

# Light Rail System Case Study



## Introduction

Bombardier Inc. has been contracted to extend the existing Vancouver SkyTrain line, add new trains and update the existing Train and Radio Information Management System (TRIMS). Willowglen Systems Inc. has supplied Bombardier with our advanced SCADACOM® master station software and Programmable Audio Switch (PAS) in order to provide advanced monitoring and control features and to integrate the many varied external devices and subsystems.



Using Bombardier Transportation's Advanced Rapid Transit (ART) technology, SkyTrain is the flagship of driverless, urban transit systems. With the opening of the 20.3 kilometre (12.6 mile) Millennium Line to passenger service in August 2002, the 49 kilometre (30 mile) SkyTrain is the backbone of an impressive integrated land-sea-rail system and the longest driverless system in the world.

Since its inaugural launch into revenue service in 1986, SkyTrain has carried over 700 million passengers safely, reliably and cost effectively. Bombardier's fully automated, driverless technology features a unique steerable axle suspension, linear induction motor propulsion, and a moving block automatic train control system that enhances operational flexibility and system expandability.

The order of 60 ART MK II vehicles, the second generation of the system's existing 150 ART MK I fleet, incorporates all the benefits of the original SkyTrain vehicle while significantly increasing the passenger carrying capacity. Because of MK II's higher performance standards, fewer trains are required to provide the same level of service, resulting in lower operating costs. Additional orders for 48 MK II vehicles will be delivered in 2009.

## Problem

Traditionally a number of different subsystem suppliers were used for a Light Rail System (LRS) and many provide their own separate user interface. The Automatic Train Control (ATC) vendor typically

offers a proprietary operator interface to the ATC and a limited number of interfaces to other LRS subsystems. The traditional approach quite often leads to independent, inconsistent, inflexible and costly solutions for the end customer. What is needed is a more integrated, flexible and less expensive solution.

## **Solution**

In a competitive bid, Willowglen Systems Inc. was selected to provide the new Train and Radio Information Management System (TRIMS) to Bombardier Inc. Willowglen's SCADACOM® product was selected it integrates a number of the LRS subsystems into a single monitoring, control, reporting, data archiving and data analysis solution. The subsystems include the following:

- Automatic Train Control (ATC)
- Radio Communication Controllers (RCC)
- Station Platform Sign Controllers
- SkyTrain Management Information System (MIS)
- System Management Centre (SMC)
- Passenger Information (PI) Displays
- Public Address (PA) System
- Private Automatic Branch Exchange (PABX)
- Operations and Management (O&M) radios

SCADACOM® displays the ATC system and is synchronized to a central Global Positioning System (GPS) Time Server clock.

In addition to the SCADACOM® servers and workstations; O&M speakers, operator communication sets, touch screen LCD displays and Programmable Audio Switches have also been included in this system. Willowglen has developed the custom Programmable Audio Switch hardware to switch the PA/PABX trunk lines, radio/speaker and public address circuits as required.

The TRIMS user interface is used to:

- Monitor Train Locations
- Monitor Train Health
- Faults and Operating Statistics
- Communicate with Passenger and Maintenance Personnel
- Alert for any Vehicle Silent and Smoke Alarms
- Monitor and Communicate using O&M radio
- Control Station Platform Displays
- Initiate PA calls to Vehicles and Stations
- Monitor and Control Vehicle Systems

The operators can initiate, receive and control calls through the PABX. All telephone, radio switching and PA activities are logged by the SCADA system.

The resulting system consists of very user-friendly operator stations. New database objects and graphic symbols have been developed for this project. Willowglen has provided Bombardier with a system that they can easily configure to interface to the many varied LRS devices so that the TRIMS operator is quickly provided with the required information in a very integrated and consistent fashion.