



Executive Summary

At Allied Telesis, we know that roadways authorities must:

- **reduce traffic congestion**
- **reduce accident rates**
- **facilitate faster emergency response times**
- **reduce pollution**

The Allied Telesis Roadways solution provides:

- **Resiliency**
Eliminate potentially life-threatening failures in traffic-controlling equipment. Optimise fault tolerance, and achieve extremely rapid recovery for reliable video transmission and remote device control.
- **High performance**
Transmit large numbers of video feeds, enable rapid switching between monitored streams, and ensure rapid recovery from link failures.
- **Sophisticated management**
Conduct detailed network performance monitoring, and comprehensive network event audits.
- **Security**
Eliminate network threats, and to enable risk-free integration with external agencies' networks.
- **Convergence**
Easily integrate systems into a converged roadways network.





Roadways needs and objectives

At Allied Telesis, we know that roadways authorities all around the world are facing a similar set of challenges. In today's fast-paced world, you must design roads and systems that work together to reduce traffic congestion, lower accident rates, as well as facilitate faster emergency response times – and reduce pollution.

The most consistent and pressing challenge is congestion. Vehicle numbers continue to grow at a significantly faster rate than new roads can be built at, due to both funding and environmental constraints. To cope with congestion, you must rely on highly efficient and sophisticated electronic traffic systems instead – a task which requires an extremely robust and high-functioning network.

Your roadways network must be resilient, since any failure in traffic controlling equipment could be life threatening. High-performance is essential to allow for large numbers of video feeds, rapid switching between monitored streams, and to ensure rapid recovery from link failures. You also need a sophisticated management feature set to conduct detailed network performance monitoring, and of course, robust security is absolutely essential. Finally, your network must allow for the convergence of multiple transportation systems, so these can all be integrated for seamless traffic management.

Finding a network that meets all these needs can seem like an impossible task – but with an Allied Telesis Roadways Solution, it is both achievable and simple.

Why Allied Telesis?

Allied Telesis is an industry leader in networking solutions. With our proven history of delivering highly reliable and feature-rich advanced network solutions, and our considerable experience in integrating transportation solutions, more and more roadways authorities are turning to Allied Telesis to achieve their objectives.

At Allied Telesis, we know that roadways providers must:

- **reduce traffic congestion**
- **reduce accident rates**
- **facilitate faster emergency response times**
- **reduce pollution**

Our Roadways solution provides the resiliency, high-performance, sophisticated management, and security you need for your roadways network, both now and well into the future. Our innovative, high-value products meet your requirements for a robust and scalable solution, whilst still working within your budget.

With an Allied Telesis solution, you also get the significant technical, financial and operational benefits that come from using a single network vendor from end-to-end across the network. You can avoid issues with inter-operation, simplify support escalation paths, optimize network design, and avoid purchasing complications.

Read on to find out how Allied Telesis can provide enhanced operations for your organization.



Resiliency – eliminate network downtime

Your roadways network needs optimal resiliency to minimize the risk of dangerous and costly downtime. A failure in your network can disrupt traffic systems, which leads to traffic congestion and carries the potential to cause accidents.

Allied Telesis products feature state-of-the-art resiliency features to eliminate failures in traffic-controlling equipment. With an Allied Telesis Roadways Solution, you can optimize fault tolerance, and achieve extremely rapid recovery for reliable video transmission and remote device control.

Our solution features a number of different sophisticated high-availability features. Plus, our products work together to provide a robust and reliable network, ensuring data flow continues even during outages. The result is a resilient network, which means an efficient and safe traffic system – which means less traffic congestion and fewer accidents.

Allied Telesis Advanced Resiliency Features

■ Ethernet Protection Switching Ring (EPSR)



EPSR allows our products to form a protected ring of switches. A multiple ring EPSR network can provide extremely high performance throughout your network. The extremely rapid (as low as 50ms) recovery provided by EPSR is essential for reliable video transmission and remote device control.

