



NET | MODULE

At the vanguard of digitalization

Connecting public transport for a future-ready network





Pioneering connectivity in public transport

→ NetModule – connection is our business

Public transport plays a crucial role in the mobility revolution and achieving climate protection targets. To inspire more people to switch to buses and trains, passengers need an engaging experience. This includes intelligent passenger information systems, convenient ticketing, safe travel and reliable journey times. Transport companies must tackle the challenge of rapid digital transformation. To enhance efficiency and customer orientation, both vehicles and infrastructure must be connected to the Internet. Belden makes these connections possible.

→ Who we are. What we can do for you.

For over 20 years, NetModule AG has been a digitization partner for the public transport sector. As a leading manufacturer of communication products for the Internet of Things (IoT) and Machine-to-Machine (M2M) communication, we provide European transport operators with innovative, robust and user-friendly connectivity solutions based on state-of-the-art wireless technologies. From hardware to central remote management platforms, our team of 60 specialists combines engineering expertise with innovation. We advise on router selection, handle system configuration and offer support and maintenance.

Headquartered in Bern, NetModule AG was founded in 1998. We have a branch office in Winterthur and subsidiaries in Frankfurt and Hong Kong. Since March 2022, NetModule AG has been part of Belden Inc.

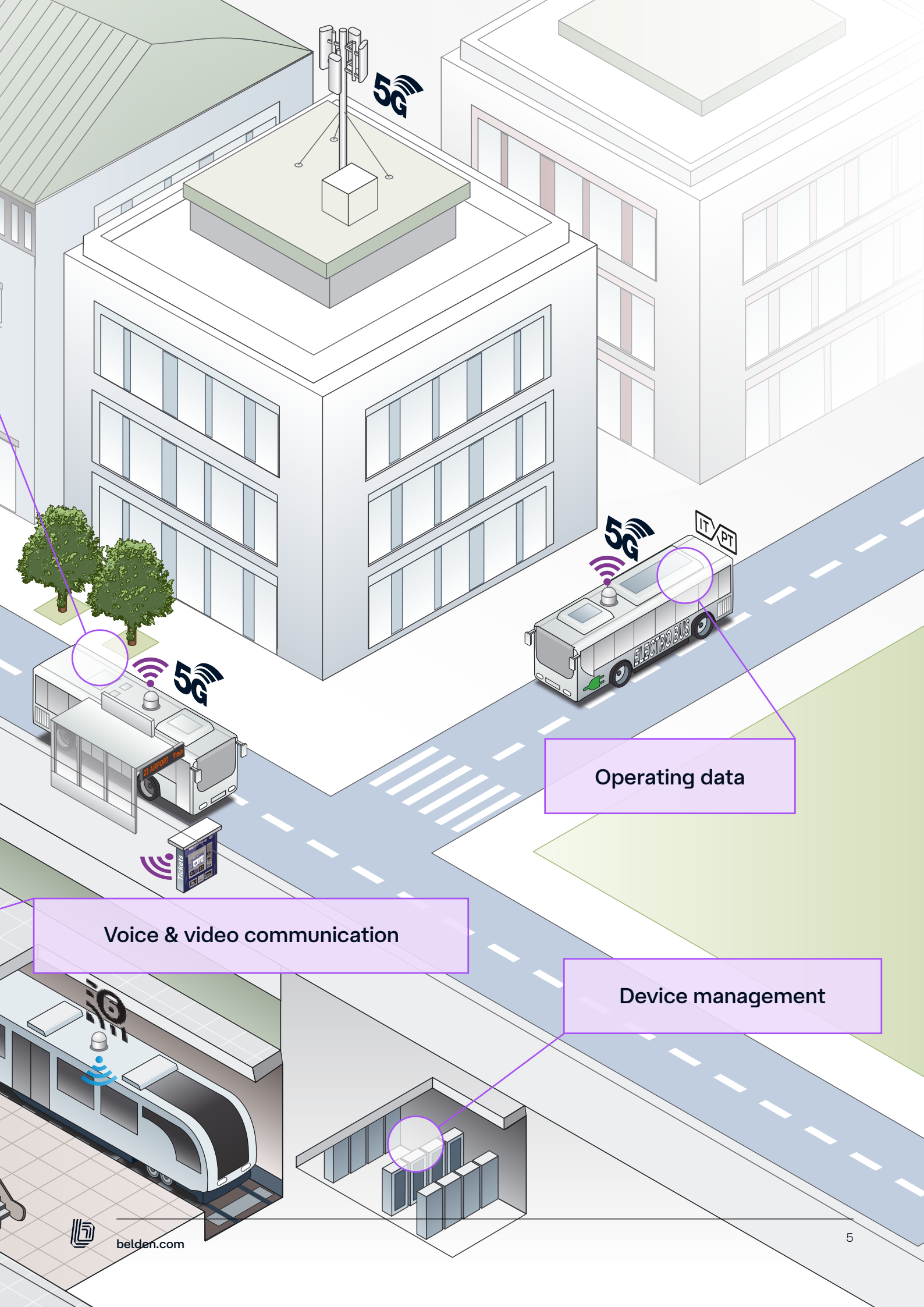
We offer comprehensive solutions
for every public transport need

