5	5
P1	attempt to send an empty document	5	5
P2	error when opening back received file	5	5
P3	error in back reception	5	5
PB	data error within TCI block	5	5
PC	form buffer overflow	5	5

(1) break code for transmission

(2) break code for extended dialing mode

Printer Speed

The printer speed basically depends upon the type of the used printer and the printer resolution. The following throughput can be achieved according to the printer and the resolution.

	HP Laser Jet III	HP Laser Jet IIIP
F90	3.04 p/min	2.44 p/min
N90	3.69 p/min	3.36 p/min

User Module for LAN Laser Printer (ULL)

Overview

The ULL module is used to print messages via TCTI (TC Transport Interface) and TCLANPRT (or LCUJOB) connection to any network printers. The difference between ULP and ULL is that the ULL module is connected to the TCLANPRT (via TCTI) while the ULP module is directly connected to the TS83 hardware module.

- The kind of laser printer module is chosen by configuration of the appropriate module name (ULP or ULL) with the config program.
- Multiple sessions between more TCLANPRT and ULL modules can be configured.
- The ULL module prepares the pages to be printed. Thus all FAX features (overlays, landscape, header and footer lines) are now supported while printing via LCUJOB.
- ULP and ULL modules recognize new control lines ++HEADER and ++BODY, which delimit the header (not converted into image) and body part (converted) of the message.
- For optimum performance with models/1xx/2xx, the ULL should be configured to the system master.

Refer to the *TCLANPRT manual* for additional information.

TCTI Connection to the LCUJOB

The TCTI transport interface is used to connect the ULL module to the LCUJOB running on the LCU. Multiple sessions between several LCUJOBS and ULLs are possible. For each LCUJOB (on the LCU or any other workstation in the LAN), one ULL module must be started on the KCS server.

The ULL module is able to print on any PCL5 printer available in the LAN. As the pages to be printed are prepared in the same way as with the ULP module, all printouts in the LAN are exactly the same as on the PCL5 printer connected via TS83 interface.

The printouts via LCUJOB is initiated by the sendorder to the ULL module connected to the LCUJOB (in the same way as with the ULP module).

Definition and Support of ++HEADER and ++BODY Lines

KCS messages are interpreted as consisting of two parts the header and the body part, as in the following example:

```
++HEADER
Line 1
...
Line n
++BODY
++TXT
Line 1
...
Line m
++FX2
TCI Code
++TXT
.....
```

The **++HEADER** information is used for the network printing commands like "capture", "endcap" in a NOVELL environment or "net use /d", "net use lpt2 ..." in an OS/2 or Microsoft LAN environment.

The **++BODY** information contains the message itself. By printing incoming FAX messages the **++BODY** part will start with a **++FX2** or **++FX1** line and end with a **++TXT** line.

If a KCS message starts with **++HEADER** before the first image block or text line appears, all of the following lines up to the **++BODY** line (or to the end of the message if **++BODY** line is not present) are considered to be a *header*. All lines after the **++BODY** line are considered to be a *body*.

If the message does not contain the **++HEADER** line, the whole message is considered to be a *body*. The body should not contain a **++HEADER** line (with the current implementation, all **++HEADER**/**++BODY** blocks within the body are ignored).

Handling header and body parts of the message (for ULL, ULP, UTF and UIF)

With ULL, all lines of the header are transferred transparently as text lines further to the LCUJOB via TCTI without performing any conversion.

With ULP, UTF and UIF, all header lines are suppressed.

The **++HEADER** and **++BODY** lines themselves are suppressed.

All text lines in the body part are converted to image lines and are sent/printed.

Note For the correct syntax of send commands, see the separate *TCLANPRT Manual [5]* which contains a full description of all possibilities for using the ULL module via TCTI.

Chapter 4

Tandem Server (Model/22x)

This section describes Tandem server.

General

For large message server installations, the system availability is extremely important.

The Tandem System consists of two mirrored KCS Servers (the primary and the secondary server). It provides fault tolerance for single failures within the system. See the *KCS system manual* for information about the available KCS Modules.

Advantages and Strengths of Tandem Servers

Fault tolerance

During normal operation, messages and system data are mirrored between both TCOSS Servers.

The two servers are connected via LAN and Status Box/Agent. The LAN carries the mirroring traffic, the status box/agent keeps track of system conditions. It makes sure that the systems never gets into a state where the two halves cannot be synchronized any more.

In the event of fatal failure on one system, no data gets lost and the server remains available. In this case, one TCOSS server runs standalone.

When the faulty server becomes available again, the two servers are automatically resynchronized. Synchronization runs a background process so that the continued operation is guaranteed.

Note As in a single TCOSS system, failures in Line Servers only affect the operation of the Line Server. When the Line Server becomes operable again, it is automatically rebooted and activated within TCOSS.

If the Primary Server fails, all client/server channels (UC0) run on the Secondary Server which starts standalone. The system is unavailable for a short time only. Clients and external TC/LINKs can continue working after a short interruption but without any change.

General Functionality

A dedicated high speed LAN connection between primary and secondary master.

The Tandem server offers the same functionality as single server, plus fault tolerance.

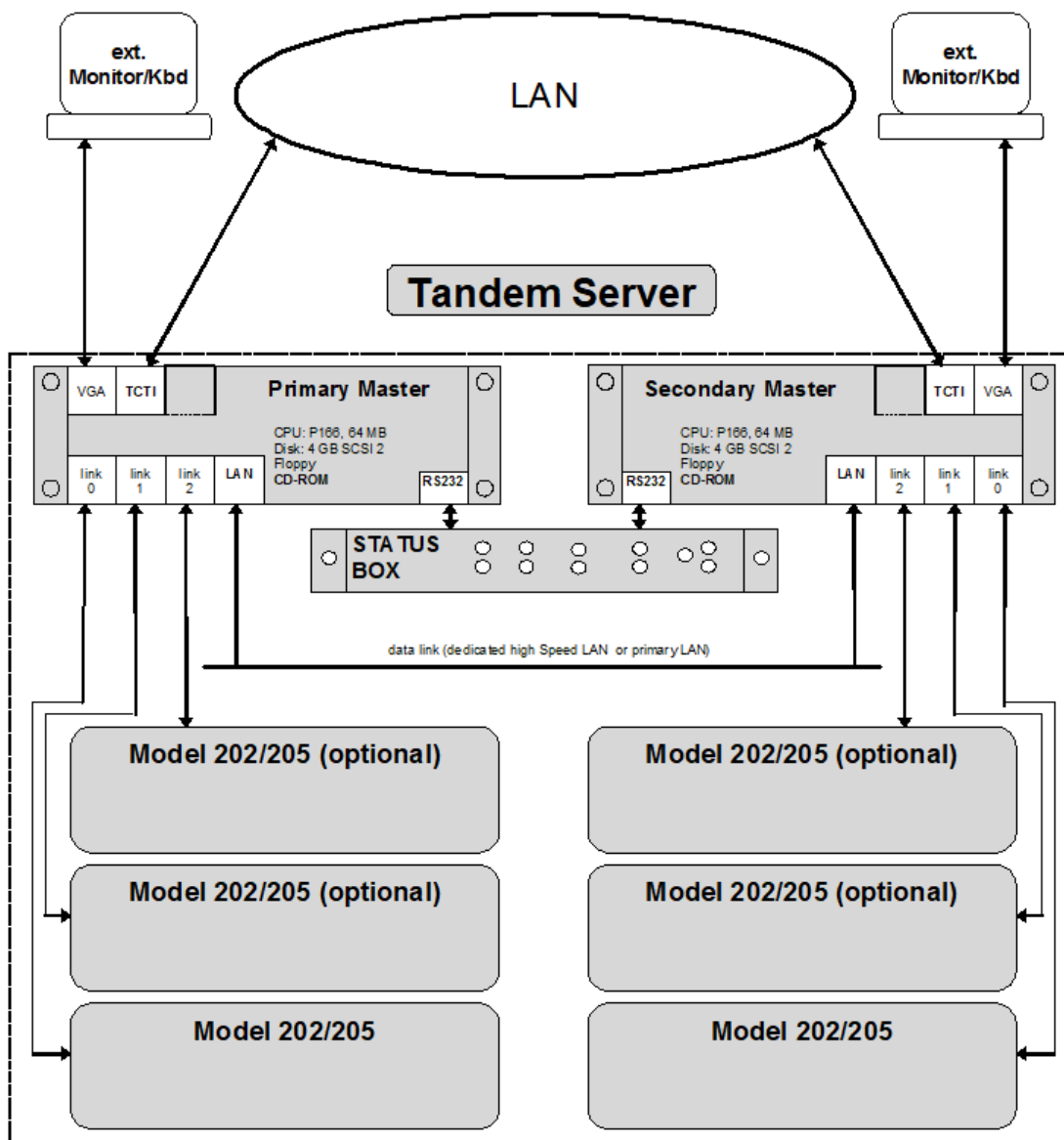
TC/LINKs with Document Converter may run on both servers. TC/LINKs may also run on any other external NT computer.

Restrictions:

- When the current Primary Server fails, the Secondary Server reboots automatically. During reboot, the system is not available.
- When using the status box, the distance between both masters and the status box is restricted to 50 meters.

Structure

This section describes the structure of Tandem server.



The Tandem server consists of two single servers. Both servers must be connected via two independent paths.

1. One is used as a data link. This must always be a LAN (or WAN) connection between both servers. It may be a dedicated high speed connection or the primary LAN used to connect the Clients via TCTI. A dedicated LAN between both systems may require a second LAN adapter for each. TCP/IP and NetBios via IPX/SPX as a transport protocol are supported on the data link.
2. The second connection goes to the Status - Box (as shown above) or Status Agent (TC/STATUS not shown above). It's only required to indicate the current state of the system and to prevent a desynchronized condition. This chapter covers a Tandem Server with status box only. For details about installations with a Status agent, see the *Model/22x Extension Manual [10]*.

Note If a status agent (TC/STATUS) is used, it has to run on an independent computer. It must not run on the primary or secondary master. Otherwise, a desynchronized condition could not be prevented in all cases of single errors.

During normal operation, one system is the Primary Server, and the other is the Secondary Server. The Secondary Server mirrors all data from the master on its local disk while at the same time providing full TCOSS functionality.

The Status Box displays the current operation and synchronization state of the system.

Windows and TCOSS must be set up on both systems. During setup of TCOSS, one system is given the role of the Primary Server. A system's role can be changed by software configuration. No hardware changes are necessary.

It is not necessary to power down Windows to restart the Secondary Server as a standalone system in case the Primary Server goes down. TCOSS can be restarted either locally or remotely using software tools.

For installations with a Status agent, see the *Model/22x Extension Manual [9]*.

Primary Server

During installation, one server must be installed as the Primary Server. The hardware of the Primary Server is not necessarily different from the Secondary Server. Both servers are distinguished by software configuration only.

Initially, the Primary Server stores all TCOSS configuration data although the configuration program WCONFIG is installed to both servers. With TCOSS stopped, usually only the Primary Server gets configured. The next time the system is started, all changes to TCOSS data are automatically replicated to the Secondary Server.

If the Secondary Server is not operable or the data link (LAN) between both servers fails, the Primary Server continues running without interruption.

Secondary Server

During installation, one server must be installed as a Secondary Server. MAKETCOSS is not required on the secondary master. The configuration program must not be used to change TCOSS configuration

on the Secondary Server if the Primary Server is also changed. This leads to a desynchronized disk condition.

If the Primary Server or the data link (LAN) between both servers fails, the Secondary Server's TCOSS reboots and waits for the Primary Server to become available again. If the Primary Server does not become available for a certain period of time, the Secondary Server runs standalone.

If the Primary Server starts, it interrupts the standalone server and restarts it. Changed TCOSS data from the Secondary Server is replicated to the Primary Server after restarting.

Status Box

If only the data link fails and the servers continue running, the status box prevents from desynchronizing TCOSS data on both servers. A server may only write to its KCS file structure if the other server did not change its data already.

If one server changes its TCOSS data and it is not possible to replicate this data to the other server, it clears its "mirrored" latch in the status box. A server that wants to change its TCOSS data, and if the "mirrored" latch of the other server is already cleared, stops running and generates an error.

To prevent desynch, never disconnect the status box from a server.

LEDs and Switches

This section describes LEDs and switches.

KCS x ON

Two green LEDs showing the power-on condition of either server. If a LED is off, the corresponding server is either powered off or not connected to the status box, or the cabling is faulty.

These LEDs additionally display if the status box has a power supply. For the status box to work correctly, at least one or both LEDs must be on.

DISK x OPERABLE

Two green LEDs indicating if TCOSS (either standalone or as a tandem system) access the corresponding server's local TCOSS data. Usually these LEDs are turned on after booting TCOSS.

After a desynchronized condition, the file structure of the secondary server is disabled (LED off) to preserve its TCOSS data. To reactivate this disk, one server must be cleared manually using the clear switch (see below).

DISK x MIRRORED

Two green LEDs reflecting the state of the corresponding server's local TCOSS data. If a server runs standalone, it clears its "mirrored" state to indicate that it is not able to replicate its TCOSS data changes to the other server. This state is stored permanently into a 2-bit latch (one bit for every server) in the status box to preserve the state even if the server is switched off. The other server reads the state to prevent desynch.

DISK x UPDATING

Two red LEDs indicating that the corresponding server's TCOSS data gets updated. This may happen after system startup to ensure both servers contain equal data.

Note During a desynchronization condition or update operation, the LEDs will flicker approximately every 5 seconds.

DISK DESYNCHRONIZED

This red LED is switched on if both disks are not mirrored (both DISK MIRRORED LEDs off). This may happen if the status box is disconnected or not working, or if the data link between both servers fails and both servers are running standalone. In this state it is not possible to automatically detect the server with the (from the operator's point of view) most current or most important data. To determine the TCOSS data to be used for further operation, the other server's data must be cleared (see below).

CLEAR KCS x

Two switches used to recover from a desynchronized condition. In a desynchronized condition, one server must be cleared to overwrite its TCOSS data with the data from the other server.

To clear a server, press the corresponding button for about 10 - 20 seconds. After approximately 10 seconds, the system will start to update the cleared server.

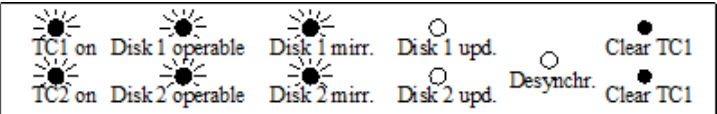
Prerequisites

To offer maximum performance, the LAN connection between both servers must provide a bandwidth of at least 500k/sec. If bandwidth is less (remaining bandwidth if LAN is used for other purposes as well), message throughput cannot be guaranteed.

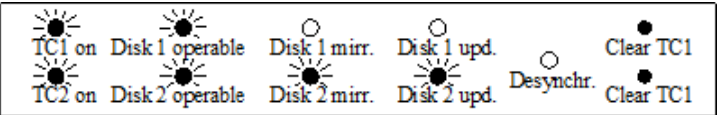
Operation

In this description, the Primary Server is connected to the status box as KCS 1, whereas the Secondary Server is connected as KCS 2. KCS1 and KCS 2 are referred to as TC1 and TC2 later in this description.

Normal Operation



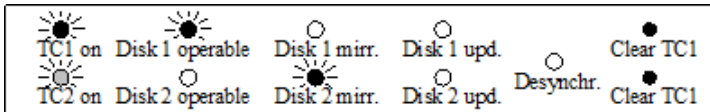
Both servers are operable and contain equal TCOSS data (mirrored).



Disk 2 Will Be Updated

This is normal situation after starting the tandem system. A minimum of 10 sections will be updated on Disk 2. This happens to ensure that data changed last before the system was shut down is equal on both servers.

KCS 2 Fails



This status box LED's are shown if KCS 2 either is switched off, or when TCOSS on KCS 2 is inoperable for any other reason. The state of the "Disk 2 mirrored" LED is permanently stored in the status box. It will not be changed due to this error. The state of the "KCS 2 on" LED may be on or off.

After restarting TC2, Disk 2 is updated.

KCS 1 Fails

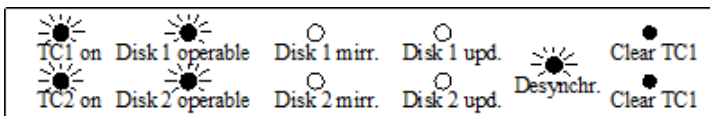
A power failure on KCS 1 or TCOSS 1 being shut down will cause KCS 2 to restart as a standalone system after approximately 1-2 minutes. To avoid accidentally rebooting of the Secondary Server, it waits for the Primary Server a certain time period (default 100 sec.) before it starts as a standalone. After starting, the status box (of TC2) shows similar information as in the case of a failure in KCS 2.

Desynchronized Condition

A desynchronized condition may occur in the following cases:

- If both TC1 and TC2 are started standalone without a data link and status box connection.
- If one server is running standalone and the other gets changed by the configuration program or other tools.
- If the system is stopped and both servers get changed by the configuration program or other tools.

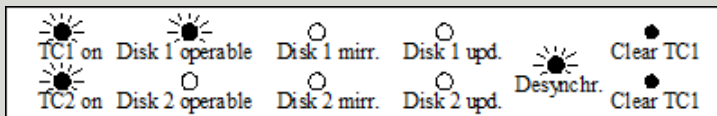
After reconnecting the status box:



In that case clearing of KCS 1 or KCS 2 has no effect because data link is not established.

Important If the data link is working, the Primary Server will restart the Secondary Server. After restarting, the disk corresponding to the Secondary Server (disk 2) is disabled, even if that disk is more up to date. The system will use from this moment disk 1 (disk of primary server) and all newly received/sent messages will be stored on disk 1 only until any of the hard disks are cleared.

If you decide to clear disk 1, take care that all data received in the meantime (between booting up the primary master again through the desynchronization state and clearing of disk 1) are lost.



In this situation, TC1 or TC2 can be cleared by pressing the appropriate clear button for at least 10 seconds. If KCS 2 is cleared, its local disk will be updated from the primary master (TC1). If KCS 1 is cleared, the server stops with an internal error "DISK-restart system!" and restarts itself.

Reboot of the Secondary Server or Slaves(Line Server, Interface)

The Secondary Server may be restarted upon operator's request similar to an ordinary slave.

A fatal error on specific nodes may cause the corresponding slave, interface or even the Secondary Server to be rebooted automatically.

Client/Server Channels

Client/Server channels (UC0) may only run on the Primary Server. If the Primary Server fails, the UC0 channels run on the Secondary Server restarting standalone. In this case, the TCTI network address of the system changes.

For the clients to seamlessly change to the new network address, they have to use TCTI's alternate path feature.

Recommended Power On/Off Sequence

If possible, the following sequence should be used if a model 22X must be switched off or on manually. Turning off a TC means stopping TCOSS. It is not necessary to power down the system.

If a release update should be made, it is only necessary to stop TCSRVR if the TCSRVR program version is changed by the release update. In case of an ASP installation with multiple TCOSS instances, "turn off" and "turn on" means that the specific TCOSS process instance is stopped / started with TC/Monitor. The TCSRVR service is not stopped because this would shut down all TCOSS instances and not just a single one.

1. Turn off Primary Server
2. Turn off Secondary Server (within 100s)
3. Turn on Secondary Server
4. Turn on Primary Server (within 100s)

Shutting down a tandem system in the recommended order (primary first) ensures that a healthy tandem system does not require any update from one disk to the other at the next system startup. A system shutdown in the wrong order (secondary first) is handled like a failure of the secondary server. The next system startup has to be done from the primary server's hard disk and the secondary server's hard disk needs to be updated from the primary. During the update there is data redundancy.

Release Update and Configuration Changes

Configuration changes should be installed via net while the system is running. This ensures both a minimum system standstill time and there is no risk to get a desynchronized condition.

If configuration update via net is not possible, shut down the system (Turn off Primary Server and then Secondary Server) and install the new configuration on the primary master only.

For release updates, follow the steps described below:

1. Shut down the system (turn off the Primary Server and then the Secondary Server). **Do not forget to shut down the Secondary Server.**
2. Install TCOSS and MAKETCOSS and the primary Master.
3. Install TCOSS on the Secondary Master
4. Update the configuration on the Primary Master.
5. Install the new configuration and program files locally.
6. Restart both servers. It is recommended to restart Windows NT too; otherwise, old program versions of TCSRVR and TPLINK driver may be used.

Changing Disk Settings with TCDISK

If the disk settings (folder spaces, directory entries used by TCOSS) have to be changed by TCDISK, follow the procedure described below:

1. Stop the primary master.
2. Stop the secondary master.
3. Change the TCOSS disk info with TCDISK on the primary master. It is recommended to make a printout of the disk info screen in TCDISK after modifications.
4. Make exactly the same changes with TCDISK on the secondary master.
5. Stop the primary and secondary master.

Consistency Check

The option "1) Disk Info / Change settings" does a consistency check between the size of the KCS file structure and the internal partition settings.

If the file is too small, a warning is displayed:

```
WARNING: TCOSS File Structure size inconsistent with partition settings !
file size 130048 kB -> maximum 7800 blocks
actual setting: mirror size 131072 kB, 7869 blocks
               last used block #5649
```

This may happen if a KCS file structure was created on a secondary master of a tandem system with a smaller size than on the primary master, and the TCOSS partition information was then mirrored from the primary master.

The best way to correct this problem is to reformat the secondary master with the same file size as the primary and then re-establish the mirror, but a valid primary master disk is required to do this.

If the primary master disk is not available, see the next section.

Re-establish Consistency Function

A new option has been added to the disk information options:

- 1) Change Disk configuration
- 2) Re-Establish consistency between file size and partition settings

The new option may be used to cut the internal settings of available blocks and mirror size down to the maximum value that fits the actual file structure size. If this option is selected and the disk is inconsistent, a warning appears:

```
This function will set the mirror size to 130048 kB
and the number of blocks to 7800
Do you want do proceed? (Y/N) ?
```

If answered with Y, the displayed values are written to the file structure. Always verify that the values are reasonable before moving ahead with this function.

Operator Warnings for Status Agent Access

Two operator messages are implemented to alert the system administrator if a connection to the status agent fails and to provide the information that a connection is back in operation. Both messages appear in the application event log and are sent as an "TENnnn" KCS system error messages to the operator short number .ERROR2 or .ERROR1, depending on the error level.

