

**IBM Flex System EN6131
40 Gigabit Ethernet Switch**



User's Guide

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40 Gigabit Ethernet Switch**



User's Guide

Note: Before using this information and the product it supports, read the general information in , "Appendix B: Notices" on page 33, the Safety Information and Environmental Notices and User's Guide documents on the IBM Notices for Network Devices CD, and the Warranty Information document that comes with the product.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 **Safety Information** (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtete příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen canjbinj soengq cungj vahgangj ancien siusik.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

ཐོན་རྒྱུ་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། རྟོག་གི་ཡིད་གཟབ་བྱ་འདྲ་མིན་ཡོད་པའི་འོད་ཟེར་བཟང་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

•••••

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

This device is intended for use with UL Listed IBM devices.

Statement 1:



DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 28:



CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Statement 3:



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Statement 8:



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Chapter 1. Introduction

This User's Guide contains setup and installation instructions for the IBM Flex System EN6131 40 Gigabit Ethernet Switch. General information about the switch, including how to configure, update firmware, and troubleshoot the switch, and how to get help is also included. The current version of this User's Guide and all other related documents are at:

<http://publib.boulder.ibm.com/infocenter/flexsys/information/index.jsp>

The IBM Flex System EN6131 Ethernet switch can be installed in the IBM Flex System chassis. This switch provides a high bandwidth, low latency fabric for Enterprise Data Centers (EDC), High-Performance Computing (HPC), and Embedded environments. When used with IBM Flex System EN6132 2-port 40 Gb Ethernet Adapters, clustered data bases, parallelized applications and transactional services applications, these switches can achieve significant performance improvements, resulting in reduced completion time and lower cost per operation.

See the documentation that came with your IBM chassis to install the IBM Flex System EN6131 40 Gigabit Ethernet Switch in the chassis; then, return to this User's Guide for the information and instructions needed to complete the installation.

For information about the types of compatible devices available for IBM products, contact your IBM marketing representative or authorized reseller. For a list of supported optional devices, see:

<http://www.ibm.com/servers/eserver/serverproven/compat/us/>

You can obtain up-to-date information about the IBM Flex System EN6131 40 Gigabit Ethernet Switch at:

<http://www.ibm.com/supportportal/>

The warranty document that came with this switch contains information about the terms of the warranty.

Note:

The illustrations in this document might differ slightly from your hardware.

Related documentation

In addition to this User's Guide, the following related documentation is available for your switch;

- *Mellanox MLNX-OS SwitchX Software User Manual*
This document is available at the Mellanox support site with a user login. Go to the http://www.mellanox.com/page/support_index Use your login or request a customer login. The MLNX-OS user manual explains how to use the Mellanox SwitchX operating system (MLNX-OS) user interface to configure and manage the IBM Flex System switch. The EN6131 switch is based on the Mellanox Technologies' SwitchX switch platform, and it uses the MLNX-OS.
- *IBM Flex System Installation and Service Guide for your compute node*
This document contains information about the compute node and includes the hardware installation instructions for optional devices such as network adapters.

- *IBM Flex System Enterprise Chassis Installation and Service Guide*
This document contains information about the IBM chassis and includes the hardware installation instructions for optional devices such as compute nodes, network switches, and pass-thru modules.
- *IBM Flex System Chassis Management Module User's Guide*
This document explains how to use the Chassis Management Module user interfaces to manage chassis components.
- *IBM Flex System Manager Systems Management Guide*
This document explains how to use the IBM Flex System Manager user interfaces to manage chassis components.
- *IBM Flex System Notices for Network Devices* CD that comes with the switch contains the following documentation in portable document format (PDF):
 - IBM Flex System Network Devices Basic Troubleshooting Information*
This multilingual document contains basic troubleshooting information and a replacement parts list for the switches, adapters, and pass-thru modules. The product documentation that comes with your IBM chassis, compute node, or network device might contain more detailed troubleshooting information.
 - IBM Safety Information*
This multilingual document contains the translated versions of the safety messages that appear in the IBM documentation.
 - IBM Environmental Notices and User's Guide*
This multilingual document contains the world wide environmental and recycling information for your product.
 - IBM License Agreement for Machine Code*
This multilingual document contains the IBM license information for the machine code for your product.
 - IBM Warranty Information*
This multilingual document is provided on the CD and in printed format. It contains the IBM warranty information for your product.

For the most up-to-date product documentation for all of your IBM Flex System products, go to the IBM Flex System Information Center at <http://publib.boulder.ibm.com/infocenter/flexsys/information/index.jsp>

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is provided on the *IBM Notices for Network Device* CD. Each statement is numbered for reference to the corresponding statement in your language in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

The IBM Flex System EN6131 40 Gigabit Ethernet Switch has the following features and specifications:

- 18 external QSFP 40 Gb Ethernet ports
- 14 internal 40 Gb Ethernet ports
- CPU management
- MLNX - OS
- Two 1Gb Ethernet ports for management (1 – internal; 1 – external)
- Serial Port Mini USB form for updating SW, FAE Access and Debug

Specifications

Table 1 - IBM Flex System EN6131 40 GbE Ethernet switch specification data

Physical		Power and Environmental	
H x W x D:	1.18 x 15.8 x 12.5 inches 30 x 401 x 317 mm	40 GbE Typical Power:	Passive: 89.7 W or 306 BTUs/hr Optical: 125.7 W or 429 BTUs/hr
Weight:	3.67 kg; 8.1 lbs.	Passive:	
Mounting:	Vertically mounted rack	Optical:	
SerDes Speeds	10, 20, 40 Gb/s per port	40 GbE Max Power:	Passive: 103.4 W or 352.8 BTUs/hr Optical: 145.75 W or 497 BTUs/hr
Connectors:	18 external QSFP connectors 14 internal midplane connectors	Passive:	
		Optical:	
		Power through connector:	2.0 W per port maximum Temperature: 0°C to 55°C Humidity: 10% - 90% non-condensing
		Temperature:	
		Humidity:	
Protocol Support		Regulatory Compliance	
Ethernet:	Auto-Negotiation of 10 GbE, 20 GbE, or 40 GbE	Safety:	US/Canada: cULus EU: IEC60950 International: CB
Mellanox QoS:	9 Virtual Lanes for all ports 8 Data transport lanes and 1 manage- ment lane	Environmental:	
			Type I / II EU: IEC 60068-2-32: Fall Test
Scalability and Performance			
Switching Performance:	Simultaneous wire-speed any port to any port		
Addressing:	48K Unicast Addresses Max. per Sub- net 16K Multicast Addresses per Subnet		
Switching Capacity	1440 Gb/s		

