

Cisco Intelligent Public **Transportation** Solution Increases Operational Efficiency and Enhances Commuter Experience

The Cisco® Intelligent Public Transportation solution is a unified, standards-based communications solution that takes advantage of existing investments in disconnected traditional systems to help transportation authorities capitalize on emerging operational, customer service, and security opportunities.

Challenge

With increasing congestion on urban roadways impeding traffic for upwards of seven hours per day in major metropolitan cities and suburbs, safe, accessible, and efficient public transportation has become a top priority. Although millions of passengers everyday rely on local systems of buses, trains, subways, and ferries as their chief means of transportation, stagnant ridership and revenues have forced many transit authorities to look for ways to streamline and secure operations, and enhance rider satisfaction.

However, budgetary constraints, regulatory compliance for increased safety measures, and disparate traditional IT networks are creating barriers that make it nearly impossible to address today's challenges. Some of the challenges that urgently need to be addressed include:

- Train delays and congested passenger flow
- Disconnected standalone information and communications systems
- Limited access to critical information in real time
- Limited ability to communicate between vehicles, stations, and emergency personnel
- Inflexible resource allocation
- Difficulty integrating new security and emergency response measures

Improving operational efficiency is a critical strategy for transit authorities looking for ways to enhance the commuter experience, improve communication, address security concerns, and augment revenue. Many operators are turning to technology to drive transformation in day-to-day operations and improve fare collection, fleet maintenance, resource flexibility, system control and reliability, and passenger and vehicle security.

Solution

Cisco Intelligent Public Transportation solutions provide an intelligent information network that is a critical enabler of operational efficiency in the public transit industry. These unified, standards-based communications solutions from Cisco enable transit managers to capitalize on emerging operational, customer service, and security opportunities through an open architecture that integrates existing systems as well as new technologies. A common communications infrastructure, built on a resilient technology foundation, can replace multiple proprietary networks with a single IP-based architecture for converged voice, video, and data.

Cisco Intelligent Public Transportation solutions facilitate application-enabling network services that securely connect public transit operations. They deliver an environment that enables operators to



access vital information in real time in order to streamline operations, safeguard assets, accelerate decisions, and extend passenger services, all while maximizing existing network investments. This improves the utilization and effectiveness of fixed and mobile resources and enables operators to create new services which boost ridership, transforming today's rail and bus operations into more service-centric environments.

The following building blocks create the foundation for the Cisco Intelligent Public Transportation solution:

Intelligent Trains and Buses

Cisco provides mobile networking solutions that extend the transit authority's network to moving vehicles and on-board applications. Key components are the Cisco 3200 Series Mobile Access Router and Cisco Aironet® wireless LAN products. The Cisco solution builds upon the mobile IP routing protocol that allows vehicles traveling from one network and data transport method to another to roam throughout transit or rail systems while maintaining secure communication sessions. The Cisco Intelligent Trains and Buses solution supports:

- *Integration and Enhanced Communication.* Networked trains and buses benefit from integrated, multi-frequency communications systems both in and outside the vehicle. This enables the integration and effective communication of telemetry readings (including gauges, GPS, and the like), preventive maintenance and repair information, crew scheduling, passenger information via displays and audio announcements, video surveillance feeds, and fare collection information.
- *Data Collection.* Information from the vehicle's vital systems gathered during scheduled maintenance periods can result in significant cost savings for transit operators. Data from the vehicle is downloaded to a centralized depot system at the end of the day, facilitating real-time problem reports that enable service managers to pull the vehicle out of service, potentially reducing further maintenance issues.
- *On-Board Internet Access.* Enhancing ridership and passenger satisfaction is contingent upon the ability to make the travel experience more productive and enjoyable for the commuter. By deploying wireless networking technologies on the vehicle, secure Internet access can be provided to passengers on commuter and intercity rail lines, ultimately creating new fee-based revenue generating opportunities for operators.

Intelligent Station

Cisco Intelligent Station architecture enables integrated communications for all station and terminal operations, passenger information, and security systems. An IP standards-based converged voice, video, and data network can be used for integrated passenger information, fare collection, security, facility management, and staff e-learning. Intelligent Station also enables transit authorities to offer passengers new services, such as wireless connectivity in waiting areas.

- *Cisco IP Telephony.* In addition to Cisco LAN and campus network infrastructure, Cisco IP Telephony is a critical enabler of Intelligent Station. Cisco IP Telephony allows transit operators to harness the power and flexibility of their IP networking to meet business needs, and it improves overall business resilience and communications mobility by integrating phones with business applications, such as time keeping, schedules, and directories. Finally, it provides a smooth transition from existing private branch exchange (PBX) systems to IP telephony.



- *Wireless Mobility.* Integration of wired and wireless networks offers transit authorities industry-leading security, manageability, scalability, and reliability that gives them access to business critical information from mobile devices. Whether maintenance workers need to access vehicle repair histories or security personnel require streaming video of a security breach, all data is secure from unauthorized users. Cisco Wireless Networks are the *de facto* standard for the wireless network infrastructure necessary to deliver integrated, end-to-end wireless accessibility.