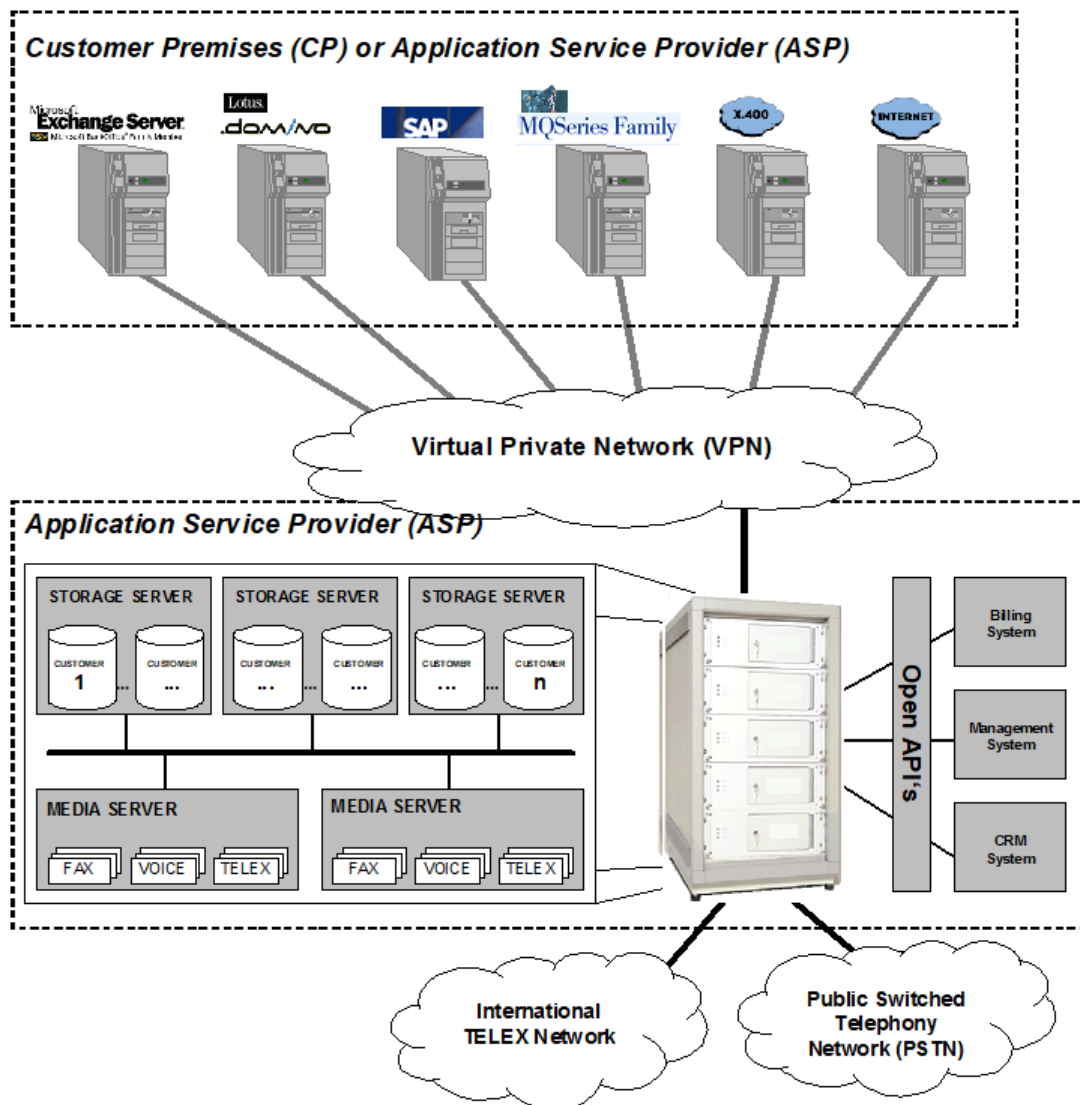
ID	Event type	Message	Corrective action	Error level	Generated when
16029	Warning	Status Agent access timeout on connection %3 from %4 Master via %5. <ul style="list-style-type: none"> • %3: "1" or "2" • %4: "Primary" or "Secondary" • %5: "serial cable" or "modem" or "LAN using TCP/IP" 	Check reported connection and whether Status Agent process "TCSTATUS" is active.	2	Connection to status agent fails after being OK. Repeated every 24 hours if failure persists.
16030	Info	Status Agent connection %3 from %4 Master via %5 is now OK <ul style="list-style-type: none"> • %3: "1" or "2" • %4: "Primary" or "Secondary" • %5: "serial cable" or "modem" or "LAN using TCP/IP" 		1	Connection to status agent OK after failure.

Chapter 5

KCS for Application Service Providers

This section describes KCS usage for application service providers.

Overview



Multi-instance TCOSS

Multiple TCOSS instances on the same server are supported.

The TCOSS disk cache settings may be adapted to the multiple instance environment (by configuration). A pair of storage servers may hold multiple TCOSS tandem systems.

A multiple instance TCOSS installation may be combined with the following functionality:

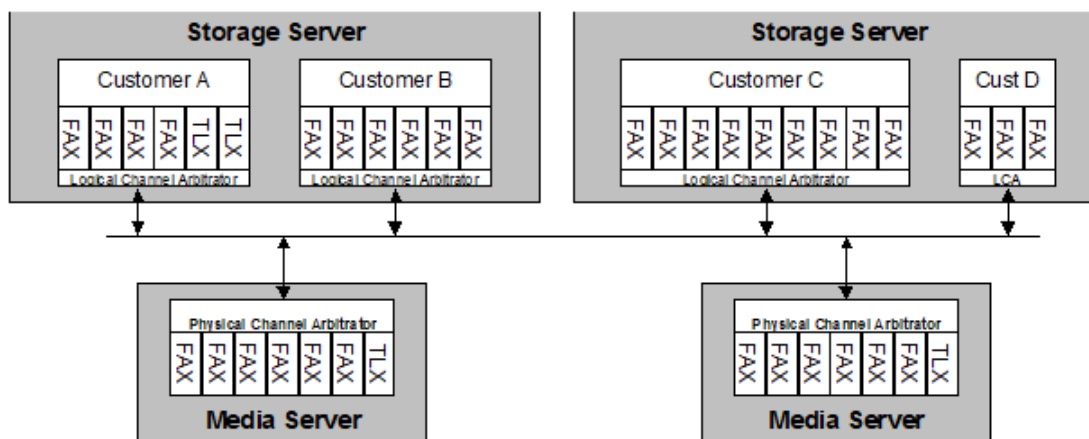
- Least cost routing
- Multiple instances of TCLANPRT/ TCFILBRK
- Multiple TC/Archive instances on an archive server with an optional, shared jukebox
- Dedicated voice servers for any TCOSS instance
- Branch boxes

Support for "Multiple instances of TC/WEB - TC/LINK-OC" is provided on request.

Entry archive on storage server is not supported.

Remote TCOSS Channels

A key feature of the TC for ASP product is the ability to have remote Fax or Telex lines installed on media servers. The physical channels on the Media Servers can be dedicated to specific customers or shared between multiple or all customers. Multiple Storage Servers can share a single or multiple Media Servers.



Remote TCOSS channels have the following characteristic features:

- The application module part of the channel runs on a storage server, with the user module of type Fax or Telex on a media server
- Application module and user module are connected by a TCP/IP based routing process. There is one permanent connection from each customer's TCOSS to each media server. The customer's TCOSS on the storage server is building up the connection, and the media servers are passive.
- All user data is kept in the customer's TCOSS on the storage server.

- The configuration values of the application modules are taken from the customer's TCOSS on the storage server. The configuration of the user module and the "TX99" file of telex channels is determined by the TCOSS on the media server.
- The TCOSS running on a media server is used for administrative functions such as line statistics and error messages of faulty lines and also for inbound routing.

The storage server holds all customer data and does general and application module processing including:

- User management
- Queue management
- Latest delivery supervision
- Log files
- Short-term archive
- Cost accounting
- Final inbound routing to users

The media server only holds the line-specific configuration parameters. In case of shared remote channels, it also provides inbound routing between customers. No customer data is stored on a media server. The media server may be seen as an enhanced branch box.

In a KCS ASP system environment, different TCOSS releases may run on storage and media servers.

Dedicated Remote Channels

Dedicated remote channels show a one-to-one relation between an application module in a customer's TCOSS on a storage server and a user module on a media server.

A dedicated remote channel is functionally equivalent to a local channel, although its configuration values are split between storage server (application module part) and media server (user module part and TX99 file in case of telex channels).

The fact that the TX99 file of telex channels is global to TCOSS and not configurable per channel results in the following restriction:

- All telex channels on a media server, even if they are dedicated, share the same TX99 file.
- A second restriction of dedicated remote channels results from the fact that the application module on a media server is inactive after the connection to the counterpart on the storage server has been established:
- Dedicated remote channels on media servers, if connected to the appropriate remote channel on the storage server, do not perform channel configuration reload and regular reload of remote channel registry values. Both actions, channel configuration reload and reload of remote channel registry values, are triggered by a channel configuration reload of the connected channel on the storage server. If a dedicated remote channel on a media server is not yet connected to its counterpart on the storage server, such as the result of wrong configuration or registry settings, a configuration reload is possible and the regular reload of remote channel registry values is done.
- Only the state of the channel on the storage server is relevant to enable/disable sending. This means the sending on a media server channel in the state "waiting" is possible if the dedicated channel on the storage is set to the "continue" state.

- If inbound distribution on an ISDN line (basic or primary rate) is used, only the following configuration options are supported: a) use shared channels for this line b) use dedicated channels for this line. In that case, all channels must be dedicated to the same storage server. If you want dedicated lines for multiple storage servers, you need at least one dedicated physical ISDN line for each storage server.
- You cannot mix dedicated and shared channels on the same physical line.
- But, if the line is exclusively used for outgoing calls only, the restrictions described above do not apply and all combinations of shared and dedicated channels (even with different storage servers) are supported.

Shared Remote Channels

With shared remote channels there is no fixed relation between application and user modules. Temporary connections are established for sending or receiving messages and then released afterwards.

Shared remote channels have some functional restrictions:

- All customers share the same user module configuration (and TX99 file in the case of telex channels). It is therefore not possible to set configuration values on a per-customer basis, such as for the default TSI of the fax module.
- Reception is only possible using DID or sub-addressing digits.
- If the line is used for reception, a disk-full situation of a particular customer is not reflected by the line state.
- If a line is not working properly, the error condition is only visible in the administrator's TCOSS on the media server, but not in the customer's TCOSS on the storage server.

Configure Remote Channels

This section describes the configuration of remote channels.

TCOSS Channel Configuration

Config line 49, 3 hex positions

Position1	Remote connection type	
	00	Local
	01	Remote user module (value used on storage server)
	02	Remote application module (value used on media server)
Position2	Dedicated / shared remote channel	
	00	Shared
	01	Dedicated
Position3	Reserved for future extensions, set to 00	

Config line 37, 24 characters

Line ID or line group

Restriction: You cannot mix remote connection types 01 (remote user module) and 02 (remote application module) in a single TCOSS instance, such as for testing purposes. However, you can run two TCOSS instances on the same server: one with remote user modules and one with remote application modules.

Common Registry Values

"MaxConnections" (REG_DWORD)

This registry value under the ". . \Software\Topcall\TCOSSn\RemoteChannels" sub-key specifies the maximum number of connections between TCOSS instances on storage and media servers. The default value is 8 for a storage server (connects to a maximum of 8 media servers) and 64 for a media server (may be used by up to 64 customers). It is usually not necessary to enter this registry value; it is only loaded at start up time.

"OwnIPAddress" (REG_SZ)

This registry value under the ". . \Software\Topcall\TCOSSn\RemoteChannels" sub-key can be used to select one of several installed network adapters for the remote channel connections between TCOSS instances on storage and media servers. If there is a separate, dedicated LAN between storage and media servers, this value should be set to the IP address of the adapter connected to the dedicated LAN. It is not necessary to enter this value if there is only one network adapter or if it does not matter which one is used. This registry value is only loaded at startup time.

Registry Values Set on Storage Server

"CustomerID" (REG_SZ)

This registry key under the process specific ". . \Software\Topcall\TCOSSn" sub-key is used to set the customer ID. This value is only loaded at start-up time.

"MediaServers" (REG_MULTI_SZ)

This registry key under the ". . \Software\Topcall\TCOSSn\RemoteChannels" sub-key is used to set the list of media servers. This value is reloaded at regular intervals.

The list of media servers is a multi-string list with each line holding the host name or IP address of a media server. In the rare case that a media server is set up as tandem system the two host names or IP addresses of the primary and secondary master should be entered in one line separated by a pipe character "|". For example:

"172.20.148.110|172.20.148.141"

Registry Values Set on Media Server

For each line ID or line group, a list of customers allowed to use this line is set. A line group is created simply by configuring the same line ID for several lines (in config line 37). All registry values set for a line ID or line group are reloaded at regular intervals.

Registry sub-key "`..\Software\Topcall\TCOSS\RemoteChannels\xxxx`", where `xxxx` = line ID or group:

- **Registry value:** "`CustomerList`" (REG_MULTI_SZ)
List of customers accessing this line
 - Special value "`(All)`" = line open to all customers
 - In case of a dedicated line, the "`CustomerList`" contains a single entry with the dedicated customer's ID. For a single entry, the registry single string type REG_SZ may also be used.
- **Registry value:** "`ListPriority`" (REG_DWORD)
Priority of entries in CustomerList
 - 0 = Equal priority of all customers (default value)
 - 1 = First customer in list has higher priority
 - Lines with ListPriority = 0 serve all customers in the list in a round robin fashion. In case all customers have messages to send, one of each is processed before switching to the next customer in the list.
 - Lines with ListPriority = 1 give the first customer in the list priority over the other customers, which have equal priority. If all customers have messages to be sent, only the messages of the first customer are processed. If the priority customer is idle, the other customers use the line in a round robin fashion.
 - The "`ListPriority`" setting has no effect if the line serves a single customer.

Configuration Examples

Shared line	Priority line
CustomerList = "(All)"	CustomerList = "CustomerA", "(All)"
ListPriority = 0	ListPriority = 1

Configure Dedicated Remote Channels

Settings on storage server

- Config line 49, Position1 = 01 (remote user module), Position2 = 01 (dedicated)
- Config line 37, 24 characters: unique line ID
- Registry:
 - "`CustomerID`" (per customer)
 - "`MediaServers`" (per customer)

Settings on media server

- Config line 49, Position1 = 02 (remote application module), Position2 = 01 (dedicated)
- Config line 37, 24 characters: unique line ID (same as on storage server)
- Registry:
 - "`CustomerList`" (per line): contains single entry with customer ID
 - The line ID set in config line 37 on media and storage server is used to identify the two parts of the remote channel which are permanently connected via TCP/IP in normal operation. The line ID must be unique, the same value must not be used for any other line in any TCOSS instance on a storage or media server.

Configure Shared Remote Channels

Settings on storage server

- Config line 49, Position1 = 01 (remote user module), Position2 = 00 (shared)
- Config line 37, 24 characters: empty (all blanks)
- Registry:
 - "CustomerID" (per customer)
 - "MediaServers" (per customer)
- **Settings on media server**
- Config line 49, Position1 = 02 (remote application module), Position2 = 00 (shared)
- Config line 37, 24 characters: line ID or line group
- Registry:
 - "CustomerList" (per line or line group)

Sending on Shared Remote Channels

A send order on a shared remote channel of a storage server is active only if a suitable remote line on a media server is idle. Remote lines of media servers poll all configured customer TCOSS processes on storage servers. The line's configured priority (shared or priority for one customer) is ensured by the polling sequence.

The following additional restrictions apply to the line selection:

- The media server must be known to the customer's TCOSS on the storage server.
- Sending must not be stopped (channel state "continue", not "wait") on both storage and media server.
- The channel group has to match (config line 2, such as X = Telex, F = Fax).
- If several lines can be used, the actual line used is selected arbitrarily.

Reception on Shared Remote Channels

In case of an incoming message on a shared channel of a media server, the fax or telex module generates a command (such as "//CHECK,N=FXI\$1234") to verify and route the received DID digits (enhancement #2994). This command is processed by the local application module on the media server.

The routing of received DID digits to customers on the media server uses the "rr99" functionality (routing based on inactive addresses does an exact match and is therefore not well-suited). For example, assuming that the service "FXI" is defined with prefix "FXI:" in the service store, the "Arr99" routing directory may look as follows:

```
**SENDMODES
**NORMALIZE
**ROUTE
FXI:1~,FXI:customer1
FXI:2~,FXI:customer2
FXI:3~,FXI:customer3
FXI:4~,FXI:customer4
FXI:~,invalid
**NODES
**INBOUND
```

The strings "customer1", "customer2" etc. in this example are the customer IDs as set in the registry value "CustomerID" of the TCOSS instances on the storage server, and the routing is case sensitive. A user "FXI" has to be created on the media server so that "FXI" is a valid recipient.

The response to the "//CHECK" command contains the localized number with the customer ID. For example:

```
"102 FXI :customer1"
```

The incoming call will then be routed to a TCOSS channel of customer "customer1" applying the following restrictions:

- The channel group must match (config line 2, such as X = Telex, F = Fax).
- Reception must be enabled on both storage and media server.
- If several channels may be used, the actually used channel is selected arbitrarily.

If no reception channel can be found, the fax or telex module will clear the incoming call. The same happens if the selected customer is not ready for reception because its disk space is 90% or more filled.

The "//CHECK" command as entered by the receiving user module will be routed to the customer's TCOSS and processed again by the selected application module. A negative response causes the incoming call to be cleared.

So the "//CHECK" command created by the fax or telex module is processed twice, once on the media server (for routing to the correct TCOSS instance on the correct storage server) and once on the storage server (for routing to the correct user). The intermediate result after routing on the media server is not passed on to the TCOSS on the storage server, and no pre-processing of the inbound number like removal of digits can be done on the media server.

All application module configuration parameters for reception, such as default originator, number series or log file, are taken from the configuration of the storage server channel.

Groups of Shared Reception Channels

To guarantee that a certain number of lines is always available for reception, you can create groups of reception channels that are not used for sending on both the storage and media server. This grouping can be done in two ways:

1. Use a different channel group for the "reception only" channels, such as "G" (instead of "F") for the fax reception channels and "Y" (instead of "X") for the telex reception group, on both the storage and media server. Do not use an empty channel group (" ") for both fax and telex reception groups, because it will be seen as a single group and fax reception channels on the storage server might receive telexes, and vice versa.
2. Use the same channel group as for the sending channels, such as "F" for fax and "X" for telex, but disable sending by setting the initial sending state "waiting" in config line 1 (and do not switch to "continue" later). On the media server, you can also set a different line ID and leave the customer list for this line ID empty to disable sending on the reception channels.

Configure Shared Telex Channels

The "TX99" feature has to be activated for reception on shared telex channels, providing variable answer-backs for each customer or even for individual users of each customer (config line 177 = 01 ..05 sub-address length). There is a single "TX99" file for all customers on each media server.

The "VV99" distribution directory feature and the automatic reception printout feature (config line 27) may additionally be used within each customer's TCOSS to distribute incoming messages among users.

For sending telex messages, an individual answer-back should be included in the message text (first line in format "---answerback"). This can be done using cover sheets or masks.

The configured default answer-back of the telex channel cannot be used and should be set to an invalid value such as "111111 invalid". Telex lines with a teleprinter are not supported as shared.channels.

Configure Shared Fax Channels

For receiving messages with an individual CSI (called subscriber identifier), the fax module has to be configured to reflect the received DID digits in the CSI.

For sending fax messages with an individual TSI (transmitting subscriber identifier), a "++TSI" control line should be included in the message text by using cover sheets or masks. The configured default TSI of the fax module can't be used and should be left empty.

Different caller IDs (calling party number) on a per-customer basis can be implemented by inserting a "++CID" control line into the message by using cover sheets or masks. It is not possible to have a configured default caller ID in the fax module.

Remote Channels Trace

Registry value: `TraceLevel bit 0x4000`

Remote channels connection trace, where bit is defined to trace the connections established between storage and media servers

Remote Channels Configuration Reload

In case of shared remote channels, the configuration reload function may be used independently for the TCOSS channels on storage and media servers. Remember that the user module configuration is determined by the media server. Also, some user modules like the fax module do not support the configuration reload function; for these modules only, the changes in the application module part of the configuration are activated. As usual, the configuration reload does not interrupt incoming or outgoing messages.

In case of dedicated remote channels, the configuration reload function works only if triggered on the storage server, and then both the channel on the storage and on the media server will do a configuration reload. If the configuration reload is triggered on the media server, it will not proceed until it is triggered also on the storage server.

The configuration reload function may be used with all kinds of user modules to activate a changed line Id or line group or a changed dedicated / shared remote type setting. It cannot be used to change a local channel to a remote channel and vice versa; in this case, a complete TCOSS reboot has to be done.

The following table gives a summary of the above description.

Changed configuration	Changed on	Action	Location
TAM part	Storage server	Configuration reload	Storage server
TAM part of shared line	Media server	Configuration reload	Media server
TAM part of dedicated line	Media server	Configuration reload	Storage server
TUM part of fax module	Media server	Node reboot	Media server
TUM part of dedicated telex module	Media server	Configuration reload	Storage server
TUM part of shared telex module	Media server	Configuration reload	Media server

Remote Channels Shutdown

Remote channels provide an additional possibility to disconnect fax or telex lines from a TCOSS instance without interrupting outgoing or incoming messages. The usual way to do this is to stop sending and reception on all fax and telex channels. This works also with remote channels.

The additional possibility when working with remote channels is to remove a specific media server from the list of media servers set in the registry value "MediaServers" (REG_MULTI_SZ) under the registry sub-key "HKLM\Software\Topcall\TCOSSn\RemoteChannels" on the storage server. This registry value is reloaded every minute.

If a media server is removed from this list, the system will stop accepting new incoming messages and stop sending new messages at the time the next registry reload is done. Already active incoming or outgoing calls are allowed to proceed normally. The permanent IP connection between the TCOSS instance on the storage server and the media server is closed once that all sending and reception activity has stopped.

