



EXB System Extender Modules for MCN™ Monitoring and Control Systems



EXB-IP



EXB-IM

Features

- Connects multiple remote MCN™ networks into a unified network
- **EXB-IP:**
Copper 10Base-T Ethernet media, or wireless with Ethernet bridges such as Canopy™
- **EXB-FI:**
Fiber 10Base-FL Ethernet media
- **EXB-IM:**
Internal Modem, 19.2Kbps for Leased-Line (4W or 2W), Analog Microwave
- **EXB-232:**
Used with Asynchronous Serial Channels (T1 / E1, Microwave, and Digital Channel Banks)
- MCN Network Speed Options:
Standard (78 Kbps) or
High Speed (1.25 Mbps)

Typical Applications

- Extending MCN Networks over Ethernet copper, fiber, wireless, Telco, T1/E1, microwave, or digital channel banks
- Connecting multiple local PC displays to a remote MCN network
- Zone Comparators
- Master / Slave Comparators (Sub-Comparators)
- State-Wide / Regional / City-Wide voting systems
- Display and control multiple remote comparator locations at a central location

Introduction

The EXB System Extender Modules are members of the Monitoring and Control Network (MCN™) family of control products. They are used to connect multiple MCN networks together or to extend the length of an MCN network beyond 4000 feet. Therefore, multiple remote comparators can be controlled from a central site.

The EXB System Extender Modules allow simultaneous monitoring and control of Master and Slave comparators in wide-area voting systems. Multiple EXB modules can connect multiple MCN networks in real time, spanning distances from campus-wide to worldwide.

Different EXB units are available for use over various types of wide-area infrastructures:

The **EXB-IP** System Extender Modules use any 10Base-T copper-based Ethernet channel.

The **EXB-FI** System Extender Modules use any 10Base-FI fiber-based Ethernet channel.

Both the **EXB-IP** and **EXB-FI** utilize the IP protocol over Ethernet media and both can coexist on a wide-area IP network with other IP devices such as workstations, servers, and IP routers. Additionally, they can exist on *dedicated* Ethernet IP networks, where the only devices on the network are EXBs and (optionally) physical layer hubs. The most common occurrence of a *dedicated* network is a set of EXB-FIs connected with dedicated fiber.

The **EXB-IM** System Extender Modules use analog channels that are capable of carrying V.32 terbo standard modem signaling, including standard 2-wire or 4-wire leased lines, or microwave channels.

The **EXB-232** Modules use asynchronous serial channels for the wide-area network connection.

CTI Products, Inc.
1211 West Sharon Road
Cincinnati, Ohio 45240
USA

phone
+1.513.595.5900

fax
+1.513.595.5983

e-mail
info@ctiproducs.com

www.ctiproducs.com

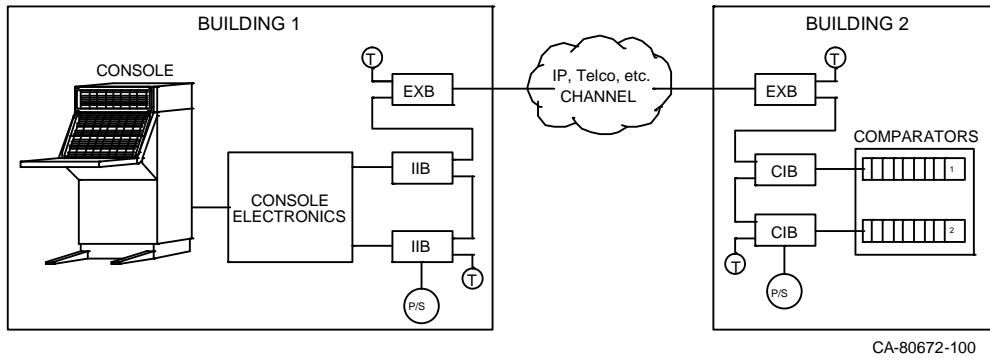


Figure 1 Extending Comparator Status & Control Signals to a Console with EXB Modules

Extending Comparator Status & Control Signals

Figure 1 shows a comparator system that is located in a different building than the console equipment. Standard MCN CIB modules connect to the comparators and IIB modules connect to the console. The length of the MCN network is normally limited to 4000 feet. As shown in this diagram, a pair of EXB System Extender Modules can greatly extend the MCN network using Ethernet channels.

For monitoring, the CIB Comparator Interface Modules in Building 2 accept the logic level comparator status indications (*Vote, Receive, Disable, and Fail*) and send status messages over the MCN network. The EXB System Extender Module at Building 2 passes the status messages over the Ethernet channel to the EXB System Extender Module at Building 1. The EXB module at Building 1 passes the status information to the IIB modules over the local MCN Network. The IIB modules then convert the status messages to logic outputs for use by the console.

For controlling, the *Force-Vote* and *Disable* control functions from the console in Building 1 are passed through the IIB modules, through the pair of EXB modules, and to the CIB modules in Building 2. The CIB modules convert the control messages to logic levels to control the comparator.

