NOTIFIER®
by Honeywell

ONYXWorks™
Routers/Repeaters

For ONYXWorks™ Echleon Networks
Installation & Operation Manual

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Fire Alarm System Limitations

While a fire alarm system may lower insurance rates, it is not a substitute for fire insurance!

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel with remote notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premise following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. These documents can be found at http://www.systemsensor.com/html/applicat.html.

A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in or behind walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second-floor detector, for example, may not sense a first-floor or basement fire.

Particles of combustion or "smoke" from a developing fire may not reach the sensing chambers of smoke detectors because:

- Barriers such as closed or partially closed doors, walls, or chimneys may inhibit particle or smoke flow.
- Smoke particles may become "cold," stratify, and not reach the ceiling or upper walls where detectors are located.
- Smoke particles may be blown away from detectors by air outlets.
- Smoke particles may be drawn into air returns before reaching the detector.

The amount of "smoke" present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photo-electronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions (caused by escaping gas, improper storage of flammable materials, etc.).

Heat detectors do not sense particles of combustion and alarm only when heat on their sensors increases at a predetermined rate or reaches a predetermined level. Rate-of-rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested at least once per year by a qualified fire protection specialist. Heat detectors are designed to protect property, not life.

IMPORTANT! Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power. If detectors are not so located, a developing fire may damage the alarm system, crippling its ability to report a fire.

Audible warning devices such as bells may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol or medication. Please note that:

- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond or comprehend the meaning of the signal. It is the property owner's responsibility to conduct fire drills and other training exercise to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A fire alarm system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the control panel. It is essential to use only equipment listed for service with your control panel.

Telephone lines needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of fire alarm malfunction is inadequate maintenance. To keep the entire fire alarm system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled monthly or as required by National and/or local fire codes and should be performed by authorized professional fire alarm installers

Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

WARNING - Several different sources of power can be connected to the fire alarm control panel. Disconnect all sources of power before servicing. The control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until this manual is read and understood.

CAUTION - System Reacceptance Test after Software Changes. To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. Reacceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring.

All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

This system meets NFPA requirements for operation at 0°C to 49°C (32°F to 120°F) and at a relative humidity 93% ± 2% RH (non-condensing) at 32°C ± 2°C (90°F ± 3°F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and all peripherals be installed in an environment with a nominal room temperature of 15-27° C/60-80° F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices this system may operate erratically or can be damaged when subjected to lightning-induced transients. Although no system is completely immune from lightning transients and interferences, proper grounding will reduce susceptibility. Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes. Consult with the Technical Services if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, and printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Over-tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

Though designed to last many years, system components can fail at any time. This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static-suppressive packaging to protect electronic assemblies removed from the unit.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation by authorized personnel.

FCC Warning

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for class A computing device pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user will be required to correct the interference at his own expense.

Canadian Requirements: This digital apparatus does not exceed the Class A limits for radiation noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement

Documentation Feedback

Your feedback helps us keep our documentation up-to-date and accurate. If you have any comments, you can email us.

Please include the following information:

- Product name and version number (if applicable)
- Manual page number
- Your comment

Send email messages to:

FireSystems.TechPubs@honeywell.com

Please note this email address is for documentation feedback only. If you have any technical issues, please contact Technical Services.

Table of Contents

Section 1 About Routers and Repeaters

1.1 Agency Listings

NOTE: ONYXWorks™ systems work with products that have been certified to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864 9th Edition, as well as products that have not received UL 864 9th Edition certification. However some systems comprise equipment that UL 8th Edition compliant. Operation of a UL 864 9th Edition compliant system together with products not tested for UL 864 9th Edition has not been UL evaluated. Such operation requires the approval of the local Authority Having Jurisdiction (AHJ).

This product is intended to be installed in accordance with the Local Authority Having Jurisdiction (LAHJ) and has been investigated to, and found to be in compliance with the following standards and documents. Before proceeding, the installer should be familiar with them too.

Underwriters Laboratories U.S. Documents

- UL-294: Access Control System Units, Fifth Edition.
- UL-864: Control Units for Fire Protective Signaling Systems, Ninth Edition.
- UL-1076: Proprietary Burglar Alarm Units and Systems, Fifth Edition.

Underwriters Laboratories Canada Documents

- CAN/ULC-S527-99: Standard for Control Units for Fire Alarm Systems.

