



**Apply One Real-time Communication Solution,
from Fields to Remote Center**

- Harmonizing iPush[®] Server with iPush[®] Embedded for Controller



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Field to remote center, getting more connectivity

In most automation application stories, the locations for monitoring, controlling, data acquisition and information processing can be divided into field and center. In general, controllers with I/O devices or sensors are deployed in fields; the management functions are deployed in a remote center.

As user demands changing and technologies shifting, automation industry wants to get stronger connectivity and co-operating capability between field and remote center.

Has no doubt, the greatest technology improvement for connectivity between field and remote center is TCP/IP network. With TCP/IP, now we see Web, FTP, Modbus/TCP, socket programming have been adopted to make connectivity works.

The challenges of connectivity for automation in network era

Since TCP/IP is getting wide adoption in automation industry, the system integrators and users have found new challenges in this popular network infrastructure. Such as:

- how to achieve manageability for one application in remote center to deal with many distributed stations in long distance, real-time, and bi-directional matters;
- how to engage with wireless communication carriers, like GSM, GPRS, PHS, CDMA, or Wireless LAN;
- how to perform WAN or VPN access transparently just like LAN;
- how to migrate remote monitor/control application to new mobile devices, like cellular phone or PDA;
- how to procure information security with data encryption, user authentication, and access authorization;
- how to integrate information from field devices with enterprise MIS.

There are some existing IP-based communication solutions to deal with single one or more challenges mentioned above, but you will find it very difficult for one single solution solving all of them.

We can address the issues among existing IP-based communication solutions as table below:

Table 1. Comparison of existing IP-based communication solutions for embedded system

IP-based Communication Solution in Controller	Apply to	Issues
Web Server	<ul style="list-style-type: none"> ● LAN and WAN ● Remote browser query ● Directly information presented in browser 	<ul style="list-style-type: none"> ● Batch processing ● Data polling, lack of initiative on controller side ● One browse-to-one web server from center monitoring view ● One-way communication if no CGI mechanism existed
FTP Server	<ul style="list-style-type: none"> ● LAN and WAN ● Remote FTP client download 	<ul style="list-style-type: none"> ● Batch processing ● Data polling, lack of initiative on controller side ● One client-to-one server from center monitoring view ● Need extra application for data processing ● One-way communication if no server side application existed for data uploading
OPC Driver	<ul style="list-style-type: none"> ● LAN ● Client / Server architecture 	<ul style="list-style-type: none"> ● Low efficiency ● Not suitable for long distance access ● Lack of application development support on mobile devices
Modbus/TCP Slave	<ul style="list-style-type: none"> ● LAN and WAN ● Client / Server architecture 	<ul style="list-style-type: none"> ● Lack of application development support on mobile devices
Socket Programming	<ul style="list-style-type: none"> ● LAN and WAN ● Customized Application 	<ul style="list-style-type: none"> ● IP Networking knowledge needed ● Low efficiency for providing applications in different platforms

Advanced communication needed for new generation connectivity of industrial automation

Right now, the automation industry needs a new way to communicate between fields and remote center. The features of new generation connectivity can be described as:

On field (controller) side

- Unload on-site data acquisition burden on system operator.
- Make controller an active node for pushing data from I/O devices, modules, or sensors to remote center in real-time base.
- Secure transmission with data encryption, user authentication, and access authorization from controller to remote center.
- Plug-and-Play capability for attached I/O modules feeding real-time data to remote center through controller.
- Configurable and manageable from remote center.
- Provides sufficient software development kits for adding wireless or mobile devices to achieve real-time bi-directional communication controller.

On remote center side

- A centralized hub for real-time data aggregation, monitoring, and controlling with many distributed fields in long distance.
- An extensible back-end functions pool for value-added services by providing open software development kits.
- Easy to be linked up with controllers to form a message supply chain from field to end-user application through remote center.
- Easy to deploy redundant system.
- Provides sufficient software development kits for adding wireless or mobile devices to achieve real-time bi-directional communication through remote center.

With such comprehensive and high extensible connectivity, system integrator and users can build next generation real-time solutions for end-to-end industrial automation.

Harmonizing iPush[®] Server with iPush[®] Embedded for Controller to build new generation connectivity

ICE Technology has addressed the challenges of communication for automation in TCP/IP network era and proposes architecture for next generation connectivity. The architecture combines both iPush[®] Embedded for Controller on field side and iPush[®] Server on remote center side.

What can iPush[®] Embedded for Controller do on field side

iPush[®] Embedded for Controller is an active, real-time, high efficiency bi-directional monitoring and data transport solution for embedded devices in field.

Through high efficiency Publish/Subscribe real-time broadcasting model, and complete remote management mechanism rapidly combine with controller, a high efficiency, secure, scalable dynamic data exchange capability is formed.

