



Making the Connection in **Transportation**

How Transit Operators Can Consolidate Cellular Connectivity for Smarter, Safer, and More Efficient Operations

The Expanding Mission for Transit Authorities

As Jim boards the bus for his morning commute to his downtown office, he pays his fare by swiping his transit pass in the fare reader. An onboard passenger counter ensures the vehicle remains within capacity limits. A separate system provides the central dispatcher with the bus's location, speed and schedule status.

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

Behind the scenes, multiple devices are at work, managing all of these processes, routing data, and connecting with central dispatch. Each process has its own requirements for bandwidth and security.

Transit agencies are struggling with a rapidly growing number of applications and how to economically implement all of them:

- Fare collection and payment terminal backhaul
- Computer-aided dispatch and automatic vehicle location (CAD/AVL)
- Untethered dead reckoning GPS capability
- High-speed passenger Internet access
- Passenger counters
- Closed-circuit security cameras
- Remote engine and fuel consumption diagnostics
- Vehicle telematics, including speed and idle time
- Digital maps, signage and advertising

Digi offers [5G all-in-one solutions](#) tailor made for transit operations that support the full range of connectivity needs. We also include [Digi Remote Manager](#) — fully integrated via [Digi 360](#) — for fast configuration, and ongoing remote monitoring and management.



Digi solutions for transportation offer an all-in-one mobile communications system for secure high-speed connectivity between vehicles and a central dispatch/data center.

Simplifying System Connectivity

As IoT technology has advanced, transit agencies have gradually added multiple applications and systems to their fleets of vehicles — often with differing methods of connecting to the Internet. The municipal authority may have started with GPS navigation and vehicle tracking CAD/AVL systems, and then later added on-board and in-terminal payment systems that needed backhaul to the central office. Then came passenger Wi-Fi, digital signage, security cameras and more.

The result for many transit agencies was a multitude of systems that do not integrate with one another, and that use differing Internet connectivity methods and cellular carriers. For municipalities already burdened with managing large fleets while maintaining an IT infrastructure within a tight budget, the challenges can stack up. And with even more hardware, software and connectivity to maintain and manage, the risk of system failure only increases.

For many transit systems, the answer is to consolidate all their vehicle connectivity through a single, robust connection platform.

Digi solutions for transportation offer an all-in-one mobile communications system for secure high-speed cellular connectivity between vehicles and a central dispatch/data center, with centralized visibility and management across the deployed network.

Designed for the most demanding transportation and mobile environments, Digi TX65 delivers 5G NR connectivity built on the Qualcomm SDX72 platform with true enterprise-class routing, security, firewall, and an integrated VPN. Digi TX65 provides a flexible interface design featuring a 2.5 GbE WAN port, 4x Gigabit Ethernet LAN, USB-C, serial, integrated Wi-Fi 7 tri-band dual concurrent, and multi-constellation GNSS.

Passenger Wi-Fi is managed securely and is separated from communications for the onboard vehicle systems. 3CC downlink carrier aggregation on each cellular interface combines available spectrum to deliver Gbps-class throughput to passengers. Onboard systems retain priority and any remaining bandwidth is made available to Internet traffic.

Dual cellular and dual Wi-Fi modules provide true segmented traffic flow of private and public data for fare collection, CAD/AVL data, camera log backhaul and passenger Wi-Fi access. Most importantly, the software-defined features from the cutting edge operating system to integrated [Digi TrustFence](#) security, system-wide intelligence with [Digi Remote Manager](#) and peerless reliability with [Digi SureLink](#) make Digi TX65 an industry-leading solution.

By consolidating vehicle connectivity for all your applications and subsystems, Digi TX65 can improve operational efficiency, increase on-time schedule performance and extend the life of your vehicle fleet.

For implementers, consolidated connectivity offers the following three distinct advantages.

1 Segmenting Secure and Non-secure Data with One Device

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

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

Traditionally, the practice was to deploy a separate, dedicated router for each application or subsystem. Digi TX65 changes this with its encryption, authentication, and message integrity features. The result is unified, secure and isolated traffic. The key technology is IPsec, a protocol for securing Internet communications through authentication and data encryption. Using IPsec, the router can establish a virtual private network (or "tunnel") using the public networking infrastructure.

