City of Tokyo Metropolitan Highway Line

Highly Reliable Communication System

Customer Overview

Many of today's rapid transit and highway systems face a myriad of problems communicating between central operation centers and the various stations, driver rest stops, parking areas and information kiosks that provide the latest in traffic information. The City of Tokyo Metropolitan Highway Line system consists of a central information-control center and hundreds of information kiosks and displays scattered along the highway. This allows the drivers and passengers who visit the rest stops to get information on traffic conditions, projected arrival times, alternate routes, and enforcement points where traffic is being redirected or controlled due to obstructions in the roadways caused by construction or accident.

Application

At the center of the Tokyo network is a Windows Server 2000 system backed up by a Solaris 8 system, while the kiosks are based on Windows XP. The majority of the network nodes are similarly diverse, using Cisco 3661, 3640 and 1720 routers for the backbone. The current 100 or so kiosks are served by network connections with a minimum of 256 kbit/second bandwidth. However, local conditions—humidity, nearby electrical activity and other factors—can sporadically reduce the data rate to and from the terminals down to about 64k bits/second.

Another feature attractive to the Tokyo Highway Line system developers was that unlike most network configurations which are heavily dependent on the underlying hardware or software chosen, this simply does not matter to RTI. If designers opt for a heterogeneous system with servers and terminals based on different types of processors and running different OS's, RTI's publish-subscribe middleware can be adapted.

Challenges

The city needed a low maintenance, highly reliable communications system that was sufficiently robust for the delivery of constant updates to the kiosks.

One of the problems facing the developers was that the environment in which these connections are maintained runs the gamut: under roadways and rail lines, next to hot cabling in the transit system through a variety of soil and wetness conditions. Depending on weather conditions, the transmission capabilities of the various physical media can vary widely.

Why RTI was selected

What appealed to the developers of the Tokyo Highway Line information kiosk network was that the publish-subscribe middleware from RTI is unlike the typical client/server link, RTI is essentially a connectionless API.

RTI's middleware does not require system designers to be concerned with the underlying communications protocols. The developer only needs to tell the system what the bandwidth constraints are, what information is needed at each node, what actions need to be taken, when to send it or to receive it, and what is required in response.

While current connections to the terminals are based on standard Cisco routers over copper cable, Tokyo's highway system engineers want to expand the network with a variety of other network connections: wireless, copper and optical cable, power lines, and even telephone wiring. Unlike many of the typical network protocols, the performance of which is very much dependent of the bandwidth available, publish-subscribe is much more forgiving and able to work with a minimum bandwidth.