Compare to OPC and Modbus/TCP, iPush[®] Embedded for Controller offers quicker response time and one-to-many real-time secure messaging capability.

Compare to web and FTP, iPush[®] Embedded for Controller offers proactive data stream push from I/O devices, modules, or sensors rather than remote client polling.

Compare to socket programming, iPush[®] Embedded offers higher level application programming interfaces (APIs) to shorten the time of TCP/IP communication application development.

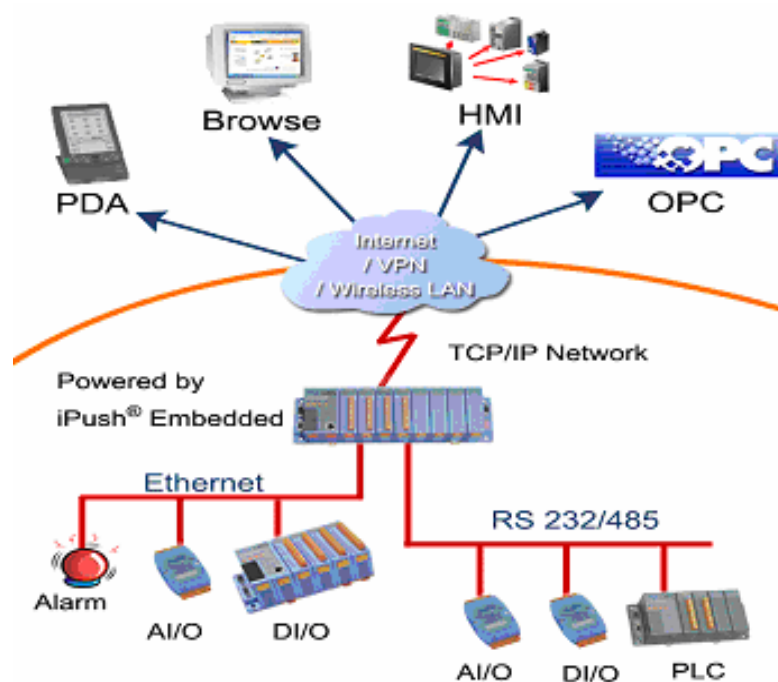


Figure 1. iPush[®] Embedded enables the real-time capabilities of controller

What can iPush[®] Server do on remote center side

iPush[®] Server is a real-time massive connection messaging platform for remote center. Except Publish/Subscribe messaging model, iPush[®] Server also provide Point-to-Point messaging model to meet more value-added applications needs.

With the massive connection superior service capability, iPush[®] Server can be a universal real-time management hub to communicate with many distributed controllers in fields with iPush[®] Embedded inside at the same time.

Compare to OPC Server, iPush[®] Server offers more robustness in WAN communication.

Compare to web browser, the application of iPush[®] Server has the abilities of subscribe-to-receive real-time data from iPush[®] Embedded, controlling, and one-to-many communication.

Compare to socket programming, iPush[®] Server offers higher level application programming interfaces (APIs) to shorten the time of TCP/IP communication application development and give developer more quality control abilities of real-time message delivery.

System architecture of iPush[®] real-time message supply chain

The iPush[®] real-time message supply chain is composed of iPush[®] Embedded, iPush[®] Server, and customized iPush[®] applications. The system architecture is showed below:

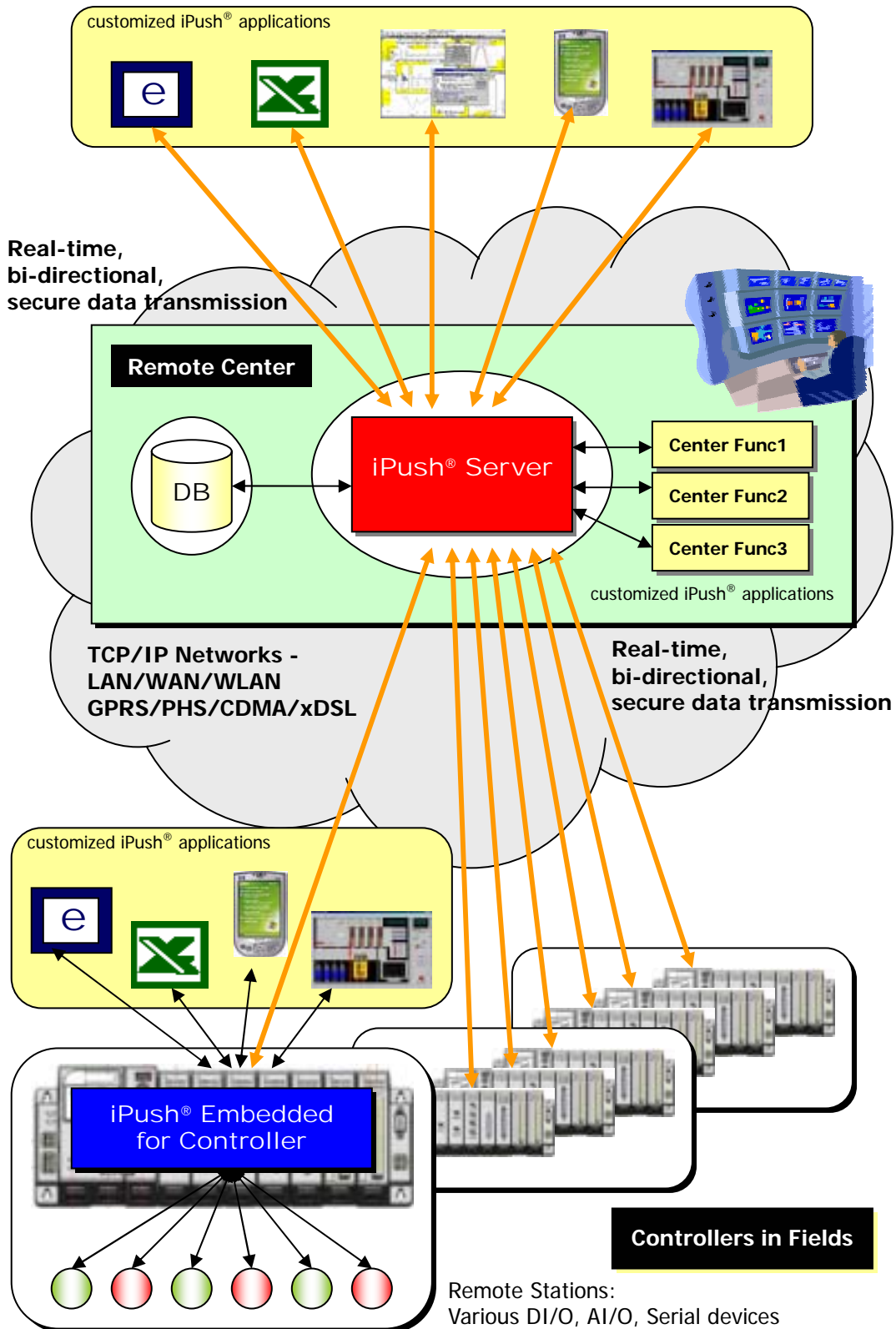


Figure 2. System architecture of iPush® real-time message supply chain

Benefits of iPush[®] real-time message supply chain

With the iPush[®] real-time message supply chain, you can take the advantage of the benefits below:

- One real-time communication solution from fields to remote center for automation and enterprise MIS.
- Easy to scale-up the managed controllers by leveraging the massive connection and massive messaging abilities of from iPush[®] Server.
- With variety of APIs support, system integrators and users can develop across platform real-time applications for automation running in field or remote side.
- Customized applications can transparently communicate with iPush[®] Embedded(s) in field or iPush[®] Server(s) in remote center, even run on wireless or mobile devices.
- Achieve secure end-to-end transmission from controller in field to applications connect to iPush[®] Server in remote center.
- Achieve high availability of communication with fail-over and load-balancing characteristics of iPush[®] Server.

Application examples

The iPush[®] real-time message supply chain meets the expectations of new generation connectivity for industrial automation. It can be functional in any application story from field to remote center.

Here are some of the application samples we like to point out for you:

- Factory automation: to be a real-time communication hub linking the shop floor and ERP together.
- Environment & disaster prevention monitoring and warning: the remote center can receive the real-time data from sensors in fields to monitor the mudflows and landslides and make alerts from customized applications.
- Utilities monitoring: with GIS (Geographic Information System), the remote center can receive the real-time data from pressure or temperature sensors in fields of distributed water/gas/oil pipeline to show the real-time information in integrated GIS client.
- Commercial vehicle operation: with GIS, global positioning system (GPS), and GPRS/PHS/CDMA network, the control center may precisely know the position of vehicles in integrated GIS client to execute business operations.
- Health care: a regional hospital can monitor temperature data and alarms of all refrigerators and cooling chambers deployed in all controlled hospitals in real-time base.

About ICE Technology Corporation

ICE Technology Corp. was established in April, 2000. It is the 1st software company in Asia to develop MOM (message-oriented middleware) as core business. Aggressively market product internationally, vowed to be: "[The World-class Business Communication Software Provider](#)". Current products have been deployed and integrated by world class enterprises, Future Exchange, financial service institutions, online game design company, military agency, environmental bureau and agency, weather bureau and agency, water resources bureau and agency, academic agency, and IT technology vendor.

ICE Technology offer high efficiency, stability, and secure communication software solution. Years of service experiences can help controller manufacturers rapidly integrate advance data transportation technology into current products.

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