Infotainment & Wi-Fi

Remote access

Secure connections





Voice & video communication

Operating data

Device management



Your challenges. Our solutions.

Infotainment & Wi-Fi

→ How can public transport offer an enhanced passenger experience?

The challenges of climate protection and Generation Z's unique approach to mobility underscore the growing importance of public transport. Public transport companies now face the urgent need to redefine themselves as attractive mobility service providers to encourage passengers to embrace the revolution in transport.

A fundamental requirement for this transformation is a fast and stable internet connection, similar to what passengers experience at home or work. They want to read the news, shop online, answer emails and chat with friends. Passengers also want to stream their favorite series with lightning-fast download speeds and uninterrupted Wi-Fi reception.

Digital infotainment systems, combining passenger information and entertainment, have become standard in public transport.

Automatic vehicle location provides real-time information about routes, possible connecting services and disruptions. Precise real-time updates enhance acceptance of public transport.

Meanwhile, news and entertainment offerings shorten the perceived journey time. Integrated advertising helps finance investment and operating costs.



AP3400 Access Point

- Wi-Fi 6, cutting-edge wireless technology
- Intelligent configuration options and top-class security functions
- Developed and certified specifically for local and long-distance public transport
- Straightforward retrofitting in existing vehicles

“Free Wi-Fi services and infotainment offerings significantly reduce the incidence of vandalism.”



Voice & video communication

→ How can public transport ensure a safe travel experience?

In the event of a medical emergency, vandalism, harassment or a technical breakdown along the route, digital communication systems enable rapid information exchange between drivers, the control center and passengers. This ensures swift responses in critical situations.

Drivers can communicate with the control center at the touch of a button. The control center can then inform passengers through announcements in vehicles, at bus stops and in stations. If passengers request help using a push-to-talk emergency call station, service staff can determine the exact location within seconds using Global Navigation Satellite System (GNSS) tracking. Video surveillance is another key component of a security concept. It helps to solve crimes and has also been proven to prevent them. Together, these systems enhance the overall safety and security of public transport.

The goal is to meet passengers' safety needs by providing a high level of security on public transport, minimizing the costs of willful property damage and reducing the need for security personnel.

“CCTV systems can also be used as intelligent sensors during normal operation, for instance, for monitoring capacity on railway platforms or serving as smoke alarms.”

Remote access & device management

→ Can large fleets also be managed conveniently?

As the vehicle fleet grows, so does the complexity of device management and the effort involved in scheduling regular maintenance cycles. Digitalized transport companies need an intelligent device management platform for cost-efficient and secure administration and remote maintenance of their device network.