You should wait a couple of minutes after removing the media server from the list or check with the "lines statistic" view of TCfW that all lines are idle. This check works only if all media servers are removed; otherwise, sending and receiving might continue via the remaining media servers. In this case only a "remote channels connection trace" would show the exact moment when the connection is closed.

If there are dedicated remote channels on the media server that is removed, you have to trigger a "configuration reload" of all those dedicated channels on the storage server using TCMon. This breaks the connection of the dedicated channels in the idle state and allows the shutdown of the media server to proceed which otherwise would not be completed.

Handling Additional Channel Groups

In an ASP configuration with storage and media servers using remote channels, the additional channel groups do not affect the sharing of lines and establishment of temporary connections between remote channels on storage and media servers. In all cases where the channel group has to match to build a connection between a remote channel on a storage server and a remote channel on a media server, only the main channel group (config line 2, 1st position) is taken.

The additional channel groups have no effect if set on a remote channel of a media server (because no send test is done on the media server).

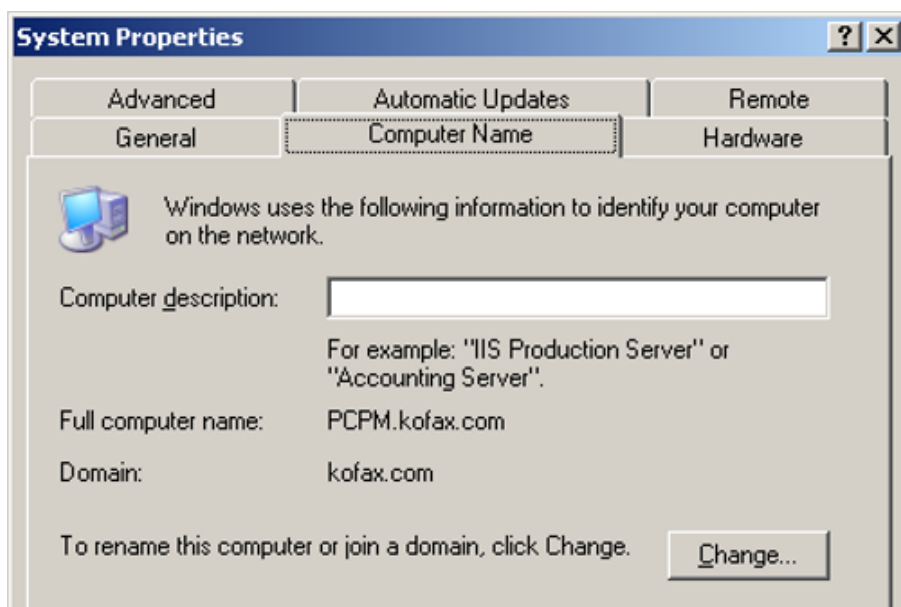
If any additional channel group is configured for a remote channel on a storage server, it causes the channel to poll this channel group in the same way a normal channel would do.

For further information on additional channel groups refer to the TCOSS Application Module Manual.

Sending to Specific Media Server Channels

In an ASP system, it is sometimes necessary to address a specific line on a specific media server, such as for line testing with the probe agent. This is now possible by sending the probe message to a system user of the form `+MediaServerChannels/mmmm/cc`, where "mmm" is the media server name and "cc" the channel on the media server. When creating a user of this kind, take care to set the "visible in outbox" flag.

Note As media server name, take the "Full computer name" as seen in the system properties, truncated to a maximum length of 31 characters:



Example:

To send a fax to number 12345 via channel "50" on the media server "MediaOne.kofax.com," address it to `FREE,+MediaServerChannels/MediaOne.kofax.com/50:12345`, assuming that the user `+MediaServerChannels/MediaOne.kofax.com/50` exists and has the "visible in outbox" flag set.

Checking numbers

A `..CHECK` command is supported by the application module. It takes only one mandatory parameter specified with `NUMBER=` or short `N=`.

The purpose of the command is to route and check the specified number exactly in the same way as it is done in the "..SEND" command, except that no send order is created. If multiple distribution with "NN99" short numbers is used, only the first number is processed.

The positive response has the format: "105", space, localized number string.

The localized number string consists of: 8 characters recipient queue, ":", additional recipient info. If the localized number contains alternative addresses, they are separated by a backslash character.

Command examples:

```
..CHECK,N=FXI$12345
..CHECK,NUMBER=TLX$54321
..CHECK,N=verylonguserid:
..CHECK,N=.short
..CHECK,N=.recipientid.+TECH
```

Response Examples:

```
105 User1 :
105 F :12345
105 X :1111/aaa\X :22222/bbb
105 #0010009:
405 bad number
406 bad channel
311 abbreviated number does not exist
```

The "..CHECK" command is an internal command (like "..LOGON") and is only accepted in the "idle" state (outside sending and reception).

The "..CHECK" command is used by the fax and telex modules to find out whether an inbound send order containing DID or sub-addressing digits will be accepted, before actually starting reception with "..LOGON".

Time Zone Support

It is possible to configure an offset between the TCOSS time and the NT server's time using a registry value. This means that different customers may work with different time zones, although these customer's TCOSS instances run on the same storage server.

Registry value: "TimeOffsetMinutes" (REG_SZ)

This registry value under the ". . \Software\Topcall\TCOSSn" sub-key is used to set the time offset in minutes. Positive and negative values are allowed. This registry value is only loaded at start-up time, and the default value is 0 (no offset).

Example:

To have TCOSS2 use Central European Time on a server using UTC, enter "HKEY_LOCAL_MACHINE\Software\Topcall\TCOSS2\TimeOffsetMinutes" with a value of "60".

Actually Used Line in Mail Entry

The following two child objects added to the SET_ENTRY_MS_MAIL, SET_ENTRY_MS_MAIL_ARC, SET_ENTRY_ARCHIVE mail entries identify the line actually used to send a message.

TS_CHANNEL	The channel number on the media server if the message is sent on a remote channel. The local TCOSS channel number in case of local sending. The channel number consists of two characters, such as "07" or "B3".
TS_SERV_ID	The ID of media server if sent on a remote channel; otherwise an empty string. The ID of the media server is truncated to a maximum of 8 characters.

The actually used TCOSS channel and the media server ID also appear in the 170-byte notification parameter field, which may be accessed with mask parameter \$I\$; contained in the line 5 of log file entries:

- notification parameter field, offset 60, length 2 ... TCOSS channel
- notification parameter field, offset 158, length 8 ... media server ID

Reception on/off setting of TCOSS channels

It is possible to enable or disable reception on TCOSS channels. This feature allows to disable reception on Telex or Fax lines, such as in preparation for a system shutdown. With previous releases, the reception was always enabled, except when the system fill-up degree exceeded 90%.

Config line 3, Position 3 defines the reception enable / disable state after start-up:

- '0': Reception disabled
- '1': Reception enabled (default value after release upgrade)

The reception enable / disable state may be switched during operation using the channel status list, similar to the way sending is enabled or stopped:

Child object INT_OPTIONS in SET_CHANNEL_STATUS, possible values:

RECEPTION_OFF (0), RECEPTION_ON (1).

Disabling reception while a message is being received does not interrupt this message. The command to disable reception will be passed on to the (fax or telex) user module only when it is idle.

This feature is not supported by the current TCfW client release (4.02.07).

Fax Routing on ASP Systems

This section describes fax routing on ASP systems.

Background

Fax Routing on non-ASP systems starts with the following sequence of commands from the fax module (example):

```
..2USER,RC=*\*\*+4318635321
105 \DDI9149:\+4318635321\DDI9149:DDI9149\FAXHDTSI$2200\DDI9149:\DDI9149
//1LOGON,TYP=1,AUTOR=+4318635321
```

The `USER` command, in this case with TSI match, checks whether routing is allowed. Then the document is stored with `logon` and `logoff` and routed to its final destination with `send`.

On ASP systems this does not work, because all commands are handled locally by a media server. The connection is not switched to a storage server so the `logon` command fails.

The purpose of the enhancement is to connect to the appropriate TCOSS instance on a storage server by a `//CHECK` command that is inserted by the fax module just before the `logon`. To do so, the fax module will analyze the uu99 record returned as response of the `USER` command. The "+MAIL5V/Auu99" system file on the media server contains the information necessary for selecting a specific customer's TCOSS instance on a storage server.

Extensions to "+MAIL5V/Auu99" System File and Fax Module

The format of the user records in the system file +MAIL5V/Auu99 has been extended with TCOSS 7.46.10.

Format of uu99 record with previous releases

userid\password\username\termid\originator-address\default-address\prefix\low-tariff-time\user-channel-group\reference-of-files\cost-center\comments

New format of uu99 record

userid\password\username\termid\originator-address\default-address\prefix\low-tariff-time\user-channel-group\reference-of-files\cost-center\ASP-customer-information\comments

The new "ASP-customer-information" field has been inserted at the end of the record before an optional comment.

If an "ASP-customer-information" field is specified, the fax module will generate a `//CHECK` command and use this field as number parameter:

```
//CHECK,N=ASP-customer-information field
```

The ASP customer information should therefore consist of a valid channel, a colon and the customer ID of the TCOSS instance on the storage server to be selected. The channel has no special function, it is only required to pass the test for a valid recipient in the `//CHECK` command. Any channel may be used, preferably one which is not modified by the rr99 routing process. The ASP customer ID must be specified in correct upper / lower case writing because the routing is case sensitive.

Examples of valid ASP customer information fields:

A:BNP Paribas Lux

XY:ACME Ltd.

ZZ:Best Company & Co.

Note The channel specified here must be a valid recipient on both storage and media server TCOSS and should not be modified by the rr99 routing. This condition is satisfied by any one or two letter string which is not actually used as a channel group or user.

Example of uu99 record:

```
\x\DDI9149:\+4318635321\DDI9149:DDI9149\\FAXHDTSI$\2200\DDI9149:\\DDI9149\XX:BNP
Paribas Lux
```

The **USER** command of the fax module is processed locally by the media server's TCOSS. Therefore, the system file "+MAIL5V/Auu99" with records extended by an ASP customer information field has to be put on all media servers of an ASP system. The actual customer's TCOSS instances on the storage servers do not require a "+MAIL5V/Auu99" system file.

The solution for fax routing commands on ASP systems is similar to the inbound routing where an adapted "+MAIL5V/Arr99" routing directory is required on all media servers.

Compatibility

The fax module will ignore a negative response to a //CHECK command inserted for fax routing on an ASP system, because the following logon will fail anyway if no connection to a storage server TCOSS instance has been made. This will ensure compatibility in cases where previously existing uu99 records contained a comment which is now mistaken as an ASP customer information field.

Nevertheless it is recommended to remove comments from existing uu99 records before updating to the new release.

Downgrading to a previous release does not cause any problem because all ASP customer information fields in uu99 records will be handled as comments by the old release (before TCOSS 7.46.10).

Overview of Fax Command Support on ASP Systems

Fax command	ASP support	Adapted system file on media servers
Inbound send order	yes	Arr99
Scan send order	yes	Auu99
Routing with 8xxx or with TSI match	yes	Auu99
Routing with matched number	no	-
Routing without uu99	no	-
8xxx+71	yes ¹	Auu99
8xxx+72	yes ¹	Auu99
8xxx+73xxx	yes ¹	Auu99
8xxx+71+0xxxx	yes ¹	Auu99
8xxx+73xxx+0xxxx	yes ¹	Auu99

¹ Cases with session reversal (information is sent back on the existing connection) are not supported. The cases where the `USER` command of the fax module is processed via inbound routing and user profiles and not by the `Auu99` system file, are also not supported.

Integration of ASP Installations in KCS Setup

The installation of multiple TCOSS, TC/Archive or Status Agent instances is supported by the Kofax Communication Server setup utility. The appropriate application is selected in the application list, such as TCOSS, then the Select button is pressed to select between TCOSS, TCOSS01, TCOSS02 through TCOSS08. In the case of the Archive Server group, you can select from TC/Archive, TC/Jukebox, TC/Archive01 through TC/Archive08. For the status agent, the selection list contains TCSTATUS, TCSTATUS01 through TCSTATUS08.

If any of the multiple process instances such as TCOSS01 is selected, all registry keys are written to the sub-tree TCOSS01 instead of TCOSS. Also, all port numbers are adapted according to the instance.

The EXE file of the selected application such as TCOSS.EXE is copied as TCOSS01.EXE to the TCOSS system directory to allow an individual release update for each instance. The registry value `CommandLine` is set accordingly, such as to `TCOSS01 /k:TCOSS01 /N`.

In case of TCOSS, the `\Drive0\FileName (REG_SZ)` registry string is added and set for example, to `D:\KCS File Structure 01.tco`. An empty list of media servers is prepared in `MediaServers (REG_MULTI_SZ)` under the `..\Software\Topcall\TCOSSn\RemoteChannels` registry subkey.

TCDIR for ASP Support

The TCDIR utility is available in the TCOSS system directory in the Windows file system.

Command line syntax:

```
"TCDIR [<filepath> [<server> [<instance>]]]"
```

Where the square brackets indicate optional parameters.

Examples:

```
TCDIR ... complete directory of single instance TCOSS
TCDIR +TECH PCPM ... +TECH subdirectory of single TCOSS instance
TCDIR * PCPM TCOSS01 ... complete directory of TCOSS01 instance on local PC (PCPM)
TCDIR +MAIL5V . TCOSS02 ... +MAIL5V subdirectory of TCOSS02 instance on local PC
```

This tool already existed before ASP support was implemented. However, its functionality has changed with support of ASP.

TCCOPY for ASP Support

The TCCOPY utility can be found in the TCOSS system directory in the Windows file system.

Command line syntax:


```
"TCCOPY [@]<srcpath> [@]<dstpath> [<Server> [<Instance>]]"
```

Where

@ specifies KCS path.

@@ means Compressed Stream Format (incl. Tos_entry).

[] indicate optional parameters.

Examples:

```
TCCOPY @+TECH\ALOADERTABLE c:\temp\lt ... copy from TCOSS instance
TCCOPY @+TECH\ALOADERTABLE c:\temp\lt . TCOSS01 ... copy from TCOSS01 instance
```

This tool already existed before ASP support was implemented. However, its functionality has changed with support of ASP.

TCDEL for ASP Support

The TCDEL utility can be found in the TCOSS system directory in the Windows file system.

Command line syntax:

```
"TCDEL <folder\name> [<Server> [<Instance>]]"
```

Where the square brackets indicate optional parameters.

Examples:

```
TCDEL +MAIL5V\AK ... delete file from single TCOSS instance
TCDEL +MAIL5V\AK PCPM TCOSS02 ... delete file from TCOSS02 instance on local PC
(PCPM)
TCDEL +MAIL5V\AK . TCOSS03 ... delete file from TCOSS03 instance on local PC
```

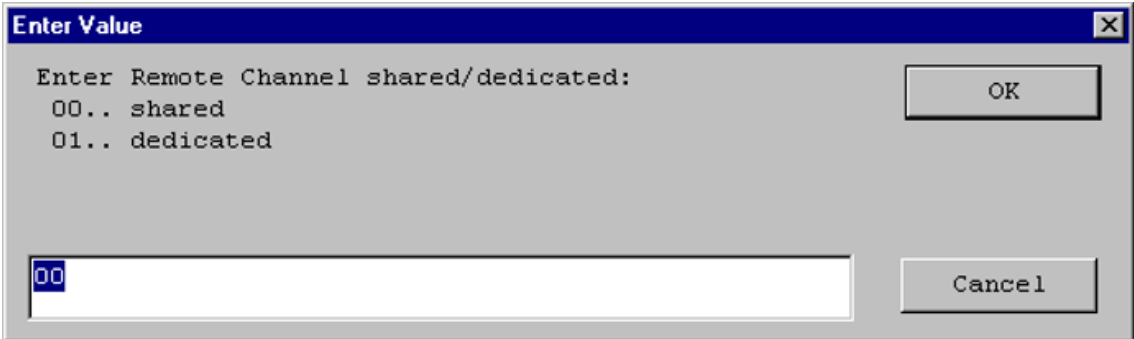
This tool already existed before ASP support was implemented. However, its functionality has changed with support of ASP.

Setup and Configuration of TCOSS on a Media Server

This is a regular TCOSS set up in a way that a single instance using registry sub key "TCOSS" is installed. The main difference is that all fax and telex channels are configured as a "remotely controlled local interface" so that they may be accessed by another TCOSS on a storage server, but this change is done in a second step.

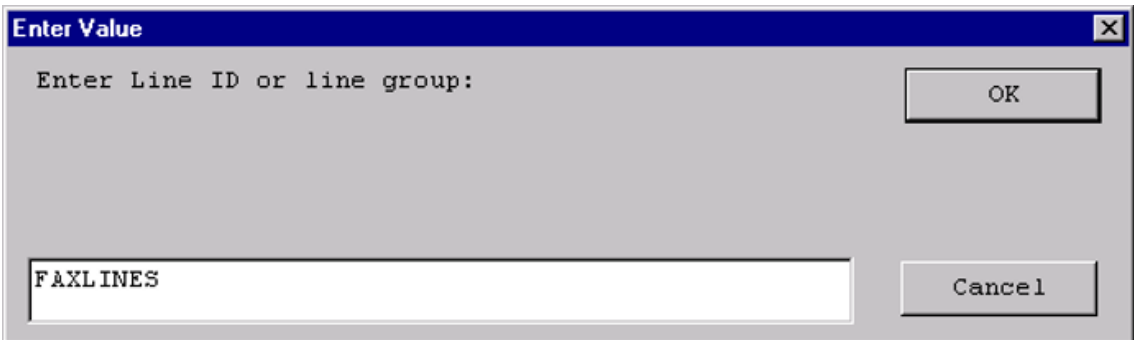
1. Configure all interfaces normally with all the settings required, such as to get the fax line operational. This configuration can be tested by sending locally from the media server's TCOSS.
2. Run the WCONFIG utility again, use the option "software-hardware assignment," select the fax and telex channels one by one by double-clicking, and apply the option "switch remote control mode of local interface" to switch this channel to remotely controlled; usable by a media server. The same option is used to switch a remotely controlled line back to local.

3. If you switch the remote control mode of a channel from local to remote, you are asked to enter two parameters:

a. 

All remote channels should be "shared." Use remote dedicated channels in exceptional cases only.

- b. Then you have to assign a line ID like "FAXLINE01". To handle a group of lines in the same way, you may assign the same line ID as in this example:



The WCONFIG option "switch remote control mode of local interface" is functionally equivalent to setting config lines 37 and 49 manually. Remember that the application module configuration part of remotely controlled channels is inactive except lines 37 and 49, the channel group in line 2 and the initial sending / reception on / off states in lines 1 and 3.

4. Create the "HKEY_LOCAL_MACHINE\SOFTWARE\Topcall\TCOSS\RemoteChannels" registry section.
5. Add the registry value "OwnIPAddress" (REG_SZ) to the "RemoteChannels" registry section and enter the IP address of the interface on the media server connected to the dedicated LAN between storage and media servers.
6. For each assigned Line ID or line group, create a registry subsection of "RemoteChannels" and add the "CustomerList" (REG_MULTI_SZ) value to this section. Set the customer list to "(All)" or enter the list of customers allowed to use this line (each list entry as set in the "CustomerID" registry value on the storage server).

Here is an example of a media server's registry setting:

```
REGEDIT4

[HKEY_LOCAL_MACHINE\SOFTWARE\Topcall\TCOSS]
```

```

"Model"="Mxxx"
"CommandLine"="TCOSS /N"
"EnablePerformanceCounters"=dword:00000001
"TraceLevel"=dword:00004003
"MaxTraceFileSize"=dword:00000400

[HKEY_LOCAL_MACHINE\SOFTWARE\Topcall\TCOSS\RemoteChannels]
"OwnIPAddress"="192.168.10.3"

[HKEY_LOCAL_MACHINE\SOFTWARE\Topcall\TCOSS\RemoteChannels\FaxLines]
"CustomerList"=hex(7):28,41,6c,6c,29,00,00

[HKEY_LOCAL_MACHINE\SOFTWARE\Topcall\TCOSS\RemoteChannels\TelexLine]
"CustomerList"=hex(7):28,41,6c,6c,29,00,00

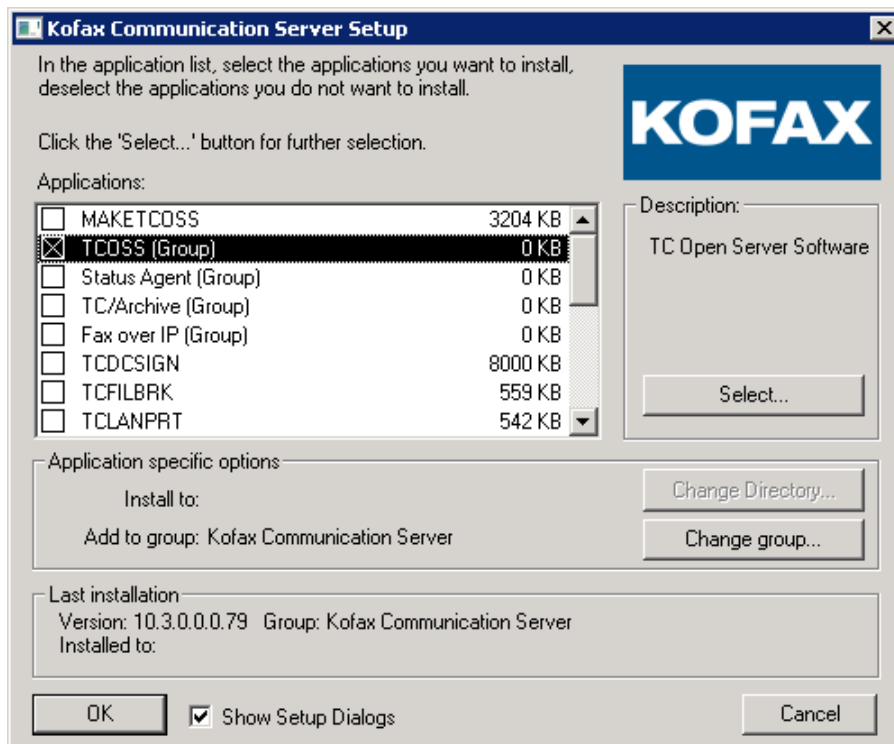
[HKEY_LOCAL_MACHINE\SOFTWARE\Topcall\TCOSS\tctiServer]

[HKEY_LOCAL_MACHINE\SOFTWARE\Topcall\TCOSS\tctiServer\rpc]
"Transport"="RPC"
"LinkTypes"="TCP/IP"

```

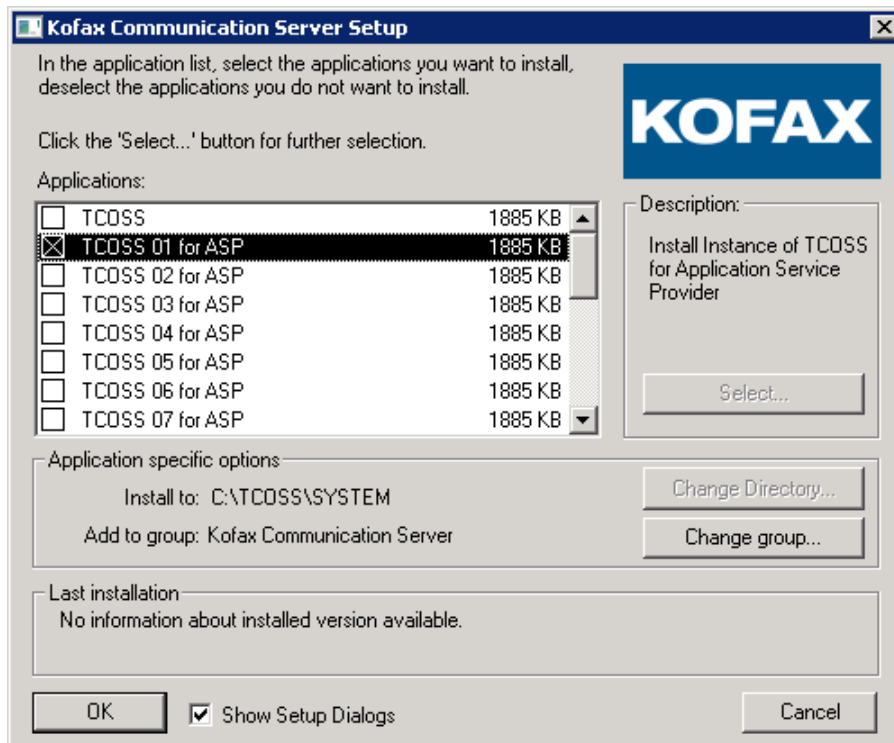
Setup of a Customer's TCOSS on a Storage Server

1. Run the KCS setup.
2. Select "TCOSS" and click **Select**.



Now you get a choice of installing a regular TCOSS instance or an ASP instance.