This robust protocol is supported across a range of Ethernet link speeds and on both copper and fibre media, enabling simple interconnection of different rings of different bandwidths.

■ Virtual Chassis Stacking (VCStack™)



VCStack provides uninterrupted network service, and delivers chassis-like resiliency and redundancy features without the high price tag. Combined with Link Aggregation, VCStack provides a superior network core solution.

■ Link Aggregation

Link Aggregation provides resiliency with higher performance, since it utilizes your full network bandwidth. Failover is immediate, as the switch (or Virtual Chassis) almost instantly adapts its forwarding process in the event of the loss of a link.

■ Environmentally-optimised equipment

Our backbone switching equipment is optimised both for both outdoor and controlled-environment deployment. Feature-rich, high performance dual-band outdoor wireless routers provide connectivity where it's needed.

■ Built in power redundancy

Built-in power redundancy guarantees the continued delivery of essential services. Many of our key products reduce the risk of network outage by allowing for two PSUs to be installed, when only one is required to power the device.

■ Hot swappable Power Supply Units (PSUs)

PSUs can be easily removed and replaced with no interruption to the network. Using two separate power sources (feed redundancy) provides even more power redundancy to the network.

■ 10/100 and Gigabit access switches

Highly reliable 10/100 and Gigabit access switches, with choices of copper or fibre connectivity.

Resiliency Benefits

- Seamless network flow, even in demanding conditions
- High performance at the core of your network
- Higher bandwidth, and optimum use of available bandwidth
- Optimal network speed
- Ensure continued delivery of essential services
- Reduced risk of network outage
- Continued service even in the event of a power supply failure



High performance for effective traffic control

High performance is a must for roadways systems. To reduce congestion, you must control traffic, which requires accurate real-time information about traffic density, and the locations of accidents, maintenance work, and long queues, to name a few. Furthermore, you need mechanisms to act upon this information in real time.

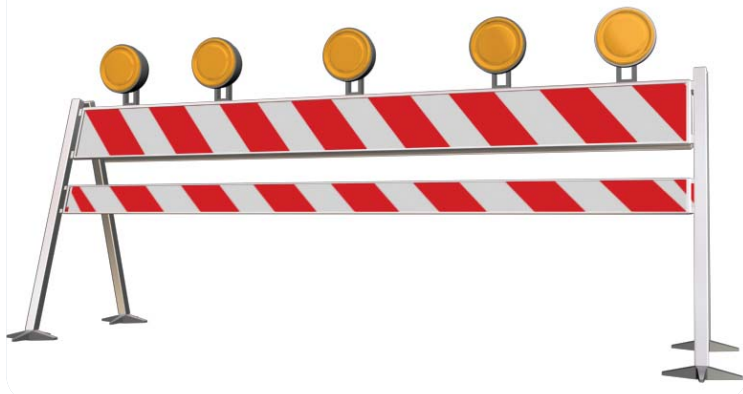
A number of traffic control elements have been in place for some years, including electronic changeable signs, video and still image feeds, centralised traffic-light control, vehicle counting systems, ramp monitoring systems, as well as monitoring of dangerous driving conditions. These methods work the most effectively when they are unified over a single communication infrastructure. The very best choice for this is IP over Ethernet.

Our solution gives you industry-leading high performance, so you can easily transmit large numbers of video feeds, enable rapid switching between monitored streams, and ensure rapid recovery from link failures.

Our advanced products ensure your network resources and applications are always available, with superior high performance features. Our products support 10Gigabit Ethernet (currently the fastest standard) to ensure maximum data throughput for your network core, allowing it to cope with large amounts of stored data, and easily handle any large surges or times of peak demand.

Clearing the way for emergency services

The combination of GPS, real-time video feeds and remote control of traffic lights and road signs provides an unprecedented ability to reduce emergency service response times. GPS and video enable operators in urban control centres to follow the progress of emergency vehicles across the city. You can remotely control traffic lights to smooth the passage of the emergency vehicles through busy intersections. Video also enables you to see where there are areas of severe road congestion, and to direct the emergency vehicles along a route that avoids that congestion.