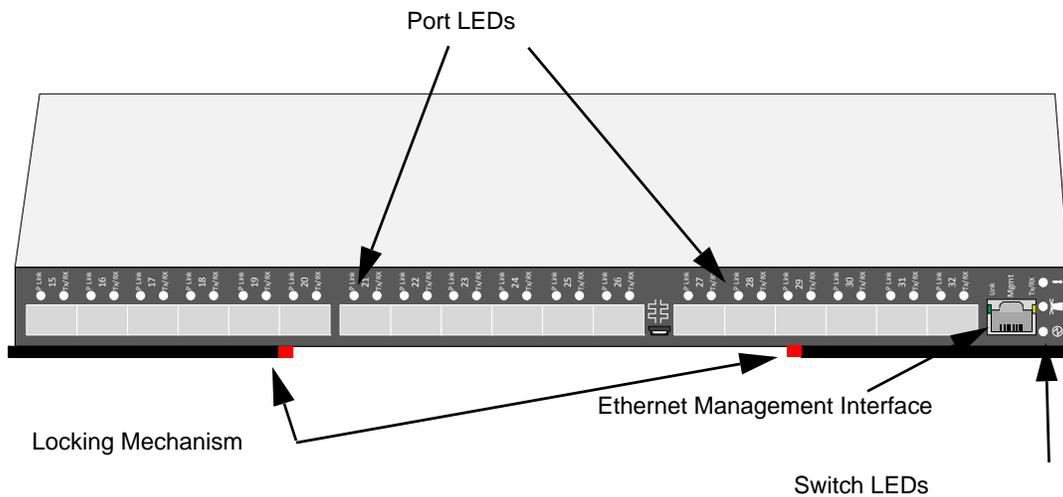
Major components of the switch

The following illustration shows the major components of the switch.

NOTE

The illustrations in this document might differ slightly from your hardware, and your switch might have labels that are not shown in the illustrations in this document.

Figure 1: Switch front panel and locking mechanism



You can manage and configure the switch through the following interfaces:

- Serial port Mini USB form factor for switch configuration
- MLNX-OS through the internal or external Ethernet port
- IBM Flex System Chassis Management Module through the internal or external Ethernet port

For more information, see the Mellanox MLNX-OS Software User Manual Rev 3.1.0800 or later.

Record information about the switch in the following table. The product name and serial number are on the identification label on the bottom cover of the switch. The media access control (MAC) address is on a separate label on the bottom cover of the switch. For an illustration that shows the locations of these labels, see Figure 2: on page 6. You will need this information when you register the switch with IBM. You can register the switch at:

<http://www.ibm.com/support/mysupport/>

Figure 2: Switch label location



Product name IBM Flex System EN6131 40 Gigabit Ethernet Switch

Model number _____

Serial number _____

Part number _____

Media access control (MAC) address for switch module

MAC addresses for other components

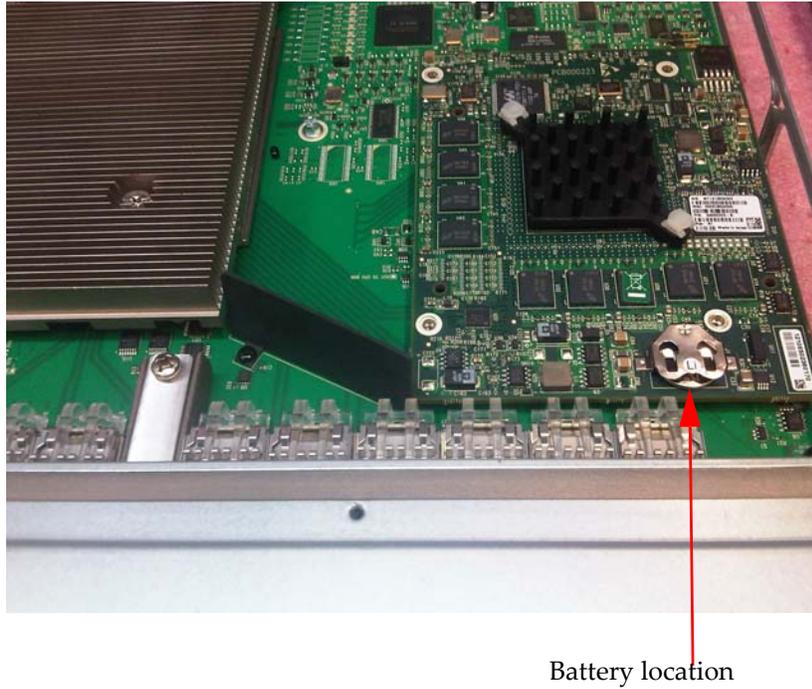
Removing the battery

WEEE and or Local regulations might require removing the battery prior to disposing of or recycling this product. Complete these steps to remove the battery:

1. Disconnect all power and communication cables from the front panel.
2. Remove all transceivers.
3. Unscrew the fasteners and remove the sheet metal cover.
4. Go to the B1 location on the circuit board, as shown in [Figure 3](#): and remove the battery from the holder. If replacing the battery, use one of the battery types listed in [Table 2](#).

Location of battery holder

Figure 3: Battery Location



Battery location

Table 2: Battery Information

Battery Type	MPN
Panasonic	BR1225/BE
Rayovac Corporation	BR1225
	BR1225/BA

5. Recycle the battery as appropriate.
6. For battery recycling and disposal information, see the *IBM Environmental Notices and User's Guide* provided on the IBM Flex System Notices for Network Devices CD that came with your product.

Parts listing

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty, see the *Warranty Information* document.

