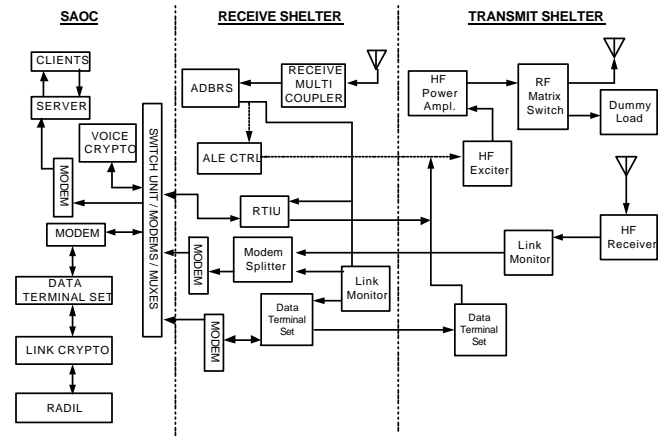


## REMOTE CONTROL AND MONITORING SYSTEM (RC&MS)

The Remote Control and Monitoring System (RC&MS) was developed by Thales Canada, Systems Division, a Division of Thales Canada Inc., to facilitate the control and monitoring of remote, un-manned HF radio stations being installed in several locations throughout Canada, three of which are in the Canadian Arctic. Each of these radio stations, or Ground Entry Sites (GESs), consists of two self-contained shelters – one is the receiver site and the other is the transmit site. These shelters are located from 3-15 kilometres apart. The central control/operations site for the GESs is located in North Bay, Ontario as part of the NORAD Regional Operations Control Centre (ROCC) and is approximately 1,500 and 3,000 kilometres from the fixed GESs.



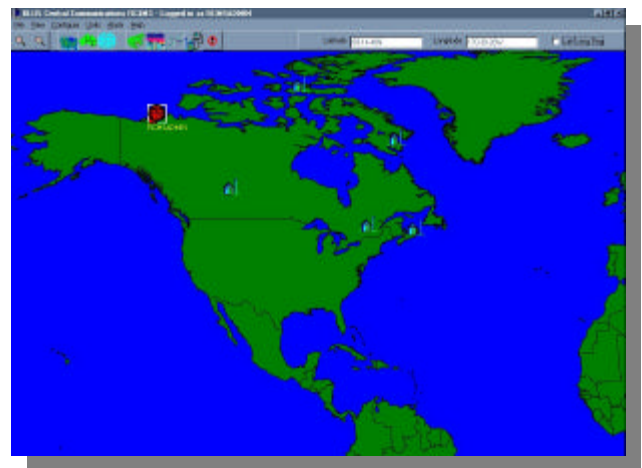
**Ground Entry Site Radio Stations**

Since the GESs are unmanned, they must be operated, controlled, and monitored, including surveillance monitoring, from the North Bay ROCC. This is achieved through the RC&MS, a WindowsNT system which enables two GESs to be controlled simultaneously while monitoring the status of two other GESs. The RC&MS enables the operator at North Bay to select the optimum GES through which voice and Link-11 communications can be established with an aircraft (or ship) and, thereafter, to monitor the channel performance and to reselect an alternative GES should communications performance suffer, or as the aircraft moves along its track.

The RC&MS interfaces with and automatically controls and monitors all resources that are capable of being controlled automatically at local (North Bay) and remote (GES) sites, and allows for traffic routing from remote sites to local sites and vice versa. It automatically reassigns resources to compensate for failures, without adversely affecting any operational circuits.

### North Bay/GES System Architecture

The RC&MS seamlessly integrates ICEPAC frequency management software, which uses the RC&MS database (time of day, fixed transmitter and fixed receiver site location, antenna bearing, list of frequencies assigned to services, transmitter power, receiver site noise floor and antenna information) to configure the system. The RC&MS software also controls and monitors Automatic Link Establishment (ALE) equipment.

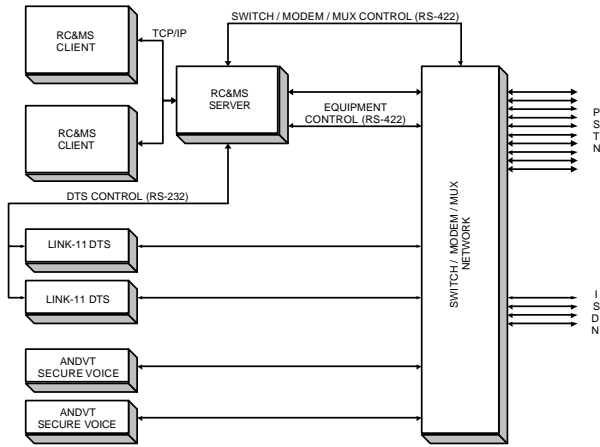


**RC&MS GUI**

### RC&MS NAADM System Architecture

The client workstations at the ROCC can simultaneously control up to four transmit/receive sites. The RC&MS automatically handles all routing of communications with these sites, health monitoring, operator control, etc. Communication is via PSTN or ISDN phone lines. The PSTN lines have potentially different capacities depending on the site, so a variety of multiplexing schemes must be supported.

