



Making the Connection In Mass Transit





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How transit agencies can consolidate remote connectivity for smarter, safer, and more efficient operations.



The Expanding Mission For Transit Authorities

As Paul boards the bus for his morning commute to his downtown office, he pays his \$2.00 fare by swiping his debit card in the fare reader. An onboard passenger counter ensures the vehicle remains within capacity limits. Meanwhile, a separate system provides the central dispatcher with the bus's location, speed, and schedule status. And a wireless vehicle bus adapter monitors and reports the engine's performance, fuel usage, idle time, and even diagnostic engine codes.

Paul quickly settles in his seat beneath a digital advertisement that changes every 60 seconds. At the back of the bus, a security video camera helps the transit authority's security team monitor the safety of the vehicle and passengers from the central headquarters. Paul takes out his smartphone, connects to the bus's passenger WiFi hotspot, starts his music-streaming service, and gets a head start on his email for the busy day ahead.

Whether it's by rail or by road, in public transit today, sophisticated connectivity has rapidly become a mandatory requirement for creating a safe, comfortable, and timely travel experienced for riders of trains, trolleys, buses, and other vehicles. Regulators and watchdogs are demanding many of these services, and riders' expectations are rising as well.

Unfortunately, agencies are struggling with a rapidly growing number of connectivity applications:

- Payment terminal backhaul
- Computer-aided dispatch and automatic vehicle location(CAD/AVL)
- Passenger WiFi
- Passenger counters
- Closed-circuit security cameras
- Remote engine diagnostics and fuel consumption
- Driver performance, including speed and idle time
- Digital signage and advertising

These intelligent applications and subsystems – at least some of which have been implemented by most transit agencies – can provide a broad range of highly valuable data, services, and feedback. But they can present their own sets of unique management and maintenance challenges as well.

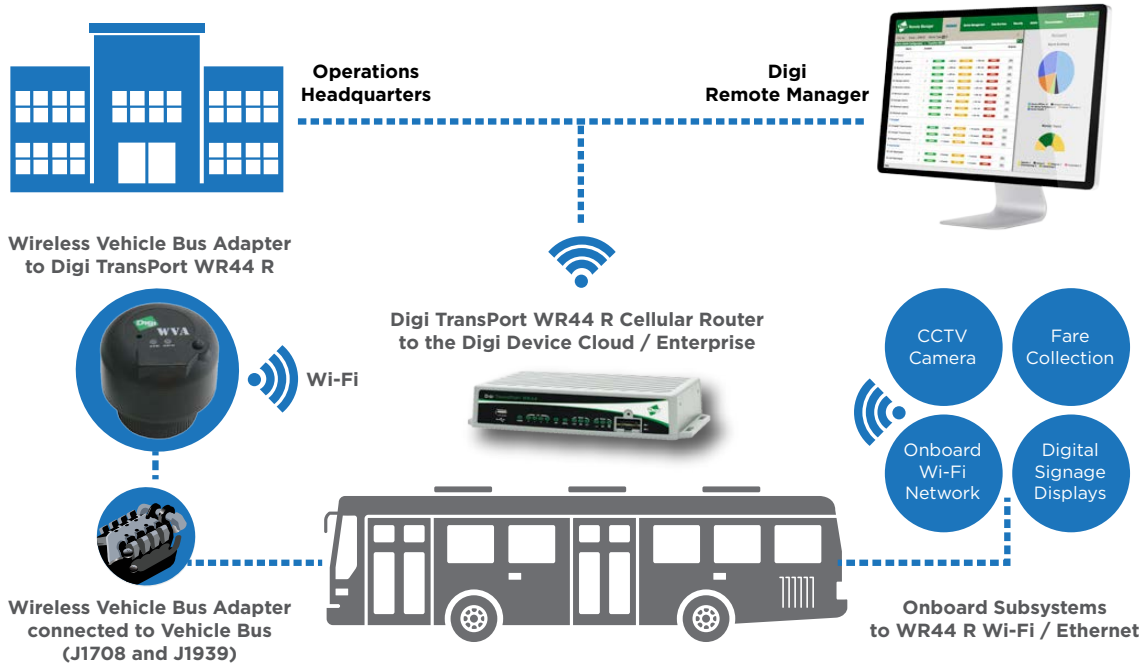


Moving Beyond Stovepipe Connectivity

Over many years, transit agencies have gradually added different applications and systems to their fleets of vehicles – each of which uses its own independent methods for Internet connectivity. It started most often with GPS navigation and vehicle tracking with CAD/AVL systems. Soon, there were on-board payment systems (and even ticket kiosks in terminals and stations) that all needed backhaul to the central office. Then, passenger WiFi, digital signs, and more.