The replaceable components in the following table are Tier 1 CRUs. If other components require replacement, see the documentation that came with those devices for instructions.

Table 3 - Part CRU numbers

Part	CRU number (Tier 1)
IBM Flex System EN6131 Ethernet Switch	90Y3477

Figure 5: Sample configuration

```
[root@teamviewer ~]# ssh USERID@192.168.70.101
password:
password:

Hostname:                MM5CF3FC25E02F
Static IP address:       192.168.70.101
Burned-in MAC address:   5C:F3:FC:25:E0:2F
DHCP:                    Disabled - Use static IP configuration.
Last login: Friday December 9 2011 8:01 from 192.168.70.3 (SSH)

system> env -T system:switch[4]
OK
system:switch[4]> ifconfig
Scalable Switch Elem
Enabled
-c static
-i 192.168.70.124
-s 255.255.255.0
-g 0.0.0.0
-pm n/a
-em disabled
-ep disabled
-pip disabled
-ipv6 enabled
-ipv6static disabled
-i6 ::
-p6 64
-g6 ::
IPv6 address in-use: ::
-dhcp6 enabled
-sa6 enabled
Link-local address: fe80::202:c9ff:fe11:alb9
Stateless auto-config IP Addresses      Prefix Length
-----
Error reading data for Stateless auto-config IP Addresses.
system:switch[4]> ifconfig -i 192.168.70.114
OK
system:switch[4]> ifconfig -em enabled
OK
system:switch[4]> ifconfig -ep enabled
OK
system:switch[4]> ifconfig -pip enabled
OK
system:switch[4]> exit
Connection to 192.168.70.101 closed.
[root@teamviewer ~]# ping 192.168.70.114
PING 192.168.70.114 (192.168.70.114) 56(84) bytes of data:
64 bytes from 192.168.70.114: icmp_req=1 ttl=63 time=294 ms
64 bytes from 192.168.70.114: icmp_req=2 ttl=63 time=0.398 ms
^C
--- 192.168.70.114 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 0.398/147.356/294.314/146.958 ms
[root@teamviewer ~]# ssh admin@192.168.70.114
The authenticity of host '192.168.70.114 (192.168.70.114)' can't be established.
RSA key fingerprint is 96:27:4c:4f:5f:03:47:77:4f:c2:09:83:62:4a:a4:9d.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.70.114' (RSA) to the list of known hosts.

Mellanox MLNX-OS Switch Management

Last login: Fri Oct 20 18:08:31 2000

Mellanox Switch

ibmsx-s4 [standalone: unknown] > exit
Connection to 192.168.70.114 closed.
```

Switch internal IP address

Test IP

Conne to ne swit

Figure 6: Serial port configuration option 2

```
-----+-----
| A -   Serial Device       : /dev/ttyUSB0
| B - Lockfile Location    : /var/lock
| C -   Callin Program     :
| D -   Callout Program    :
| E -   Bps/Par/Bits       : 9600 8N1
| F - Hardware Flow Control : No
| G - Software Flow Control : No
|
| Change which setting? █
|-----+-----
|
| | Screen and keyboard |
| | Save setup as dfl   |
| | Save setup as..    |
| | Exit                |
| | Exit from Minicom  |
|-----+-----
```

Configure the following:

```
Serial port setup--> Serial Device : /dev/ttyS0 or /dev/ttyUSB0
Serial port setup--> Bps/Par/Bits  : 9600 8N1 (change with SHIFT-e)
Serial port setup--> Hardware Flow Control : No
Hit enter and exit to main menu
Hit "Save setup as dfl"
Hit ESC to "Exit" Note: You can move up or down using the arrows.
```

Configuration

```
switch-5eaf88 [standalone: master] (config) # configuration jump-start
```

This command opens the Mellanox configuration wizard.

```
Step 1: Hostname? [switch-5eaf88]
Step 2: Use DHCP on mgmt0 interface? [yes]
Step 3: Enable IPv6? [yes]
Step 4: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no]
Step 5: Admin password (Enter to leave unchanged)?
```

You have entered the following information:

1. Hostname: switch-5eaf88
2. Use DHCP on mgmt0 interface: yes
3. Enable IPv6: yes
4. Enable IPv6 autoconfig (SLAAC) on mgmt0 interface: no
5. Admin password (Enter to leave unchanged): (unchanged)

To change an answer, enter the step number to return to.
Otherwise hit <enter> to save changes and exit.
Choice:
Configuration changes saved.

Configuration Wizard (Method 2)

Alternatively, you can use the Configuration Wizard to configure the serial port.

Notes:

1. No remote IP connection is available at this stage via the external management port. The internal management port can be accessed currently by the CMM.
 2. The configuration presented below is required only for external management port (mgmt0).
1. Configure a serial terminal program (for example, HyperTerminal, minicom, or Tera Term) on your host PC with the settings described in Table 4.

Table 4 - Serial Terminal Program Configuration

Parameter	Setting
Baud Rate	9600
Data bits	8
Stop bits	1
Parity	None
Flow Control	None

Attention:

Do not allow the external management port to be on the same subnet as the CMM. If both the internal CMM ethernet interface and external ethernet interface are on the same ethernet subnet, the switch's operating system routing tables will get confused and not allow traffic to move in and out of the switch.

2. Log in from a serial terminal program as *admin* and use *admin* as the password. This starts the Mellanox configuration wizard.
3. Go through the Mellanox configuration wizard. Table 5 shows an example of a wizard session.

Table 5 - Configuration Wizard Session - DHCP (Sheet 1 of 2) Configuration (Example)

Wizard Session Display	Comments
Mellanox configuration wizard Do you want to use the wizard for initial configuration? yes	You must perform this configuration the first time you operate the switch or after resetting the switch. Type 'y' and then press <Enter>.
Step 1: Hostname? [switch]	If you want to accept the default hostname, then press <Enter>. Otherwise, type a different hostname and press <Enter>.
Step 2: Use DHCP on mgmt0 interface? [no] yes	Perform this step to obtain an IP address for the switch. (mgmt0 is the management port of the switch.) If you want the DHCP server to assign the IP address, type 'yes' and press <Enter>. If you type 'no' (no DHCP), then you will be asked whether you want to use the 'zeroconf' configuration or not. If you enter 'no' (no Zeroconf), then you need to enter a <i>static</i> IP, and the session will continue.
Step 3: Enable IPv6? [yes]	The management interface will be able to use IPv6 addresses.