National Fire Protection Association Standards

- NFPA 70: National Electrical Code.
- NFPA 72: Installation, Maintenance, and Use of Protective Signaling Systems.

WARNING: Installation
Improper installation, maintenance, and lack of routine testing could result in system malfunction.

1.1.1 Environmental Requirements

This product must be installed in the following environmental conditions:

- Temperature range of 0°C to 49°C (32°F - 120°F).
- 93% humidity non-condensing at 30°C (86°F).

1.2 Product Descriptions

Routers

Routers are optional devices for use with the ONYXWorks™ system. Routers, when used in pairs, allow you to connect multiple Echelon networks spanning great distances. Router options are the ROUTMB, NCB-EL, NCB-FL, and NCB-IM. ROUTMBs must be used to separate (installed between) 4WRMB from a subsequent 4WRMB when such routing exists on Echelon networks.

Repeaters

Repeaters are mainly used to switch network topologies but do not regenerate the signal; therefore, repeaters are more limited by wiring distances. Signal degradation is a factor to consider when utilizing repeaters. The repeater option for ONYXWorks™ is the 4WRMB. A ROUTMBs must be used to separate (installed between) 4WRMB from a subsequent 4WRMB when such routing exists on Echelon networks.

1.2.1 Routers Network Application Diagram

The following figure shows a typical application of routers.

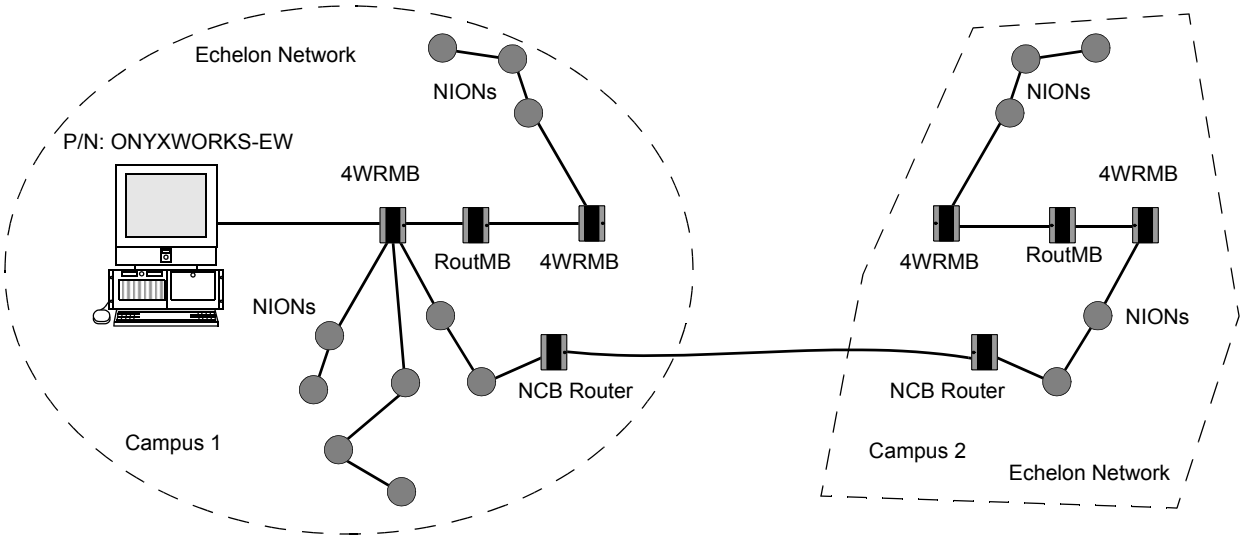

Figure 1.1 Typical Application of Routers

1.2.2 Router Options For ONYXWorks™ Systems

The routers listed here allow you to connect Echelon network segments isolated by great distances that cannot be spanned by conventional wire media.

ROUTMB The ROUTMB is a field programmable, protocol regenerating, intelligent router. It allows transparent passage of network messages between two network segments of the same or different types. ROUTMBs must be used to separate 4WRMB from a subsequent 4WRMB on an Echelon network. Available network formats are wire and optical fiber.

NCB-EL Communication between two NCB-EL routers is via an Ethernet-to-Lonworks connection that uses standard CAT 5 Ethernet cross-over cable.