It takes just a few clicks to view the entire fleet and access each individual device. A web interface allows necessary security updates, firmware updates or configuration changes to be performed remotely during operation. These updates can be done either automatically or on demand without on-site service technicians.

Modern network infrastructures remain fully scalable. New vehicles, systems and devices can be integrated quickly and without expert knowledge.

“Using a device management platform as a central data hub enables, for instance, the use of passenger counts to optimize vehicle deployment by incorporating current utilization figures.”



NB3800 Railway Router

- State-of-the-art cellular technology, 5G-NR and multi-provider bundling: automatic selection
- Voice communication system, Voice over IP gateway
- Up to 1 TB internal router memory
- Compact, fanless, robust design optimally built for rail vehicles



Connectivity Suite

- Device management, over-the-air remote updates and configurations
- Remote maintenance at any time, at any location worldwide with just a few clicks
- Large-scale rollout made easy thanks to automated task processing
- On-premises or cloud installation



Operating data

→ How can efficiency be boosted in public transport?

Public transport is resource-intensive. Passengers expect an extensive network and high-frequency service. At the same time, vehicle utilization levels must be high to reduce operating costs. Transport operators cannot afford unplanned, long downtimes.

Fleet digitization allows real-time monitoring of operational status using condition monitoring systems. These systems use temperature sensors and vibration monitors, for example. Vehicle routers transmit status information from important components to the control center. This information is securely encrypted and prioritized by relevance to the system.

Maintenance teams can use intelligent data analysis to identify problems early and respond proactively. Spare parts can be ordered in good time and service intervals can be planned according to needs (predictive maintenance).

This reduces the number of breakdowns and the risk of accidents. Timetables are adhered to more reliably, customer satisfaction grows and operating costs are reduced.



NB2800 Vehicle Router

- Data capture and qualification in a single unit
- Simplified installation in the vehicle using the interoperable ITxPT architecture
- State-of-the-art cellular technology, 5G-NR
- Interface extensions allow the onboard systems of different types of vehicles such as buses, or municipal, emergency and even agricultural vehicles to be integrated

“Vehicle telematics also provide valuable information on driving behavior. They help to cut fuel consumption, minimize wear and tear and reduce the ecological footprint.”

Secure connections

→ Is sensitive data really transmitted securely?

Public transport must be simple and secure. This includes modern-day ticketing at user-friendly machines with options for cashless payment. Whether on the bus, at the bus stop, or at the station, straightforward ticketing relieves the burden on drivers and avoids queues. A stress-free travel experience boosts customer satisfaction.

Transport operators face the challenge of networking all ticket vending machines to the control center. These machines must be enabled for cashless and contactless payments, including wireless options for on-board ticket purchases and in passenger areas without a wired connection.

Handling sensitive payment data requires maximum security during transmission between the service terminal and the control center. High connectivity, guaranteed coverage and state-of-the-art encryption technologies like OpenVPN are essential. This ensures adherence to the highest EU data protection standards and minimizes revenue loss due to downtime and aborted purchases.



IIoT router range

- Ideally suited for installation in fixed-location systems
- One software platform for all NetModule devices, simple expansion of applications across all hardware ranges
- Multi-talented: Connect services and systems, such as CCTV cameras, digital signage or public WLAN
- Strong, systematic security – manage the attached critical infrastructure with the integrated, industry standard firewall

“Digitalized POS terminals make it possible to implement customer-friendly eTicketing services entirely without the need for passengers to work out complex fare zones.”





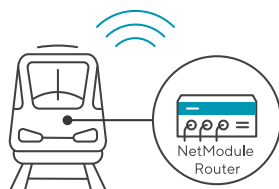
Success stories

Top public transport companies across Europe are using NetModule solutions to digitalize and network their vehicle fleets.