3. Select "TCOSS01 for ASP" to install the first customer's instance, "TCOSS02 for ASP" for the second customer and so on.



The setup of the first customer's instance requires the input of a number of IP addresses for the connection between storage and media servers and between the primary, secondary master and status agent in case of a tandem system. The setup of the second, third, and the rest instance takes the IP addresses of the first instance as default values, which makes the setup of these instances much easier.

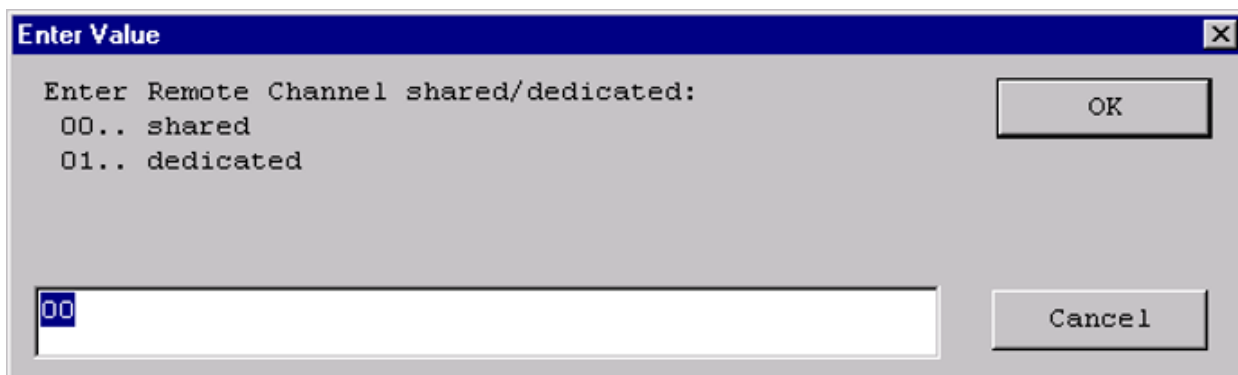
4. The setting of the storage server - media server connections has to be completed manually using the registry editor. The value "MediaServers" (REG_MULTI_SZ) in the "TCOSS01\RemoteChannels" registry section under "HKEY_LOCAL_MACHINE\SOFTWARE\Topcall" is prepared by the setup utility containing an empty list. Enter the IP addresses of the media servers, one per line and make sure to take the IP address of the interface on the media server that is connected to the dedicated, private LAN between storage and media servers.

Configure Customer's TCOSS on a Storage Server

The configuration of a customer's TCOSS is created in the usual way.

In the WCONFIG utility's "software-hardware assignment" window, instead of configuring fax and telex interfaces, use the options Remote Fax and Remote Telex to create fax and telex lines.

For each remote line, you are asked to enter the shared / dedicated parameter:



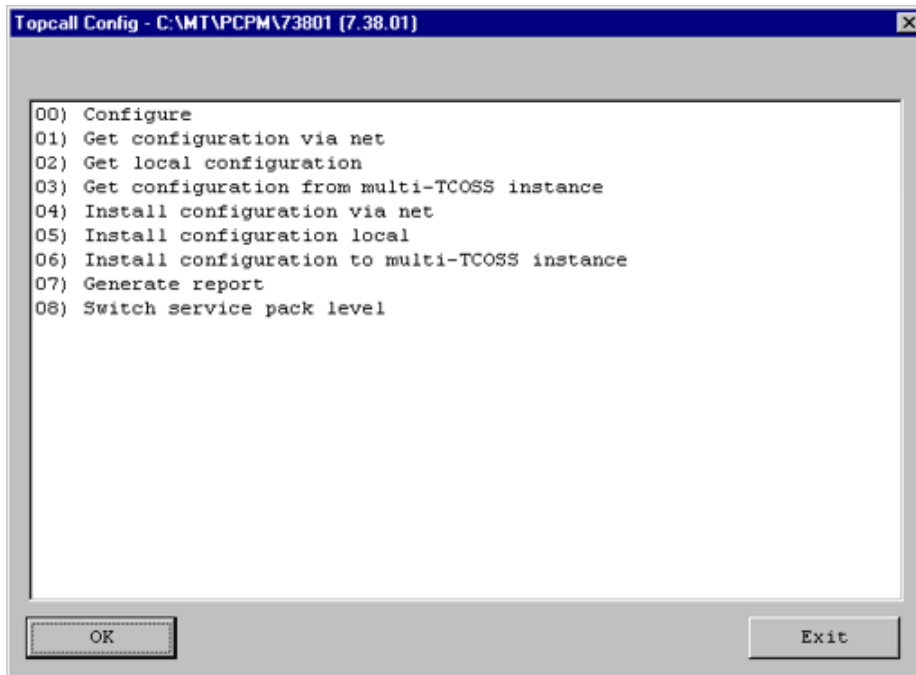
All fax and telex lines should be configured as remote shared channels; use remote dedicated channels in exceptional cases only.

The number of remote fax lines you set on the storage server limits the number of actual fax lines the customer can use at the same time, so put in a sufficient number of lines.

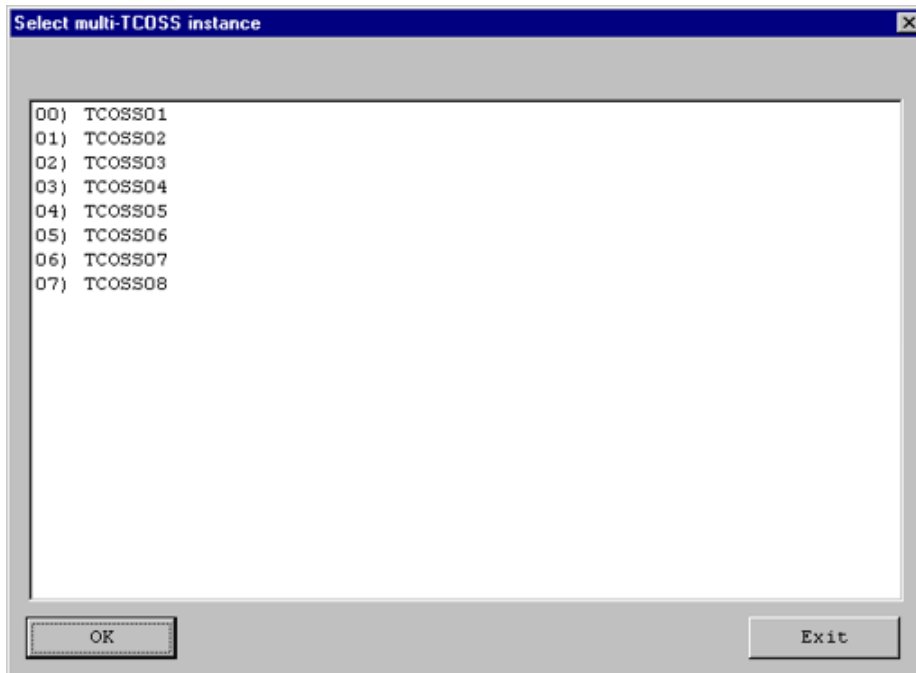
Note The WCONFIG options Remote Fax and Remote Telex set config lines 37 and 49, and also remove the TUM part of the configuration. There is no functionally equivalent manual procedure using the line editor.

If you configure asynchronous RPC channels for connecting with the TCUAS tool, make sure that the channel numbers used by different TCOSS instances do not overlap. For example, if you use "00" in all instances, only one will work (the one which started first) and all others will show the error message "ID:16001 00:UAS-231 - All pipe instances are busy. RPC error" in the trace, monitor and event log.

For installing the configuration to a multi-TCOSS instance or for loading the configuration, the main config program menu offers two choices: "03) Get configuration from multi-TCOSS instance" and "06) Install configuration to multi-TCOSS instance".



Choices 03) and 06) replace the "Get local configuration" and "Install configuration local" choices in an ASP environment. If they are selected, you can enter the TCOSS instance in a subsequent window:



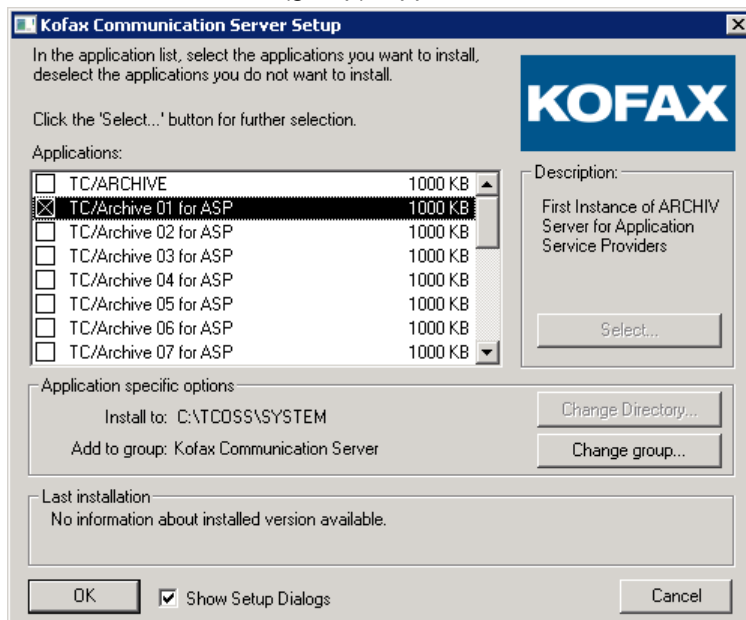
It is also possible to access an already running multi-TCOSS instance via net. Use options "Get configuration via net" and "Install configuration via net" and specify a server path containing a symbolic

port number to select the TCOSS instance, such as "TCP/IP,ComputerName:TCOSS03" to access the 3rd instance.

Setup of Multiple Archive Instances

The setup of multiple archive instances is integrated into the KCS setup utility in a way similar to the multi-TCOSS instances.

1. Select the "TC/Archive (group)" application and click **Select**.



2. Select TC/Archive 01 for ASP for the first customer instance. The TC/Jukebox option works with a single or with multiple archive instances. Even with multiple TC/Archive instances, there is only a single, shared TC/Jukebox instance.
3. When entering the volume subdirectories and the directory holding temporary files during CD creation, be sure that you specify different directories for each instance.
4. When specifying the "Path to TCOSS server," enter a symbolic port number to access a specific TCOSS instance, such as "TCP/IP,ComputerName:TCOSS03" to access the 3rd instance.
5. The only additional input required for an ASP archive instance is a 2-byte "Customer Code". The customer code must be in capital letters only, such as "TC", not "Tc". It must be different for each instance and is used for the CD labels. The volume labels of CDs written in the jukebox have the following format:
 "xxnnnnnnnCDa", where xx = 2 byte customer code, nnnnnnn = 6 digit volume number, a = 1 digit CD number
 The customer code is also inserted (by the setup utility) into the jukebox file path (registry value " . . \TCARCH\Jukebox\FilePath") where it ensures that each customer's archive instance will see only its own CDs.

Overview of IP Port Numbers Used in a Single-Server ASP System

The following port numbers are used by a single-server ASP installation.

IP port number	Symbolic constant	Used for
64505	-	Storage server - media server connection
64508	TCOSS	Single TCOSS instance, client access
64509	ARCHIVE	Single TCARCH instance, client access
64510	TCOSS1	First of multiple TCOSS instances, client access
64511	ARCHIVE1	First of multiple TCARCH instances, client access
64512	TCOSS2	Second of multiple TCOSS instances, client access
64513	ARCHIVE2	Second of multiple TCARCH instances, client access
...
64387	-	TCARCHn - TCJUKE communication

Multi-Tandem Setup

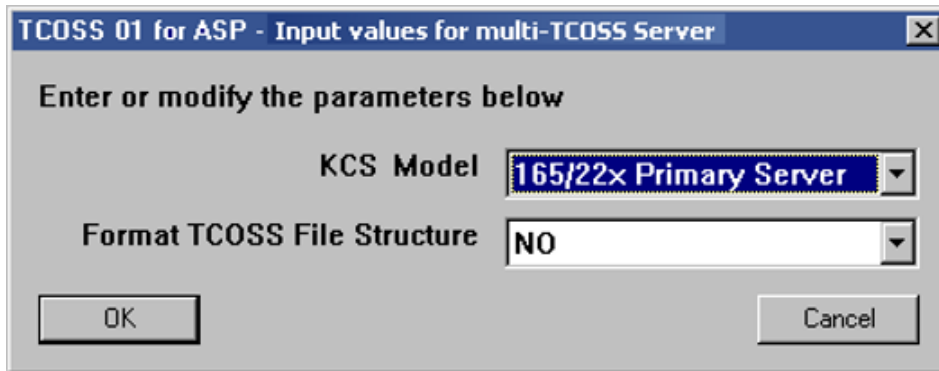
A pair of storage servers may hold multiple TCOSS tandem systems. The TCOSS installations on the media servers do not hold customer data and shared lines are usually distributed over several media servers, so there is no need to do tandem installations on the media servers.

Each pair of TCOSS instances requires an instance of the Kofax Communication Server Status Agent TCSTATUS. The Status agent instances should run on a separate server; this may be an archive server or a link server. The two storage servers and the server running the status agent instances should have two independent LAN connections.

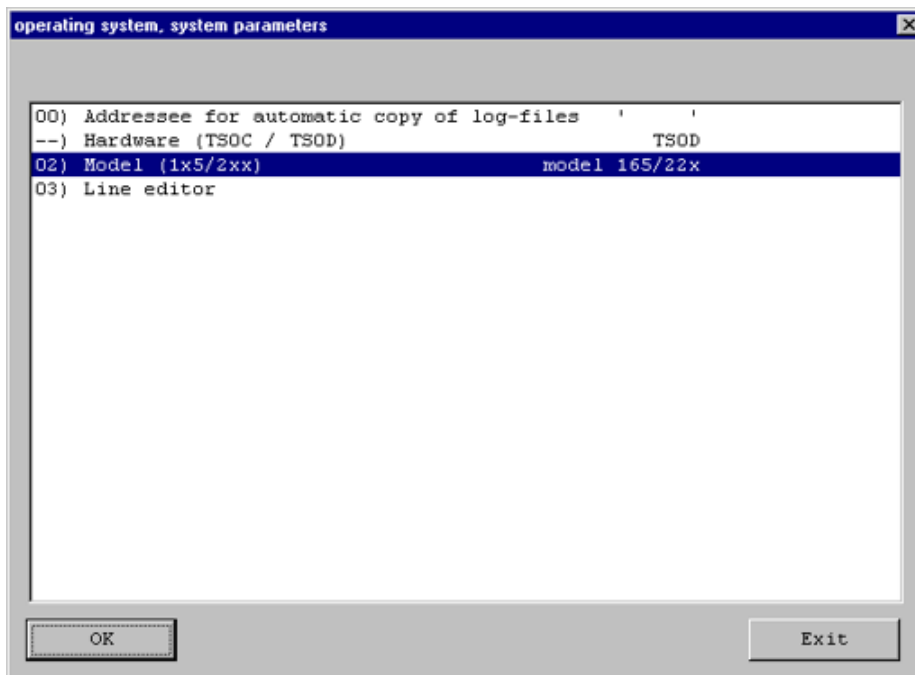
We recommend that you put all primary TCOSS instances on one storage server and all secondary instances on the other server; this configuration is more simple to administrate. On the other hand, if one can cope with the additional complexity, mixing primary and secondary instances on both servers would distribute processing power requirements more evenly with a slightly higher overall performance.

The setup of an ASP tandem system is similar to a single server setup, except that you select a different KCS model (2xx primary or secondary server):

The connections between primary and secondary master and to the status agent require the input of a number of IP addresses.



In the TCOSS configuration created with the WCONFIG utility, you must specify the fault tolerant model again. Select "model 165/22x" under "operating system, system parameters":



All registry keys for a tandem system described in the following sections are generated automatically by the KCS setup utility.

The only registry value for a storage server TCOSS instance which is generated by the setup utility, but not filled is the media server list in "MediaServers" (REG_MULTI_SZ) under the registry sub-key ". . . \Software\TOPCALL\TCOSSn\RemoteChannels". Fill this value on both servers of the tandem pair.

Note Be sure that you update the media server list on both the primary and secondary master if a new media server is added to the system.

The media server list on the secondary master is only used if the secondary master TCOSS instance is running stand-alone, and in this error case one wants to access the same media servers.

TCSRv Settings

The server side of the control channel used by Tandem Systems should be set to the TCP/IP protocol type. The control channel is used by TCOSS on one master server to determine the status and to control TCOSS on the other master server.

The protocol type is determined by the registry value (REG_DWORD):

HKEY_LOCAL_MACHINE\Software\TOPCALL\Boot\TCRPCServerModel

Set to 1 ... TCP/IP

TCOSS Primary Master Settings

The "CommandLine" registry value has the following format:

```
TCOSSn /M:\TCOSSn
/K:TCOSSn
/TCP1:<IP address of secondary>/<IP address of primary>
/TCP:/<IP address of primary>:<port>
```

Switch	Description
/M	Runs TCOSS in the primary master mode and gives the process name (TCOSSn) of the associated TCOSS instance running in secondary master mode. Please note the backslash after the colon.
/K	Specifies the registry subkey and the process name of this TCOSS instance.
/TCP1	Specifies the path to the TCSRv service controlling the secondary master instance, and the primary master TCOSS instance connects as a client. All TCOSS instances use the same default port number (64386).
/TCP	Defines the path for the data connection between the primary and secondary master, and the primary master is the server on this connection. A separate port number for each instance according to the above numbering plan has to be assigned.

All IP addresses are those of the dedicated LAN between primary and secondary master; this same LAN may also be used to connect storage and media servers.

Example of "CommandLine" for TCOSS01 where IP address of primary master on dedicated LAN is 10.0.0.1 and IP address of secondary master on dedicated LAN is 10.0.0.2:

```
"TCOSS01 /M:\TCOSS01 /K:TCOSS01 /TCP1:10.0.0.2/10.0.0.1 /TCP:/10.0.0.1:64261"
```

The details of the two connections to the status agent are set under a "StatusAgent\Connection1" and "StatusAgent\Connection2" subkey:

Type	(REG_DWORD)	Type of connection	3 = LAN using TCP/IP
------	-------------	--------------------	----------------------

Path	(REG_SZ)	Network path to status agent	<status agent adapter IP address>:port number (fixed)/<IP address of own LAN adapter> Example: "10.0.0.3:64262/10.0.0.1" for Connection1 of TCOSS01
-------------	----------	------------------------------	--

Connection1 and Connection2 should use independent LAN connections. It is important that the IP addresses of the actually used adapters are set in the network path.

TCOSS Secondary Master Settings

The "CommandLine" registry value has the following format:

```
TCOSSn /S:\TCOSSn
/K:TCOSSn
/TCP1:<IP address of primary >/<IP address of secondary >
/TCP:<IP address of primary>:<port>/<IP address of secondary >
```

Switch	Description
/S	Runs TCOSS in the secondary master mode and gives the process name (TCOSSn) of the associated TCOSS instance running in primary master mode. Please note the backslash after the colon.
/K	Specifies the registry sub key and the process name of this TCOSS instance.
/TCP1	Specifies the path to the TCSRv service controlling the primary master instance, and the secondary master TCOSS instance connects as a client. All TCOSS instances use the same default port number (64386).
/TCP	Defines the path for the data connection between the primary and secondary master; the secondary master is the client on this connection. A separate port number for each instance according to the above numbering plan has to be assigned.