Table 5 - Configuration Wizard Session - DHCP (Sheet 2 of 2) Configuration (Example)

Wizard Session Display	Comments
Step 4: Enable IPv6 auto-config (SLAAC) on mgmt0 interface? [no]	This turns on auto-configuration of the IPv6 addresses. This is unsuitable for DHCPv6.
Step 5: Enable DHCPv6 on mgmt0 interface? [no]	To enable DHCPv6 on the MGMT0 interface.
Step 6: Admin password (Press <Enter> to leave unchanged)? <new_password> Step 6: Confirm admin password? <new_password>	To avoid illegal access to the machine, type a password and then press <Enter>. Then confirm the password by re-entering it. Note that password characters are <i>not</i> printed.
You have entered the following information: <A summary of the configuration is now displayed.> To change an answer, enter the step number to return to or hit <enter> to save changes and exit. Choice: <Enter> Configuration changes saved.	The wizard displays a summary of your choices and then asks you to confirm the choices or to re-edit them. Either press <Enter> to save changes and exit, or enter the configuration step number that you want to return to. Note: To re-run the configuration wizard run the command "configuration jump-start" in Config mode.

Table 6 - Configuration Wizard Session - Zeroconf Configuration

Wizard Session Display - IP Zeroconf Configuration (Example)
<p>Mellanox configuration wizard</p> <p>Do you want to use the wizard for initial configuration? yes</p> <p>Step 1: Hostname? [switch] Step 2: Use DHCP on mgmt0 interface? [yes] no Step 3: Use zeroconf on mgmt0 interface? [no] yes Step 4: Default gateway? [For example:192.168.10.1] Step 5: Primary DNS server? Step 6: Domain name? Step 7: Enable IPv6? [yes] Step 8: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no] Step 9: Admin password (Enter to leave unchanged)? To change an answer, enter the step number to return to. Otherwise hit <enter> to save changes and exit. Choice: Configuration changes saved. To return to the wizard from the CLI, enter the "configuration jump-start" command from configure mode. Launching CLI... switch></p>

Table 7 - Configuration Wizard Session - Static IP Configuration

Wizard Session Display - Static IP Configuration (Example)
Mellanox configuration wizard
Do you want to use the wizard for initial configuration? yes
Step 1: Hostname? [switch]
Step 2: Use DHCP on mgmt0 interface? [yes] no
Step 3: Use zeroconf on mgmt0 interface? [no]
Step 4: Primary IP address? [for example 192.168.10.4] 10.10.10.10 Mask length may not be zero if address is not zero (interface eth0)
Step 5: Netmask? [0.0.0.0] 255.255.255.0
Step 6: Default gateway? [for example 192.168.10.1] 10.10.10.255
Step 7: Primary DNS server?
Step 8: Domain name?
Step 9: Enable IPv6? [yes]
Step 10: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no]
Step 11: Admin password (Enter to leave unchanged)?
To change an answer, enter the step number to return to. Otherwise hit <enter> to save changes and exit. Choice: Configuration changes saved.
To return to the wizard from the CLI, enter the "configuration jump-start" command from configure mode. Launching CLI... switch>

4. Before attempting a remote (for example, SSH) connection to the switch, check the mgmt0 interface configuration. Specifically, verify the existence of an IP address.

Make sure you enable external management ports from the chassis manager software in order to access the switch external management port. Refer to the chassis manager user manual for instructions.

5. Check the current mgmt0 configuration; enter the following commands:

```
switch > enable
switch # configure terminal
switch (config) # show interfaces mgmt0
```

The following is an example of the output:

```
Interface mgmt0 state
  Admin up:          yes
  Link up:           yes
  IP address:        192.168.10.43
  Netmask:           255.255.255.0
  Speed:             1000Mb/s (auto)
  Duplex:            full (auto)
  Interface type:    ethernet
  Interface source:  physical
  MTU:               1500
```

```

HW address:      00:02:C9:11:2A:AE
Comment:

RX bytes:        1343502058          TX bytes:        313920869
RX packets:      17589211           TX packets:      992717
RX mcast packets: 0                 TX discards:     0
RX discards:     0                 TX errors:       0
RX errors:       0                 TX overruns:    0
RX overruns:     0                 TX carrier:     0
RX frame:        0                 TX collisions:  0
                                           TX queue len:   1000

```

```

Interface mgmt0 state
Admin up:        yes
Link up:         yes
IP address:      169.254.15.134
Netmask:         255.255.0.0
IPv6 enabled:    yes
Autoconf enabled: yes
Autoconf route: yes
Autoconf privacy: no
IPv6 addresses: 1
IPv6 address:    fe80::202:c9ff:fe11:alb2/64
Speed:           1000Mb/s (auto)
Duplex:          full (auto)
Interface type:  ethernet
Interface ifindex: 2
Interface source: physical
MTU:             1500
HW address:      00:02:C9:11:A1:B2
Comment:

RX bytes:        11700449          TX bytes:        15139846
RX packets:      55753            TX packets:      28452
RX mcast packets: 0                 TX discards:     0
RX discards:     0                 TX errors:       0
RX errors:       0                 TX overruns:    0
RX overruns:     0                 TX carrier:     0
RX frame:        0                 TX collisions:  0
                                           TX queue len:   1000

```

Cabling the switch

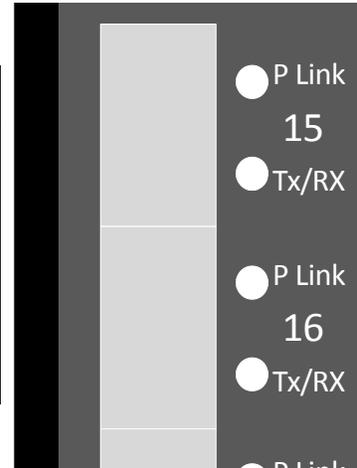
The IBM Flex System EN6131 40 Gigabit Ethernet Switch has 18 external QSFP ports. These ports are auto negotiated for speed and bandwidth. There are also 14 internal ports going through the midplane. Active cables are supported up to 2 watts power per port.