The result? A classic “stovepipe” situation with a multitude of different systems, data types, priorities, and hardware and software. And, of course, each system had its own connectivity requirements and methods, installations, carriers, and other complexities. For transit agencies already burdened with countless vehicles and IT infrastructure to maintain and strapped by severe budget constraints, that’s a recipe for failure. With more hardware, software, and connectivity to maintain and manage, the risk of system failure increases.

For many transit systems, the answer is to consolidate all vehicle connectivity through a single, robust connection platform. The Digi TransPort WR 44 cellular router offers an all-in-one mobile communications solution for secure high-speed wireless connectivity between vehicles and a central dispatch center/data center. TransPort WR44 features a rugged, flexible design with an integrated Wi-Fi access point (with multi SSID), USB, serial, and four-port Ethernet switch, as well as a variety of configuration options including multiple serial ports (async or sync), GPS for connecting to CAD/AVL, and integration with Digi's Wireless Vehicle Bus Adapter to monitor engine diagnostics and vehicle performance.



The Digi TransPort WR44 R consolidates fleet connectivity

By consolidating vehicle connectivity for all applications and subsystems, the TransPorts WR44 R can improve operational efficiency, increase on-time schedule performance, and extend the life of your vehicle fleet.

For implementers, consolidated connectivity offers three distinct advantages, as described below.

1. Secure And Non-Secure Applications Traffic Through A Single Router

Most transit authorities want to take the right steps to ensure that the data from their high-security applications, such as fare readers and payment systems are segregated from less-critical applications, such as digital advertising signage. Those critical applications require three important characteristics:

- Encryption to prevent unauthorized viewing of your data
- Message integrity to ensure the data hasn't been tampered with enroute from the vehicle to the central office
- Authentication to verify the message is from a valid source

Traditionally, the best practice was to deploy a separate, dedicated router for each application or subsystem. However, with the TransPort WR44 R, can provide the encryption, message integrity, and authentication to provide unified, secure, and isolated traffic. The key technology that makes that happen: IPSec, a protocol for securing Internet communications through authentication and data encryption. Using IPSec, the TransPort WR44 R can establish a virtual private network (aka a "tunnel") using the public networking infrastructure.

Digi employs this feature in the TransPort WR44 R router to enable transit authorities to create multiple separate, autonomous, and simultaneous VPN tunnels from one router - one tunnel for each application or subsystem's traffic. In this manner, high-security payment data can travel on its own protected VPN tunnel without impacting—or being impacted by—other data traffic.

2. Prioritizing Traffic

Of course, even when you route all of your wireless connectivity through a single device, that doesn't mean all data traffic has the same value. Certain subsystems - such as payment terminals or bus-engine data - must take priority, while passenger WiFi and digital signage are less important. For example, you don't want your payment transactions blocked because a passenger is streaming a music video.

PCI Compliance for Transit Authorities

The payment card industry (PCI) standard for security is an important consideration for transit authorities that accept fare payments using debit or credit cards because PCI compliance is required for processing card-based payments.

This involves, not only components, but also securing the entire process. The Digi TransPort's IPSec-over-VPN architecture is ideal for achieving PCI compliance because all of the requirements can be incorporated into the router:

- Stateful firewall
- Encryption
- Network segmentation
- Event logging
- User authentication

The goal is to ensure that the high-priority traffic has the lowest latency. This is achieved through the IETF standard for differentiated services, an enhancement to the Internet Protocol (IP) that lets you configure bits in the IP packet header to designate the priority of the traffic. Using quality of service (QoS) settings at the router, you can specify the importance of the data in that packet. This method is universal, so that IP packet receives priority throughout its journey – all the way to the back office or data center. In this manner, you ensure that your connectivity prioritizes the data traffic that matters most.

