

The Allied Telesis Roadways Solution

Overview - Challenges and Concepts

Introduction

Roadways authorities everywhere are facing a similar set of challenges. You must design roads and systems that work together to:

- reduce traffic congestion
- lower accident rates
- facilitate faster emergency response times
- 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 need highly efficient and sophisticated electronic traffic systems instead – a task which requires an extremely robust and high-functioning data network.

To reduce congestion, you must be able to **control traffic**. Effective traffic control requires accurate real-time information about traffic, for example, where and when queues and densities are occurring; accident locations; and the location and duration of road maintenance work. Furthermore, you need mechanisms with which to act upon this information, in real time.

An Allied Telesis Roadways Solution meets all these needs, and more. Read on to find out how.

Unified systems, employing open standards

Traffic control is achieved in numerous ways:

- electronic signs
- video feeds and still images from city streets and highways
- centralised traffic-light control
- vehicle counting systems
- ramp monitoring systems
- driving condition monitoring – for example icy roads, and fog.

New technologies are continually being developed, that provide more and more efficient and effective ways to ensure traffic control. All these elements can be integrated over a single communication infrastructure – the obvious choice for this is **IP over Ethernet**, as provided in the Allied Telesis Roadways Solution.



Unification onto an open-standards infrastructure provides multiple advantages:

- Lower operational costs through no longer needing to maintain multiple parallel systems
- Higher data rates, and a simple upgrade path to assure even higher data rates in the future
- Higher system reliability
- Significantly reduced time scales when developing new system responses to on-road events
- Simpler integration of new open-standards equipment, reducing reliance on higher-cost proprietary equipment
- Better collection of data, for traffic analysis and modelling to underlie future planning
- Access to a wider pool of engineers and technicians skilled in the use of the open-standard protocols

With all these road control systems integrated, you can experience the benefits of a converged transportation network.

Unified systems open new possibilities

The superior efficacy of an integrated roading control system is further augmented by interfacing it to previously unrelated systems, for example the Internet, and Public transport companies' data systems. This not only improves the performance of existing functions, it opens the door to new possibilities:

- Clearing the way for emergency services
- Traffic information on the Internet
- Toll road systems
- Integration with public transport services

Clearing the way for emergency services

Global Positioning Software (GPS), real-time video feeds, and remote control of traffic lights and road signs provide an unprecedented ability to reduce emergency service response times. GPS and video allow operators in urban control centres to track the progress of emergency vehicles across the city. They can then remotely control traffic lights to smooth the passage of the emergency vehicles through busy intersections. Video feeds also allow them to see where there are areas of road congestion, and direct emergency vehicles along alternative routes.

Traffic information on the Internet

The simple act of presenting up-to-date traffic information on the Internet achieves a significant degree of traffic control, as it allows road users to make informed decisions about when and where they drive. Today, websites providing real-time congestion maps and live video feeds are very popular. Providing this, and benefiting from its congestion-reduction effects, is simple with an IP-based traffic control system.

Toll road systems

Toll roads are an effective way to raise funds for roading development and maintenance. Unfortunately they can also 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 secure communication with payment websites.

Toll road systems derive other significant benefits from connection to a reliable, high performance network:

- 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

Integration with public transport services

A key component in solving urban traffic congestion is increasing the use of public transport. Your Roadways network can provide services that improve the user experience of public transport, particularly buses, thus encouraging and facilitating growth in public transport usage. For example:

- An accurate knowledge of bus locations and statuses enables the accurate display of expected bus arrival times at bus stops.
- The traffic light control system keeps track of bus locations, and makes decisions that minimise the time buses spend waiting at red lights.
- Network cameras capture the licence plates of vehicles making illegitimate use of bus lanes, allowing those committing infringements to be penalised.
- Wireless communications to buses allows updates of onboard fare card databases in real time, so cards topped up online may be used immediately
- Wireless download of digital security video enables rapid response to crimes on buses.

The key enabler for these services is wireless Ethernet communication.

Allied Telesis wireless routers

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

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



The Allied Telesis Roadways solution

Allied Telesis offer a product set well suited to roadways applications, and have considerable experience in integrating roadways solutions.

The network underlying the control of a large roadway system must be highly reliable, resilient to link failure, scalable, flexible and have excellent multicast performance. Allied Telesis provide innovative, high-value solutions that meet these challenging requirements.

The key factors in Allied Telesis' Roadway solutions offerings are:

- Ethernet Protection Switched Ring (EPSR) provides Ethernet backbones with telco-like fault tolerance. The extremely rapid (as low as 50ms) recovery provided by EPSR is essential for reliable video transmission and remote device control. (See further information in the Box "Key Feature – Resilient Rings with EPSR")
- Highly reliable 10/100 and Gigabit access switches, with choices of copper or fibre connectivity.
- Feature-rich and high performance Layer-2 and layer-3 Multicasting, supporting reliable transmission of large numbers of video feeds, enabling rapid switching between monitored streams, and rapid recovery from link failures
- Backbone switch ranges optimised both for both outdoor and controlled-environment deployment
- Feature-rich, high performance dual-band outdoor wireless routers
- Highly developed management feature-set, to enable detailed monitoring of network performance, and comprehensive audit of network events.
- Strong security, enabling risk-free integration with external agencies' networks

Resilient Rings with EPSR

As more services are converged over Roadways networks, the smooth operation of the roadways system becomes more dependent on network availability. Even brief network outages can lead to unresponsive traffic lights, delayed response to emergencies, less efficient running of public transport, and so on. Hence, high availability is a key criterion in your network's design.

Allied Telesis core switching equipment provides extremely high availability network via a powerful ring-protection protocol called Ethernet Protection Switched Ring (EPSR). Self-healing rings based on EPSR can recover from link loss within 50ms of the switches detecting the link failure.

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.

Network Management software

A reliable network requires clear, comprehensive visibility of network status, and proactive monitoring of network events and performance trends. Allied Telesis network management applications provide a full range of tools for monitoring network health and rapid alerting of network events.

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

An end-to-end network provider

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 interoperation, simplify support escalation paths, optimise network design, and avoid purchasing complications.

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

- Modular multi 10-gigabit Layer 3 switches for your 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

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, and 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.

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