Case Study

Mobile High-Speed Internet Access Onboard City Trains

Advantages

- The Eurotech DURAMAR 2150 is a fully integrated purpose built Mobile access router for trains that combines a CISCO 3220 MAR core with modern high speed wireless interfaces.
- Designed for high availability and continuous customer service operation, the DuraMAR 2150 includes an independent GPRS modem for remote on-demand SNMP diagnostics and SMS configuration and recovery control.
- Built for train and rolling stock installations, this MAR combines isolated power supply, wireless interfaces, CISCO MAR core and the Eurotech embedded Linux communication controller all working seamlessly together.
- System upgrading is easy due to the modular architectural implementation of the DuraMAR2150. Migration to support new high-speed wireless technologies is possible. Firmware upgrading and maintenance is easy securing investment and reducing maintenance costs.

The Eurotech DuraMAR™ 2150 router to provide wireless high-speed Internet access to city train passengers

EUROTECH GROUP

The Systems Integration partner for this project is an Asian premier telecommunications provider in and a world-class solution provider in Information & Communications Technologies (ICT).

The Eurotech's DuraMAR™ 2150 was the optimal choice for implementing a high-availability on-train network back-haul connection. The Eurotech solution combines functionality, compatibility with CISCO communications infrastructures and compliance to international train and rail standards for mechanical durability, EMC as well as immunity and safety.

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The Scope of the Project

In order to extend the coverage of Wi-Fi service coverage across the complete city the high speed train connecting the city centre to the Airport would need to be equipped with a wireless backhaul connection providing a seamless high availability connection to passengers.

The wireless technology to be used would connect using current 7.2Mbps HSDPA network with an upgrade to support 14.4Mbps speed in the near future. The train would need to connect using layer 2 tunnelling based on l2tpv3 protocol over the 3G network.

A CISCO networking infrastructure is in place, so the mobile node would need to be bass on a CISCO Mobile Access router such as the 3200 Series MAR. This MAR would need to connect on one side to the train LAN network providing the Wi-Fi and on the other hand to a remote network using a 3G wireless interface.

The final deployment on a passenger train requires stringent adherence to internationally recognized standards for safety, EMC, immunity and resistance to shock and vibration commonly encountered on trains. The installation would have to be made on an existing feeder powered electric train.

The complete system and its operational management would need to be performed from a central control room where fleet status is remotely monitored, events logged and systems configured and controlled without disrupting the service.

The Eurotech DuraMAR2150 Solution

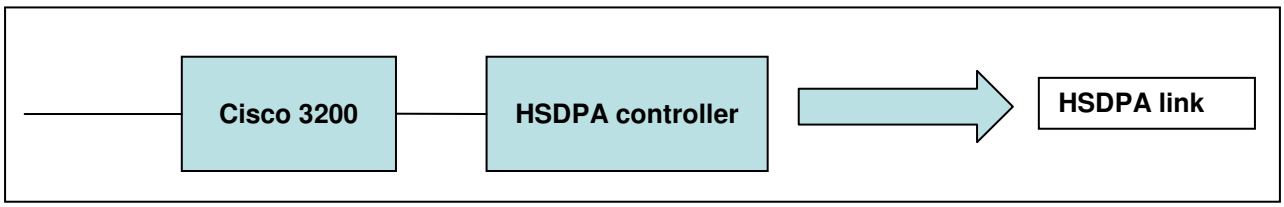
The DuraMAR 2150 with its internal architecture combining the CISCO 3220 MAR core, the Eurotech wireless communications controller interfacing the HSDPA modem to the MAR core, the train power supply – all in a single rugged enclosure proved to provide the functionality required for the Project.

Features of the CISCO MAR core and its' IOS used inside the DuraMAR2150 would support the required networking services and functionalities such as encryption, tunnelling and routing; while the controller interfaces the wireless modem to the CISCO MAR. The combination of these two subsystems connected with an internal Ethernet connection is capable of interfacing to an external switch and access points on the train side and the 3G wireless network.

Migration from 7.2Mbps HSDPA to 14.4Mbps or faster networks is possible due to the internal implementation of the system. Modem firmware can be upgraded and the modem can easily be changed to support new wireless technologies. The use of standard modular wireless devices and universal device interconnection schemes makes upgrading easy.