All IP addresses correspond to the dedicated LAN between primary and secondary master; this same LAN can be used to connect storage and media servers.

Example of "CommandLine" for TCOSS1 where IP address of primary master on dedicated LAN is 10.0.0.1 and IP address of secondary master on dedicated LAN is 10.0.0.2:

```
"TCOSS01 /S:\TCOSS01 /K:TCOSS01 /TCP1:10.0.0.1/10.0.0.2 /TCP:10.0.0.1:64261/10.0.0.2"
```

The details of the two connections to the status agent are set under a "StatusAgent\Connection1" and "StatusAgent\Connection2" subkey:

Type	(REG_DWORD)	Type of connection	3 = LAN using TCP/IP
Path	(REG_SZ)	Network path to status agent	<status agent adapter IP address>:port number (fixed)/<IP address of own LAN adapter> Example: "10.0.0.3:64262/10.0.0.1" for Connection1 of TCOSS01

Connection1 and Connection2 should use independent LAN connections. It is important that the IP addresses of the actually used adapters are set in the network path.

Status Agent Settings

A command line option (/k:subkey) is used to specify a registry sub-key where configuration values are taken from (instead of using the fixed "TCSTATUS" subkey). This allows you to run different TC/Status instances for different customers on the same server.

Example of "CommandLine" for the 2nd ASP instance:

```
"TCSTATUS02 /k:TCSTATUS02"
```

TCOSS Tandem Server IP Port Numbering Plan

Each pair of TCOSS instances and their status agent instance use 5 IP connections: one for the data link between primary and secondary master and two each for the connection between primary or secondary master and the status agent. This results in a group of 5 port numbers used by a customer's tandem installation. To avoid collisions, the port numbers are assigned according to the following numbering plan by the setup utility.

Instance	Primary - secondary Data link	Primary master - Status agent Connection1, Connection2	Secondary master - Status agent Connection1, Connection2
TCOSS	64256	64257, 64258	64259, 64260
TCOSS1	64261	64262, 64263	64264, 64265
TCOSS2	64266	64267, 64268	64269, 64270
TCOSS3	64271	64272, 64273	64274, 64275
TCOSS4	64276	64277, 64278	64279, 64280
TCOSS5	64281	64282, 64283	64284, 64285
TCOSS6	64286	64287, 64288	64289, 64290
TCOSS7	64291	64292, 64293	64294, 64295
TCOSS8	64296	64297, 64298	64299, 64300

Client Access to ASP TCOSS and TC/Archive Instances

The TCfW client and other clients based on TCSI use TCP/IP and symbolic port numbers to connect to a specific TCOSS or TC/Archive instance. The connection path is specified in the format "TCP/IP,ComputerName:TCOSSnn" or "TCP/IP,ComputerName:ARCHIVEnn", such as "TCP/IP,DEMOTC:TCOSS02" or "TCP/IP,TCARCHIVE:ARCHIVE1".

Restriction:

Link types other than TCP/IP are not supported.

A TCTI32.DLL release 2.12.00 or later is required for the resolution of the symbolic port numbers "TCOSSnn" or "ARCHIVEnn". With older TCTI releases, the actual port number such as "64512" instead of "TCOSS2" can be used.

Licensing in an ASP System

All TCOSS instances on a storage server have the same CPU number and use the same model 1xx / model 2xx license that covers the total disk space. Nevertheless, this license has to be set in all instances. Because the storage server TCOSS instances have no local fax or telex interfaces, only the links contribute to the channel count.

The model 1xx license for the single TCOSS instance on a media server covers the installed fax or telex channels and the (small) media server disk size.

All TC/Archive instances on an archive server use the same archive server license covering the total archive disk space. This license has to be set in each TCOSS instance. The same applies to the optional jukebox / CD writing license, which is set in all TCOSS instances and covers the total number of jukebox slots.

ASP System Compatibility

In a Kofax Communication Server ASP system environment, different TCOSS releases may run on storage and media servers. The table below shows a list of compatible releases.

Storage Server release	Media Server Release
7.37.01 ... 7.55.xx	7.37.01 or higher
7.56.00 or higher	7.56.00 or higher

Chapter 6

Error Messages

This section describes the error messages.

Two-Character Error Codes

Two-character error codes indicate errors that may occur during reception or transmission of a document. These codes are visible on the End-User GUI.

These error codes are described within this manual in the description of the appropriate module. For example, the fax error codes are described in the section "User Module for Transputer Fax (UTF)."

The following table is an alphabetical list of error codes where more detailed information is available.

System

Code	Short description	May be caused by	Technical description	End-user description
SC	Cancelled during transmission.	Sending of document has been cancelled.	It is possible to cancel a document that is currently sent. In that case, the document is terminated with error code SC.	Sending of document is cancelled during transmission by any user.
SP	Server process is stopped by error or operator.	Any server component that failed or has been stopped during reception or sending of a document.	Any server component that failed or has been stopped during reception or sending of a document.	The sending/reception of document has been aborted either by any fatal error in server or due to maintenance shutdown by an operator.
SZ	Maximum number of pages exceeded.	A document that exceeds the configured maximum number of pages (999 by default) was sent.	The maximum number of pages is limited to avoid huge documents that are queued by mistake to be sent out via fax.	Check if you really want to send this document. Contact the system operator if you have to send (fax) messages with a huge number of pages.

LINKS

Code	Description
LE	Image conversion failed. When the message that has to be sent as a fax contains an image attachment and that attachment has to be converted, the attachment is passed to the TC/IMGIO, which tries to convert the image to TCI. If that conversion fails, you get an error message above.

Code	Description
LF	Delivered to mail recipient as unregistered.
LG	<p>Document conversion failed.</p> <p>When the message that has to be sent as a fax contains an attachment and that attachment has to be converted, attachment is passed to document converter to do the conversion. For example, if you attach a Word document in the message and send the message as a fax, the document converter will convert the Word document into a fax image.</p> <p>If that conversion fails, you get an error message above.</p> <p>Conversion works in a way that KCS looks for an attachment extension (such as .doc) and uses the associated VB script. The VB script starts the application, loads the attachment and prints it to KCS fax printer driver.</p> <p>The most common problems are when an attachment contains macros or references to external objects. The associated application will then present a dialog box asking how to proceed. The VB script is then unable to close the dialog box and the conversion is timed out.</p> <p>Therefore, check that the file in question doesn't pop up any messages when opened with its associated application.</p> <p>Examples:</p> <ul style="list-style-type: none"> • .DOC Microsoft Word • .XLS Microsoft Excel • .PDF Adobe Acrobat Reader
LH	<p>Wrong address format for recipient.</p> <p>If something is wrong with recipient address (wrong service, wrong address format), then this error occurs.</p>
LI	<p>Wrong address format for originator or passive recipient.</p> <p>If something is wrong with the address of the originator or a passive recipient (wrong service, wrong address format), then this error occurs.</p> <p>A passive recipient is a recipient for whom TC/LINK is not responsible (such as when a mail user sends a message to another mail user and to FAX, the other mail user is delivered by the mail server itself. From the view of TC/LINK, the other mail user is a "passive recipient.")</p>
LJ	<p>Recipient not accepted by TCOSS.</p> <p>If you sent a message to a non-existent Kofax Communication Server user, this error message appears. Check that the recipient is valid.</p>
LK	<p>Originator not accepted by TCOSS.</p> <p>If you sent a message to KCS and you do not specify an originator or an invalid one, this error appears. Please check the originator.</p>
LL	<p>Originator has insufficient permissions.</p> <p>If the originator has configured the "restricted use of services", the sending service cannot be changed by using the KCS address syntax. For example, FAX#12345@kofax.com would normally generate a fax send order on KCS, if it is allowed.</p>
LM	<p>TCOSS server inaccessible.</p> <p>If the TCOSS server is not reachable, this error message appears.</p>
LN	<p>Syntax error (for messages rejected by the special mail DLL).</p> <p>If the message is rejected by the mail system, then it is possible for the specific link to set this error code (such as LINK-FI).</p>

Code	Description
LP	Posted to unregistered mail.
LR	Read by mail recipient.
LS	<p>Terminated and unread by recipient.</p> <p>If the link supports read notifications, this error will appear, if the message is deleted before the message was read.</p> <p>Example: You send a message registered from TCFW to an Exchange mailbox (via TC/LINK-MX). The Exchange user deletes the message without opening it, and deletes it also from the "Deleted Items" folder. Then Exchange returns a "non read notification" to TC/LINK-MX, and the send order on KCS gets error code LS.</p>
LT	<p>Registered message cannot be posted to mail.</p> <p>If a registered message is sent from KCS to any Link recipient and this fails (connection problem to the mail system), this error message appears.</p>
LU	<p>Unregistered message cannot be posted to mail.</p> <p>If an unregistered message is sent from KCS to any Link recipient and this fails (connection problem to the mail system), this error message appears.</p>
LV	<p>Message cannot be delivered to mail recipient.</p> <p>If a message is sent from KCS to any Link recipient and the receiving mail system does not accept the recipient, this error message appears.</p>
LW	<p>Virus detected</p> <p>If you configure a virus checker for this link and a virus is found, then this error message appears.</p>
LX	<p>Other error</p> <p>Any other error condition that is not handled by the rest of the Link errors, can get this error code.</p>
LY	<p>Message conversion error</p> <p>If a general message conversion problem occurs (such as document conversion is needed, but disabled), this error appears.</p>
LZ	<p>Virus checker timeout</p> <p>If you configure a virus checker for this link and the scan runs into a timeout, this error appears.</p>

FAX

Code	Short description	May be caused by	Technical description	End-user description
X0	Call collision in layer 7	Sending a document with UTF, UIF or UFI	A channel that starts sending a fax detected an incoming fax call. The transmission is stopped and the incoming fax is received. KCS retries to send the stopped message later.	The fax channel is occupied by an incoming call. KCS retries to send the message later.
X1	Attempt to send an empty document.	Sending a document with UTF, UIF or UFI	A document without image blocks or text lines has been sent. This should not happen because typically all documents have at least a cover sheet.	The sending document is empty. Sending of empty documents via fax is not supported.

Code	Short description	May be caused by	Technical description	End-user description
X2	Error when opening back-received file.	Sending a document with UTF, UIF or UFI	<p>An error occurred during opening the back reception file. This may be caused by the following reasons:</p> <ol style="list-style-type: none"> 1. Wrong configuration. Check the back reception drive and number series in configuration lines 19 and 20. 2. The next 10 references according to the back reception number series can't be used, because a non-deletable file with that name already exists. Corrective action: Increase the cycle and/or keep always value for the used number series. 	The transmission of the fax was not possible due to a temporary problem on the local KCS server. Try to re-send the message and contact the administrator.
X3	Error in back reception	Dending a document with UTF, UIF or UFI	An error occurred while writing the back reception file. This may happen if the disk gets full while sending a very large file with back-reception. Check the available disk space and delete unused files. Check the settings of the number series.	The document could not be send because there is not enough free disk space on the KCS server to save the sending copy. Contact the administrator to fix the problem.
X5	Error during reception.	Receiving a document with UTF, UIF or UFI	Reception stopped because the KCS disk space limit was reached.	Reception stopped because the KCS disk space limit was reached.
X6	Cannot create inbound/scan/routing send order.	Receiving a document with UTF or UIF	A incoming call failed, due to a wrong received number (such as DID/DDI or DTMF input). The calling user will be informed with 3 beeps. In that case, no reception file is created. The error is used internally and only visible in the fax log entries in the short-term archive.	End user will never see this error.
XA	Call collision in layer 6.	Sending a document with UTF, UIF or UFI	A channel that starts sending a fax detected an incoming fax call. The transmission is stopped and the incoming fax is received. KCS retries to send the stopped message later.	The fax channel was occupied by an incoming call. KCS retries to send the message later.

Code	Short description	May be caused by	Technical description	End-user description
XB	Data error within TCI-block.	Sending a document with UTF, UIF or UFI	The sending document contains a corrupted TCI block with invalid characters or a TCI block that does not end with a comma.	The sending document contains a bad image block. Try to send to message again. Contact the administrator, if the problem still exists.
XC	Form buffer is out of memory.	Sending a document with UTF, UIF or UFI	An overlay exceeds the maximum available overlay buffer. Overlays are typically used in cover sheets. They are stored as 1-dimensional Huffman code (like TCI code). Try to simplify the overlay images.	The message cannot be sent because it contains too many or too large overlays.
XF	No answer from distant station (ring detected).	Sending a document with UTF on an analog or E&M line	If an analog line is used, the call progress is detected using an in band ring and busy tone detector. If this detector recognizes at least 10 ring tones, the transmission is stopped with this error.	The distant fax machine did not answer the call. This typically happens if the number is wrong or the distant fax is out of order (such as out of paper).
XG	Receiver not ready timeout (ECM).	Sending a document with UTF or UIF	A partial ECM page (up to 64kbyte of data) is not confirmed by the receiver within 60 seconds. This may happen if the receiver has a problem storing the received data.	The transmission of the fax is not successful due to a temporary problem with the receiving fax machine. Try to re-send the message.
XH	Line occupied by local Telefax unit.	Sending a document with UTF using TS29 + TS2X	The local connected fax machine occupies the line.	The local connected fax machine occupies the line. Try to resend the message.
XI	Error in selection number.	Sending a document with UTF, UIF or UFI	The fax receiver number contains invalid characters.	The fax receiver number contains invalid characters.
XJ	No dial tone.	Sending a document with UTF	No dial tone is detected. Check if the fax line is OK and connected with the KCS (line) server.	No dial tone is detected. Check if the fax line is OK and connected to the KCS (line) server.
XK	Answer back mismatch.	Sending a document with UTF, UIF or UFI	You have specified an answerback verification in the number that does not match with answerback of the received fax machine.	You have specified an answerback verification in the number that does not match with answerback of the received fax machine.
XL	No fax machine detected.	Sending a document with UTF, UIF or UFI	The call is not answered by a fax machine. This typically happens if the number is wrong and the call is answered by a distant person or answering machine.	The call is not answered by a fax machine. Check if the number is correct (try to call the number with a telephone) and then try to send again.
XM	Illegal identification of called station.	Sending a document with UTF or UIF	The receiver is a fax machine that is not compatible to receive a fax according to recommendation ITU-T T.30.	The receiver is a fax machine that is not compatible to receive a fax.

Code	Short description	May be caused by	Technical description	End-user description
XN	illegal response during training phase.	Sending a document with UTF or UIF	The T.30 training (DCS+TCF) is terminated due to a response from the receiver that is not allowed according to recommendation ITU-T T.30.	The transmission of the fax is not successful due to a temporary problem with the receiving fax machine. Try to resend the message.
XO	Three unsuccessful learn attempts.	Sending a document with UTF or UIF	The receiving fax machine does not respond to the training sequence (DCS+TCF) even after 2 retries (see decision "3 rd TRY" in ITU-T). This may typically happen if the receiving fax machine disconnects the line during training.	The transmission of the fax is not successful due to a temporary problem with the receiving fax machine. Try to resend the message.
XP	Illegal page confirmation.	Sending a document with UTF or UIF	The receiving fax machine did not respond to the end of page command (MPS, EOP and EOM) according to recommendation ITU-T T.30.	The transmission of the fax is not successful due a temporary problem with the receiving fax machine. Try to resend the message.
XQ	Page transmitted incorrectly.	Sending a document with UTF, UIF or UFI	A page is rejected with the T.30 response RTN.	The transmission of the fax is not successful due to bad line quality. Try to resend the message.
XR	Illegal frame received.	Sending a document with UTF or UIF	The receiving fax machine does not respond to the training (DCS + TCF) according to recommendation ITU-T T.30.	The transmission of the fax is not successful due to a temporary problem with the receiving fax machine. Try to resend the message.
XS	Unable to find appropriate baud rate.	Sending a document with UTF or UIF	The receiver responded with FTT (failure to train) to a training with the lowest compatible speed (= V.27 with 2400 bps). KCS does not retrain in that case because it is better to reconnect to the distant fax machine (see decision "RETRA*" in ITU-T). This may happen if the line quality is very bad.	The transmission of the fax is not successful due to a temporary problem with the receiving fax machine. Try to resend the message.
XT	No response received.	Sending a document with UTF, UIF or UFI	The receiving fax machine did not respond to the end of page command (MPS, EOP or EOM).	The transmission of the fax is not successful due to a temporary problem with the receiving fax machine. Try to resend the message.
XU	Busy or no dial tone on PBX connection.	Sending a document with UTF	If an analog line is used, the call progress is detected using an in band busy and ring tone detector. If this detector recognizes a busy tone after the number is dialed, the transmission is stopped with this error.	The telephone line to the distant fax machine is busy. Try to resend the message.

Code	Short description	May be caused by	Technical description	End-user description
XV	Unexpected end of document.	Receiving a document with UTF or UIF	<p>The sending fax machine disconnects the line instead of sending any more pages. This may be caused by:</p> <ol style="list-style-type: none"> 1. A non T.30 confirm protocol implementation of the sending fax machine. 2. The sending fax machine has stopped sending due to manual interventions or due to a bad transmitted previous page. For example, KCS as a sender does this if the break page is not configured in configuration line 57. 	The reception of the fax is not successful due to a temporary line problem or the transmission has been stopped by the sending side. If the received document is not complete, the sender will likely retransmit it because missing pages have not been confirmed to the transmitter.
XW	Too many line distortions at training sequence.	Receiving a document with UTF or UIF	KCS responds with FTT (failure to train) with the lowest compatible speed (= V.27 with 2400 bps). This may happen if the line quality is very bad.	The reception of the fax is not successful due to a temporary line problem or the transmission is stopped by the sending side. If the received document is not complete, the sender will likely retransmit it because missing pages have not been confirmed to the transmitter.
XX	Illegal identification received.	Receiving a document with UTF, UIF or UFI	The sending fax machine starts with the T.30 procedure with a wrong command (training sequence with DCS is expected). If you get the error with a specific fax machine, you should report in to Kofax Support.	If you get this error, the receiver will retry sending you the message.
XY	No command received.	Receiving a document with UTF, UIF or UFI	KCS expects any T.30 command from the sending fax machine but does not receive it within the command reception timeout (configured in position 2 of configuration line 73). See decision "COMMAND REC?" in ITU-T. This timeout typically happens if the connection to the sending fax machine gets lost during reception or if the line quality is very bad.	The reception of the fax is not successful due to a temporary line problem or the transmission is stopped by the sending side. If the received document is not complete, the sender will likely retransmit it because missing pages are not confirmed to the transmitter.

Code	Short description	May be caused by	Technical description	End-user description
XZ	illegal command received.	Receiving a document with UTF or UIF	The distant fax has sent a T.30 command that is not valid in the current state.	The reception of the fax is not successful due to a temporary line problem or the transmission is stopped by the sending side. If the received document is not complete, the sender will likely retransmit it because missing pages have not been confirmed to the transmitter.
Y0	The receiving fax machine does not support fax sub-addresses.	Sending a document with UTF or UIF	A Fax sub address is specified, but the receiving fax machine does not support reception of fax sub addresses.	A Fax sub address is specified, but the receiving fax machine does not support reception of fax sub addresses. Remove the fax sub address and try again.
Y1	The specified fax sub address is too long (maximum of 20 digits are allowed).	Sending a document with UTF or UIF	A fax sub address with more than 20 digits is specified. According to ITU-T.30, the maximum number of fax sub address digits is restricted to 20.	The document cannot be sent, because the fax sub address is longer than 20 characters. Reduce the fax sub address length and try again.

ISDN

Code	Short description	May be caused by	Technical description	End-user description
IA	Call collision.	Sending a document with UIF	A channel that starts sending a fax detected an incoming fax call. The transmission is stopped and the incoming fax is received.	The fax channel is occupied by an incoming call; therefore, the current outgoing fax transmission is interrupted. KCS retries later to send the message.
IC	No channel available (temporary problem).	Sending a document with UIF	The transmission channel negotiation procedure between KCS server and the local exchange (PBX or PSTN) is unsuccessful. This error can occur rarely due to the call collision problem (both KCS and the local exchange require the same channel for two different - incoming and outgoing - calls at the same time). However the persistent occurrence indicates a serious protocol problem between KCS server and the local exchange.	The transmission channel cannot be established between KCS server and the local exchange (PBX or PSTN). This error may occur rarely due to heavy concurrent incoming and outgoing traffic at the same time. If it occurs too often, contact the system administrator.

Code	Short description	May be caused by	Technical description	End-user description
IF	No answer from distant station.	Sending a document with UIF	The destination fax machine is alerted but hasn't answered the call prior to the call request timer expiry.	The destination fax machine has been alerted but hasn't answered the call prior to the call request timer expiry. The destination fax machine is eventually not working properly (such as an out of paper situation).
II	Error in selection number.	Sending a document with UIF	The format of the dialed number is invalid and the network cannot route the call to the destination. Correct the number and/or verify the public line escape prefix in the case of PBX connection and resend the document again.	Correct the number and/or verify the public line escape prefix in the case of PBX connection and resend the document again.
IJ	No connection to local exchange.	Sending a document with UIF	The connection line between the KCS server and the local exchange (PBX or PSTN) is not active, either due to a cabling problem or serious lower layer protocol problem. Check the cabling and verify the line configuration on both sides.	The local connection line between KCS server the local exchange (PBX or PSTN) is broken.
IN	Wrong number.	Sending a document with UIF	The dialed number is wrong and the network cannot route the call to the destination. Correct the number and/or verify the public line escape prefix in the case of PBX connection and resend the document again.	Correct the number and/or verify the public line escape prefix in the case of PBX connection and resend the document again.
IS	Service or function not supported by network or user.	Sending a document with UIF	The fax service is not supported by the network. Its persistent occurrence indicates a serious protocol problem between KCS server and the local exchange (PBX or PSTN). If it occurs only with specific destinations, then most probably the destination exchange or terminal is not configured for fax service (like data terminals).	The fax service is not supported by the network for this call.

