CASE STUDY:

Singapore MRT

Singapore advanced train radio communication system

MOTOROLA

The seamless upgrade marks a world's first for installing the new TETRA digital communications system in a transit system without disrupting communications or passenger services.

CUSTOMER NEEDS

SMRT's old system was straining under its growing needs, and SMRT wanted an upgrade that could fulfill the following needs:

- Efficient and dependable instantaneous communications across the network
- Improved voice quality
- Integrated data capability to support a suite of data applications, e.g. Visual Passenger Information System

Performing the upgrade without any disruptions to existing revenue-generating passenger services was critical to ensure service continuity.

BACKGROUND

In December 1998, Motorola was awarded a contract to supply Singapore MRT Ltd (SMRT) with an integrated digital communications system for its operations. SMRT is a train operator, whose routes link major population concentrations with the central business district, and the main shopping and tourist belts in Singapore. The new communications system was commissioned in June 2003. The seamless upgrade marks a world's first for installing the new TETRA digital communications system in a transit system without disrupting communications or passenger services.

The system is used to monitor and supervise the day-to-day operations of the passenger train fleet, providing seamless coverage and roaming capabilities for aboveground and underground stations and tracks, including 106 trains, 19 locomotives, 51 train stations, 42 radio sites, 3 depots and the operations control centre over a track length of 89 kilometres.

It replaces a 15-year-old analogue conventional radio system, which was not providing adequate radio communications coverage in some operational areas.

MOTOROLA SOLUTION

Motorola provided SMRT with a fully TETRA compliant Dimetra system operating in the 380-400 MHz band. The total solution is an integration of various subsystems to Motorola's Dimetra; the CAD system to support the Train Run Number (TRN) calling features and with interfacing to the ATS (Automatic Train Supervisory) system to extract train location information; and a Trainborne Radio system that interfaces with the in-train emergency communications button, public address system and other equipment monitoring.

High availability in rail transportation operations is essential so redundancy was built into the system such that if one component fails, another immediately and seamlessly takes over as a backup. These redundant system components ensure high system uptime and continuous operations.

The new system not only ensures seamless coverage across the entire track length and in key operational locations, the control centre is also capable of setting up individual calls or designated group calls. Communication groups can be dynamically formed so that key personnel from different functional groups can speak to one another.

Benefits

Operational Efficiency:

- Improved communication among staff
- Commuters can receive immediate guidance from staff in case of emergencies

Reliability:

- Efficient and reliable dispatch operations for fleet of passenger trains and maintenance vehicles
- Redundancy of critical components ensures high level of dependable communications at all times
- Increased reliability of system means reduction of maintenance and repair costs

Performance:

- Higher operational performance of the overall system
- Simplified monitoring and reporting procedures
- Improved response time

Passenger announcements can be transmitted from the control centre or within the trains. The control centre may initiate voice or data calls to trains identified by their Train Run Numbers (TRNs), which are dynamically assigned based on time, route and destination of runs. This is made possible through the CAD system, which cross-references the train's radio ID and its assigned TRN.

Operations control centre staff can also send data messages to the passengers in the trains through a Visual Passenger Information System (VPIS). These data messages, displayed on in-train information screens, communicate important information about train delays or changes in schedule. With this service, commuters are kept updated at all times, increasing the level of customer satisfaction.

Working in tandem with SMRT's ongoing passenger schedule, the project team comprising both Motorola and SMRT staff had to ensure that the system upgrade caused no disruption to existing passenger services. This made it necessary for upgrading work to take place only during off-service hours, typically between midnight and 4 a.m.

Installation of in-train equipment was carried out in two stages, with wiring completed in stage one and radio equipment installed only at a later stage. To ensure service continuity, Motorola designed an interface module that allowed the train service controller to seamlessly switch between new and existing systems. Motorola's engineers were also available 24 hours a day, seven days a week throughout the project implementation to ensure installation progressed without a hitch.

The result was a smooth migration to a new digital radio communications system that enhances operational performance and enables SMRT staff to deliver quality and reliable services.

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