Chapter 3. LEDs and interfaces

Port LEDs

Figure 7: Physical and logical link indication LEDs

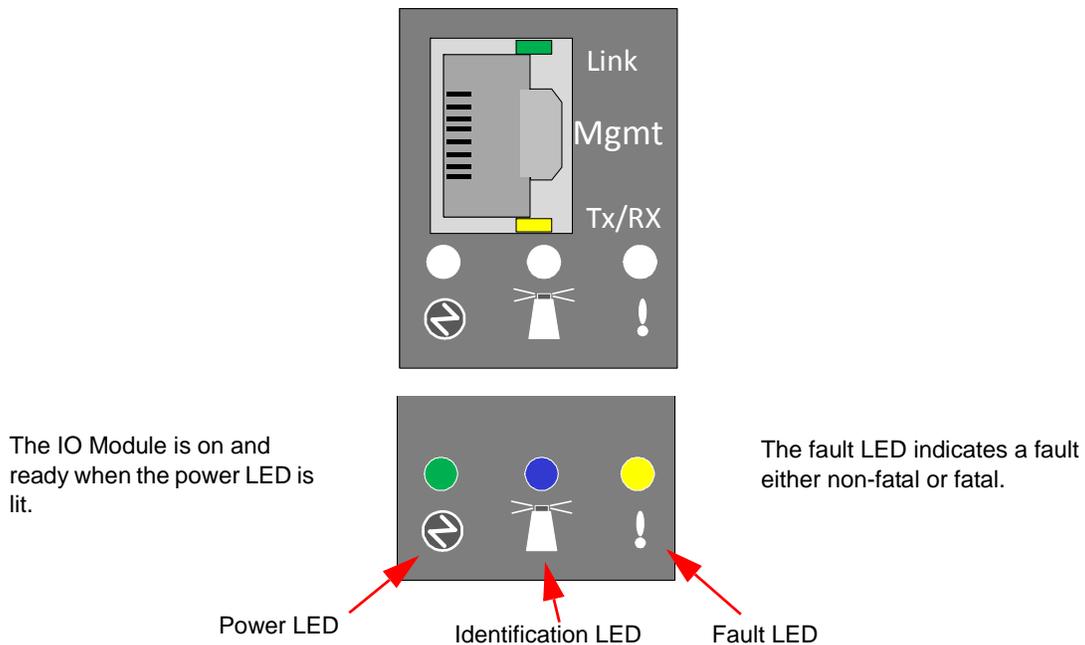
LED Name	Connection Status
P Link Physical Link - Green	Off – no physical link ON – physical link
TX/Rx Data Activity - Green	Blinking – indicates data transfer Constant on – indicates link exists with no Data Transfer taking place. Off with green P Link lit – indicates that the subnet manager may not be running.



Switch status lights

The switch status lights indicate whether the switch is receiving power from the chassis, and the state of the switch.

Figure 8: Indicator LEDs



Power LED

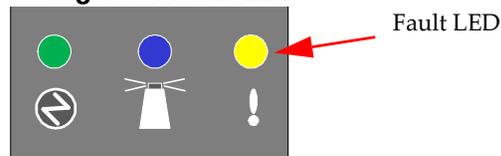
The power LED indicates that the switch is receiving power from the chassis.

Table 8 - Power LED configurations

LED color	Status
Green	OK – the power supply is delivering the correct voltage – 12VDC
Blinking	Booting up and performing Power On Self Test
Off	Off – there is no power to the system

Fault LED

Figure 9: Fault LED



The Fault indicator is located on the bottom right side of the unit. This LED shows software and hardware errors. The following Fault conditions are possible:

Table 9 - Fault LED configurations

LED Configuration	Description
Off	OK – the system is up and running normally
Yellow	Fault – this LED shows any type of failure both non-fatal and fatal. Determine these failures through the CMM or the MLNX-OS.

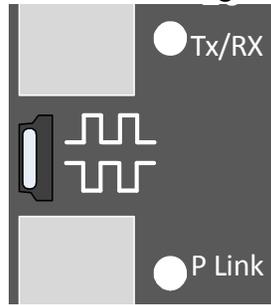
Unit identification switch identifier LED

The identification LED is a debug feature. Set this LED to ON to identify this switch easily in the chassis. This LED is lit through the CMM.

RS-232 interface through mini connector

There is a mini USB interface on the front panel for direct contact with the (Management) CPU.

Figure 10: RS-232 interface through mini USB connector



The mini USB connector can be used for software updates, debug and FAE access.

These switches are Plug and Play and all firmware updates should be done in-band.

RJ-45 Ethernet connector

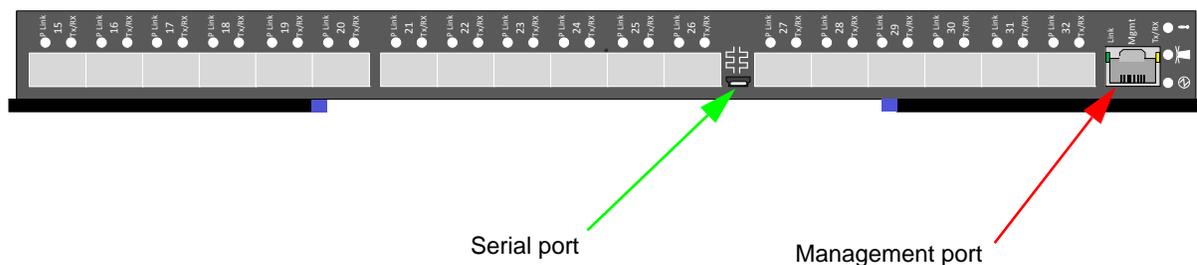
The RJ-45 connector provides an interface to standard 1/10-GBase Ethernet CAT 5 cable. The Ethernet connection can be used for Remote Advanced Management functionality. This Ethernet connection can be either 1 Mb or 10 Mb.