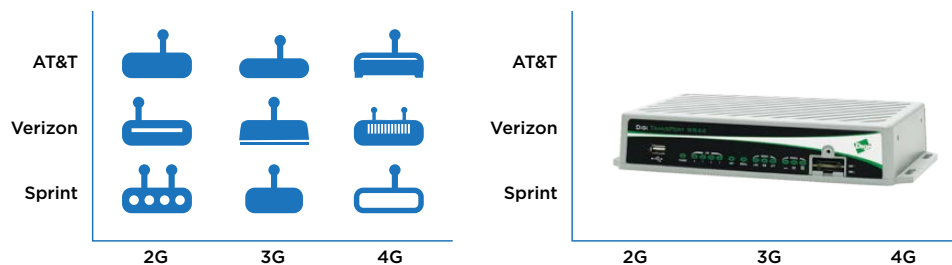
3. Managing Cellular Plans And Networks

A modern bus requires equipment that leverages robust and resilient connectivity. This implies two careful design considerations:

- Complete cellular connectivity – with a fallback option
- LTE coverage for faster connectivity, where available

The Digi TransPort WR44 R relies on Qualcomm’s GOBI LTE technology, providing dual SIM cards. That means a bus can use its router to connect over two different wireless carriers, such as Verizon and AT&T. If one carrier goes down (or out of range), the TransPort WR44 R auto-switches to another carrier. And, since the device is no longer tied to a specific carrier, you can switch carriers without a field-service call requiring a technician to physically access the device.

Transit authorities should also ensure their vehicles have the ability to work under different carrier bandwidth. For instance, the TransPort router can automatically fall back from 4G LTE to 3G or even 2G, as required. While bandwidth does degrade (potentially disrupting non-essential services such as passenger WiFi or security-camera feeds), CAD/AVL and GPS systems can continue to function normally.



Other Routers

Digi TransPort WR44 R

One SKU, all carriers, all speeds



Scalable, Secure Management Of Routers

To help transit authorities stay on top of every vehicle at every minute, Digi Remote Manager lets you remotely manage and monitor the health of your wireless devices. Complementing your current management tools, Digi Remote Manager lets you diagnose and fix remote devices without sending a technician on site. That means your critical applications enjoy greater reliability and availability without expensive site visits.

For instance, you can schedule firmware and configuration updates for your routers. When new firmware is launched that offers features you want to implement in your vehicles, you can activate those new versions without physically visiting each Digi router. By scheduling updates and configuration changes, and security changes for when vehicles aren't running, you can minimize disruptions.

Digi Remote manager can also help you track cellular usage and provide alarms when thresholds are exceeded. This can prevent runaway bandwidth consumption, for instance, in connection with passenger WiFi.



Conclusion

The future of mass transit belongs to agencies and authorities that can leverage smart, secure, and cost-efficient connectivity to improve the rider experience, lower costs, and improve safety and performance. With cellular routers like the Digi TransPort WR44 R, they can consolidate remote connectivity and simplify their infrastructures.



About Digi International

Digi International (NASDAQ: DGII) is your mission critical M2M solutions expert, providing the industry's broadest range of wireless products, a cloud computing platform tailored for devices and development services to help customers get to market fast with wireless devices and applications. Digi's entire solution set is tailored to allow any device to communicate with any application, anywhere in the world.

Key Takeaways:

- ✓ A proliferation of subsystems has created a hodgepodge of stovepiped applications that all use independent connectivity strategies.
- ✓ Agencies can move beyond stovepiped connectivity and consolidate their communication through a single on-board cellular router that supports everything from CAD/AVL and fare-card swiping to passenger WiFi and digital advertising signage.
- ✓ Secure and non-secure applications traffic can be merged through a single router through the use of IPSec and VPNs for separate, autonomous, protected data streams.
- ✓ Traffic can be prioritized by configuring IP packet headers to ensure critical applications such as passenger payments get through.
- ✓ Fallback strategies and carrier redundancies can minimize the risk of downtime and give transit authorities more flexibility in their choice of carriers.

Contact a Digi expert and get started today

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