NCB-FL Communication between two NCB-FL routers is via an Ethernet Fiber-to-Lonworks connection that uses dedicated fiber optic wire runs.

NCB-IM The communication channel between these routers can be any analog or digitized analog channel capable of supporting V.32 turbo standard modem signalling, including standard dial up public switched telephone circuits, 2-wire or 4-wire leased lines or dry copper CAT 5 cable (dry copper mode uses leased-line configuration over shorter distances). Data transfer between routers is delayed only by the transit time through the routers and telephone networks.

Maximum wire lengths are listed in Table 1.1 and should be considered the ABSOLUTE MAXIMUM. In many cases, where special care is not taken to protect the specified wire from electrical noise, moisture, etc., reliable long-term operation cannot be sustained at those wire lengths.

Table 1.1 Router Wiring Distance Limitations

Router Type	Cable Type	Max Distance
NCB-IM phone line	Public switched telephone circuits	N/A
NCB-IM leased line	Leased line telephone circuits	N/A
NCB-IM “dry” copper	Voice grade (CAT5) copper pair, 22-24 AWG*	6,000-8,000 ft.
	High data grade copper pairs (CAT5), heavier than normal gauge (such as 18 gauge or better) to lower resistance†	15,000-20,000 ft.
	14 to 18 gauge THHN power wire (not twisted)	3,000-4,000 ft.
NCB-EL to NCB-EL direct	CAT5 Ethernet crossover cable	300 ft.
NCB-EL to NCB-EL with ENIC-HUB	CAT5 Ethernet cable	300+300=600 ft. total
NCB-FL	Multi-mode fiber with ST connector	32,500 ft.
ROUTMB		‡

* Unless specifically stated otherwise, all wire described is twisted, un-shielded, and protected from electrical noise to the same extent computer network wiring would be if run in the same areas.

† The technical description for wire types normally specifies the wire gauge; for instance, wire specified as CAT-5 is normally 22 or 24 gauge. It takes a special effort to obtain wire that meets the electrical specifications (capacitance, characteristic impedance, velocity factor), exceeds the attenuation, and is a lower gauge wire, and technically the wire at that point would no longer be “CAT 5.” Jobs using the NCB-IM at these wire distances should be approved by NOTIFIER® prior to purchase.

‡ Refer to the ONYXWorks™ *Echelon Gateway* manual for wiring distances.

1.3 4WRMB Repeater Options For ONYXWorks™ Systems

The 4WRMB is a physical layer repeater that allows transparent passage of network messages between four network segments. The 4WRMB uses FTXC wire or FOXC fiber transceivers to connect four network segments. The 4WRMB does not support the DFXC transceiver.

When using wire, each segment allows T-tapping of up to 64 transceivers with a maximum distance of 1500' between any two nodes. A wire segment can have a maximum length of 8000' when only one node is attached to the repeater on that segment.

When using fiber, each segment must be point-to-point only (repeater to repeater or repeater to a single node). Each segment can tolerate up to 8db of attenuation.

Section 2 4WRMB Repeaters

2.1 Repeater Description

Repeaters are used for applications that require complex network configurations. They are mainly used to switch network topologies but do not regenerate the signal; therefore, repeaters are more limited by wiring distances. Signal degradation is a factor to consider when utilizing repeaters. Repeaters cannot be connected together.

The 4WRMB is a wire or fiber media repeater that allows transparent passage of network messages between four network segments. The 4WRMB uses FTXC wire or FOXC fiber transceivers to connect four network segments. ROUTMBs must be used to separate (installed between) 4WRMB from a subsequent 4WRMB when such routing exists on Echelon networks. Consecutive 4WRMBs on a bus should not be implemented in your system design (refer to Figure 2.1).

When using wire, each segment allows T-tapping of up to 64 transceiver connections with a maximum distance of 1500' between any two transceivers. A wire segment can have a maximum length of 8000' when only one node is attached to the repeater on that segment.

This repeater has to have four transceivers mounted on it in order for it to function correctly. Each of the four segments must be property terminated if they are twisted pair wire runs. If an FOXC is used on a 4WRMB it must be Rev C or later. Only FTXC and FOXC transceivers can be used with a 4WRMB repeater.

When using fiber, each segment must be point-to-point only (repeater-to-single node). Each segment can tolerate up to 8 db of attenuation.