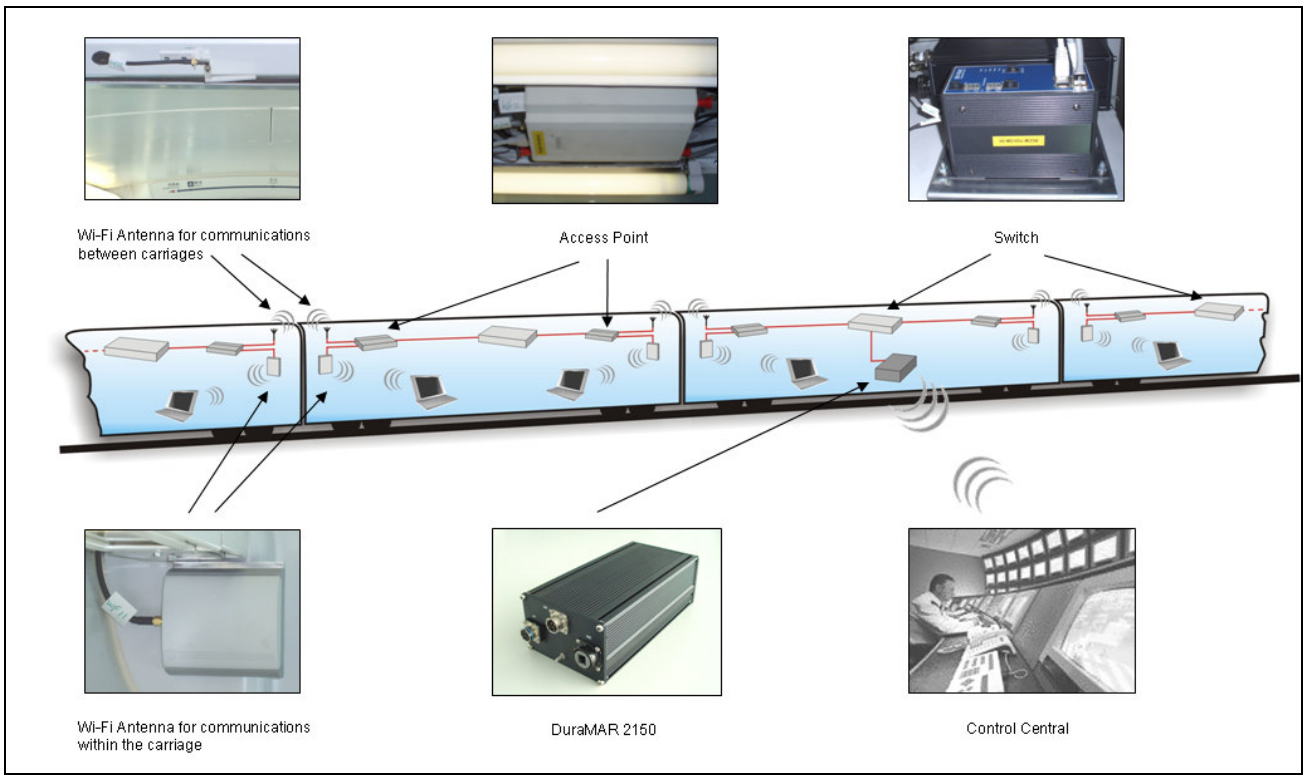
The DuraMAR2150 is purpose built for demanding vehicle installations. With its' structural heat dissipation, rugged metal connectors and IP65 sealed aluminium enclosure, the system proved to be easy to install in the existing structures of the train. The train with its 110Vdc power feeder was used to power the DuraMAR2150 further reducing device count. Approved installation required compliance to EN50155, EN61373, as well as EN50121. This made the fully compliant DuraMAR2150 easy to deploy. Testing of the final HW and SW configuration was performed to ensure safety and reliability.

The Eurotech DuraMAR2150 with its internal communications controller and GPRS modem addressed the need for remote diagnostics, SNMP support and recovery from a fatal failure. The Eurotech firmware is capable of managing remote access to the systems using GPRS data or SMS. The system supports remote diagnostics and alerts using SNMP and allows system logging from a remote control room. A special hardware power-on-off cycle can be asserted through an authenticated command SMS even if key subsystems are not responding.



Two sub-systems are integrated to create the DuraMAR2150

As shown in the picture below, one DuraMAR2150 is used to provide the wireless 3G HSDPA back-haul connection. The MAR is installed into the middle car of the train. Car-to-car network connection was implemented using dual radio access points capable of providing local passenger Wi-Fi coverage in the car and transparent mesh network connection between cars. This solution makes retrofit wiring easy and train resizing and reconfiguration faster. Downlink data rates up to approximately 4Mbps were reached using a 7.2Mbps HSDPA network in a moving train operating at a maximum speed of 130Km/h.



Wi-Fi and train network-architectural implementation

About Eurotech

Eurotech provides high reliability computer, networking and wireless hardware and middleware systems for applications such as transportation, domestic security, industrial, medical and defense. Our advanced platforms target system integrators and enterprise customers offering solutions increasing competitive advantage, business focus and revenue generation.

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