Allied High Performance Features

■ Superior Quality of Service

Prioritise real-time data and manage bandwidth allocation to specific applications, with superior QoS features ensuring wire-speed delivery of all your critical IPv4 and IPv6 traffic.

■ 10 Gigabit Ethernet

Products that support the leading Ethernet standard of 10 gigabits per second ensure maximum data throughput, to support multiple simultaneous network applications.

■ Ethernet Protection Switching Ring (EPSR)

With the ability to form a ring at up to 10Gigabits per second, EPSR can provide extremely high performance at the core of your network, with as little as 50 milliseconds (ms) failover; providing virtually uninterrupted access to resources and applications. EPSR far outperforms traditional STP based networks where failover and network re-convergence is in the order of many seconds.



■ Virtual Chassis Stacking (VCStack™)

VCStack provides uninterrupted network service, and maximizes the use of available network bandwidth to ensure access to information when you need it.



■ Layer 2 and layer 3 Multicasting

Feature-rich and high performance Layer-2 and Layer-3 Multicasting allow large numbers of video feeds to be transmitted, enable rapid switching between monitored streams, and provide rapid recovery from link failures

High Performance Benefits

- High system reliability
- Maximum data throughput
- Wire-speed connectivity
- Rapid recovery from failures
- Lower operational costs through no longer needing to maintain multiple systems
- Higher data rates, and a simple upgrade path to yet higher data rates in the future
- Significantly reduced time-scales for developing new system responses to on-road events
- Simpler integration of new open-standards equipment, reducing reliance on higher-cost propriety equipment
- Collection of more data for the traffic analysis and modelling that underlies future planning

Sophisticated Network Management

Your roadways network requires a sophisticated management feature set that allows for clear, comprehensive visibility of network status, and proactive monitoring of network events and performance trends.

Effective network management requires web complementary elements including automatic network mapping, alarm management, device drill-down, configuration archiving, statistics collection, and remote provisioning. Our network management software provides this full set of elements, to enable a complete management solution.

The Allied Telesis Roadways Solution provides a full range of tools for monitoring network health and rapid alerting of network events. With our products, you can easily conduct detailed network performance monitoring, and comprehensive network event audits.

Allied Telesis Advanced Management Features

■ AlliedWare Plus™

The advanced AlliedWare Plus™ Operating System delivers a rich feature set and an industry standard Command Line Interface (CLI).

■ Graphical User Interface (GUI)

A comprehensive GUI provides web-based access for network monitoring and configuration.

■ Secure Management Options

SSHv2 and SNMPv3 ensure encrypted and strongly authenticated remote login sessions.

■ Network Access Control (NAC)

Security automation eases your management overhead. Once implemented, NAC provides advanced security by requiring users to prove their identity. It also ensures that the computers themselves have an up to date security status – all without continuous administration effort.

■ Network in a Box

A number of integrated network services in our advanced switches simplify network administration – a complete 'Network in a Box'. Radius Server checks the identity of users to keep the network safe and free from uninvited 'guests'. Storm Control ensures a robust and resilient network by managing the amount of traffic allowed, and dealing with any unexpected surges. DHCP server automates the distribution of addresses to every computer. Plus, a centralized Timekeeper ensures the network is always working in full synchronicity.

Effective Management Benefits

- Easily conduct detailed network performance monitoring, and comprehensive network event audits.
- Clear, comprehensive visibility of network status
- Proactive monitoring of network events and performance trends
- Guaranteed confidentiality, with multiple secure options for monitoring and configuring devices
- Reduced management overhead with integrated network services
- Simplified administration with automated network security





Security to eliminate network threats

Security is paramount to your roadways network. With the safety of road users at stake, you must protect your network from external or internal attack. As well as the increasing risk of attack from the Internet, you must protect your sensitive information from insider interference.