Digi employs this feature in Digi TX65 routers to enable transit authorities to create multiple separate, autonomous, and simultaneous VPN tunnels from a single router; each application and subsystem has its own tunnel. 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

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 Wi-Fi and digital signage are less important. For example, you don't want your payment transactions blocked because a passenger is streaming a music video.

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 your connectivity prioritizes the data traffic that matters most.

This is particularly relevant in mission-critical communications used by first responders, including FirstNet, Frontline and other public safety networks for emergency group communications, interagency communications and location tracking.

3 Highly Reliable Cellular Connectivity

City officials and residents expect their regional transit systems to be safe and to run on schedule — and that onboard systems such as fare collection and Internet access be fully operational. This requires a cellular communication link that is fail-safe and secure, with high bandwidth and low latency. Digi routers are purpose-built for such a task:

- Dual cellular interfaces with 5G NR and LTE fallback, each with dual SIMs, enabling seamless automatic failover
- Digi SureLink maintains persistent connections ensuring rapid, always-on communications
- Advanced cybersecurity features keep hackers out and the system running

Digi TX65 integrated software for security, reliability, monitoring, and predictive maintenance, plus industry-leading hardware features, enables onboard systems to operate at peak performance. The outcome? A more efficient, secure, and friendly transit service for the community served.

Automatic Failover Maintains Uptime

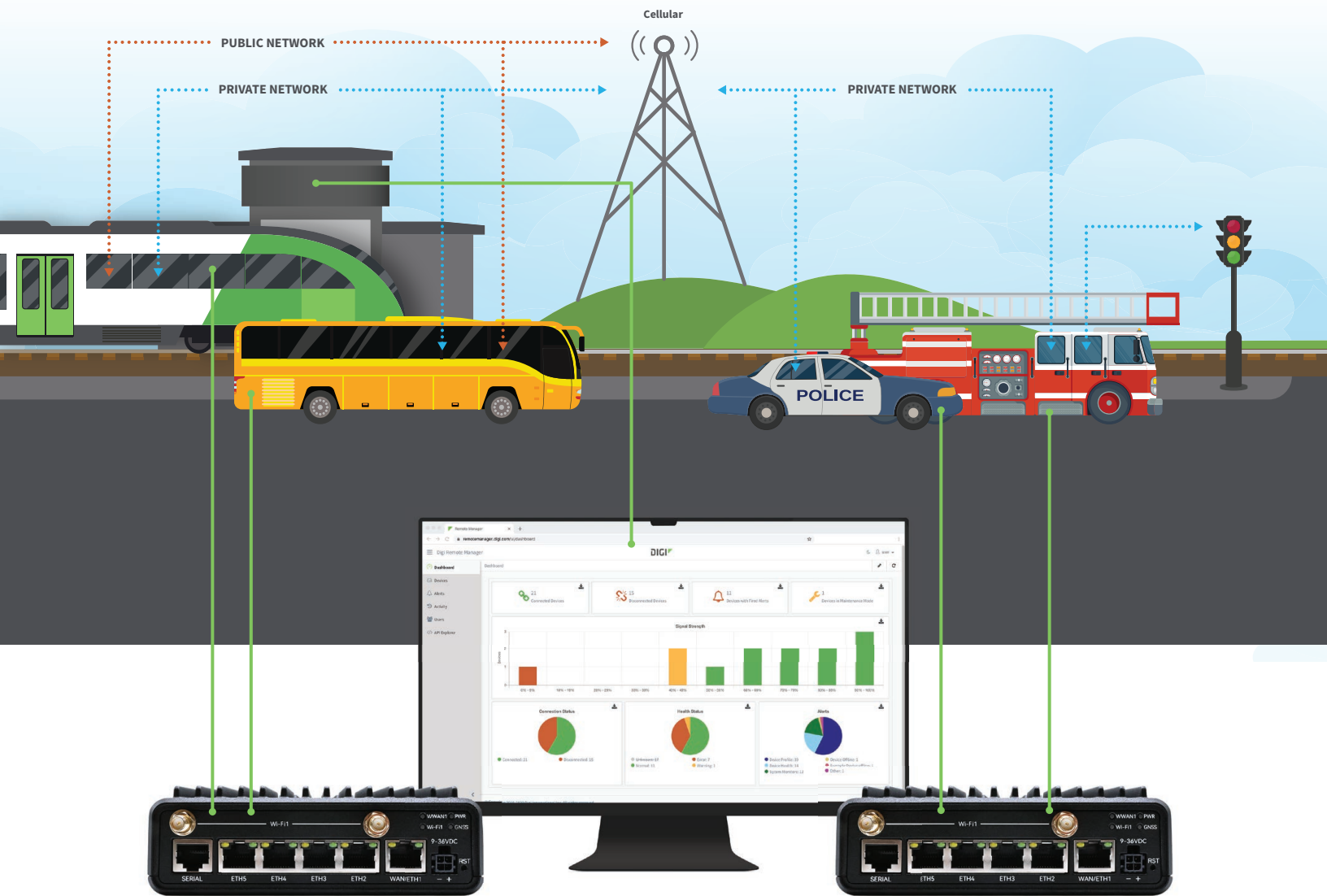
Modern transit requires equipment that leverages robust and resilient connectivity. This implies three careful design considerations:

- Dual redundant communications
- Complete cellular connectivity — with failover between carriers
- 5G and LTE coverage for faster connectivity

For each cellular module in Digi TX65, there are 2 physical SIM slots plus an integrated eSIM on the 5B modem, enabling connection across two different wireless carriers with seamless automatic failover and Dual-SIM Dual-Standby for intelligent failover. That means a vehicle 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), Digi TX65 auto-switches to another carrier across dual cellular modules. Dual cellular radios, each with dual SIMs (WWAN 1 and WWAN 2), ensure a seamless ‘sub-second’ transition between two carriers to avoid any interruption during critical service times.



Versatile on-board public and private data connectivity.



Digi TX65 (FirstNet Ready™)

Public Transport and Light Rail Applications

- High-speed passenger Wi-Fi
- On-board security video
- Infotainment and digital signage
- Operator VoIP
- Fare collection
- Automated passenger counter
- Computer-Aided Dispatch (CAD) and Automated Vehicle Locations (AVL)
- Untethered Dead Reckoning

Public Safety Applications

- Body worn camera
- Automated license plate reader
- Mobility tablet
- LMR to LTE gateway
- Vehicle camera
- Location (GPS)
- FirstNet Ready™
- Passenger Wi-Fi

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 securing the device components, connectivity and transactions. Digi TX65 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 New Standard for Dual Redundant Communications

Passengers today demand a faultless onboard Internet experience. And with so many transportation options, transit agencies that are unable to provide seamless Wi-Fi will struggle to grow or even retain their ridership. Meanwhile, agencies must also be able to integrate vehicle data from engines, logistics programs, fare collection, cameras and digital signage, all while maintaining the highest level of security.

Digi TX65 meets these complex simultaneous needs with Gbps-class 5G NR cellular via the Qualcomm SDX72 platform and Wi-Fi 7 tri-band dual concurrent radios, so that transit organizations can securely segment private data from public data. Internet access for riders is managed separately without impact to onboard communications systems.

- Digi Remote Manager is a web-based management platform that monitors both device and network health in mobile locations with automated updates to minimize service disruptions

- Video and vehicle data offload over Wi-Fi 7 backhaul; via Digi Remote Manager, vehicles can prioritize data offloading at a depot via Wi-Fi so as not to incur high cellular data plan costs
- Wi-Fi 7 tri-band dual concurrent access point for all IP-enabled passenger devices
- 1x 2.5 GbE WAN + 4x Gigabit Ethernet LAN for onboard systems, eliminating the need for a separate network switch on board
- Quad-core 64-bit CPU with 2 GB RAM and 8 GB eMMC storage