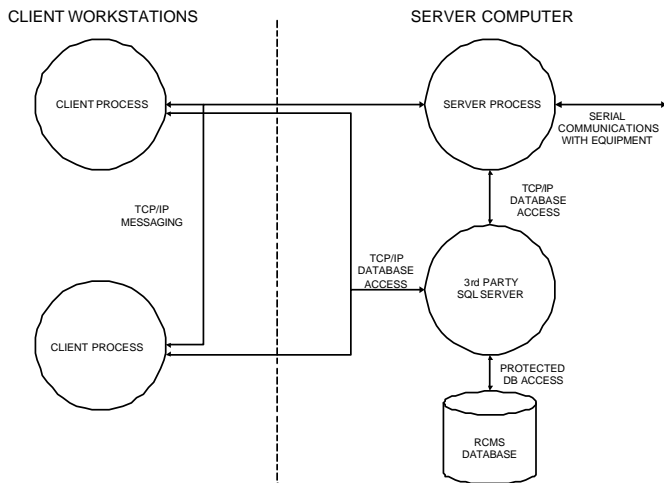
The ROCC configuration of the RC&MS is shown in the block diagram below.



**North Bay RC&MS/System Diagram**

**RC&MS Software Architecture**

There are two main processes used by the RC&MS software, a single threaded client process and a multi-threaded server process. The system also relies heavily on an SQL based network database server (InterBase) running on the server computer. The software is shown in the diagram below.



**RC&MS Client Server Software Structure**

**RC&MS Server Process**

The server process is intended to run for the life of the RC&MS system. It has three main areas of responsibility:

- (1) managing client sessions;
- (2) managing communication assets and links with remote sites; and
- (3) communicating with and interpreting responses from the remote equipment.

Clients establish a TCP/IP connection to the server as soon as they are started. When a connection is established the server

creates a separate thread of execution for the client, and all activities involving the client take place within that thread. The server has a main thread used for listening for new clients and for logging error messages. Also, when a connection is established with a site a health monitor thread is started which will poll all of the equipment on the site in a round robin scheme to determine their statuses. Each thread maintains a separate session to the SQL server, which prevents conflicts from occurring.

Clients must log in before they can interact with the system. Client user ids and privileges are stored in the RCMS database. Once a client is logged in, the TCP/IP link to the client is mainly used for requests for control of sites, equipment commands, and notification to the client of status changes so that the client displays may be updated.

When a clients request control of a remote site, a new commlink object is created in the server running in the client's thread. This object will then check the database to determine the type of connection required to that site and allocate the required resources to establish the link. These resources include various communication ports, tactical data links, secure voice, multiplexers, modems, etc. The commlink will then configure these resources to establish the connection and return to the client the level of link that was established.

**RC&MS Client Process**

The RC&MS client will normally be running only when a user requires it. The RC&MS client is primarily responsible for allowing the user to interact with the system by displaying status and accepting commands for the RC&MS and the controlled equipment.

At start-up, the user is presented with a map of the systems coverage area with icons located at the appropriate location for the controlled sites. The user can manipulate the map in a number of ways (pan, zoom, layer control, etc.) The user can request control of a particular site by clicking on the appropriate icon, which reveals an equipment block diagram. The equipment graphics on the window change to reflect equipment status, and the data and voice paths are shown based on the position of the audio and RF switches. Control of individual equipment is done by clicking on the appropriate graphic, which will invoke the "Fine Tuning" window for that equipment. A number of configuration functions that may be accessed from the main client window, including adding, editing, and deleting users, and sites, and configuring and downloading the master channel table to RF equipment at all the sites.

*For further information, please contact:*

*Thales Canada, Systems Division  
1 Chrysalis Way · Ottawa, Ontario, Canada K2G 6P9  
Tel: (613) 723-7000 · Fax: (613) 723-5600*

*e-mail: [inquiries@ca.thalesgroup.com](mailto:inquiries@ca.thalesgroup.com)*

*web site: [www.thalesgroup.com/canada](http://www.thalesgroup.com/canada)*