Our solution provides a number of cutting edge, top-class security features to protect your network from the edge to the core. Network Access Control (NAC) provides total network security mitigating threats to your network infrastructure, and Private Virtual LANs (VLANs) providing secure access to information. We offer robust security to eliminate network threats, and to enable risk-free integration with external agencies' networks

Security benefits

- Protect your network from external attack
- Maintain unprecedented control over user access to your network.
- Increase your overall reliability and performance, and make the network easier to maintain
- Ensure continued operation of essential services
- Control the use of network bandwidth, prioritising critical network services and applications

Allied Telesis Advanced Security Features

■ Network Access Control (NAC)

NAC allows you unprecedented control over user access to your network. Allied Telesis NAC uses industry standard features to provide this security optimally at the interface between the user and the network, assigning network access based on identity, access method, location and end-point security status.

■ Private VLANs

Multiple users sharing the same VLAN can enjoy access to appropriate network resources, while communication between user ports is blocked. .

■ Advanced Network Traffic Management

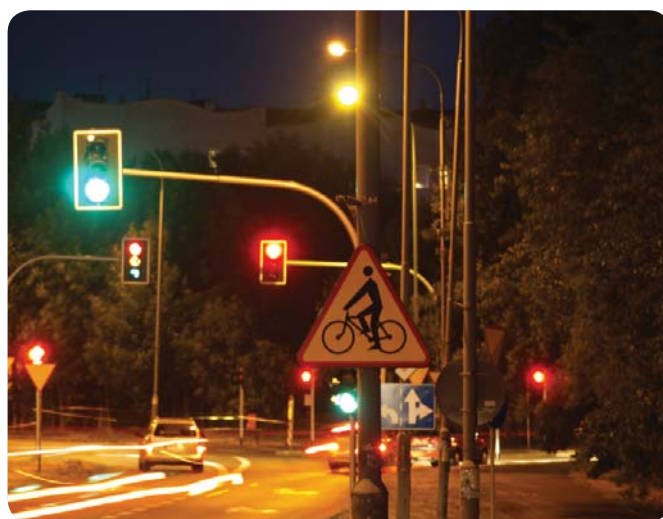
Powerful traffic filtering capabilities can be implemented to prevent malicious LAN-based attacks. Alongside port learning limits and hardware based denial-of-service defence, this provides a continually secure network environment.

■ Control Plane Prioritization (CPP)

Ensure maximum performance even during heavy network use, or network attacks. CPP prevents the Control Plane from becoming flooded in the event of a network storm or Denial of Service (DoS) attack, ensuring critical network control traffic always reaches its destination.

■ Industry-leading Quality of Service (QoS)

Be confident that inappropriate or malicious use of the network won't stop your essential services. Comprehensive low-latency wire-speed QoS provides flow-based traffic management with full classification, prioritization, traffic shaping and min/max bandwidth profiles. Enjoy boosted network performance and guaranteed delivery of business-critical services and applications. Time-critical services like streaming video feeds take precedence over non-essential services such as file transfers.



Integrated Systems within a converged roadways network

You need a network that encourages the use of public transport, provides up to date traffic information on the Internet, enables smart toll road systems, and clears the way for emergency services. Integrating these multiple services within a single converged transportation network provides a singular approach to traffic control that is more easily managed and unified, as services share the communication infrastructure.

An important component of the solution to urban traffic congestion is to encourage the use of public transport. Your network can provide services that improve the user experience of public transport, particularly buses, encouraging growth in the use of public transport. For example, real time knowledge of bus locations, traffic light control systems that track bus locations, and wireless communication to and from the buses themselves.

A significant degree of traffic control is achieved by the simple act of presenting up-to-date traffic information to road users, and enabling them to make informed decisions about when and where they will drive. Websites providing real-time congestion maps and live video feeds are proving very popular with road users. Providing this service, and benefiting from its congestion-reduction effects, is relatively simple once an IP-based traffic control system is in place.