Configuring the IBM Flex System EN6131 Ethernet switch

The switch can either be configured automatically or administratively.

1. Connect the host PC to the Serial (mini USB) port of the switch system using a mini USB to DB-9 cable. This cable is not supplied with the switch.

Figure 11: Console and management ports for IBM Flex System EN6131 Ethernet switch



Rerunning the Wizard

If you want to rerun the wizard, run the following commands on the MLNX-OS Command Line Interface:

```
switch > enable
switch > configure terminal
switch (config) # configuration jump-start
```

Updating the switch software

This section provides all the information required to update the switch software.

Switch update

This procedure assumes you are using a “standard” linux based server to perform the update.

Typed commands are highlighted in yellow.

Expected results are highlighted in green.

Determine IP of switch requiring update: Connect to chassis' CMM and use the `nv -T system:switch[x]` and `ifconfig` commands to display the switch's IP address.

In this example the switch to be updated is in switch bay 3 and the displayed IP address is 192.168.70.123.

After the address is retrieved, exit from the CMM interface and test if the switch is reachable on the network with the ping command.

```
[root@teamviewer ~]# ssh USERID@192.168.70.100
password:
Hostname: MM5CF3FC25E02F
Static IP address: 192.168.70.100
Burned-in MAC address: 5C:F3:FC:25:E0:2F
DHCP: Enabled - Try DHCP server first, then use static IP.
Assigned IP address: 0.0.0.0
Last login: Friday November 18 2011 18:24 from 192.168.70.3 (SSH)
system> env -T system:switch[3]
OK
system:switch[3]> ifconfig
Scalable Switch Elem
Enabled
-c static                Switch internal IP address
-i 192.168.70.123
-s 255.255.255.0
-g 0.0.0.0
-pm n/a
-em disabled            External Management disabled
-ep enabled             External ports enabled
-pip enabled           Internal ports enabled
-ipv6 enabled
-ipv6static disabled
-i6 ::
-p6 64
-g6 ::
IPv6 address in-use: ::
-dhcp6 enabled

-sa6 enabled
Link-local address: fe80::202:c9ff:fe11:a5c3
```

Stateless auto-config IP Addresses Prefix Length

```
-----  
Error reading data for Stateless auto-config IP Addresses.  
system:switch[3]> ifconfig -i 192.168.70.100      Change internal IP  
OK  
system:switch[3]> ifconfig -em enabled           External management enabled  
OK  
system:switch[3]> ifconfig -ep enabled           External ports enabled  
OK  
system:switch[3]> ifconfig -pip enabled          Internal ports enabled  
OK
```

```
system:switch[3]> exit
```

```
Connection to 192.168.70.100 closed.
```

```
[root@teamviewer ~]# ping -c 3 192.168.70.123
```

```
PING 192.168.70.123 (192.168.70.123) 56(84) bytes of      Test IP  
data.
```

```
64 bytes from 192.168.70.123: icmp_req=1 ttl=63 time=44.1 ms  
64 bytes from 192.168.70.123: icmp_req=2 ttl=63 time=0.284 ms  
64 bytes from 192.168.70.123: icmp_req=3 ttl=63 time=0.378 ms  
--- 192.168.70.123 ping statistics ---
```

```
3 packets transmitted, 3 received, 0% packet loss, time 2001ms  
rtt min/avg/max/mdev = 0.284/14.920/44.100/20.633 ms  
[root@teamviewer ~]#
```

Start of secure terminal session. Login as admin. "En" = enable admin mode, "co t" = configuration from terminal.

```
[root@teamviewer ~]# ssh admin@192.168.70.123
```

```
Mellanox MLNX-OS Switch Management  
Last login: Tue Sep 26 06:43:39 2000 from 192.168.70.3  
Mellanox Switch
```

```
switch-11a5c2 [standalone: master] > en  
switch-11a5c2 [standalone: master] # co t  
switch-11a5c2 [standalone: master] (config) #
```

Confirm that switch is running at-least 3.1.0850.

```
switch-11a5c2 [standalone: master] (config) # show version
```

```
Product name: SX_PPC_M460EX  
Product release: SX_3.1.0858  
Build ID: #1-dev  
Build date: 2011-09-25 09:44:30  
Target arch: ppc  
Target hw: m460ex  
Built by: alia@fit15  
Uptime: 22h 0m 5.824s  
Product model: ppc  
Host ID: 0c305d1a9fd9  
System memory: 91 MB used / 1936 MB free / 2027 MB total  
Swap: 0 MB used / 0 MB free / 0 MB total  
Number of CPUs: 1
```

```
CPU load averages: 0.01 / 0.01 / 0.01
```

```
Delete images stored on switch not required.  
Show images list the images on the switches file space.
```

```
switch-11a5c2 [standalone: master] (config) # show images
```

```
Images available to be installed:
```

```
Image-PPC_M460EX-SX_3.1.0850.img
```

```
SX_PPC_M460EX 3.1.0850-dev-HA 2011-09-15 13:47:45 ppc
```

```
Image-PPC_M460EX-SX_3.1.0858.img
```

```
SX_PPC_M460EX SX_3.1.0858 2011-09-25 09:44:30 ppc
```

```
Installed images:
```

```
Partition 1:
```

```
SX_PPC_M460EX 3.1.0850-dev-HA 2011-09-15 13:47:45 ppc
```

```
Partition 2:
```

```
SX_PPC_M460EX SX_3.1.0858 2011-09-25 09:44:30 ppc
```

```
Last boot partition: 2
```

```
Next boot partition: 2
```

```
Boot manager password is set.
```

```
No image install currently in progress.
```

```
Require trusted signature in image being installed: yes
```

```
Delete all .imgs on file system to ensure space is available for update
```

```
Settings for next boot only:
```

```
Fallback reboot on configuration failure: yes (default)
```

```
switch-11a5c2 [standalone: master] (config) # image delete Image-  
PPC_M460EXSX_3.1.0850.img
```

```
switch-11a5c2 [standalone: master] (config) # image delete image-  
PPC_M460EXSX_3.1.0858.img
```

```
switch-11a5c2 [standalone: master] (config) #
```

```
switch-11a5c2 [standalone: master] (config) # image fetch
```

```
scp://root:password@192.168.70.3/root/image-PPC_M460EX-SX_3.1.0906.img
```

```
100.0% [#####]
```

```
switch-11a5c2 [standalone: master] (config) # show images
```

```
Images available to be installed:
```

```
image-PPC_M460EX-SX_3.1.0906.img
```

```
Upload and install new software to switch. My server machine is  
192.168.70.3.
```

```
The show image command confirms that the image was placed on the switch's  
file system
```

```
SX_PPC_M460EX SX_3.1.0906 2011-11-28 15:41:52 ppc
```

```
Installed images:
```

```
Partition 1:
```

```
SX_PPC_M460EX 3.1.0850-dev-HA 2011-09-15 13:47:45 ppc
```

```
Partition 2:
```

```
SX_PPC_M460EX SX_3.1.0858 2011-09-25 09:44:30 ppc
```

```
Last boot partition: 2
```

```
Next boot partition: 2
```

```
Boot manager password is set.
No image install currently in progress.
Require trusted signature in image being installed: yes
Settings for next boot only:
Fallback reboot on configuration failure: yes (default)
```