Code	Short description	May be caused by	Technical description	End-user description
IP	Procedural error.	Sending a document with UIF	Its persistent occurrence indicates a serious protocol problem between KCS server and the local exchange (PBX or PSTN). If it occurs only temporarily with specific destinations, then most probably the remote destination or exchange disconnected the call with an unexpected error code. Its persistent occurrence only with specific destinations indicates a serious protocol problem on the destination terminal or exchange side.	Its persistent occurrence indicates a serious protocol problem between KCS server and the local exchange (PBX or PSTN). If it occurs only temporarily with specific destinations, then most probably the remote destination or exchange disconnected the call with an unexpected error code. Its persistent occurrence only with specific destinations indicates a serious protocol problem on the destination terminal or exchange side.
IR	Call disconnected by the network or remote user (reason unspecified).	Sending a document with UIF	Its persistent occurrence indicates a serious protocol problem between KCS server and the local exchange (PBX or PSTN). If it occurs only temporarily with specific destinations, then most probably the remote destination or exchange disconnected the call with an unexpected error code. Its persistent occurrence only with specific destinations indicates a serious protocol problem on the destination terminal or the exchange side.	Its persistent occurrence indicates a serious protocol problem between KCS server and the local exchange (PBX or PSTN). If it occurs only temporarily with specific destinations, then most probably the remote destination or exchange disconnected the call with an unexpected error code. Its persistent occurrence only with specific destinations indicates a serious protocol problem on the destination terminal or the exchange side.
IU	Busy	Sending a document with UIF	The destination number is busy.	The destination number is busy.
IX	Unknown error.	Sending a document with UIF	The network reported an undefined error code. Its persistent occurrence indicates a serious protocol problem between KCS server and the local exchange (PBX or PSTN). If it occurs only with specific destinations, it indicates a protocol, problem on the remote destination or exchange side.	The network reported an undefined error code. Its persistent occurrence indicates a serious protocol problem between KCS server and the local exchange (PBX or PSTN). If it occurs only with specific destinations, it indicates a protocol problem on the remote destination or exchange side.

TELEX

Code	Short description	Technical description	End-user description
T1	Call collision on telex line.	A channel that started sending a telex detected an incoming call. The transmission is stopped and the incoming telex is received. KCS tries to send the message later.	The telex channel was occupied by an incoming call. KCS tries to send the message later.
T2	Called telex subscriber is busy.	A telex channel could not send a message because the called subscriber is busy or the network is congested. KCS tries to send the message later.	A telex could not be sent because the called telex number is busy. KCS tries to send the message later.
T3	No response after selection of telex number.	A telex channel did not receive any response after dialing a number to send out a message. Could be that the telex exchange is overloaded and could not establish the connection in time. KCS tries to send the message later.	A telex could not be sent because of a problem which is probably temporary, similar to dialing a phone number and not hearing any response. KCS tries to send the message later.
T4	'der', 'nch', 'np' or 'na' telex service signal.	A telex channel dialed a number to send out a message and received a 'der' (out of orDER), 'nch' (Number CHanged) 'np' (No Path) or 'na' (Not Allowed) service signal. Although some of these service signals suggest that the number is wrong, the problem can also appear temporarily with a correct number. KCS tries to send the message later.	A telex could not be sent because of a temporary problem or a wrong number. The called telex machine could be out of paper or switched off. KCS tries to send the message later.
T5	Clear during transmission of telex.	The telex line is disconnected while KCS is sending out a message. Could be that someone pressed the clear button on the distant telex machine or that the connection has broken down. Part of the message is sent out, but something (or almost all) is missing.	The connection broke down while a telex was sent out. KCS tries to send the message later.
T6	Wrong telex answerback.	A telex is not sent because the answerback from the distant subscriber does not match the expected answerback. The number or the expected answerback may be wrong.	A telex is not sent because we did not receive the expected answerback. A telex subscriber answered the call but it's probably not the one we wanted to send the message to.
T7	No call confirmation on telex line.	A telex is not sent because it is not possible to establish a connection to the telex exchange. The telex line is probably not plugged in correctly.	A telex is not sent because the telex line is unplugged.
T8	No "proceed to select" from telex exchange.	A telex was not sent because the telex exchange did not send the "proceed to select" signal. The telex exchange is probably down or overloaded, or the telex module runs with a wrong configuration.	A telex is not sent because the telex exchange is down.

Code	Short description	Technical description	End-user description
T9	Clear during selection on telex line.	A telex is not sent because the line was cleared while the telex module dialed the number. This can be caused by a wrong configuration of the telex module or by problems in the telex exchange.	A telex was not sent because the telex exchange hung up while dialing.
TA	Clear without "proceed to select" on telex line.	A telex was not sent because the telex exchange cleared the connection instead of sending the "proceed to select" signal. The telex exchange is probably down or overloaded, or the telex module runs with a wrong configuration.	A telex is not sent because the telex exchange is down.
TB	Clear after "proceed to select" on telex line.	A telex was not sent because in a two-stage selection the telex gateway cleared the connection after sending the proceed to select signal. The telex gateway is probably down or overloaded or the telex module runs with a wrong configuration.	A telex was not sent because a telex gateway is down or overloaded.
TC	Incorrect telex number.	A telex is not sent because the specified number has more than 40 digits.	A telex is not sent because the specified number is clearly too long.
TD	Incoming signals on telex line.	Sending a telex is abandoned because incoming signals are received when the recipient is not supposed to send back anything. Possibly somebody pressed keys at the receiving telex machine or the line quality is so bad that stray signals are received. In both cases, the output at the receiving side is likely to be garbled so transmission is stopped. Part of the message is sent out, but something (or almost all) is missing.	Sending a telex was abandoned because incoming signals were received. Possibly somebody pressed keys at the receiving telex machine or the line quality is so bad that stray signals are received. In both cases, the output at the receiving side is likely to be garbled so transmission is stopped. Part of the message is sent out, but something (or almost all) is missing.
TE	No received character time-out.	An incoming call is cleared after no characters are received for a period of time that exceeded the configured reception timeout. Maybe the telex was sent manually and the sender took too long a break while typing or forgot to disconnect at the end of the transmission. Everything sent on the line is stored correctly, but the sender might have wanted to send more.	A received telex was closed and the telex line disconnected because at the end the transmission stopped and nothing was received for half a minute or so. Maybe the telex was sent manually and the sender took too long a break while typing or just forgot to disconnect at the end of the transmission. Everything sent on the line is stored correctly, but the sender might have wanted to send more but we disconnected the line.
TF	Error while storing the received document.	An intermediate or final save of a received telex fails and the telex line is disconnected to stop reception. This is a rare situation which could be caused by sporadic hard disk write errors. The received part of the message is correct but something is missing at the end.	Reception of a telex is stopped by disconnecting the telex line because of server hardware problems. The received part of the message is correct but something is missing at the end.

Code	Short description	Technical description	End-user description
TG	Disk full, unable to store back-received document.	A telex is not sent because the send options include back-reception and it's not guaranteed that the back-reception document can be stored as the disk is already more than 95% full. KCS tries to send the message later.	A telex is not sent because the disk is almost full. KCS tries to send the message later.
TH	Ring buffer overflow during reception.	One or more pieces of an incoming telex are lost because of a ring buffer overflow. This is a rare situation that could be caused by the slow response of a heavily overloaded system. A hard disk failure in a tandem system in combination with connection problems to the status agent could also cause this problem. The sender of the telex is not aware of the incomplete reception because the telex line is not disconnected by the recipient.	A received telex has been stored incompletely with one or more pieces missing anywhere, because of an overloaded or failing hardware. The sender of the telex is not aware of this situation.

LANPRINT

Code	Short description	May be caused by	Technical description	End-user description
R1	Illegal 1st line.	TC/LANPRT process	Invalid format of the KCS mask used for printing via ULL module. The mask must start with the ++HEADER line. See the <i>TC/LANPRT</i> manual for details.	Invalid format of the KCS mask used for printing via ULL module.
R2	The print job could not be started.	TC/LANPRT process	The Windows printer API reported that the print job could not be started. Contact system administrator.	The Windows printer API reported that the print job could not be started. Contact system administrator.
R3	Can't open printer.	TC/LANPRT process.	Error during opening the printer (such as wrong printer name). Verify the printer name in the P command line in the KCS mask used for printing.	Error during opening the printer (such as wrong printer name). Contact system administrator.
R4	This error code is not used.			
R5	Can't open file for conversion.	TC/LANPRT process	The output file for the format conversion could not be open due to insufficient rights or directory not existing. Contact system administrator.	The output file for the format conversion could not be open due to insufficient rights or directory not existing. Contact system administrator.
R6	File write failure during copy.	TC/LANPRT process	A file write error occurred during copy operation through C command line in the KCS mask without the -d format specification switch. Verify whether the disk is full.	A file write error occurred during copy operation through C command line in the KCS mask without -d format specification switch. Verify whether the disk is full.

Code	Short description	May be caused by	Technical description	End-user description
R7	Print job failed.	TC/LANPRT process	An error occurred during sending the document to the printer (queue). Verify whether the printer is working properly (printer may be out of paper).	An error occurred during sending the document to the printer (queue). Verify whether the printer is working properly (printer may be out of paper).
R8	Can't execute command.	TC/LANPRT process	The command/external application specified in the D or E command line of the KCS mask could not be executed.	The command/external application specified in the D or E command line of the KCS mask could not be executed.
R9	Application error.	TC/LANPRT process	The application that was executed through D or E command line of the KCS mask reported an error.	The application that was executed through D or E command line of the KCS mask reported an error.
RA	Unknown image format.	TC/LANPRT process	Image format specified in the -d switch of the C command line is not supported.	Image format specified in the -d switch of the C command line is not supported.
RB	This error code is not used.			
RC	File write failure during format conversion.	TC/LANPRT process	A file write error occurred during conversion operation through C command line in the KCS mask. Verify whether the disk is full.	A file write error occurred during conversion operation through C command line in the KCS mask. Verify whether the disk is full.
RD	This error code is not used.			
RE	User break.	TC/LANPRT process	TCLANPRT process is stopped manually by operator during printing.	TCLANPRT process is stopped by operator during printing.
RF	Time-out.	TC/LANPRT process	Time-out occurred during communication between TC/ LANPRT process and KCS Server. This is an internal error that should normally never occur. If so, contact the system administrator.	Time-out occurred during communication between TC/ LANPRT process and KCS Server. This is an internal error that should normally never occur. If so, contact the system administrator.
RG	TCTI attach error.	TC/LANPRT process	TC/LANPRT process can't attach to the TCTI transport interface. This is an internal error that should normally never occur. If so, contact the system administrator.	TC/LANPRT process can't attach to the TCTI transport interface. This is an internal error that should normally never occur. If so, contact the system administrator.
RH	This error code is not used.			

Code	Short description	May be caused by	Technical description	End-user description
RI	TC/LANPRT internal error 1.	TC/LANPRT process	TCLANPRT encounters an undefined event during operation. This is an internal error that should never occur. If so, contact the system administrator.	TCLANPRT encountered an undefined event during operation. This is an internal error that should never occur. If so, contact the system administrator.
RJ	TC/LANPRT internal error 2.	TC/LANPRT process	TCLANPRT encountered an undefined state during operation. This is an internal error that should never occur. If so, contact the system administrator.	TCLANPRT encountered an undefined state during operation. This is an internal error that should never occur. If so, contact the system administrator.
RK	ULL module time-out.	ULL module	ULL time-out problem occurred during operation. This is an internal error that should never occur. If so, contact the system administrator.	ULL time-out problem occurred during operation. This is an internal error that should never occur. If so, contact the system administrator.
RL	ULL TCTI disconnected.	ULL module	The TCTI connection was either disconnected during a printing or conversion operation, or at the time the ULL module fetched the next printing or conversion send order from TCOSS, there was no active TCTI connection with the TC/LANPRT process. If this error occurs very often, it indicates significant TCTI connection problems between KCS Server and the TC/LANPRT server.	The TCTI connection was either disconnected during a printing or conversion operation, or at the time the ULL module fetched the next printing or conversion send order from TCOSS, there was no active TCTI connection with the TC/LANPRT process. If this error occurs very often it indicates significant TCTI connection problems between KCS Server and the TC/LANPRT server.
RM	ULL module protocol error	ULL module	ULL module protocol error occurred during operation. This is an internal error that should never occur. If so, please contact system administrator.	ULL module protocol error occurred during operation. This is an internal error that should never occur. If so, please contact system administrator.

Event Logs

This section provides additional details about specific event log entries.

Event ID 16106

Format

Compatibility warning: Right '{access}' is missing for user {login user}

Description

User {login user} performed the operation {access} that is granted with the current TCOSS security configuration, but the same access would fail if additional security checks are enabled on the TCOSS server. In most cases, additional security checks are activated by increasing the TCOSS security level from 20 to 40.

Description of parameter {access}

Content of {access}	Description of missing user right
SERVER	The right "Server" is missing
Services	The right "Services" is missing
Registration/License	The right "Registration/license" is missing
Mail-System-list(or={or}, og={og}, rec={rec}, rg={rg}), or Mail-System-read(or={or}, og={og}, rec={rec}, rg={rg}),	<p>The right to list/open messages in the in/out box with the following filter is missing:</p> <p>{or}: Originator user filter (in-box filter "...From Continued", out-box filter: "From:")</p> <p>{og}: Originator group filter. (in/out-box filter "Orig. Group")</p> <p>{rec}: Recipient user filter (in-box filter: "To", out-box filter: "...To Continued)</p> <p>{rg}: Recipient group filter (in-box filter: "Recip. Group")</p> <p>One of the following rights must be granted:</p> <ul style="list-style-type: none"> • Inbox (All users) | Open • Outbox (All users) | Open • Inbox (Group members) | Open (if {rg} = own group name) • Outbox (Group members) | Open (if {og} = own group name)
Mail-System-write(or={or}, og={og}, rec={rec}, rg={rg}),	<p>The right to correct the following entry from the out box is missing:</p> <p>{or}: Originator user</p> <p>{og}: Originator group</p> <p>{rec}: Recipient user</p> <p>{rg} Recipient group</p> <p>One of the following rights must be granted:</p> <ul style="list-style-type: none"> • Outbox (All users) | Correct • Outbox (group members) | Correct
Mail-System-Poll(queue={que}, group-of-queue={group})	<p>The right to poll queue {que} that belongs to group {group} is missing.</p> <p>One of the following rights must be granted:</p> <ul style="list-style-type: none"> • Inbox (All users) | Open • Inbox (Group members) | Open (if {group} = own group name)
File-list({folder}/{name})	<p>The right to list files with folder filter {folder} and name filter {name} is missing.</p> <p>One of the following rights must be granted:</p> <ul style="list-style-type: none"> • System Folder | Read • Message Folder (All users) | List • Message Folder (Group members) | List (if group of user {folder} = own group name) • Message Folder (Own) | Read (if folder=own user name) • FIS Folder | Read (if folder="+MAIL5V" and name starts with "F")

Content of {access}	Description of missing user right
File-read({folder}/{name})	<p>The right to read file ({folder}/{name}) is missing. One of the following rights must be granted:</p> <ul style="list-style-type: none"> • System Folder | Read • Message Folder (All users) | Open • Message Folder (Group members ) | Open (if group of user {folder} = own group name) • Message Folder (own) | Read (if folder=own user name) • FIS Folder | Read (if folder="+MAIL5V" and name starts with "F")
File-write({folder}/{name})	<p>The right to write or delete file ({folder}/{name}) is missing. One of the following rights must be granted:</p> <ul style="list-style-type: none"> • System Folder | Write • Message Folder (All users) | Open • Message Folder (Group members ) | Open (if group of user {folder} = own group name) • Message Folder (own) | Write (if folder=own user name) • FIS Folder | Write (if folder="+MAIL5V" and name starts with "F")
Address-Book-list({ab}/{rec}) Or Address-Book-read({ab}/{rec})	<p>The right to list/open recipients from address book {ab} is missing. One of the following rights must be granted:</p> <ul style="list-style-type: none"> • All priv. Address Books | Read • Group Address Books | Read (if group of user {ab} = own group name) • User Address Book | Read (if {ab} = own user name) • System Address Book | Read (if {ab} = "+TECH")
Address-Book-write({ab}/{rec})	<p>The right to modify/delete recipients from address book {ab} is missing. One of the following rights must be granted:</p> <ul style="list-style-type: none"> • All priv. Address Books | Write • Group Address Books | Write (if group of user {ab} = own group name) • User Address Book | Write (if {ab} = own user name) • System Address Book | Write (if {ab} = "+TECH") <div style="background-color: #f0f0f0; padding: 10px; margin-top: 10px;"> <p>Note Able to edit Distribution List Id from System Address Book even when System Address Book write permission is not assigned: In this case, the TCTECH user has the Write permission for User Profile. This is the highest permission right as it can be used to change the own user profile. Therefore, if the User Profile Write permission is assigned to a user, it has the access for everything. If you remove the User Profile Write permission, you will get an error.</p> </div>
User-Profile-list(id={usrid})...	<p>The right to list user profiles with filter {usrid} is missing. One of the following rights must be granted:</p> <ul style="list-style-type: none"> • System User Profiles | Read • Group User Profiles | Read (if group user filter matches = own group name)

Content of {access}	Description of missing user right
User-Profile-read(id={usrid})...	The right to open user profile {usrid} is missing. One of the following rights must be granted: <ul style="list-style-type: none"> System User Profiles | Read Group User Profiles | Read (if group of {usrid} = own group name)
User-Profile-write(id={usrid})...	The right to modify/delete user profile {usrid} is missing. One of the following rights must be granted: <ul style="list-style-type: none"> System User Profiles | Write Group User Profiles | Write (if group of {usrid} = own group name)
User-Profile-write(x=...)	The right to change the password, group, representative, cost center, language or location is missing.

Note In some cases, long user names are mapped to #nnnnnnnn user names. The mapping between short- and long user names can be found in the ASCII backup (user.asc) created by TCfW as shown in the sample screen:

```

01300  ... }
01301  ... }
01302  ... }
01303  }
01304  set_entry_us := (
01305    cl_integer/int_file_id = 3354932,
01306    cl_integer/int_file_size = 5224,
01307    cl_time/time_created = "150512:230802",
01308    cl_textstring/ts_file_name = "#0010030",
01309    cl_textstring/ts_user_id = "NewUser without rights",
01310    cl_textstring/ts_password = "#0A2d(d@T.iA",
01311    cl_integer/int_days_pw_valid = 2147483647,
01312    cl_integer/int_account_locked = 0,
01313    cl_integer/int_auto_login_enable = 0,
01314    cl_textstring/ts_representative = "NewUser without rights",
01315    cl_textstring/ts_group = "NewUser without rights",

```

Example 1

Message	Compatibility warning: Right 'User-Profile-read(id=#0010030, u=3, x=0)' is missing for user MINRIGHTS.
Description	User "MINRIGHTS" does not have the right to read the user profile "NewUser without rights" (mapping of #0010030 was taken from the screen shot above).
Required Rights	"System User Profile | Read" or "Group User Profile | Read" (If users "MINRIGHTS" and "NewUser without rights" are in the same group)

Example 2

Message	Compatibility warning: Right 'Mail-System-read(or=*, og=*, rec=FAXQU, rg=*)' is missing for user MINRIGHTS.
Required Rights	"Inbox (All Users) | Open" or "Inbox (Group Members) | Open" (If users "MINRIGHTS" and "FAXQU" are in the same group)

Event ID 16107

Format

Compatibility warning: Right '{access}' is missing for role {role} used by {login user}

Description

User {login user} switched to role {role} and performed the operation {access} that is granted with the current TCOSS security configuration, but the same access would fail if additional security checks are enabled on the TCOSS server. In most cases additional security checks are activated by increasing the TCOSS security level from 20 to 40.

Description of parameter {access}

As described in event log 16106.

Internal Errors

Internal Errors are generated whenever a unexpected situation that is typically not caused by the end-user happens. They are intended to be clarified by the local administrator, a KCS technician, or the Kofax Support team.

The following error lists consists of the error message text, the dedicated modules and the probable causes.

The message output by the software can be longer than the messages shown in this list. Whenever the "%" character appears in the list, a variable parameter is inserted at this position (like the "C" print function).

The probable reason gives an idea about the possible reason for every error. Therefore, one or more of the following characters are written after the message:

- **B** System breakdown (in German: "Absturz"). Will be recognized if an invalid pointer is passed to a function.
- **C** Configuration error. Check last configuration changes. Delete channels to find out the channel causing the error. Reconfigure the system based on standard configuration.
- **D** Data error on Disk. Defect data on hard disk causes the error; most of them will be repaired automatically and error will clear after restarting the system. Otherwise, try to erase defect files, initially install the software, or reinitialize the hard disk.
- **H** Hardware failure. Change hardware.
- **I** Internal configuration File error. Like "C" but these files are automatically produced by the configuration program.

- **L** Link (or serial if it occurs with TS24/25/27) communication error. Check TS81, optical cable and SOS. Can also occur between direct connect transputers (Example: connection between TS0D and TS29).
- **P** defect program. A program constant has an improper value. Reinstall and make TCOSS master-disk. Make new installation disk. Reinstall release. Check computer for virus.
- **M** No Memory available. This can happen if not enough RAM or disk space is available or after an update (especially from 5.08 to 5.20) or configuration changes.
- **S** Internal Software protocol error. An internal interface between two modules is not handled correctly by one of them. The other detects the protocol error. This error may also be generated due to Link communication errors. Report the error to Kofax.
- **R** Out of resources or resource conflict.

Transputer and Model/1xx Master Errors

This type of error can happen on every hardware using a transputer (TS80/82/0C/0D/29/32/33). The error message is written to LCD (if connected). Depending on the error class (level), the actions described below are taken.

Error class	Meaning	Action
1	Trace	TE-File created and sent to .ERROR1
2	Warning	TE-File created and sent to .ERROR2
3	Line out of order	TE-File created and sent to .ERROR3
4	HW or SW error corrected	TE-File created and sent to .ERROR4
5	Partial stop	TE-File created and sent to .ERROR5
5r	Partial stop with reboot	Same as 5, but node will reboot.
F	Fatal error	Stop system output message on port 0a of slave 1

Errors during starting the system (before the message "TCOSS started" is displayed on LCD) are only shown on the LCD connected to the hardware where the error occurs. In this case, an LCD should be connected to the system master (TS80 with mod. 55 or TS0C/0D).

Note If a fatal error occurs on a reboot able node (such as an Interface card) this error is handled as a "partial stop" (error class 5).