Intelligent Trackside

Completing the picture, Cisco Intelligent Public Transportation incorporates high-bandwidth communications to facilitate security, operations and control, and integration of both local and remote transit system-wide applications. Cisco provides a secure and resilient infrastructure to enable video surveillance, computer-based train control systems, and authority-wide communication systems.

- *Connectivity.* Interconnecting numerous stations and operation center sites within a bounded geographic area—typically a city or cluster of cities in close proximity—is critical to enabling true integrated communications and operability. Unlike traditional metropolitan networks, which provide connectivity only between sites, the Cisco Intelligent Trackside architecture connects many devices along the network path, enabling surveillance, train control, wireless access, and other applications.
- *Integration.* IP networks enable interaction with other organizations such as police or other emergency responder, and neighboring public transportation authorities. For example, open-standards IP networks enable integration across disparate fare systems, even with neighboring authorities, allowing smoother travel between multiple systems.
- *Growth.* Cisco optical networking solutions are key building blocks for today’s metropolitan networks because of their ability to offer next-generation transport capabilities and economics. They offer comprehensive network management, which speeds time to deployment, reduces complexity, and limits the need for retraining (low learning curve).

Business Benefits

Cisco’s Intelligent Public Transportation solutions enable operators to automatically and securely gather, analyze, and distribute vital networked information and resources in real time, regardless of their location or the time of day. This means not only transportation information but police, emergency, and other fleet information and resources are available to those who need it when they need it. Advantages of Cisco Intelligent Public Transportation include:

Streamlined Operations

Cisco Intelligent Information Network (IIN) helps turn today’s operation centers, stations, and depots into sophisticated service-centric command centers that take on a more proactive role in managing, monitoring, and mitigating problems throughout the transit system by:

- Providing greater visibility into important transportation assets around the clock
- Enabling operators to turn raw data into intelligence by accessing it quickly enough to achieve the desired outcome
- Improving communications so that the information can be moved quickly out to train and bus crews, passengers, and motorists to reduce the impact of road conditions, traffic congestion, and emergency incidents



Enhanced Customer Service and Increased Revenue

Ridership is the key indicator of success for public transportation operators. Using Cisco solutions, transit agencies can:

- Effectively communicate with passengers by collecting information about vehicle location and integrating passenger information systems to estimate and convey the time of arrival or departure for a transit vehicle. This information can be transmitted to digital signs at route stops or to a Web site, PDA, or cell phone to give commuters access to real-time schedules.
- Integrate dynamic signage and automatic voice announcement (AVA) applications using location-based data with the on-vehicle network to provide real-time information to passengers, increasing rider control, satisfaction, and ultimately, usage.
- Help intercity and commuter rail lines take full advantage of their existing network investment to offer fee-based Internet access for passengers, creating a new revenue source for the transit operator and enabling passengers to enhance their own productivity during their travels.

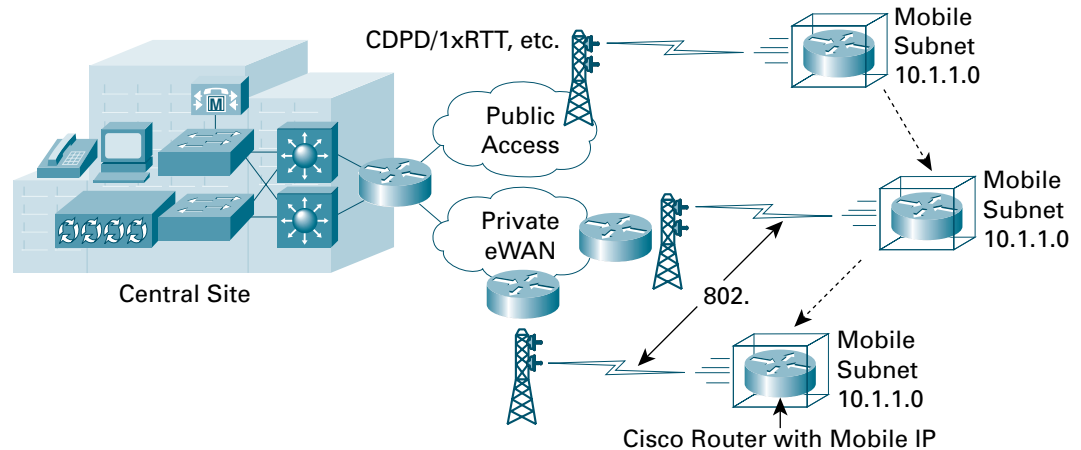
Safeguarded Passengers and Assets

The criticality of ground transportation infrastructure, along with its inherently open nature, makes transit systems highly susceptible to emerging security threats. By network-enabling these systems and carrying information over a common, standards-based communications infrastructure, transit operators can:

- Correlate security information in real time and base immediate action on the totality of any situation. For example, activating cameras when an alarm is triggered and providing first responders with real-time video of security threats can make a critical difference in effectively handling a threat to security or public safety.
- Extend the security perimeter with wireless and wired networking technologies by enabling security cameras and other devices to be placed in new locations currently unreachable by legacy systems.
- In case of an emergency, enable real-time information to be sent to police and other first responder PDAs or mobile computing devices, which will allow front-line personnel to view video of an event or receive real-time information on a developing situation while en route.
- Deliver emergency information to passengers via passenger information displays and public address systems.
- Manage network security including intrusion detection, encryption, virtual private networks (VPNs), access control, port identification, and firewalls. The Cisco Security solution builds on the security, scalability, and reliability of Cisco network infrastructure to extract the full potential of the network investment.



Architecture



Intelligent Information Network

Due to fluctuating budgets, physical space limitations, and the investment they have already made in network infrastructure, public transit officials today can't afford to take significant business risks. However, if the existing infrastructure consists of disparate IT network elements, the ability to improve the network is significantly inhibited, creating the following challenges:

- Functional silos of information
- Redundant applications
- Proprietary systems
- Different network protocols
- Costly, complicated network design and deployment

To gain the benefits of integrated resources without the setbacks of multivendor point solutions, Cisco enables convergence of disparate networks onto an intelligent information infrastructure. The Cisco network architecture for the public transportation industry is a cohesive, resilient, and responsive foundation that lets administrators centrally provision, deploy, and maintain advanced transportation applications.

This integrated network supports voice, video, and data so transit operators can leverage existing networks while deploying and integrating new applications. Converging network resources also improves operational efficiency and support for innovative customer services that drive new revenue streams. Finally, total cost of ownership (TCO) is minimized because common network standards require less staff for management and maintenance than multiple networks.



Supporting Solutions or Products

- **Metro and Optical Networks** enable business continuance and improved disaster recovery, storage consolidation, and multiservice integration. Additionally, they provide high-speed interconnectivity and maximize the return on fiber investments.
- **IP Telephony, Unified Communications, IP Video and Audio Conferencing, and Contact Center** are all part of the comprehensive, enterprise-class system of Cisco IP Communications solutions that facilitate more engaging and efficient interactions among employees, partners, and customers, and provide the foundation for a collaborative workforce.
- **Cisco Wireless Networks** provide secure, manageable, scalable, and reliable wireless (802.11) network connectivity, enabling secure access to both public and private network services, even in areas inaccessible to network cabling.
- **Cisco Network Security Solutions** include firewalls, intrusion detection systems, authentication services, and network security management services which protect data and network access.
- **Wireless/Mobility Solutions** enable mobile communications both on board vehicles and from vehicles to operations centers. By deploying a single IP infrastructure and leveraging innovative mobile technology, including in-vehicle mobile IP networks and wireless local-area networks (WLANs), authorities are capitalizing on new applications such as on-board systems for vehicle monitoring, fare collection, passenger information, and driver information.

Why Cisco?

Many vendors in today's marketplace will offer discrete niche products that solve a specific problem on the network. As a result, organizations often experience less consistent network and application performance, and must pay more for system maintenance because the lack of rich, integrated network features and services and network intelligence prevents the network from operating as a unified system. Point systems also suffer from other challenges, including:

- Difficulty in protecting the entire network from outages, service degradation, and security breaches
- Inability to adapt to existing infrastructure or offer the scalability necessary to meet changing business requirements
- Lack of a "best practices" track record in network deployment and management, which drives up cost and complexity in the long term
- Difficult and costly to upgrade, modify, and manage

Traditional networking vendors boast an end-to-end solution made up of interconnected "boxes" which are typically an outgrowth of their existing systems. The challenge of this approach is that the performance and availability are typically set by the weakest network component.

Cisco has the networking breadth and depth to deliver an intelligent, truly integrated (both wired and wireless), end-to-end network solution that works as a unified system throughout the organization and across an organization's extended infrastructure. Cisco solutions help ensure an unsurpassed user experience and a consistent level of performance because the more cohesive the network, the more cohesive the operations.

In addition to boosting network performance, network elements are interlocked through integrated network protocols and network intelligence.

Equally important, a Cisco converged network provides the lowest TCO through:

- **Reduced hardware costs.** A highly optimized network reduces the need for multiple proprietary networks, reducing hardware costs. For example, a single Ethernet card can replace three separate cards, reducing cost and complexity.
- **Reduced software and training costs.** Expanding intelligent network services pave the way to innovative transportation applications without having to replace or learn new operating software, reducing software and training costs.
- **Reduced troubleshooting.** Multilayered security closely aligns people, procedures, and technology with business goals, which reduces troubleshooting due to security breaches. In addition, a highly reliable network reduces administrative troubleshooting and downtime costs.

For More Information

For more information about Cisco Intelligent Transportation Solutions, contact your local account representative or visit <http://www.cisco.com>



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