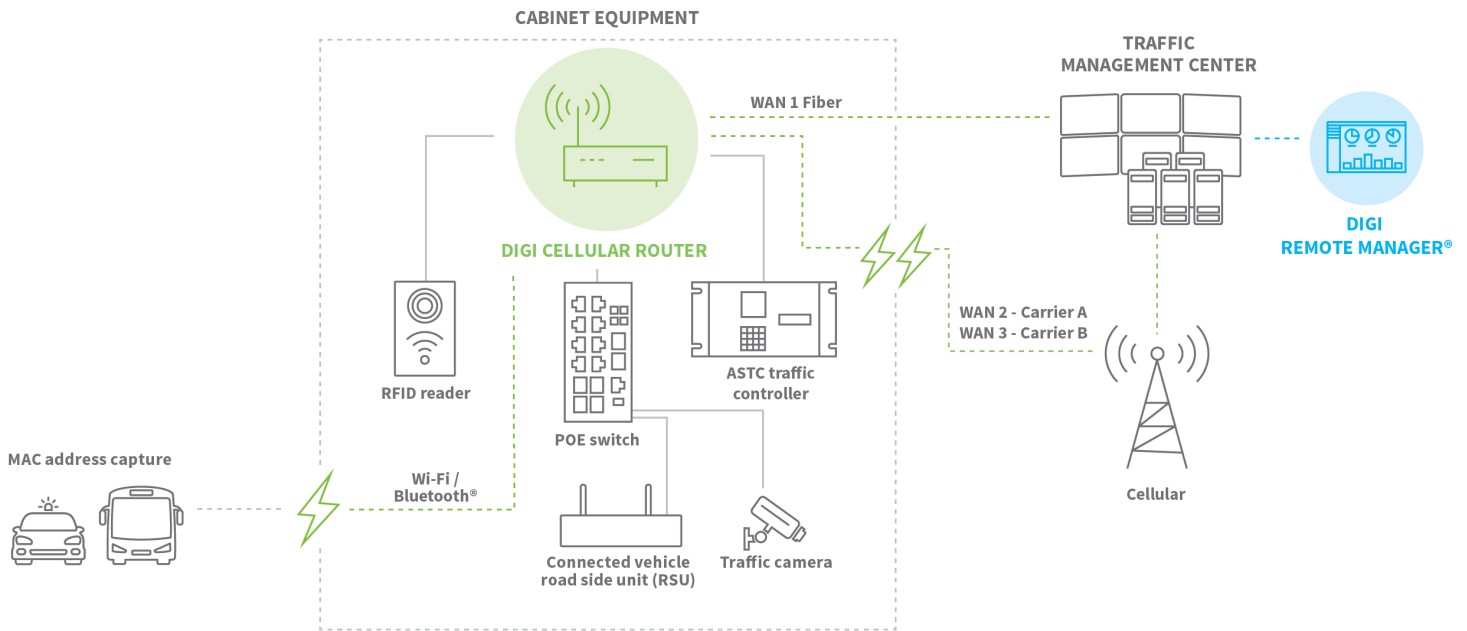
Digi TX65 (FirstNet Ready) / Public Safety Networks and Applications

The high performance and versatility of FirstNet Ready™ Digi TX65 routers make them ideal for mission critical use cases requiring continuous connectivity, field longevity, edge computing and public safety communications.

Designed to meet the demands of first responders, including FirstNet [extended primary](#) industries like utilities and transportation, the Digi TX65 includes concurrent and independent dual-cellular interfaces that prioritize critical communications during an emergency. Available with dual Wi-Fi radios, Digi TX65 also segments passenger Wi-Fi from fare collection, data, video and other transit applications to ensure passengers are getting the best Wi-Fi experience.



- Wi-Fi 7 tri-band dual concurrent (2.4/5/6 GHz) for WAN or LAN service, with dual Wi-Fi radios on applicable SKUs to securely segment passenger data from mission-critical communications across Gbps-class 5G NR cellular via Qualcomm SDX72
- Quad-core 64-bit CPU with 2 GB RAM and 8 GB eMMC storage for high-throughput edge compute and DAL OS workloads
- FIPS 140-3 validated cryptographic security with Digi TrustFence for secure key generation, keeping agency and passenger data protected
- Digi Remote Manager, fully integrated via Digi 360, minimizes service disruptions with web-based tools to configure, update, and monitor device and network health