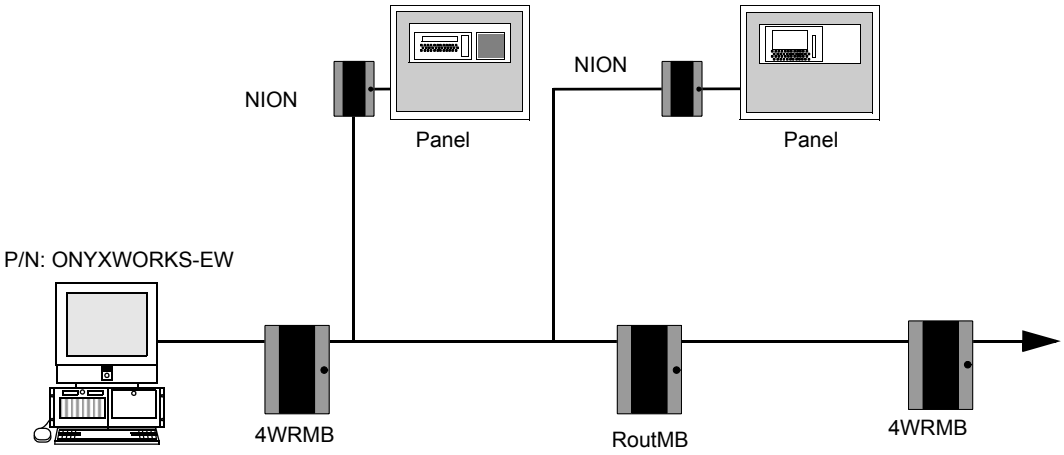

Figure 2.1 Typical 4WRMB Connection

2.1.1 Motherboard Description

The 4WRMB repeater requires these physical connections:

Network facilitates NION's communication over the ONYXWorks™ Echelon network. The transceiver header connector fits onto the transceiver connector on the router board. Refer to the ONYXWorks™ *Echelon Gateway* manual for more details on transceiver connections.

Power Provides DC voltage and ground for the 4WRMB.

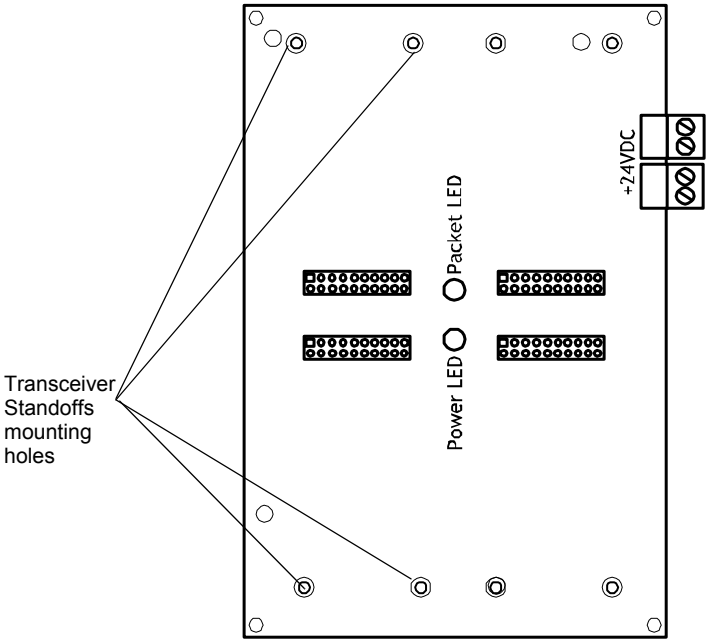

Figure 2.2 4WRMB Motherboard Layout

CAUTION: IMPORTANT
When "nesting" 4WRMB repeaters, be sure to place a ROUTMB intelligent router between them as in the illustration below to rebuild the network packets, or signal loss will result between the Echelon Gateway and NIONs placed beyond the second repeater. Refer to Figure 1.1, "Typical Application of Routers" on page 10.

LED Descriptions

Two LEDs are provided to display repeater operation:

- Power - On during normal operation.
- Packet Transmit/Receive - Flashes when a network message is transmitted or received.

2.2 4WRMB Installation

2.2.1 Required Components

- 4WRMB motherboard.
- SMX Echelon network transceivers (ordered separately - FTXC, or FOXC).