Toll roads are an effective way to raise funds for roading development and maintenance, however they have the potential to cause driver inconvenience and delay. Smart systems for billing by radio-signalled vehicle ID, or by licence-plate imaging, significantly reduce these delays. Optimal operation of these smart systems requires their secure communication with payment websites.

Allied Telesis offer a broad range of well-integrated networking products that fulfil the varied requirements of the different portions of the roadway network.

Allied Telesis Advanced Convergence Features

■ An end-to-end network provider

With an Allied Telesis solution, you get the significant technical, financial and operational benefits that come from using a single network vendor from end-to-end across the network. You can avoid issues with interoperation, simplify support escalation paths, optimise network design, and avoid purchasing complications.

■ Broad product portfolio

We offer a broad range of well-integrated networking products that fulfil the varied requirements of the different portions of the roadways network:

- Modular multi 10-gigabit layer3 switches for the network core

- Environmentally hardened switches for street side nodes in high-speed distribution rings
- IADs as connection points for end devices
- Feature-rich wireless routers, optimized for outdoor deployment
- A broad range of pluggable optical devices (SFPs), supporting all speeds, media and distances
- Secure, resilient switches for control-centre LANs

■ System Integration

Our advanced IP network products easily handle the competing requirements of the many systems that are included in a converged traffic network.

■ Wireless connectivity

The Allied Telesis outdoor wireless routers are ideal to provide the wireless link between the terrestrial network and buses. The flexibility, high throughput, and reliability of our wireless routers enables them to integrate with a range of network designs, in a broad spectrum of environmental conditions.

■ High-performance encrypted tunnels

Allied Telesis routers provide high-performance encrypted tunnels to securely transport toll billing information across the shared roadway network, and over public networks.

Convergence Benefits

- Real time knowledge of bus locations to enable accurate display of expected bus arrival times at bus stops.
- A traffic light control system which keeps track of bus locations, then makes decisions to minimise the time buses spend waiting at red lights.
- Network cameras to record any vehicles that use bus lanes illegally, which can then be issued with infringement notices.
- Wireless communications to buses to update on-board fare card databases in real time, so cards topped-up online can be used immediately
- Instant wireless download of digital security video to enable rapid response to crimes on buses.
- Up to date traffic information allows road users to make informed decisions about routes and travel times.
- Centralised monitoring of IP-based surveillance video, to enhance security
- Remote control and monitoring of equipment, to lower operating cost and reduce equipment downtime
- Real-time safety monitoring within tunnels

Looking ahead to the future

Intelligent roadway transportation information systems have an exciting future. Integration of GPS, mobile wireless and IPv6 will undoubtedly yield some powerful applications for delivering traffic and road-condition information to drivers.

Great potential exists for intelligent real-time route choosing, based on current delays and congestion levels.

Significant research work is currently going into vehicle-to-vehicle, and roadside-to-vehicle communication systems to enhance collision avoidance, propagate hazard warnings.

Allied Telesis have a long history of making leading-edge network technologies a commercial reality. The blue skies ideas of today will be the standard Allied Telesis products and features of tomorrow.

About Allied Telesis Inc.

Allied Telesis is a world class leader in delivering IP/Ethernet network solutions to the global market place. We create innovative, standards-based IP networks that seamlessly connect you with voice, video and data services.

Enterprise customers can build complete end-to-end networking solutions through a single vendor, with core to edge technologies ranging from powerful 10 Gigabit Layer 3 switches right through to media converters.

Allied Telesis also offer a wide range of access, aggregation and backbone solutions for Service Providers. Our products range from industry leading media gateways which allow voice, video and data services to be delivered to the home and business, right through to high-end chassis-based platforms providing significant network infrastructure.

Allied Telesis' flexible service and support programs are tailored to meet a wide range of needs, and are designed to protect your Allied Telesis investment well into the future.

Visit us online at www.alliedtelesis.com.





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