

CASE STUDY: SINGAPORE MASS RAPID TRANSIT



Millions of Commuters Stay Connected Everyday

JMA Wireless Provides Powerful Mobile Communications for Singapore Mass Rapid Transit

Overview: Popular Rail System Seeks an Upgrade

Since 1987 Singapore Mass Rapid Transit (SMRT) has been transporting millions of passengers per year. In fact, just in the first 10 months of 2016 over 750 million travelers have used this railway system. The North-South and East-West lines (NSEWL) are the oldest, longest and most heavily traveled routes forming the backbone of Singapore's transit system. However, a few years ago SMRT decided an upgrade was needed; therefore, a complex set of engineering projects were put in place to modernize the system from its 1987 beginnings. The renewal of the NSEWL is the largest modernization project on a "live" MRT system anywhere in the world. The updated and renewed rail system will allow SMRT to run more trains, increase passenger capacity, and

serve travelers better. The passengers will not only be served better with faster connections across the railway network, but also with enhanced mobile communications. Powerful cellular connectivity would now be experienced by commuters waiting on underground platforms as well as while traveling on the train through tunnels and other types of topography. The overall mission was to serve passengers better; therefore, the Teko DAS (distributed antenna system) from global wireless communications leader, JMA Wireless, was selected to ensure robust connectivity on underground platforms and throughout miles of train tunnels.



Situation: Big Upgrade, Little Time

The project of deploying a wireless system across the busy NSEW lines brought with it a multitude of challenges. First, the system had to be robust enough to provide cellular communications in 18 underground railway stations and the miles of tunnels connecting them. These stations and tunnels are constructed of concrete and steel, two materials that naturally hinder cellular signals from the outside.

Millions of passengers ride the trains on the NSEW lines every day, which leads to another issue known as densification. This is a term mobile network operators use to describe areas densely populated with mobile subscribers having a high demand for cellular connectivity. The railway system experienced this challenge on a daily basis during peak commuting times.

Next, since these millions of passengers are comprised of both business and pleasure travelers, the wireless system needed to be very versatile. It had to be flexible enough to support multiple carriers, numerous bands and the latest in cellular technology.

Finally, the team commissioning the wireless network had to be very flexible. Since the transit system runs almost around the clock, there was a very short time frame every day that it was not operational; therefore, the work had to be done during only a few off hours.

Solution: The Teko DAS Ensures Powerful Cellular Connectivity

Since 2015 the Teko DAS from JMA Wireless has been enabling robust mobile communications at 18 underground train stations and miles of tunnels, which are all part of the NSEW lines. This modular offering is comprised of several different components. A main element, the Master Unit (MU), combines different wireless technologies such as DCS, LTE and UMTS with numerous bands to support the needs of the mobile subscribers. The first phase of the project supported 3G technologies while phase two supported 4G. The future proof design of the Teko DAS will allow it to easily enable 5G technologies when available.

Each Remote Unit (RU) is connected by a single optical fiber cable to the MU. The amount of optical fiber required

to support the Teko DAS is at a minimum 50 percent less than competitive offerings in the market today. A total of 33 four-band low power Remote Units with DL and UL ports were deployed across the 36 sector system. Eighteen sectors support the tunnel while the remaining eighteen sectors provide coverage for the underground rail stations. Each Remote Unit was customized to support separate Rx and Tx ports. In addition to the RUs, antennas and a leaky cable were deployed to help enable cellular coverage in the stations and tunnels.

The Teko DAS enables coverage for the EGSM900, DCS1800, UMTS2100, and LTE2600 bands. In addition, the wireless system supports the following mobile operators: SingTel Mobile, MobileOne, and StarHub.

The first phase of the Teko DAS took over one year to deploy due to the limited number of hours each day the team could work on the roll-out. The trains did operate only a maximum of four hours per night, and it was during this short timeframe that the team could work on deploying the wireless system. The team's schedule depended upon the SMRT schedule for each line. Two teams worked on the project. Each team consisted of an installer, two supervisors and a safety officer from SMRT.

Result: Millions of Passengers Enjoy Mobile Connectivity Daily

The peak commuting hours on the busiest lines of the SMRT railway system are no match for the Teko DAS. Since being installed in 2015 it has met the wireless needs of millions of passengers traveling daily on SMRT. The first phase enabled 3G technology while phase two brought 4G technology to commuters. JMA Wireless builds its solutions with the future in mind. The modular Teko DAS will enable 5G offerings without the need to invest in major system upgrades or replace existing equipment. As a true partner, JMA Wireless produces solutions that are cost efficient, effective, and enable powerful mobile communications anywhere, anytime.

About JMA Wireless

JMA Wireless is the leading global innovator in mobile wireless connectivity solutions that ensure infrastructure reliability, streamline service operations, and maximize wireless performance.

Employing powerful, patented innovations their solutions portfolio is proven to lower the cost of operations while ensuring lifetime quality levels in equipment and unrivaled performance for coverage and high-speed mobile data.

JMA Wireless solutions cover macro infrastructure, outdoor and indoor distributed antenna systems and small cell solutions. JMA Wireless corporate headquarters are located in Liverpool, NY, with manufacturing, R&D, and sales operations in over 20 locations worldwide.

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