Multiple PCs Monitoring Remote Comparators

Figure 2 shows a way to connect multiple PCs to remote comparators using a wide-area channel. The pair of EXB System Extender Modules extends the MCN network at the remote site to the local site. The remote network of CIB Comparator Interface Modules is essentially re-created at the local site. Multiple PCs are then connected to the local MCN network through internal PCLTA cards. The number of PCs at the local site is limited only by standard MCN system limitations.

**Multi-Site Comparator Networks
Zone & Master/Slave (Sub) Comparators**

Many voting systems covering a large geographic area will have comparators located at multiple sites. In this way, comparators for particular zones are located close to their receivers, with the voted audio brought back to the dispatch center on Ethernet channels.

Some statewide or citywide systems use Master-Slave (or Sub-Comparator) systems. In these systems, the City-Wide or State-Wide channel is broken into zones, each with its own comparator, called Slave or Sub-Comparators. The voted audio from the Sub-comparators is brought back to a Master comparator at the dispatch location. The Master comparator then picks the best signal from the sub-comparators.

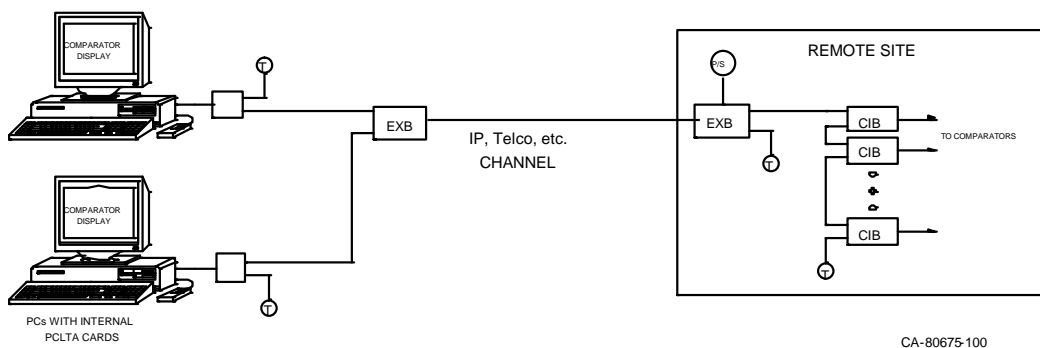


Figure 2 Multiple Local PC Displays with Remote Comparators using EXB Modules

Figure 3 shows a way to monitor and control the comparators in a Zone or Master/Slave (Sub) Comparator system. Each of the remote sites has its comparators connected to CIB modules on its own MCN network. Each remote site is connected back to the central (master) site through EXB System Extender modules. The master site has its Master Comparator connected to CIB Comparator Interface Modules.

Since all the MCN networks are connected together at the master site, the PCs there can monitor comparators at multiple sites simultaneously. If, for instance, a wide-area channel has 3 sub-comparators, the PCs can monitor all 3 sub-comparators and the master comparator simultaneously.

High-Speed Backbone (1.25 Mb)

The standard EXB System Extender Modules are furnished with a standard 78 Kbps MCN network interface. For large multi-site systems, the EXB System Extender Module is also available in a high-speed 1.25 Mbps network version for increased performance at the central site. In a large system, standard EXB System Extender Modules would be used at the remote sites, and high-speed modules would be used at the central site. Our engineers will help design a system to meet your system needs.

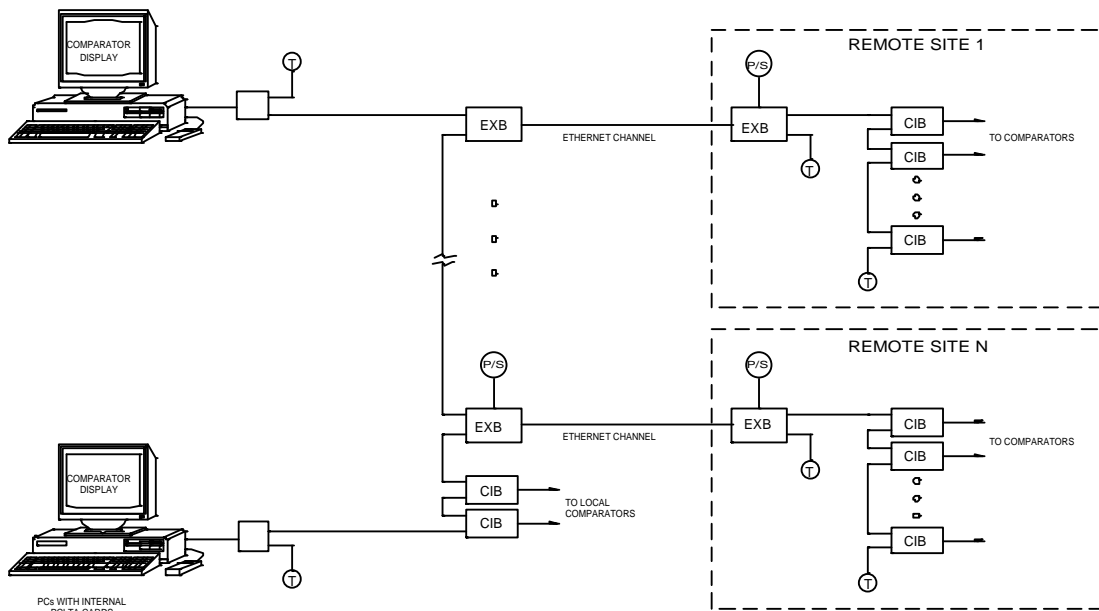
Router Configuration & Traffic Segmentation