NOTE: The 4WRMB does not support DFXC transceivers.

- A UL listed, battery backed, +24VDC power supply (+24 VDC @ 0.050 A).
- NISCAB-1 enclosure (ordered separately).

2.2.2 Installation Overview

This is the recommend installation order for a 4WRMB:

1. Secure SMX transceivers and wires on repeater before inserting repeater into NISCAB-1.
2. Install repeater in cabinet.

2.2.3 4WRMB Power Requirements

The 4WRMB requires +24 VDC @ 0.050 A nominal and battery backup in accordance with local code requirements. It can be powered by any power limited +24 VDC source which is UL or ULC listed, as appropriate for your area, for use with fire protective signaling units. Power connections are made via plug-in screw terminals.

2.2.4 NISCAB-1 Installation

This section details how to install the 4WRMB into the NISCAB-1 enclosure. This enclosure is provided with door and key lock.

Mounting the Enclosure to its Wall Position

Step 1. Use the provided key to unlock the enclosure cover.

Step 2. Remove the enclosure cover.

Step 3. Remove the mounting stud indicated in the figure below, if not removed the stud could possibly short the board.

Step 4. Mount the enclosure to the wall. Refer to the enclosure mounting hole layout below.

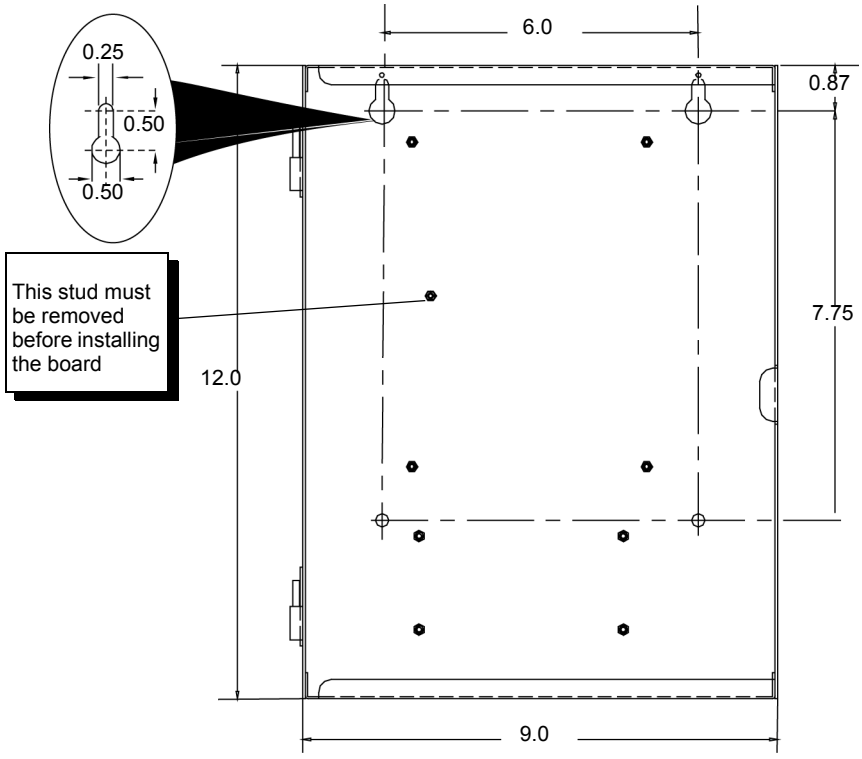

Figure 2.3 NISCAB-1 Mounting Hole Layout

Mounting the 4WRMB in the Enclosure

When installing the 4WRMB in this enclosure, be sure to use the inboard set of four mounting studs as shown below.