List of Modules

BOOT	TCOSS6 Booter
DISK	SCSI Harddisk driver
FLINK	Fast Link
FXC	UTF or ULP
INST	Install program, Remote TOS (model/1xx)
LNK	Serial communication module to TS24/25/27
OCR	User Module for Character recognition (not supported)
SYS	Any module

TAM	Application Module (TAM, KK99, TT99, VV99, EDIT, ROUTE)
TCT	TC Transport Interface (used by UCL and UCF)
TOS	Operating system (TOS, DIR, DISK, MISC, SMISC, UHR, CPU)
TRP	TC Routing protocol (transfers messages between modules and Transputers; appears as software modules DIST, LDIST, MUX, CBOOT or START)
TUM	Any user module
UAS	Asynchronous module
UIF	User Module ISDN Fax
UIS	User Module ISDN serial
ULP	User Module for Laser Printer (not supported)
UTF	User Module Transputer Fax
UTX	User Module for Telex

Parameters

[err]	Replaced by an acknowledgment number as described in this manual. See list of acknowledgments.
[path]	Specifies the receiver of data block.
[nn]	Node number: specifies a specific transputer in the system. The master (TS0C/0D with mod. 25/45 or TS80) has number 1. You can look into the TCOSS\LOADERTA file to find out all the modules started on a specific node. The lines L[nn] contain the program and the lines S[nn] contain the modules for this node.
[disk]	Disk number (1=Disk1, 2=Disk2)
[diskerr]	Disk driver error code (0=ok)
[SCSI-ID]	Physical SCSI ID (0=disk1, 1=disk2)
[block]	SCSI block number (as used by TCSV)
[sec]	Logical TCOSS disk sector number ([block] = 2*[sector]+2)

List of Errors

Message	Class	Module	Error	Remarks
%s RPC error	1	UAS	CS	Pipe for TCUAS could not be opened
_RestartProcess: invalid link %i\n	1	SYS	IS	
2 invalid disk	F	DISK	D	Two invalid disks within tandem disk system
2main3,%h	5	UTF	S	
amcct	F	TAM	S	
amcifo1,recno	F	TAM	S	ill. cif (send order) record number. 'recno' should be between 0 and 2999
amdelcif [nr]	F	TAM	S	Invalid CIF record number [nr]

Message	Class	Module	Error	Remarks
amempfrest	F	TAM	S	
ameot	F	TAM	S	
amgetrempf1 [err]	4	TAM	C	Error during ..logon - check back reception configuration. Cannot create back reception document
amgetsym	F	TAM	S	
aminicif_alloc	F	TAM	C	Insufficient RAM available
aminicif0,[size]	F	TAM	P	CIF record size is not 1024
aminicif1,[filename], [err]	F	TAM	S	Can't access CIF file
aminicif2,[err]	F	TAM	S	CIF file open error
aminicif3,[mode], [cifnr],[err]	F	TAM	DS	CIF initialization error
aminicif3,W, [cifnr],308	F	TAM	C	Not enough free disk space in mail area to create CIF file with configured size
aminicif4,[err]	F	TAM	DS	CIF initialization error - write problem
aminicif5,[err]	F	TAM	DS	CIF initialization error - open problem
aminicif6,[err]	F	TAM	DS	CIF initialization error - read problem
aminiconf1	F	TAM	C	TAMCONF file does not exist
amininums ...	F	TAM	DS	File +MAIL5V/Att99 does not exist or corrupted
amjour: err [err] during logfile..	4	TAM	M	Problem during journal write
amkostini1	4	TAM	M	kk99 is too large
amkostini2	F	TAM	S	
amkostini3	4	TAM	C	Illegal tariff class specification in kk99
amlisini0,%1	F	TAM	S	Invalid size (%s) of license structure
amlisini1,%1	F	TAM	SI	Error %1 during open ALICENSEFILE
amlisini2,[mode],[no], [err]	F	TAM	M	Error [err] during init license record [no]
amlisini3,[no],[err]	F	TAM	M	Error [err] during license record [no] write
amlisini4,[no],[err]	F	TAM	M	Error [err] during license record [no] write
amlisini5,[err]	F	TAM	M	New created licenses file could not be closed
amlisio1,[no]	F	TAM	S	License record number out of range
amnumsio	F	TAM	D	File +MAIL5V/Att99 is destroyed
amputcif1,[cifnr]	F	TAM	S	Invalid record number or record is locked
amputcif2,[origchan], [orig],[cifnr]	F	TAM	S	Originator channel and first 8 characters of originator are not equal

Message	Class	Module	Error	Remarks
amputjhead%h	F	TAM	M	Disk full during journal write
amputjline[err]	F	TAM	M	Disk full during journal write
amputval	F	TAM	SP	
amreadinh	F	TAM	S	
amrec_alloc	F	TAM	M	Not enough RAM
amrecini,W, [recno],308	F	TAM	C	Not enough free disk space for recipient directory
amrecini...	F	TAM	S	Error during recipient directory initialization
amrecio1[recno]	F	TAM	S	Invalid recipient record number
amregini...	F	TAM	S	Error during registration store initialization
amregini3,W, [recno],308	F	TAM	C	Not enough free disk space for registration store
amregio1[recno]	F	TAM	S	Invalid registration record number
amrmz	F	TAM	S	
amsend0	4	TAM	S	Open problem
amsend1	F	TAM	S	
amsend2	F	TAM	S	
amserini...	F	TAM	S	Error during service directory initialization
amserini3,W, [recno],308	F	TAM	C	Not enough free disk space for services
amserio1[recno]	F	TAM	S	Invalid service record number
amsnread	F	TAM	S	
amstr([h]) l4_receive *ppos != 0,[pos]	2	TAM	S	Invalid stream position [pos] during receive
amuse_alloc	F	TAM	M	Not enough RAM
amuse_ini,[err], [userno]	F	TAM	S	Error during initialization of user store
arc_blk_init_mem	F	TAM	C	Not enough RAM for conf. archive size
arc_ch_tab_init_mem	F	TAM	C	Not enough RAM for conf. number of users
arc_entry_init...	F	TAM	P	Archive initialization error
arc_expand,[oldsiz], [newsiz]	2	TAM	C	LCD-warning: not enough free disk space to expand archive size from old size to new size
arc_init_[x],[err]	F	TAM	D	Error during archive initialization
arc_init0	F	TAM	I	Archive process was not being started

Message	Class	Module	Error	Remarks
archiv queue for user [name] removed	4	TAM	C	Queue for user [name] has been removed from archive. Normally [name] will be a renamed or deleted user. If it is a long user name, its internal representation ("#" followed by a number) is shown. In any case, sending to this user can be used to verify if it is an existing user.
archiv queues for n users available	2	TAM	C	More users than configured in system config used.
ARCOFI[chnl] error	4	IFX	H	ARCOFI init. error (TS33/3F problem)
ASputline	5r,F	UAS	D	Tried to send a line with an illegal length (corrupted document: try to erase this file. If not possible, send it with a mask without \$\$ line). Fatal error with mod 25/45.
Asrxoverrun	5r,F	UMM	C	Receiver overrun in UMM. Fatal error with mod 25/45
Autom.TEI ([tei]) configured	5r	IFX	C	Invalid TEI configured (UIF config line 250)
boot1,%h	F	TRP	IL	Error in "LOADERTABLE" file
boot2	F	SYS	I	Error in LOADERTABLE file
boot3	F	SYS	I	Error in LOADERTABLE file
boot4	F	SYS	I	Error in LOADERTABLE file
boot6	F	SYS	I	Error in LOADERTABLE file
bufsiz1	5r,F	SYS	SI	Only if tracer is configured
bufsiz1	5r,F	TRP	S	
bufsiz2	5r,F	SYS	SI	Only if tracer is configured
bufsiz2	5r,F	TRP	S	
Cache Invalid Handle %i,%s	F	TOS	S	
Cache Invalid Pool %i,%s	F	TOS	S	
Cache pageNo %i> %i,%s	F	TOS	S	Cache page number out of range
cache.CPage.FindDescr [no]>=[max]	F		S	Invalid page descriptor number requested
cache.validate offs,len [offs],[len]	F	TOS	S	Specified area exceeds cache page boundaries
cache.validate RdLen %l	2	TOS	S	Invalid relative last sector detected
CacheCreate Alloc failed	F	TOS	M	Error during cache buffer allocation

Message	Class	Module	Error	Remarks
CacheCreate invalid PageSize [siz]	F	TOS	S	Page size is not multiple of sector size
CacheCreate Too many objects	F	TOS	S	Too many cache objects initialized
CacheWrite(%i,%i,%i) Changed=%i,%i	F	TOS	S	internal error detected during Cache Write
CacheWriteCB invalid handle [h],%l	F	TOS	S	Invalid cache handle [h]
can't open [file]	5,F	LNK	I	File [file] can't be open
can't read	F	TRP	D	TCOSS 6 booter can't read from floppy disk or hard disk
cannot open ..	F	UCR	C	Can't open input
Cant Alloc new Process - Too less RAM	F	SYS	MCI	Failure during allocating memory for new thread
channels stopped ([node])	5	SYS	S	Channels stopped on [node] due to error reboot
check_ecmb	4	UTF	S	Invalid state of ECM buffer
close[x] [filename]	4	TOS	S	Warning: close problem
config1 %12.12s	F	LNK	I	Link Module Config File not present
conn_ind,%i	5r	FXC	C	Back reception configuration (config lines 19,20)
cpyca	5r,F	SYS	SB	Try to move a memory block that does not fit into the specified destination
create event (%i)	F	INST	R	No resource for new event available
CreateChannel: malloc failed %i\n	F	SYS	IS	
CreateSemap: malloc failed %i\n	F	SYS	IS	
defnn1 %h	F	TRP	SP	
deletefilec1 %i/%i,%i.12s	4	TOS	S	Paranoia during moving file to short term archive
desynchronized, using disk [disk]	2	DISK		Desynchronized condition detected, only disk [disk] will be used
dhs_send,%h	5r	UTF	S	
dhs-pack	5r	UTF	PS	
dir_cnf[x]	4	TOS	C	Invalid DIR config command
DIRW32 Session %i uses client file h	1	TOS	S	Internal error detected
disc_ind-ELOGOFF	5	FXC	S	

Message	Class	Module	Error	Remarks
disc_ind-EOT	5r	FXC	S	
disc_ind-RLOGOFF	5r	FXC	S	
disk [disk] deactivated"	2	DISK		Non recoverable write error on disk [disk] during tandem operation. Disk [disk] will be deactivated.
disk error	F	BOOT	D	Can't read from hard disk
Disk Error	F	SYS	H	HD error
disk full: file	F	INST	M	Disk full during installation or file copy.
disk_conf: %h	F	DISK	SD	Could not configure disk
disk_i[ec]	F	TOS	HP	HD error during reading HD configuration. [ec] must be 2 (can't read from HD) or 3 (program defect)
disk_read: [err],[lsec], [len]	F	DISK	D	Error [err] during read [len] sectors at [lsec]
disk_stat: [err]	F	DISK	DS	Error during disk statistics read
disk_write: [err],[lsec], [len]	F	DISK	D	Error [err] during write [len] sectors at [lsec]
diskformat	F	TOS	C	No TCOSS6 disk format
diskque already initialized	F	DISK	S	
dist ilink=x	5r,F	TRP	IL	Error in "LOADERTABLE" file
dotambef,%h	5r	FXC	S	Error during ..ERROR, ..WAIT or ..CONT
down6	5r	UTF	S	
ECMB_install	5r	UTF	S	
ecmb_pg_conf	5r	UTF	S	invalid ECM buffer call
ecmb_sto_bin	4	UTF	S	Frame must be longer than 256 bytes
edoc1	4	UTF		Invalid event at begin of reception
edoc2,%h	5r	UTF	S	
empfang2,%i	5r	FXC	S	Ill. internal response before begin of reception
end_page1,%i	5r	FXC	S	
end_page2%i	5r	FXC	S	
EOT Rsp=%s	1	TUM	CS	illegal response to ..EOT in NULL TUM
epage1	5r	UTF	P	
Error ([err]) during installation of [file]	F	INST	IM	Error during first installation of users, services, ...
error reboot ([node])	4	TRP	HS	[node] has been rebooted due to error. Check prev. error messages for the error reason.

Message	Class	Module	Error	Remarks
ev_enable	5r	UTF	S	Illegal event handle
ev_init, x,y,z	5r	UTF	CHS	Possible error in Loadertable file or TS32/33 hardware defect
ev_perr %i	4	UTF	SH	Unexpected hardware event
Event20, install_irq ret=%l	5r	UIF	S	Error during installation of event handler
evnt_handl32	5r	UTF	HS	Event input pin is always active. May be caused by a defective Modem
executable contains no Resource	F	INST	P	

Message	Class	Module	Error	Remarks
Fax Number [num] has been locked	1	UTF	-	Check config line 134 (failure counter)
fcopy1	F	INST	S	
fcopy2	F	INST	H	Floppy, hard disk write protected; HD error
fcopy3	F	INST	S	
fcopy6	F	INST	S	
fcx_run_net2,%i,%i	5r	FXC	P	
file write (%i)	F	INST	MS	
filt_string_ci	F	TRP	S	Unsupported function called
find_block	1	TOS	-	Test trace info
Flinkrecv	5r	FLINK	P	
Flinksend	5r	FLINK	P	
Flinkwatch	5	FLINK	HS	Fastlink task could not be restarted after time out handling. This may be caused by bad rear panel contacts (check TS84).
Floppy Error		SYS	H	Floppy error
floppy error	F	BOOT	D	Can't read from floppy disk
fn	5r,F	COM	S	
form_i,%h	5r	FXC	M	Too little RAM on interface
free_block	1	TOS	-	Test trace info
FRNR=%x FRLEN= %d HEAD=%20n..	4	UIF	S	
FX2setline%h	5r	UTF	S	
fxc_mkinit1,%h	5r	FXC	SP	
fxc_run_net io_to	5r	FXC	P	

Message	Class	Module	Error	Remarks
fxc_run_net too many objects	5r	FXC	P	
fxc_run_net3,%i	5r	FXC	P	
fxcddata EventInit[%i] is wrong	5r	FXC	S	
fxcddata EventInit[%i] wrong size	5r	FXC	S	
fxclUnionInit: wrong event %l	5r	FXC	S	
fxport_activ,%h,%h	5r	UTF	S	
gedelen1,%h	F	TOS	S	
get_etc%i,%i	5r	FXC	PS	
getblk	4	TOS	-	Warning: no free block found
getlog invalid typ %x	4	TAM	SH	Invalid type received in response from TUM
getlsec1	F	TOS	S	
getlsec2,%h	F	TOS	S	
getlsec3	F	TOS	SD	Cannot read FIF entry from disk or wrong FIF
getnumber,%d	5r	UTF	S	
guard	5r	UTF	SC	DID state machine config (lines 181-230)
hp%h	5r,F	UTX	S	
htrunc1,[session-id],[filename]	4	TOS	S	Warning: problem during file truncate
htrunc2 [filename],[fifnr],[offset]	F	TOS	S	Error during file truncate
hw_inbit1,	5r	TUM	BP	
hw_inbit2,	5r	TUM	BP	
hw_mkbit0,%x,%s	5r	TUM	PBS	
hw_mkbit1,%x,%s	5r	TUM	PBS	
hw_mkbit2,%x,%s	5r	TUM	PBS	
hw_mkbit3,%x,%s	5r	TUM	BP	
hw_mkbit4,%x,%s	5r	TUM	BP	
hw_mkpdev0,	5r	TUM	S	
hw_mkpdev1,%i	5r	TUM	P	
hw_mkpdev2,	5r	TUM	P	
hw_mkpdev3,	5r	TUM	HS	If modem 2 on TS32 is defect
hw_mkword,%x,%s	5r	TUM	PS	

Message	Class	Module	Error	Remarks
hw_or,%x,%x,%x	5r	TUM	PBS	
hw_outbit1,	5r	TUM	BP	
hw_outbit2,	5r	TUM	BP	
ill. font %i,%i	5r	FXC	P	
ill. Object call %i	5r	FXC	PS	
Illegal Script 1 %s	F	INST	C	Destroyed auto install script file
Illegal Script 2 %s	F	INST	C	Destroyed auto install script file
illegal script 3	F	INST	C	Destroyed auto install script file
Illegal SIO,	F	COM	SP	
Incomp. Disk For	F	INST	-	Incompatible disk format with auto install
init_alloc,%i	5r	FXC	M	Too little RAM on interface
init1,[filename]	F	TOS	S	File "filename" is greater than allowed - will be repaired
Init3	F	TOS	D	ill. drive initialization (no log. drives)
init4,[ref]	F	TOS	D	2 files using the same physical disk sector (2nd file with reference [ref] (without 1st character) has been deleted now). If this error occurs with previous releases, insert a 5.21 installation disk and select "copy files from hard disk". Error will occur and directory will be repaired.
init5	4	TOS	S	Warning: hard disk configuration error
init6	4	TOS	D	Folder sizes don't match and will be repaired.
init6	F	TOS	D	Too many partitions on hard disk
init7		TOS	S	Warning: hard disk configuration error
initial1	F	INST	C	Initial install after normal install with auto install
initreq dateformat	5r	ULP	C	ill. date format
InMessEx: create event (%i)	F	SYS	IS	
Interface in Sx missing	5r,F	LNK	C	Interface in slot x missing
Invalid disk	F	DISK	D	Disk is clear or invalid (single disk system)
Invalid number of Parameters	5r	SYS	S	Wrong call to RunProcess function
ISAC_rec_wrong_addr_4x]		IFX	S	Wrong address from Q.931 (layer 3) rec.
ISACinitL1_...	4	IFX	H	ISAC init. error (TS33 problems)
L1 input queue full task stopped	4	UIF	S	Internal software problem of higher layer on ISDN D-channel protocol. Some additional messages are created for further information.

Message	Class	Module	Error	Remarks
L3 layers [nr]	5r	UIF	I	More than two UIF's on a TS33
len1	5r,F	SYS	I	Only if tracer is configured
len1	5r,F	TRP	IS	Error in "LOADERTABLE" file
len2	5r,F	SYS	I	Only if tracer is configured
len2	5r,F	TRP	IS	Error in "LOADERTABLE" file
linkio open handle	5	UCS	S	Can't open handle
linkio_main, [lnk],invalid LinkNo	F	TCT	IC	Invalid link number with UCL (1...3 is ok)
lis_init0	F	TAM	I	License TUP did not start within 100s
Inc	5r,F	TRP	IL	Error in "LOADERTABLE" file
LNKblkin1	5r,F	LNK	I	ill. link config file
LNKboot24_1	5r,F	LNK	I	Link Module Config File not present
LNKboot24_2	5r,F	LNK	I	ill. link config file
LNKboot24_3	5r,F	LNK	I	ill. link config file
LNKconfig	5r,F	LNK	I	ill. link config file
LNKlink1	5r,F	LNK	I	ill. link config file
LNKlink3	5r,F	LNK	I	ill. link config file
LNKlink5	5r,F	LNK	S	
LNKlink6	5r,F	LNK	S	
LNKramtest_1	5r,F	LNK	H	Defect TS24/25/27
LNKroml24_1	5r,F	LNK	H	TS24/25 RAM error
LNKroml24_2	5r,F	LNK	H	TS24/25 RAM error
LNKroml24_3	5r,F	LNK	H	Defect TS24/25
LNKroml24_4	5r,F	LNK	H	Defect TS24/25/27
LNKwkennung1	5r,F	LNK	H	Defect TS24/25/27
LNKwready1	5r,F	LNK	H	Defect TS24/25/27
LO_RDY:%i HIO_RDY:%i	5r	UIF	S	
LOGOFF Rsp=%s	1	TUM	C	Error during ..LOGOFF in NULL TUM
Logon Rsp=%s	1	TUM	C	Error during ..Logon in NULL TUM
lpc_putl	5r	FXC	S	
Main	F	SYS	B	
main_o1,%i	5r	FXC	S	
main_o2,%i	5r	FXC	S	

Message	Class	Module	Error	Remarks
main_o3,%i	5r	FXC	S	
master [disk] failed, slave inv.	F	DISK	D	Non-recoverable write error on disk [disk] during tandem update
Master is running stand alone!	5	SYS		
Master KCS out of order.	5	SYS	H	Mod/65 Slave System is running standalone!
memcmp_ci	5r	SYS	S	Not implemented function called
mk_init1,	5r	FXC	CP	Destroyed TAMCONF file
mk_init2,%h,%h,%h	5r	FXC	CP	Destroyed TAMCONF file
mod_idle	5r	UTF	S	Modem does not generate events to send data
mod_idle1	4	UTF	H	Modem problem
mod_invalid,	5r	UTF	B	Invalid pointer
mod_rx_start	5r	UTF	S	
mod_tx_data1	4	UTF	H	Modem problem
mod_tx_dtmf	4	UTF		Wrong modem configuration detected during DTMF dialing. Problem will be corrected.
mod_valid,	5r	UTF	B	Invalid pointer
mod_wait4,[bit], [value], [currValue]	4	UTF	H	Modem Timeout during... if [bit]=601E0008: access internal register (TSxx) if [bit]=601F0001: load new configuration. (TSxx) if [bit]=801E0008: Transmit buffer empty (TCxx) if [bit]=800D0002: Transmit FiFo not full (TCxx) if [bit]=800A0002: Flag indicator (TCxx) if [bit]=800F0020: Clear to Send (TCxx) if [bit]=801F0001: load new configuration (TCxx) if [bit]=801D0080: access internal register (TCxx)
Model/2xx sync stop	F	DISK	D	Desynchronized condition detected via status box
model2xx license insufficient	3	TAM	C	TCOSS is running in restricted mode, due to missing license. Enter a new license key with TC/LT and restart TCOSS.
modemcontrol0	F	DISK	M	Could not create Event for Overlapped IO
MOT(x) HANGUP2	5r	UIF	S	Will be created after "MOT(x) HANGUP" message
my_alloc,%i,%i	5r	FXC	S	
new_page1	5r	FXC	S	
new_stat,%i	5r	FXC	S	
no confbef	5r	FXC	C	TAMCONF file has no TUM config lines

Message	Class	Module	Error	Remarks
no CPU number	F	TAM	H	System has no CPU number
No Program found	F	BOOT	I	MAINPROGRAM not found
No Stacksize for [thread]	5	SYS	SI	No stacksize for [thread] defined. Using default values.
no TC9x	F	TAM	H	No TC9X found
node [nn] auto reboot	1	TRP		This happens if an interface in slot T3....T6 must be rebooted due to a link error. In that case the corresponding interface in slot T0...T2 with its sub-nodes will be rebooted.
node [nn] channels stopped	5	START		Channel on interface has been stopped due to repeated errors on the interface.
node [nn] error reboot:	4	START		An interface has been rebooted due to a fatal error.
node [nn] operator reboot	1	TRP		Node [nn] will be rebooted due to operator request.
node [nn] permanent stop	5	START		Whole interface has been stopped due to permanent error condition. Happens if more than 6 internal errors occur within 24 hours.
node [nn] stopped	2,5	TRP		Node [nn] has been stopped due to link errors. If an interface can't be booted, an error message such as this is produced: "START-node 4 stopped, link error (trp_send_lnk l=1024,,B5D1D073)"
NoFunct %i	F	TOS	SL	
not enough RAM for MAINP..	F	TRP	M	Not enough RAM to load main program
not enough RAM,...	F	TOS	C	Not enough RAM for this hard disk
Not supported TOS function	F	TOS	S	

Message	Class	Module	Error	Remarks
open_[mode]1 [filename]	4	TOS	S	Warning: no free file control block available mode = rw, wr or cr
operator system reboot	1r	TAM	-	System reboot was initiated by operator via TCSI.
OSI_MOT_fntype[x]	5r	IFX	S	Invalid function type.
OSI_MOT_linit:hi[up_5ns]	5r	IFX	I	Invalid number of up connections.
OSI_MOT_mem	5r	IFX	C	Not enough RAM.
OSI_MOT_noconf	5r	IFX	S	Config. data expected.
OSI_MOT_state	5r	IFX	S	Invalid state in internal state machine.