The EXB System Extender Modules are typically factory-configured in repeater mode, which passes network traffic for all MCN groups in all directions. This works well for systems up to 16 Comparator Interface modules. In systems with EXB System Extender Modules configured for repeater mode, all traffic will be seen at all sites,

When systems use more than 16 comparator interface modules, the peak network traffic can become too high for EXB System Extender Modules in repeater mode, causing a slow-down in display updates.

For these systems, CTI Products can custom-configure the EXB System Extender Modules for Configured Router mode. This allows only the messages for a certain number of MCN groups to be passed over a particular link.

For example, in Figure 3, the pair of EXB System Extender Modules serving Remote Site 1 could be configured to pass traffic for the Site 1 CIB modules. Likewise, the EXBs for Site 2 would be configured to pass only traffic for only the Site 2 CIB modules. This would allow traffic from the remote CIBs to pass to the central site, but the traffic from the site 1 would not clog the WAN channel or the local MCN network for Site 2 (and vice versa).



CA-80674-100

Figure 3 Multiple Remote Comparator Sites combined with EXB Modules

General Specifications

	EXB-IP Ethernet Unit S1-60962 78 Kb/s S1-60963 1.25 Mb/s	EXB-FI Fiber Unit S1-61112 Multimode 78K S1-61113 Single Mode1.25M S1-61114 Multimode 78K S1-61115 Single Mode1.25M	EXB-IM Integral Modem Unit S1-60602 78 Kb/s S1-60603 1.25 Mb/s	EXB-232 Serial Unit S1-60655 78 Kb/s S1-60656 1.25 Mb/s
Network Transport	UDP/IP over 10Mbps 10Base-T Ethernet	UDP/IP over 10Mbps 10Base-FL Ethernet	n/a	n/a
IP Addressing Modes	Unicast, Unicast-Replicated, Multicast Static IP Address is User programmable	Unicast, Unicast-Replicated, Multicast Static IP Address is User programmable	n/a	n/a
Ethernet Media & Connector	10Base-T (twisted pair), RJ-45 connector, or 15-pin D-sub female connector (AUI)	10Base-FI Duplex Multimode, ST (2 km max), or Single-Mode, ST (20 km max)	n/a	n/a
Power	10 to 30 VDC (10Base-T only) 15 to 30 VDC (AUI) 6 watts max. Requires separate power supply (Does not use power from MCN network.)	15 to 30 VDC 6 watts max. Requires separate power supply. (Does not use power from MCN network.)	10 to 30 VDC 5 watts max. (Counts as 2 MCN standard loads)	10 to 30 VDC 5 watts max. (Counts as 2 MCN standard loads)
Modem	n/a	n/a	Internal V.32 turbo 19.2 Kbps, 2/4 wire leased line (switch selectable)	n/a
Telephone Line Levels	n/a	n/a	TX: -10 or -16 dBm (switch selectable) RX: -45 to -16 dBm	n/a
Telco Approvals	n/a	n/a	FCC Part 68 (U.S.) IC CS02 & CS03 (Canada)	n/a
Serial Ports	For Configuration only	For Configuration only	n/a	2 Asynchronous Serial DE-9M DTE (PC-AT pinout)
Baud Rates	9600 – 33.6K Controlled by configuration program	9600 – 33.6K Controlled by configuration program	n/a	9600, 19.2K, 38.4K, 57.6K, 115.2K Switch selectable per port 8 Data, 1 Stop, No Parity (8N1)
Size	7.5" D x 5.6" W x 1.6" H (MCN "B" size module). Add 3.5" to depth of EXB-FI, due to fiber adapter.			
Mounting	Desktop with integral non-slip feet. Optional mounting brackets available (See Below)			
Environmental	0-60°C at 10-95% relative humidity, non-condensing			
Listings	UL1950, CSA C22.2 No.950, EN60950 Carries the CE Mark		UL1459, CSA C22.2 No.225, EN60959, Carries the CE Mark	
EMI	FCC part 15 Industry Canada (IC) EN55022	Class B Class B Class B	FCC part 15 Industry Canada (IC) EN55022	Class A Class A Class A
EMC	Complies with EN50082-1, IEC 801-2, 3, 4			

Mounting Kits

Model	Description
S2-60472	MCN 3B Rack Mount for EIA 19" racks, 1 Rack Unit (1.75") High Mounts (3) EXB modules.
S2-60967	MCN 2A + B Rack Mount for EIA 19" racks, 1 Rack Unit (1.75") High Mounts (1) EXB module and (2) size A MCN modules.