

Client:
Toronto Transit
Commission

Location:
Toronto, ON,
Canada



The TTC provides surface and subway mass transit for the entire Metro Toronto area. They own and operate 2600 transit vehicles serving an average of 1.4 million riders each work day. The newly constructed Transit Control Centre building houses new state-of-the-art electronic systems for communications, signals, and SCADA. Trak Com designed and implemented a highly reliable, fault tolerant Integrated Communications System (ICS) that handles all telephone, radio, public address (PA), and paging communications for subway/SRT and surface operations. In part, it controls and enhances the Subway Car Radio System (SCRS) previously provided by Trak Com. Substantial completion was achieved at the end of 2004.

The core software platform is the Enterprise Interaction Center (EIC), a call center package developed by Interactive Intelligence Inc. The EIC platform offers a cost-effective, feature-rich system solution, with open-architecture that includes the following:

- Windows ® 2000 operating system platform, with distributed server architecture
- TCP/IP based network communications, with COM and DDE software APIs and full support for SNMP-based network management
- Flexible Interaction Engine allowing integration of user-definable event processing for all types of messaging
- Built-in performance and operational reporting via an Oracle 8.i database server
- Flexible, user-configurable call handling through the Interaction Designer
- Wide range of standard telephony hardware from Intel/Dialogic

The system has been enhanced by Trak Com to include a fully integrated incident reporting system custom developed from the ground up to meet the TTC's specific needs.

A further system enhancement was the addition of a custom designed Automated Announcement System as an integrated sub-system, which provides flexible programming and control of scheduled announcements to the public over the subway station public address (PA) system. This subsystem satisfies the requirements of both the subway operations and marketing departments for the targeted delivery of automated announcements.

Major hardware components include the following:

- **EIC Telephony Servers**

The Enterprise Interaction Center (EIC) Telephony Servers manage all radio, telephone, station PA, and intercom calls within the ICS. They also include the primary voice circuit switching equipment and paging line interface. Two EIC Telephony Servers have been included for full system redundancy for this critical element. Only one server is active at one time, with all external audio circuits switched through the switchover equipment.

- **SCRS Servers**

The SCRS Servers manage all communications over the SCRS control channels (train calls and status messages, SMS/EVL messages, and logon/logoff messages), as well as maintaining the train database. All voice calls made via the ICS workstations and the SCRS are passed to and from the EIC Interaction Engine to the SCRS Handler, which reports and sets up the calls. The SCRS Servers also manage all radio channel monitoring, with audio switching and conferencing for workstations and radio channels. Each one interacts with an EIC Telephony Server by means of a TCP/IP Socket interface. As a system critical component, the SCRS Servers have been supplied in a redundant, hot-standby configuration with all external circuits switched through the switchover equipment.

- **Exchange Server**

Microsoft Exchange is installed and run on a separate non-redundant server as an adjunct to the EIC Telephony Server. It manages and stores messages generated by the system, as well as handling all storage and retrieval of email, voicemail, and FAX messages

- **Database Servers**

Redundant Oracle Database Servers are used to store all active databases utilized by the system, including call and diagnostic log information used to generate standard reports.

- **Switchover Equipment**

The Switchover equipment provides reliable switching of all ICS console and external interface connections between the active and standby servers.

- **ICS Workstations**

The initial system includes a total of 31 of 48 potential ICS workstations, complete with headset telephone, operator headset, and PTT switch as follows:

- 23 active operator positions
- one programmer's console computer
- one training position
- two maintenance positions
- four backup positions located at the backup control center (BCC)

All workstation positions have full access to all communications facilities under the control of the ICS.



- **Media Player Workstation**

A separate computer workstation was created to run the Automation Announcement Player application as part of the Automated Announcement System. It has access to the ICS network, and includes a standard audio card used to playback the announcement files and digital I/O cards used to interface to the Station PA Amplifiers and control relays

- **ICS Network**

The ICS network provides a high speed, robust LAN/WAN backbone that interconnects all ICS Servers with the ICS workstations. The ICS Servers connected to the ICS Network also have controlled access to and from the TTC's Real Time System Integration Network (RTSIN) which communicates with the ICS servers via the routers for the purpose of alarm reporting, paging notifications, and data transfers.

- **Interface Equipment**

Some existing DSP3 Radio Interface Equipment has been retained and re-deployed as required to support the ICS interfaces to the SCRS. New microprocessor based interfaces have been developed for the SRT radio, Surface UHF radio, Plant VHF radio, and Station PA systems. The ICS is connected to the TTC's Centrex system by means of dual ISDN-PRI digital trunk facilities.

- **Network Monitoring**

All critical system elements are monitored by a standard SNMP-based monitoring station running HP OpenView ®. This allows system faults to be detected quickly before they affect system performance.

- **Fallback Equipment**

In the event of a catastrophic failure of the ICS, independent radio and telephone equipment will be provided both at the TCC and the backup control center (BCC) to maintain critical communications under all circumstances.

- **ACD Display Signs**

All incoming telephone calls to the Subway Dispatch number are processed by an Automatic Call Distributor and the ACD queue statistics are displayed on wall mounted LED signs.

- **Building Security System**

The ICS provides interfaces to the building security system to enable TCC operators to seamlessly answer calls from the door access telephones, display live video images from closed circuit door cameras through a video server, and to remotely control the door locks, all via their ICS workstations.
