

# IPC

## RTI selected for VOIP IQMX Turret Design

*“RTI provided the flexibility we required, that no other solution could provide.”*

John Brennan  
Director of Software Development  
IPC



*IQMX Turret*

The integration of voice and data networks is creating a fundamental change in the telecommunications and data industries. This change holds the potential for better phone service, lower prices, new features, better maintenance, and in general, more choices for customers. Certainly, the pace at which new converged products and services are being introduced suggests that this voice and data revolution has only begun. Technologies like Voice over Internet protocol (VoIP) have emerged to help bring the promise of convergence to all types of industries.

The benefits of VoIP are so compelling that it has the potential to revolutionize existing industry solutions by replacing circuit-based switching systems and public telephone networks. Soft switches and IP-based PBX systems are providing enhanced telecom services, often at reduced costs for customers. IPC has used VoIP technology as the building block for its IQMX™ product.

### **IQMX VOIP Turret Design**

Most PBX telephones are relatively unintelligent devices. Their features and capabilities are largely determined by the backroom equipment they are connected to. This paradigm has been changed with the development of the IPC VOIP turret (IQMX). The IQMX turret has the intelligence to subscribe to IP-based services on the firm's wide area network (WAN). With services such as data, voice and video, the turret has the ability to deliver richer, more interactive applications incorporated into state of the art integrated services.

### **Unique Application Environment**

The primary function provided by the IQMX voice station turret system is to enable multiple people to participate in a party line conversation. At a single desktop station, a user can select one or more different party line conversations to listen to. With each line selected, the user can also select the option to participate or just “listen in.”

This environment presents unique challenges whereby users can dynamically change the set of conversations selected or dynamically login or logout of the system altogether. The reliability of the service provided to the users must be very high.

### **Integration of RTI for All Control and Status Data**

In order to facilitate the VOIP communications of over 4000 IQMX turrets, IPC has employed a three-tier design approach. The first tier consists of a primary System Center server that is responsible for keeping a database of what turrets are talking to each other. This database is then distributed to the second tier of TCIX Call Processing cards. Each TCIX card is then responsible for interfacing with up to 16 IQMX desktop VOIP turrets. Conversation setup and configuration messages are sent between the turrets and the TCIX. Also, status messages from each turret are sent directly to the System Center database. IPC chose RTI Data Distribution Service (formerly NDDS) as the communications framework for sending messages among all the tiers.

### **Decision to use RTI**

IPC needed an easy and robust way to control the setup and connection of voice communications. RTI was chosen for this task because of its ability to address the needs of the control environment. The system needed to support over 4000 IQMX turrets with the following requirements:

- Heterogeneous environment
- Dynamic start-up and steady state operation
- Efficiency of database distribution
- Reliable and Best Effort publications

### **Heterogeneous Environment**

The design of the system required the IQMX turrets and TICX Call Processors (both of which run on PowerPC® machines with the VxWorks™ operating system) to talk with other systems running on Solaris™ and Windows® platforms. RTI has the ability to



seamlessly facilitate communications between these different platforms by performing all of the necessary data conversion and serialization. The need to convert between big and little endian formats is all taken care of by the RTI framework.

### Dynamic Startup and Steady State Operation

The system has 350 TICX cards and each one can interface with up to 16 IQMX turrets. The system requires a very flexible design environment to accommodate all of the dynamic configurations. The RTI communications framework enables system nodes to start up in any order. RTI also allows nodes to dynamically enter or exit the system, thus giving designers greater flexibility when creating the architecture of their application.

### Efficiency of Database Distribution

The System Center is responsible for maintaining the database of all calls in progress and their configuration. This database is then distributed out to each of the TICX Call Processor cards. Instead of sending out the same database messages to each of the TICX cards individually, the System Center utilizes the multicast capability of RTI to transfer this information with one transmission. Because these messages are critical to the operation of the TICX, receipt of these messages is required. RTI provides the ability



*IPC uses RTI in thousands of IQMX systems, the most popular floor communications platform in the world*

to send these messages reliably over multicast, thus insuring that all nodes registered to the selected multicast address have received the data. RTI's reliable multicast feature provides IPC with an efficient mechanism to distribute the application database information.

### Reliable & Best Effort Publications

As with many distributed applications, IPC requires different behavior for different types of messages in the system. Some messages, like the turret status messages, are very cyclic and need determinism on delivery. These types of messages exhibit a "Best Effort" requirement, where only the last status message received is important. In contrast,

other messages, such as the call setup and control messages, are acyclic and critical to insuring proper operation of the system. Connecting an IQMX desktop turret into an existing party line conversation must happen promptly for each user. Thus, critical messages are sent with a reliable mechanism to make sure that subscribers to the publication are notified. RTI provides the necessary quality of service controls to allow each message to be designated as using Best Effort or Reliable service, giving IPC the flexibility they require.

### Conclusion

By using RTI as the communications framework for all control and status messages, IPC is able to achieve the flexibility, reliability, and performance requirements of their demanding application, while also providing a modular and adaptable architecture for their software.

### About RTI

RTI supplies middleware and distributed data management solutions for real-time systems. With innovative technology and deep expertise in distributed applications, RTI provides an unequalled competitive advantage to customers developing systems that benefit from high-performance access to time-critical data. RTI solutions have been deployed in a broad range of applications including command and control, intelligence, surveillance, data fusion, simulation, industrial control, air traffic control, railway management, roadway traffic monitoring and multimedia communications. Founded in 1991, RTI is privately held and headquartered in Sunnyvale, California.