

Ottawa Light Rail Transit's Public Safety Radio System



Ottawa's light rail transit (OLRT) system, the O-Train, is the city's largest transportation infrastructure project since the Rideau Canal. Budgeted at \$2.1-billion-dollars, Phase 1, the Confederation Line, spans a 12.5 KM east-west route (10 KM running above ground and 2.5 KM underground) and supports thirteen stations (10 above grade and 3 below).

This P3 project is a private/public collaboration between the City of Ottawa and the Rideau Transit Group. Bell Mobility Radio was contracted to provide public safety radio coverage for the Confederation Line above and, more importantly, for all underground infrastructure. Bell, in turn, chose CarTEL to review the design, provide the equipment, and produce a closeout package for the P25 enhancement. CarTEL was also contracted to produce a turnkey communication system for the O-Train's Maintenance and Storage Facility (MSF) building and the Connector Tunnel.

Life is better when we communicate. Read more to find out how that is proving true for the OLRT's public safety communication system.

Discovery & Collaboration

The City of Ottawa's Enhanced Digital Access Communication System (EDACS), first implemented in 1990, was declared end-of-life as of July 2015.

At the time, this system supported 5,500 users including those in city departments such as Public Works, Fire, Paramedics, Police, Transit and By-Law Services and external partners. In 2013, after a long consultative called the "City of Ottawa Interoperable Mobile Communications Modernization Project," the city announced plans to migrate their public safety radio communications to a Project 25 (P25) Radio System.

P25 provides interoperable radio communication; it is the industry-standard digital radio communication suite used by provincial public safety and local public safety agencies. Bell Mobility Radio was selected as the preferred proponent for this 7-million-dollar Interoperable Mobile Communication Managed System (IMCMS) and given a 10-year contract to support the system.

When Phase 1 of the OLRT project was approved, support for the IMCMS needed to be added to the O-Train as well. Having collaborated before, Bell chose Cartel Communication Systems as one of their partners in bringing P25 radio into the OLTR, including a 2.5-kilometre tunnel that runs under the central Ottawa business district, under Queen Street.

Bell Mobility Radio also engaged Cartel to supply engineering design and commissioning services for a complete in-building coverage enhancement system for the O-Train's Maintenance and Storage Facility (MSF) and the connector tunnel.

Engineering Review and Procurement

The new P25 public safety system for the OLTR needed to be engineered, procured, and installed. After evaluating and refining the communications engineering plan provided by Comtech, Cartel procured and supplied a BTI wireless 800 MHz fibre active Distributed Antenna System (DAS) that would make up the backbone of the O-Train's P25 radio enhancement system within the underground stations and tunnel.





This system included a redundant head end located at the West Portal and the St-Laurent station feeding an active fiber distributed radio enhancement system. An off-air P25 radio signal is picked at each of the head-ends where it is conditioned and converted to a light signal and transmitted to each of the 24 fibre redundant 800 MHz remote bidirectional amplifier units located inside telecom rooms and this to provide radio enhancement in the stations and along the tunnel. The system includes a network management system to monitor and provide visibility and health of the system.

Configuration and Commissioning of OLRT P25

Cartel is responsible for the final activation, configuration, and testing of the failover redundancy of the O-Train's P25 radio enhancement system.

As part of this process, we provided BTI rack diagrams for each of the appropriate OLRT stations, configuring, and commissioning of two Comscope Bidirectional Amplifier (BDAs), configuring and commissioning the BTI active DAS system, and configuring the BTI / EMS alarms and directing them to Bell's Network Operations

Command Center (NOCC). We are also providing closeout documents for the project.

OLRT Maintenance and Storage Facility

The Maintenance and Storage Facility (MSF), located off Belfast Road, is where OLTR's 34 LRT vehicles are assembled, cleaned, inspected, maintained, washed, and stored. From there, the vehicles have access to the Confederation Line via a connection track that runs parallel to Belfast Road. The connector track then slopes down to an underground concrete tunnel under the Via rails and splits to go east and west on the OLRT lines.

The MSF site includes an administration building, a two-storey office facility that includes a lobby, open and closed office spaces, training and conference rooms, operational control rooms, and the headquarters for the maintenance of the Confederation Line. The facility has two large adjoining open areas used to perform LRT vehicle assembly and maintenance.

MSF Engineering and Design

The design for the MSF radio enhancement system consists of an off-air 800 MHz BDA (installed in the main telecom room at the ground level that feeds a passive DAS for the MSF facility) and a BTI host shelf that feeds a fibre BDA (in the connector tunnel). The DAS consists of 10 power tappers and 11 service antennas.

The donor antenna is mounted on the roof of the MSF building facing one of Bell's P25 radio sites. The RF signal is distributed throughout the building via ½ inch plenum rated coaxial cable and splitters to each service antenna. The passive distribution system is designed to support frequencies from 698 MHz to 2700 MHz.

In order to provide coverage enhancement in the connector tunnel, a custom RF shelf with 30dB coupler was installed prior to the passive DAS in order to provide a small amount of RF power that then feeds the BTI active DAS head end. From the BTI FIU card (fibre interface unit), the signal is then sent over single mode fibre to the Remote 800 MHz FBDA where it is amplified and feeds 2 omnidirectional antennas within the connector tunnel.

We are happy to have completed the OLRT's Manufacturing and Storage Facility's turnkey communication system. We continue to work with Bell and will be training their technical team on the O-Train's P25 radio enhancement systems (DAS).



The Cartel Way

Reliable Public Safety radio coverage is essential in large transit projects like the O-Train, especially when the signal needs to work above and below ground. Cartel has plans to be a part of keeping the public safe as the OLRT keeps them moving.

If your transit project needs engineering, enhancement, or a full turnkey solution, please give us a call. Cartel will find a solution to fit your requirements.