Message	Class	Module	Error	Remarks
OutMessEx: create event (%i)	F	SYS	IS	
permanent stop ([node])	5	TRP	HS	[node] will not be rebooted.
pollidle1,%x,%s	5r	FXC	S	
preconn	5r	UTF	SC	DID state machine config (lines 181-230).
Primary Master out of order, Secondary				
Pro licence expired	3	SYS		The time limit for the current FAXDESKPRO key has been reached.
Pro licence will expire within [n] days	2	SYS		The time limit for the current FAXDESKPRO key will be reached in [n] days.
prog_crc Node=[nn],...	4	SYS		Program memory modification detected on node [n]. The program tries to locate the modified program position. It creates a lot of error messages (about 2 pages). The last message produces a hex dump of the modified code. It is very important to print or save all messages in that case.
putconf%i,%i,%s	5r,F	SYS	C	Destroyed config file.
Q921 MOT(x) HANGUP	2	IFX	S	ISDN Motor hangs (further messages follows)
Q931 MOT(x) HANGUP	2	IFX	S	ISDN Motor hangs (further messages follows)
Q931M MOT(x) HANGUP	2	IFX	S	ISDN Motor hangs (further messages follows)
Q931M_nrhi,[nr_hi]	5r	IFX	I	Illegal number of layer management
queue_small_buffer !	5r	IFX	S	Internal queue buffer is too small
rb_getby,%h,%h	5r	TUM	B	
rb_inst,%h	5r	TUM	P	
rb_inst,%i,%i	5r	TUM	M	Not enough RAM on interface
rb_stoby,%h,%h	5r	TUM	B	
rb_valid %h, %s	5r	TUM	BP	Invalid pointer
rdperrlvl	4	TRP	BS	LCD warning only (illegal pointer), system continues to work.
read_us	5r	SYS	S	Function not implemented
read1 [session-id]	4	TOS	S	Warning: no free file control block for read
read1: error [diskerr] from master-hardd.	2	DISK		Read error on the master hard disk of a tandem system.

Message	Class	Module	Error	Remarks
read2: sector [sector] filled with zeros	4	DISK		May occur after read1:... problem during tandem update and if the same sector is invalid on the tandem disk. In that case the sector is filled with zeros. A file may be corrupted or erased.
read3,%h,%h	2	TOS	D	Document contains a line with an illegal length.
read3: sector [sector] used from disk	2	DISK		May occur after read1:... problem during tandem update and if the same sector is valid on the tandem disk.
read4: sector [sector] successful corr.	2	DISK		May occur after read1:... during tandem operation.
Reading Destination Lock Counter	1	FXC		
rec_init0	F	TAM	I	Recipient process was not being started
recStore full	F	TAM	C	Not enough memory for recipient names
RecvLink: invalid linkno %i\n	2	SYS	IS	
RecvLinkOrFail: invalid linkno %i\n	2	SYS	IS	
reg_init0	F	TAM	I	Registration process was not being started
Rel. %s<%s.3s	F	INST	-	Incompatible memory file format
Release incomp	F	INST	-	Incompatible releases with auto install
Remote Disk Access Timeout	4	DISK	HC	Time-out on read/write to the remote disk on secondary master
remove1	5r	FXC	S	error during removing a form from the overlay buffer
ResetChannel: invalid link %i\n	1	SYS	IS	
resource lock or size (%i,%i)	F	INST	P	
restart system	F	DISK	D	occurs if TC1 in mod/65 was cleared after desynchronized condition. System must be rebooted
rout_main %h	F	TAM	S	
routing entry for user xx not loaded	4	TAM	M	Increase max. number of users in Sysconf
run2	F	UTF	S	
rxoverrun	5r,F	UAS	H	receiver overrun
save[x] [filename]	4	TOS	S	warning: write problem
sbox_init	F	DISK	S	could not initialize SBOX

Message	Class	Module	Error	Remarks
sboxa_new init	F	DISK	S	could not initialize connections to Status Agent
script file 4	F	INST	C	ill. memory file install script file
SCSI can't reassign [SCSI-ID], [block]	2	DISK		failed to reassign block [block] on drive [SCSI-ID]
SCSI reassign [SCSI-ID],[block]	1	DISK		try to reassign block [block] on drive [SCSI-ID]
sdoc	5r	UTF	S	Illegal event received from upper layer after connect request
send_cmd1,	5r	FXC	S	
send_kdz,%i	5r	FXC	C	ill. date format
send_prg1 %12.12s	F	TRP	PI	File "????PROGRAM" does not exist - or error in "LOADERTABLE" file
senden	5r	UTF	S	Illegal event received from lower layer after connect request
SendLink: invalid linkno %i\n	2	SYS	IS	
SendLinkOrFail: invalid linkno %i\n	2	SYS	IS	
ser_init0	F	TAM	I	Service process was not being started
set_io_anz	5r,F	TRP	IL	Error in "LOADERTABLE" file
setfun	5r	UTF	S	Invalid event handle
setiodes	5r,F	TRP	IL	Error in "LOADERTABLE" file
setnode	5r,F	TRP	IL	Error in "LOADERTABLE" file
sig_trace	5r	UTF	B	
Sig-Timeout	5r	UTF	S	Signal recording task is dead
SMISC-illegal function	F	TOS	S	
spage,%h	5r	UTF	P	
spage-timeout	5r	UTF	S	No huffman code for sending within 10 minutes, expect upper layer to be dead
Sseite Rsp=%s	1	TUM	C	Error in response to ..SSEITE command
start cb_fun	5r,F	TRP	S	Invalid TRP control message
start_(%s	5r,F	TRP	IL	Error in "LOADERTABLE" file
start_) %s	5r,F	TRP	IPL	Error in "LOADERTABLE" file
start_:%s<	5r,F	TRP	IL	Error in "LOADERTABLE" file
start_cnl,%s	5r,F	TRP	IL	Error in "LOADERTABLE" file

Message	Class	Module	Error	Remarks
start_eol %s	5r,F	TRP	IPL	Error in "LOADERTABLE" file
start_iol%s	5r,F	TRP	IPL	Error in "LOADERTABLE" file
start_n %s	5r,F	TRP	IPL	Error in "LOADERTABLE" file
start_register [nn], [Inc] Task stopped	5	TRP		Too many user modules have been started (should not occur)
status box defectiv	2	DISK		Status box (TS86) is not connected or defect
sto_dat,%i	5r	FXC	S	
sto_end	5r	FXC	S	
SYS-[syserr]	F	SYS	S	C-code runtime error message
tam_cmd	4	TUM	S	
tam_get len %i!=%i %80n	4	TAM	H	TUM/TAM communication length check
tam_get1	4	TUM	SB	
tam_resp	4	TUM	S	
tam_stat	4	TUM	S	
tandem disk license insufficient	4	TAM	C	Enter a new tandem disk license key with TC/ LT
TC20 not supported	F	TAM	C	TC20 is not supported with model/125,145
TCFW licence expired	3	SYS		The time limit for the current TCFW key has been reached. The maximum number of registrations has been set to 5.
TCFW will expire within [n] days	2	SYS		The time limit for the current TCFW key will be reached in [n] days.
tcl_main-too many links	F	TCT	IC	More than 10 layer 2 links configured
TCRPC open (%i)	F	INST	R	Pipe name already exists.
tcSem CreateEvent ([SysErr])	F	TOS	SM	Event could not created.
tcSemSleep wait failed	4	TOS	HS	Any locked disk operation could not be completed within 200 seconds. This may be caused by network problems on a tandem server.
tcSemWait Resource was not locked	F	TOS	S	Internal error
tct_attach	5r	SYS	S	Function is not implemented in TS0d.run
tct_call_confirm	5r	SYS	S	Function is not implemented in TS0d.run
tct_disconnect	5r	SYS	S	Function is not implemented in TS0d.run
tct_receive	5r	SYS	S	Function is not implemented in TS0d.run

Message	Class	Module	Error	Remarks
tct_send	5r	SYS	S	Function is not implemented in TS0d.run
TCTI_tupmalloc	F	TCT	C	Too little free RAM for TCTI buffers
tcWriteEx: Cant expand code %x	F	INST	S	Error during installation of services, users
This version supports 1 Phy. Drv only!	F	TOS	S	
ThreadName %s double used	5	SYS	S	Error in stack size table
tofxc_get	5r	FXC	S	
tofxc_put1,%x,%s	5r	FXC	S	
toirl ill. font %i	5r	FXC	C	ill. font in page layout configuration
tos init failed (%i)	F	INST	DC	TOS initialization failed
tos_gdate	5r,F	TOS	H	RTC on slave 1 defect
tos_init	5r,F	TOS	H	Hard disk or floppy error
tos_sdate	5r,F	TOS	H	RTC on slave 1 defect
TOS-ERROR [fn], [err]	5r,F	LNK	I	TOS function [fn] returned error [err]
trac_i1,%i,%i	5r	FXC	C	if FXC Trace is configured (config lines 231 to 234)
Trace1,%i	5r	FXC	SP	
Trace2,%i	5r	FXC	SP	
trp_lnk_err	5r,F	TRP	S	Error in link error handling
trp_sbi1 %h	F	TRP	SP	
trp_sbi2 %h	F	TRP	P	
trp_send_broadcast len=[len]	4	TRP	S	Invalid length for Broadcast frame. Frame has been ignored.
TRPerr	F	TRP	HS	Link error during installation
trplib.GetPtype cant open [name]	5	TRP	C	Can't open program file [name]
trplib.GetPtype cant read [name]	5	TRP	D	Can't read program file [name]
trplib.GetPtype Inv. Proc. ID [id] found	5	TRP	D	Invalid type of program file
trplib.GetPtype Unknown Ptype	1	TRP	D	Invalid type of program file
tup_free2,[adr],%h	F	SYS	S	Can't free allocated memory block with address [adr]. Will not be used now.

Message	Class	Module	Error	Remarks
tup_getInc	F	TRP	S	Internal software error
tup_getpars1	F	SYS	B	
tup_getpars2	F	SYS	S	
tup_io0	F	SYS	B	
tup_malloc[LargestFree], [RequSize]	4	SYS	M	Too little RAM to perform allocation
tup_mem%h,%h	F	SYS	M	Too little RAM to start new process
tup_mkio1	F	SYS	B	
tup_mkio2,%h,%h	F	SYS	S	
tup_phase2	F	SYS	B	
tup_phase2,%i	4	TRP		This message may be generated during the first start after initial installation.
tup_rec	F	SYS	B	
tup_rec1	F	SYS	S	
tup_runp: create thread (%i)	F	SYS	M	Cannot run thread
tup_runp: malloc failed (%i)	F	SYS	M	
tup_send	F	SYS	B	
tup_send1	F	SYS	S	
tx_pp-timeout	F	FXC	RC	Timeout during sending. At least one pixel should be received from TAM within 20s. This problem is most likely caused by very bad performance or if too many traces are configured.
UAS [parameter] [value]	1	UAS	C	Invalid [value] for [parameter] (UAS on mod/1xx master). Check config lines 52 and 53
ucr_close_eot	5r	UCR	S	
ufxsig1,%c,%i	5r	UTF	C	Signal detection State machine (config lines 84 to 123).
unable to get disk size (%i,%i),	F	TAM	S	Unable to get the physical disk size from WinNT.
Unknown protocol [x]	5r	UIF	C	Neither EURO-ISDN, 1TR6 nor ECMA QSIG protocol is configured
unpack1,%h,%h,%h	5r,F	SYS	C	Destroyed configuration file
unpack2,%h,%h	5r,F	SYS	C	Destroyed configuration file

Message	Class	Module	Error	Remarks
User Module Timeout	3,4	TAM		No response from user module configured as channel [chnl] received within 20 minutes. This time out is used to detect a standstill condition for any user module.
utf_callcol	5r	UTF	S	Unexpected call collision between layers
utf_send	5r	UTF	S	
utf_send2	5r	UTF	SC	
utf_trac conn_rs	5	UTF	SC	
utf2 sm-returns	5r	UTF	I	Error in DID state machine
utf2 too many channels	5r	UTF	I	More than 2 UTF or UIF channels on the same interface
utf2_sm [fun],[state], [laststate]	5r	UTF	C	Invalid function call of DID state machine
utf2_sm1	5r	UTF	B	Invalid DID state machine handle
utf2_sm2	5r	UTF	C	Invalid DID state (check config lines 181 to 230)
utfdwn6	4	UTF	S	Invalid ECM buffer response
utfio_rec2	5r	UTF	SP	
utfsig_det,	5r	UTF	B	
utfsig_init	5r	UTF	B	
watchdog	4	UCL		LCU watchdog timer has detected LCU standstill or failure
write3,%h,%h	F	TOS	S	
Wrong CRlen	5r	UIF	C	Invalid call reference length configured
Wrong ISDN config	5r	UIF	C	Type of connection parameters (config lines 250, 251, 252, 266) are different on both channels
X25_ionr,[ios]	5r	IFX	I	Illegal number of TRP IO's
X25_ionr,[ios]	5r	UIS	IC	Invalid number of TRP IO's for UIS module
X25L3M_nrhi,[no_hi]	5r	UIS	IC	Invalid number of layer management's configuration

Errors on TS24/25

The messages are printed on the Teletex printer.

List of Modules

TOS: operating system

LNK: serial communication module

TUM: UFX or UTT

SYS: any module

List of Errors

AV-Tp	TOS	BHS	
cpyca	SYS	SB	
I/T 0x	TOS	BHS	Ill. Interrupt or Trap
LNKblkin1	LNK	IB	defect Link config files
LNKboot24	LNK	IB	defect Link config files
LNKconfig	LNK	IB	defect Link config files
LNKlink1	LNK	IB	defect Link config files
LNKlink2	LNK	SL	data error on serial communication to interface
LNKlink3	LNK	IB	defect Link config files
LNKlink4	LNK	IB	defect Link config files
LNKlink5	LNK	S	
LNKramtest_1	LNK	IB	defect Link config files
LNKroml24	LNK	IB	defect Link config files
LNKsend280_1	LNK	BC	destroyed link config file
LNKskennung1	LNK	S	
LNKwkennung1	LNK	IB	defect Link config files
LNKwready1	LNK	IB	defect Link config files
open-Error on File <A:LOAD	TOS	B	
open-Error on TAM/TUM- File	TOS	B	
OS0	TOS	BP	
OS1	TOS	BP	
OS2	TOS	BP	
OSalloc	TOS	S	
OSId not enough RAM	TOS	B	
OSlinkout1	TOS	S	
OSminilink1	TOS	S	
TOSfTS27_LINK_1	LNK	L	Serial communication error
UBtamresp	TUM	SB	

MakeTCOSS Errors

This section describes the MakeTCOSS errors.

List of Modules

CNF: config program

DTOS: DosTos: Is used to access all files on the PC

TOS: TOS.DLL and IP06.DLL: used for TCOSS Floppy access

RELUP: Update Program

SYS: any module

TRANS: TCOSS Floppy access

List of Errors

A/P mismatch	CNF	I	Error in master.cnf file
ABPC:closedok	DTOS	S	Error during document close
Alloc_int	TOS	M	
alloc_slave_number: illegal. model	CNF	C	Illegal model in System Configuration File
autoinstall	CNF	S	
call	DTOS	S	illegal TOS function call
chrGet	CNF	S	
close	TOS	S	
cmain	CNF	S	
CNF3Close	RELUP	S	
CNF3ferase	RELUP	S	Can't erase file
CNF3fUpdate	RELUP	S	File is too large
CNF3genFname1	RELUP	I	Defect release update control file
CNF3genFname2	RELUP	I	Defect release update control file
CNF3getW	RELUP	S	File is too large
CNF3Open	RELUP	C	Can't open file
CNF3parsF	RELUP	I	Defect release update control file
CNF3putRN	RELUP	I	Defect release update control file
CNF3readLn	RELUP	S	
CNF3readUCF	RELUP	IS	Too many changes in update control file

CNF3write	RELUP	S	Can't write file
cnfgetconfl	CNF	P	
cnfmt: findschange	CNF	SP	
cnfmt: tfchange	CNF	SP	
Could not open Applikation Session	CNF	-	TCSI DLL is already in use.
cpyca	SYS	SB	Try to move a memory block that does not fit into the specified destination
DefVirtDrive	DTOS	S	
did_space0	CNF	M	Not enough RAM on PC
dir_cnf	TOS	S	
DISC_INIT:[bios error msg.]	CNF	D	BIOS error during TCOSS floppy access
DISC_RD:[bios error msg.]	CNF	D	BIOS error during TCOSS floppy read
DISC_WR:[bios error msg.]	CNF	D	BIOS error during TCOSS floppy write
drawMenu	CNF	SM	
Error %i (%s)	DTOS	-	Return TCSI error code
expand: %s not available on any node	CNF	I	
expand: No node xxx	CNF	I	
expand: overflow	CNF	M	
find_block	TOS	S	
free_block	TOS	S	
gen_slave_path: illegal. model	CNF	C	Illegal model in System Configuration File
genload	CNF	S	
GETCONF	CNF	S	
getelen1	TOS	S	
getlsec	TOS	S	
getnext	DTOS	S	
GETPAR	CNF		
getST	CNF	PC	Error in hard/software assignment config. file
getTrans	CNF	S	
htrunc	TOS	S	
ill fn %i	TOS	S	
illegal ionumber	CNF	SI	Error in Master.CNF file
inconfig1	CNF	C	Config file missing or defect

init1	TOS	S	
Init3	TOS	S	
init4	TOS	S	
init5	TOS	S	
Init6	TOS	S	
init7	TOS	S	
Invalid Diskformat	TOS	-	
lineEdit	CNF	-	
lmode	DTOS	S	
LTAB: ...	CNF	SI	
ltabRoute:no tup	CNF	I	
ltabRoutex:not enough memory	CNF	M	
mem_sum: no tup	CNF	S	
menu: fTrace	CNF	S	
Missing CLUSTER in description file	CNF	I	
Missing TUPSI in description file	CNF	I	
nNo such path: %s\n	DTOS	SP	Check MakeTCOSS Installation
NoFunct	TOS	S	
not enough memory	CNF	M	
not enough RAM	TOS	M	
open pc file	TRANS	C	Can't open file (check MakeTCOSS installation)
Open Trace File	CNF	S	Can't open Trace Files
open_cr1	TOS	S	
open_rw1	TOS	S	
open_wr1	TOS	S	
opendok mod	DTOS	S	
pClose	DTOS	S	
pRead	DTOS	S	
putcnfl1,%i,%s	CNF	C	Destroyed config file: erase and reconfigure channel
putcnfl2,%i,%s	CNF	C	Destroyed config file: erase and reconfigure channel
putwin	CNF	S	
pWrite	DTOS	S	
pWrite	DTOS	S	

read	TOS	S	
readln	RELUP	I	Error reading MT/DOS file
readStarted:%s not defined	CNF	SI	
readsysconf	CNF	C	Can't read SYSCONFCCCC File
report filtab=-1	CNF	S	
rout1	CNF	S	
rt	CNF	S	
save	TOS	S	
selectMenu1	CNF	S	
SMISC-illegal function	TOS	S	
startTup	CNF	SI	
Syntax Error:	CNF	I	Error in Master.cnf
tClose	DTOS	S	
tclose1	DTOS	S	
tclose2	DTOS	S	
TCOS\\reln0	RELUP	C	Can't open file "TCOSS\RELNO"
TCOSREL	TRANS	PS	Environment variable %TCOSSREL% is not set
tcsigetnext	DTOS	S	
TCSITOS: open selector	DTOS	S	
TCSITOS:open folder	DTOS	I	Can't open folder (such as invalid installation director, release is not completely installed)
to many ios on %s	CNF	I	
tOpen path to long	DTOS	S	Path too long; try with other installation directory
tOpen	DTOS	S	
tOpen: xopen	DTOS	S	File open error; File on PC does not exist. Check make TCOSS installation
tos_gdata	DTOS	S	
tos_init	DTOS	S	
tos_sdate	DTOS	S	
tread1	DTOS	S	
tried to start tup %s on node %i..	CNF	C	Wrong model configured (Sysconf file)
ts72Transparent1	CNF	SP	
uifgenpart1	CNF	S	
unclosed windows left	CNF	S	
unpack	CNF	C	Destroyed config files

Windows	CNF	S	
write	TOS	S	