

# Comprehensive Railway Solutions

## Advertising, Voice and Passenger Information System in Helsinki's Metro Trains



### ⇒ Project Intro

Helsinki City Transport (HKL) - Helsinki's underground operator – contracted the advertising space in their underground to the company Clear Channel, in order to provide real-time advertising and entertainment for metro passengers. Naturally, the technology of choice for the content delivery was IP. That was the basis for the design and deployment of all necessary equipment and services in HKL's underground trains. HKL decided to show advertisement spots on screens in the subways. The ads are fed over the network to the subways in real time. This required the deployment of a new communication network to the subway system. The network infrastructure is used for maintenance scheduling, access to the train diagnosis system and real-time access to general train information. These functions had to be carried out on board the train before, and can now be done remotely. The same network could be used to offer passengers a free WLAN connection while travelling.

Company: **Helsinki City Transport (HKL)**

Location: **Helsinki, Finland**

### System Requirements

- Seamless wireless connection from the track to the subway car, with wireless Access Points inside the car
- Rugged industrial products with IP54 or higher and rail certification
- Rail approved EN-50155 Ethernet switches that offer VLAN capability and redundancy inside the train
- Products that are easy to integrate with legacy devices
- High number of ports to connect all equipment in each car to a single Ethernet switch

### Moxa Solution

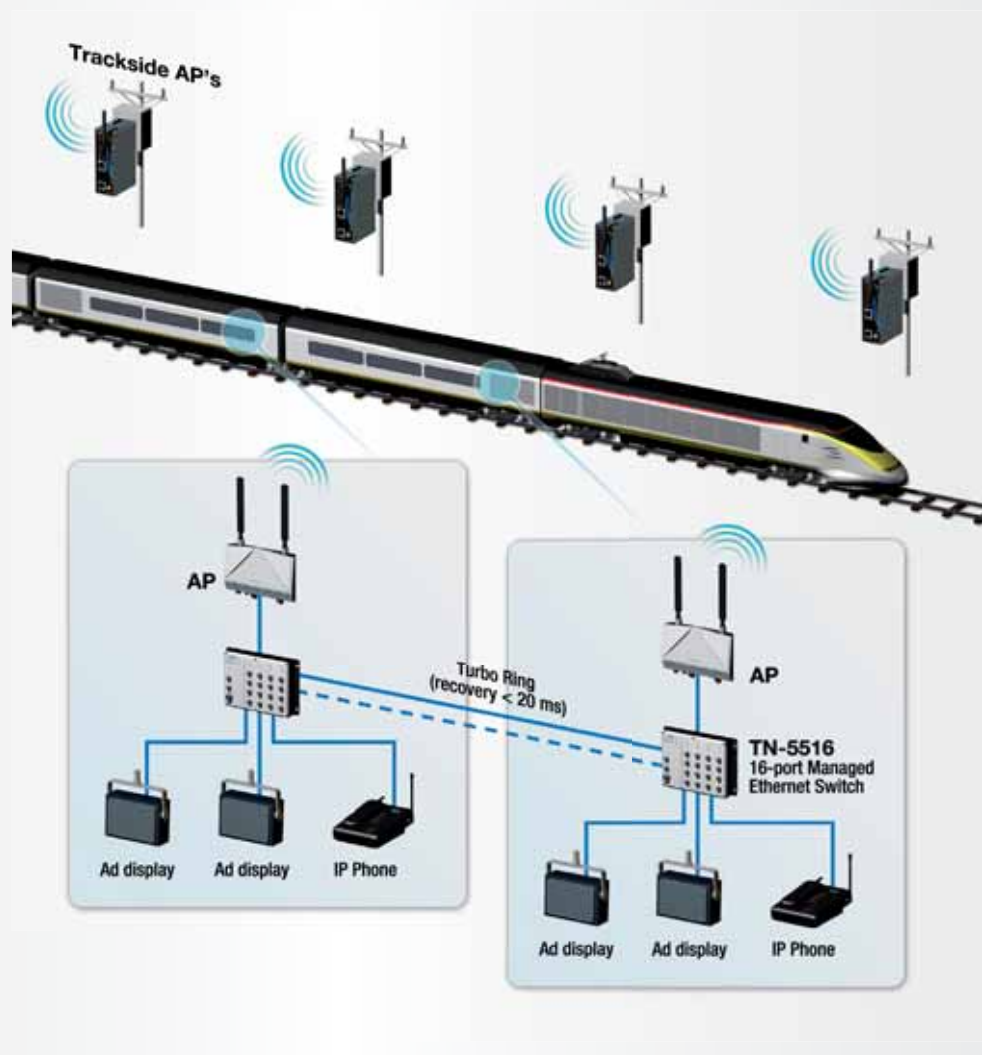
Delivering IP based content to moving vehicles such as underground trains posed several challenges to the HKL engineers, which after surveying the available options, made two key choices: the train to ground communication will be based on 802.11 wireless, and the communication infrastructure used on-board the trains will be industrial Ethernet. HKL was looking for both a highly reliable wireless connection and an industrial Ethernet network on-board the trains. The different devices needed to comply with EN-50155:2007 certifications for rolling stock and offer a high degree of protection against environmental influences, at least IP54 or higher.

The communication from the trackside to inside the underground car is realized by an existing redundant WLAN system. The system is always connected to two access points. As soon as one access point is dropped, the system immediately connects to the next one. This way, there is no roaming time at all.

The communication inside the train is realized with Moxa's TN-5516 EN50155 16-port managed Ethernet switches. Two switches, with two independent power inputs on two voltage levels (24 VDC, 72 VDC) are mounted in every two-car subway. The switches are connected through Moxa's redundant Turbo Ring protocol with less than 20 ms recovery time. All other communication devices are connected to the switches and separated into different VLANs. The network provides the customers with both an information system and a free WLAN connection while travelling with the subway.

## System Diagram

Twisted Pair Cable



## Why Moxa?

- Moxa was able to provide a train approved switch solution with a sufficient number of ports to cover all devices in the network ports and VLAN capability to fulfill the customer's needs
- TN-5516 managed Ethernet switches provide a stable and reliable, easy to deploy solution for redundant networks with Moxa's redundant Turbo Ring structure
- Their extended operating temperature range of -40 to 75°C is ideal for rugged environments
- Three rotary switches for setting the last 3 digits of the IP address - makes maintenance even easier
- The two independent power inputs on 24 VDC and 72 VDC perfectly matched the available power system in the cars

## ➔ Product



### EN50155 16-port M12 Managed Ethernet Switch with Redundant Power Inputs

- IPv6 Ready
- IEEE 1588 PTP (Precision Time Protocol) for precise time synchronization of networks
- DHCP Option 82 for IP address assignment with different policies
- Modbus/TCP industrial Ethernet protocol supported
- Turbo Ring, Turbo Chain, and RSTP/STP (IEEE802.1w/D) for network redundancy
- IGMP snooping and GMRP for filtering multicast traffic
- Port-based VLAN, IEEE 802.1Q VLAN, and GVRP to ease network planning
- QoS (IEEE 802.1p/1Q and TOS/DiffServ) to increase determinism
- IEEE 802.3ad, LACP for optimum bandwidth utilization
- SNMPv3, IEEE 802.1X, HTTPS, and SSH to enhance network security

And many more features. For details please refer to [www.moxa.com](http://www.moxa.com)