The image install command installs the new software. This command may take a few minutes to complete. (coffee time!)

```
switch-11a5c2 [standalone: master] (config) # image install image-
PPC_M460EXSX_
3.1.0906.img
Step 1 of 4: Verify Image
100.0% [#####]
Step 2 of 4: Uncompress Image
100.0% [#####]
Step 3 of 4: Create Filesystems
100.0% [#####]
Step 4 of 4: Extract Image
100.0% [#####]
switch-11a5c2 [standalone: master] (config) #
```

Use show images command to confirm image was installed

```
switch-11a5c2 [standalone: master] (config) # show images
Images available to be installed:
image-PPC_M460EX-SX_3.1.0906.img
SX_PPC_M460EX SX_3.1.0906 2011-11-28 15:41:52 ppc
Installed images:
Partition 1:
SX_PPC_M460EX SX_3.1.0906 2011-11-28 15:41:52 ppc
Partition 2:
```

Change image used for next boot and confirm.

```
Settings for next boot only:
Fallback reboot on configuration failure: yes (default)
switch-11a5c2 [standalone: master] (config) # image boot next
switch-11a5c2 [standalone: master] (config) # show images
Images available to be installed:
image-PPC_M460EX-SX_3.1.0922.img
SX_PPC_M460EX SX_3.1.0922 2011-09-26 09:11:04 ppc
image-PPC_M460EX-SX_3.1.0906.img
SX_PPC_M460EX SX_3.1.0906 2011-11-28 15:41:52 ppc
Installed images:
Partition 1:
SX_PPC_M460EX SX_3.1.0906 2011-11-28 15:41:52 ppc
Partition 2:
SX_PPC_M460EX SX_3.1.0858 2011-09-25 09:44:30 ppc
```

Reload switch

```
Last boot partition: 2
Next boot partition: 1
Boot manager password is set.
No image install currently in progress.
```

```
Require trusted signature in image being installed: yes
Settings for next boot only:
Fallback reboot on configuration failure: yes (default)
switch-11a5c2 [standalone: master] (config) # reload
```

Final steps, reconfirm that the correct software and switch asic firmware was loaded on switch.

```
[root@teamviewer ~]# ssh admin@192.168.70.123
Mellanox MLNX-OS Switch Management
Last login: Tue Sep 26 08:15:03 2000
Mellanox Switch
switch-11a5c2 [standalone: master] > en
switch-11a5c2 [standalone: master] # co t
switch-11a5c2 [standalone: master] (config) # show version
Product name: SX_PPC_M460EX
Product release: SX_3.1.0906
Build ID: #1-dev
Build date: 2011-11-28 15:41:52
Target arch: ppc
Target hw: m460ex
Built by: alia@fit05
Uptime: 16m 17.230s
Product model: ppc
Host ID: 0c305d1a9fd9
System memory: 88 MB used / 1939 MB free / 2027 MB total
Swap: 0 MB used / 0 MB free / 0 MB total
Number of CPUs: 1
CPU load averages: 0.07 / 0.13 / 0.20
switch-11a5c2 [standalone: master] (config) # show asic-version
=====
SX module Version
=====
SX 9.1.1080
switch-11a5c2 [standalone: master] (config) #
Update complete!
```

Chapter 4. Connecting to the switch platform

This chapter shows how to start a remote connection using either SSH for CLI or Web UI.

Starting an SSH connection to the switch (CLI)

1. Set up an Ethernet connection between the switch and a local network machine (“the remote machine” henceforth) using a standard RJ-45 connector.
2. Connect to the remote machine (*rem_mach1* is used as an example).
3. Start a remote shell to the switch using the following command using `<switch_IP_address>` is the IP address of the switch or its DNS name.

```
rem_mach1 > ssh -l <username> <switch ip address>

Mellanox MLNX-OS Switch Management

Password:
Last login: Thu Apr 28 11:24:13 2011 from 192.168.10.1

Mellanox Switch

sx-43 [standalone: master] >
```

