Hytera Supplies A Island-wide Communication System for Sri Lanka Railway

Introduction

Hytera recently supplied a new island-wide railway communication system across Sri Lanka. Few companies are able to supply the full range of devices required, including train cab radios, hand portable PTT mobile phone, IP desk telephones and dispatching systems, and then integrate them together via a unified network management system with railway specific features. This innovative and comprehensive solution has completely modernised communications for Sri Lanka Railways, thereby enabling it to deliver a much more efficient, cost-effective, and passenger-friendly service.

The Background

Sri Lanka Railways (SLR) owns, operates and maintains 1,561 km of rail tracks, including 9 lines and 403 stations, 72 locomotives, 78 power sets and 565 carriages. At present, it employs a workforce of 17,634. SLR operates approximately 396 train services, including 67 long-distance and 16 intercity trains.

Project Name

Island-wide Radio Telecommunication System for Sri Lanka*

* won the "Best Use of Critical Communications in Transport" at ICCA 2022

Client Name

Sri Lanka Railways

Project Start/End Dates

Dec 2020-Feb 2023

Project Location

Colombo, Sri Lanka

Products

• PNC550 Handheld Phone
• SD1000 IP Phone
• CZT902 Train Cab Radio
• MCPTT Service Platform
• Railway Dispatching System

SLR is a government owned department operating under The Ministry of Transport. It's network is divided into three regional divisions: Colombo, Navalapitiya and Anuradhapura. The rail network carries about 3.72 million passengers daily.

However, several years ago the Government recognised that the railway network needed modernising. Tourism is a major industry for Sri Lanka, so providing an excellent rail experience was seen as a key factor in helping to attract more visitors.

To enable this, the Government launched the Sri Lanka Railway Efficiency Improvement Project (REIP). This comprised four main strands: the Railway Island-wide Smart Ticketing and Seat Reservation System; the Railway Island-wide Telecommunication System; Improving Railway Safety; and Improving Training Facilities.

The Railway Island-wide Telecommunication System (IRTS) was designed to replace the existing VHF/UHF radio telecommunications system (known as the BBC system) installed in 1985, which was no longer fit for purpose by 2012. The BBC system was unable to support communications with train drivers after the telegraph network was dismantled. It also did not allow voice recording or data transmission, and coverage did not extend to all the stations, which resulted in frequent delays. SLR also faced difficulties in finding spare parts and maintaining the system.

The Challenge

SLR needed a modern and reliable digital communication system to replace its out-of-date radio system. SLR does not possess any LTE radio frequencies itself, but in 2018 the government approved the building of the railway IRTS based on MCPTT (Mission Critical Push-to-Talk) over LTE technology.

The IRTS covers the entire railway network including all the stations, trains, level crossings, SLR maintenance and security units, and the three regional control centres in Colombo, Nawalapitiya and Anuradhapura. It provides voice and data communications for onboard train staff, railway station staff, railway maintenance staff and control room dispatchers and managers. It supports seamless communications for trains operating up to speeds of 160 km/h.

The main purposes of the IRTS are: to achieve safer train operations by avoiding collisions and other disruptive occurrences; to enhance railway operations by providing better train control and related decision making; to maintain good coordination between train operations staff; and to enable better management decisions relating to train operations.

The Solution

Sri Lankan mobile network operator Dialog won the bid to build the IRTS. Hytera was chosen as Dialog's business partner to provide the end-to-end MCPTT railway dispatching service, along with all the required radio and telephone devices.

A key reason for Hytera's selection is that it is one of the few communications vendors able to provide an end-to-end solution for railways covering train cab radios, handheld push-to-talk (PTT) mobile phones, indoor IP telephones, an MCPTT-compliant network management and service platform, and a railway dispatching system.

Hytera was awarded the contract thanks to its ability to provide this end-to-end solution, along with its strong track record in meeting the communication needs of mass transit systems, including railways and metros. SLR also appreciated Hytera's customer-oriented approach and flexibility over supporting the introduction of customized railway specific features, as well as the overall value provided by its cost effective solution.

Hytera supplied 20 dispatching controllers, three system management devices, three voice recording devices, 1,239 SD1000 IP telephones with MCPTT features for indoor use, 275 CZT902 train cab radios, and 1,951 PNC550 PTT handheld mobile phones.

All the devices enable individual, group and emergency calling, and text messaging, to provide flexible and efficient communications over LTE based on the Android operating system. Priority is built into the solution to ensure the most urgent calls are transmitted first based on an agreed priority hierarchy set by SLR.

The system supports individual calls between dispatching controllers and station masters, train drivers and train guards. The dispatching controller can also make a broadcast call to all station masters and train drivers.

The CZT902 train cab radio supports dual SIM, GPS location services and consumes less power than the previous model. Train drivers can make MCPTT private and group calls to controllers, other drivers in the area, rail staff on the same train, and make MCPTT emergency calls to dispatching controllers.

The cab radio also supports a number of railway specific features like: location dependent addressing, which enables the driver to call a different controller depending on the location of the train; functional addressing, which allows a call to be made to based on job function, such as train driver or guard; link assurance signal, which provides reassurance to the driver that the radio link is working; shunting mode and shunting emergency calling; and so on - all based on MCPTT technology over LTE.

The PNC550 ruggedized (MIL-STD-810 G and IP68) mobile PTT handsets are used by station staff, maintenance crews and security guards. The PNC550 integrates full smartphone functionality and features a long battery life of around 18 hours talk time. Dual cameras allow users to send multimedia messages.

The three railway control centres use the Hytera dispatching system, system monitoring device, and voice recording device.For railway stations, SD1000 IP desk telephones were applied. As the latest model IP telephone that supports WAN/LAN and LTE and features a 10.1-inch IPS multi-touch screen, SD1000 enables conference calls, hands free talking, caller ID display and caller switching among other features.

The dispatching device provides call lists and request functions and the ability to list calls according to priority. Dispatchers can send and receive text messages, make emergency calls, and have an override function. The system monitoring device enables users to log in/out, provides security, network topology, alarm and subscriber management. The voice recording device records all calls, user IDs, along with search facilities to locate historical voice and messaging.

Products

- PNC550 Handheld Phone
- SD1000 IP Phone
- CZT902 Train Cab Radio
- MCPTT Service Platform
- Railway Dispatching System

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The Results

The Hytera devices and MCPTT service platform have greatly improved the operational efficiency of SLR by providing reliable, interoperable and mission critical levels of communication between train drivers, dispatching controllers, station staff and maintenance crews to ensure all parts of the railway network can be continually in touch with each other at the touch of a button. This has helped to eliminate train delays and reduce complaints from passengers due to insufficient information as to what is happening on the rail service.

The new telecommunications system would reduce overall train delays by 10%, representing an annual cost saving of Rs. 49.2 million. By avoiding just one accident per year and accruing annual savings from not having to pay SLT infrastructure (for the BBC system) would result in an overall annual saving of Rs. 153.0 million for Sri Lanka Railways.

The implementation of a modern radio communication system with cutting-edge technology provides a great example of how to improve railway services in South Asia using flexible, but cost effective MCPTT LTE solutions. As evidence of this, the new Hytera communications solution has reduced SLR's overall management costs by 60%.

Hytera Communications Corporation Limited

Stock Code: 002583.SZ

Address: Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, P.R.C

Tel: +86-755-2697 2999   Fax: +86-755-8613 7139   Post: 518057
Http: //www.hytera.com   marketing@hytera.com