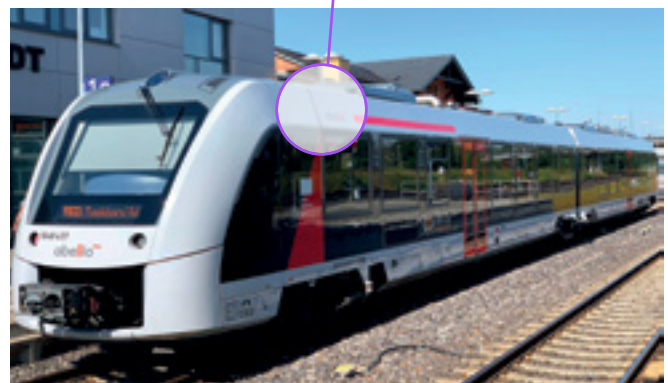
→ Unwired Networks & Abellio Rail Mitteldeutschland

Abellio Rail Mitteldeutschland operates 54 trains on the Saxony-Anhalt diesel network (DISA). The commissioning body provided a solution for on-board networks, including passenger WLAN. This solution could be rolled out to Abellio companies as a group standard.

We partnered with Unwired Networks to develop a concept for Abellio. This included hardware, passenger WLAN, real-time route information, an entertainment portal and network management. A high-performance NetModule router and certified access points were used to deliver a future-proof platform.



Passenger WLAN & infotainment



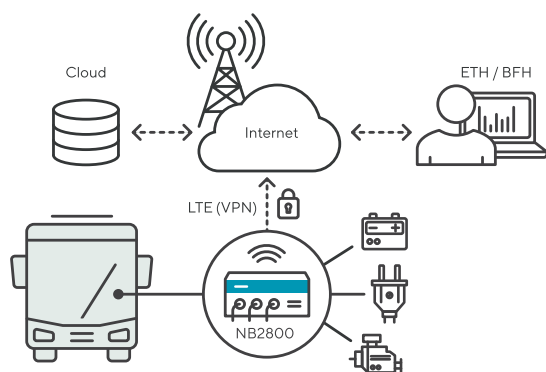
“The quality and modularity of NetModule’s network components provides the ideal basis for demanding customer projects.”

Alexander Szlezak, CEO, Unwired Networks GmbH

→ HESS AG

The “SwissTrolley plus” research project, sponsored by the Swiss Federal Office of Energy, has been serving Zurich’s public transport routes since early 2017. Developed by Swiss vehicle manufacturer HESS AG, this innovative electric vehicle accommodates around 160 passengers.

A unique challenge was securely isolating and reading data from different vehicle parts for direct pre-processing on the router. NetModule designed the router with special interface connections to meet this need. Each day, several gigabytes of data are securely transferred to the cloud using LTE and OpenVPN. Participating universities use this data for research on maximizing battery life.



Customer-specific router



Over-the-air device management

→ Hamburger Hochbahn

Hamburger Hochbahn AG (HHA), one of Germany’s largest public transport companies, operates the Hamburg underground and most bus services within the Hamburg public transport network (HVV). To introduce around 300 self-service terminals for modern ticketing, HHA needed to connect the ticket vending machines to the Internet for online services and cashless payments.

NetModule provided a solution with 300 routers, ensuring simple management and maintenance over the air. These routers are monitored, controlled and maintained remotely using the Connectivity Suite.

“NetModule was the only vendor that could meet the challenges with its modular routers and device management software.”

Martin Austen, project manager, Hamburger Hochbahn AG



Connect to what's possible.



About Belden

Belden Inc. delivers complete connection solutions that unlock untold possibilities for our customers, their customers and the world. We advance ideas and technologies that enable a safer, smarter and more prosperous future. Throughout our 120+ year history we have evolved as a company, but our purpose remains – making connections. By connecting people, information and ideas, we make it possible. We are headquartered in St. Louis and have manufacturing capabilities in North America, Europe, Asia and Africa.

For more information, visit us at:
belden.com

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