Conclusion

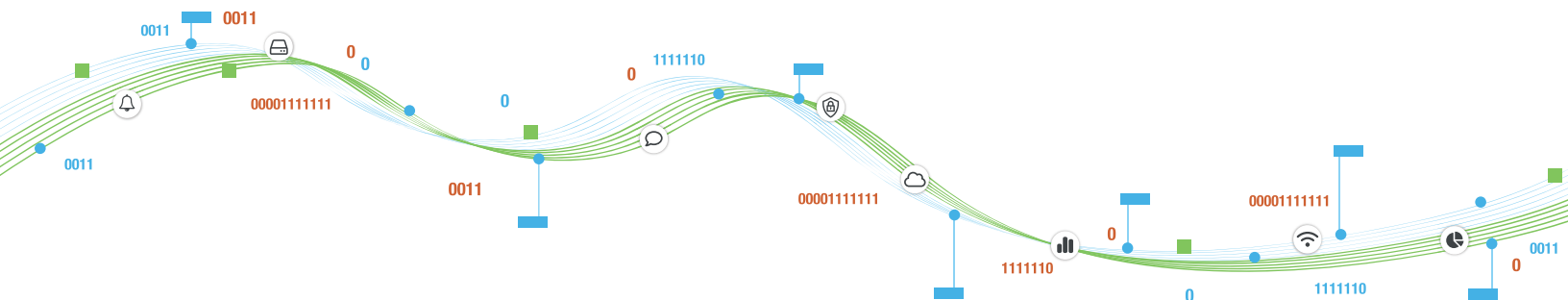
The future of transit belongs to agencies, operators and authorities that can leverage smart, secure and cost-efficient connectivity solutions to improve the rider experience, lower costs and improve safety and performance. With cellular routers like Digi TX65, they can consolidate remote connectivity and simplify their infrastructures.

The Digi Advantage

Digi International is your mission critical IoT solutions expert, with the broadest range of wireless transit products, a cloud computing platform for command and control of your entire network, and development services to help customers plan and deploy infrastructure and connectivity upgrades faster and at a lower cost. The entire Digi solution set is tailored to allow any device to communicate with any application, anywhere in the world. Look to Digi for what's next to keep you up to speed and up to date.

Key Takeaways

- A proliferation of subsystems has created disparate, unintegrated transit applications that all use independent connectivity strategies.
- Agencies can move beyond connectivity and consolidate their communications through a single on-board cellular router that supports everything from CAD/AVL and fare-card swiping to passenger Internet and digital signage.
- A single router can manage traffic for both secure and non-secure applications using IPsec and VPNs for separate, autonomous protected data streams.
- Passenger payments and other critical applications can be prioritized by configuring IP packet headers.
- Carrier redundancies can minimize the risk of downtime and give transit authorities more flexibility in their choice of carriers.





Why Digi?

Digi is a complete IoT solutions provider, supporting every aspect of your project, from mission-critical communications equipment to design and deployment services to get your application designed, installed, tested, and functioning securely, reliably and at peak performance.

Digi builds its products for high reliability, high performance, security, scalability, and versatility so customers can expect extended service life, quickly adapt to evolving system requirements, and adopt future technologies as they emerge. Digi embedded modules, routers, gateways, and infrastructure management solutions support the latest connected applications across verticals, from the enterprise to transportation, energy, industrial and smart cities use cases.

Our solutions enable connectivity to standards-based and proprietary equipment, devices, and sensors, and ensure reliable communications over virtually every form of wireless or wired systems. Our integrated remote management platform helps accelerate deployment and provide optimal security using highly efficient network operations for mission-critical functions such as mass configuration and

firmware updates, as well as system-wide monitoring with dashboards, alarms, and performance metrics.

Company Background

- Digi has been connecting the “Internet of Things” — devices, vehicles, equipment and assets – since 1985
- Digi is publicly traded on the NASDAQ stock exchange: DGII
- Headquartered in the Twin Cities of Minnesota, Digi employs over 800 people globally, and has connected over 100 million devices worldwide

As an IoT solutions provider, Digi puts proven technology to work for our customers so they can light up networks and launch new products. Machine connectivity that’s relentlessly reliable, secure, scalable and managed — and always comes through when you need it most. That’s Digi.

Next Steps

- Ready to talk to a Digi expert? [Contact us](#) →
- Want to hear more from Digi? [Sign up for our newsletter](#) →
- Shop now for Digi solutions: [How to buy](#) →

Contact a Digi expert and get started today

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