4. You can enter any supported command now.

Starting a WebUI connection to the switch

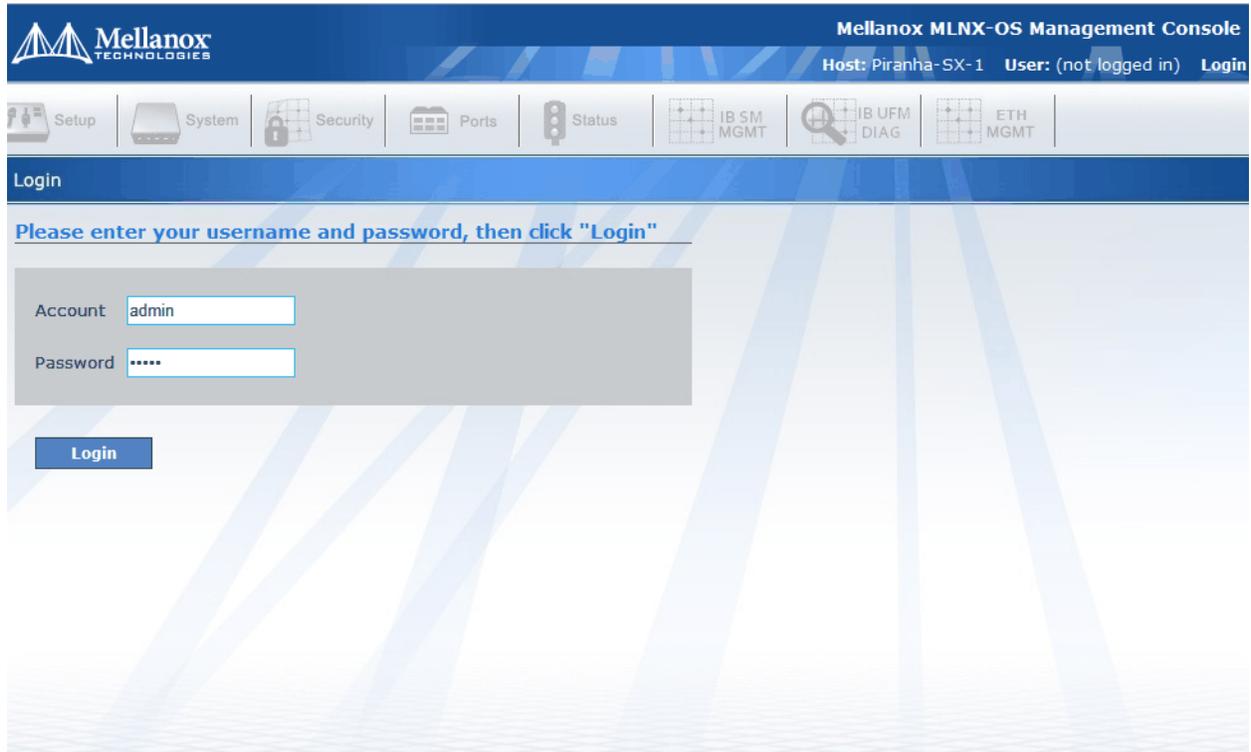
1. Set up an Ethernet connection between the switch and a local network machine (“the remote machine” henceforth) using a standard RJ-45 connector.
2. Start a Web browser – Google Chrome, Microsoft Internet Explorer 7.0 or Mozilla Firefox 3.0.

Note:

Make sure the screen resolution is set to 1024*768 or higher.

3. Enter as URL the following: `https:11//<switch_IP_address>` where `<switch_IP_address>` is the IP address of the switch or its DNS name.
4. You will receive the login window for remote management of the switch. The following figure shows an example. Note that the default username is *admin*.

Figure 12: Web-UI login page



Managing the IBM Flex System EN6131 40 Gigabit Ethernet Switch

This switch can be managed through the Chassis Management Module (CMM) or through MLNX-OS.

Chapter 5. Solving problems

If the switch does not work, remove and reinsert the switch in the chassis as explained in the IBM chassis manual.

You can reset the factory defaults on the switch by running the following commands on the MLNX-OS Command Line Interface:

```
switch > enable
switch > configure terminal
switch(config) # reset factory [reboot] [keep-basic] [keep-all-config]
```

If you cannot locate and correct a problem by using the information in this section, see Appendix A, “Getting help and technical assistance,” on page 13.

Running POST

To ensure that it is fully operational, the IBM Flex System EN6131 switch processes a series of tests during power-up or a restart (power-on self-test, or POST). These tests take approximately 1 minute to complete. The management module reads the test results and displays them for you. During normal operation, these tests are completed without error, and the green OK LED is lit. However, if the IBM Flex System EN6131 Ethernet switch fails the POST, the amber switch-module error LED and the system-error LED on the chassis are lit. An event is stored in the event log in the system status panel of the management module. The specific failure is displayed on the system status I/O module panel of the management module.

Note: For the locations and descriptions of the switch LEDs, see LEDs and interfaces on page 17.

POST errors

There are two types of errors: noncritical and critical. A noncritical error applies to one port, and the switch continues to operate. You can continue to operate the switch; however, you must replace it as soon as possible. When critical errors occur, the switch does not operate. To view POST results, complete the following steps:

1. Log on to the management module as described in the IBM Flex System Chassis Management Module Command-Line Interface Reference Guide. If necessary, obtain the IP address of the management module from your system administrator. The login window opens.
2. Turn off the power to the switch; then, turn it on again.
3. After POST is completed, the management module displays the results. Refresh the window to view the POST results. If a critical error occurs, replace the switch. If a noncritical error occurs, see the switch-module error log for additional details.

The following table describes the basic critical and noncritical failures. This abbreviated list is representative; it is not an exhaustive list. An error code is associated with each failure. Error codes are displayed on the Management Module Switch

Information window. Be sure to note the applicable error code for service. For details, see Appendix A, Getting help and technical assistance on page 29.

Table 10 - Failure criticality

Diagnostic indicator (in hex)	Failing functional area	Failure criticality
00-7F	Base internal functions	Critical
80-9F	Internal interface failures	non-critical
AO-AF	External interface errors	non-critical
FF	Switch module "good" indicator	operational

Appendix D. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM support website at <http://www.ibm.com/supportportal/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/supportportal/> and follow the instructions.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM website has up-to-date information about IBM systems, optional devices, services, and support. You can find service information for IBM systems and optional devices at <http://www.ibm.com/supportportal/>.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems. For information about which products are supported by Support Line in your country or region, see <http://www.ibm.com/services/supline/products/>.

For more information about Support Line and other IBM services, see <http://www.ibm.com/services/>, or see <http://www.ibm.com/planetwide/> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to <http://www.ibm.com/partnerworld/> and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see <http://www.ibm.com/planetwide/>. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks, nor is it intended to be used in a public services network.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Responsible manufacturer:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:

IBM Deutschland GmbH
IBM Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15-2941
E-mail: lugi@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Japan VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А. В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

声明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

Taiwan Class A compliance statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。



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