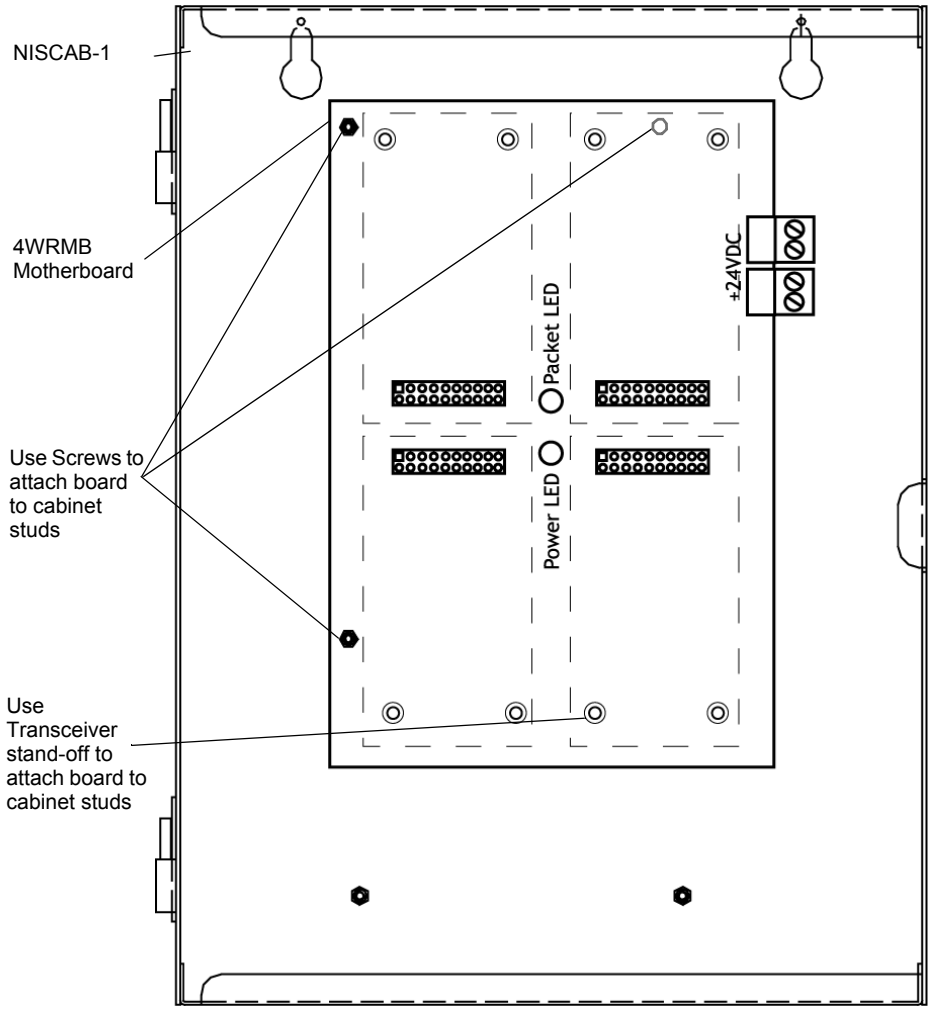

Figure 2.4 4WRMB Mounting Stud Locations

Section 3 ROUTMB Routers

3.1 About Routers

Routers are used for applications that require network runs with large node counts, extreme distances, and complex configurations.

Typically, a router is required under these conditions:

- Any time more than 64 nodes are to be attached to a network segment.
- When the segment needs to be more than 6000'.
- When a free topology (star) configuration would be more efficient.

Routers regenerate the signal, resulting in no signal degradation. A router is an Echelon network node that can be used to connect differing media types together or to extend the network. These are the supported router types.

3.2 ROUT-MB Description

The ROUTMB is a field programmable, protocol regenerating, intelligent router. It allows transparent passage of network messages between two network segments of the same or different types. Available network formats are wire and optical fiber. ROUTMBs must be used to separate (installed between) 4WRMB from a subsequent 4WRMB when such routing exists on Echelon networks.

This router has connections for two transceivers. Each transceiver has a side associated with it (Side A and Side B). By convention Side A should be the side that is closer to the Echelon Gateway that is used to configure the router and is referred to as the near side. FTXC, FOXC, and DFXC transceivers may be used with this type of router, however you may not use two DFXCs on the router because of power limitations.

Those transceiver daughter boards connect two network segments of the same or different types; FTXC for wire, FOXC for optical fiber (maximum fiber attenuation of 8 db) and (12 db) DFXC for bidirectional fiber media. All transceivers are mounted to the ROUTMB motherboard using header strips.

3.2.1 Motherboard Description

The ROUTMB requires two physical connections:

Network facilitates NION's communication over the ONYXWorks™ Echelon network. The transceiver header connector fits onto the transceiver connector on the router board. Refer to the ONYXWorks™ *Echelon Gateway* manual for more details on transceiver connections.

Power Provides DC voltage and Ground connections for the ROUTMB.

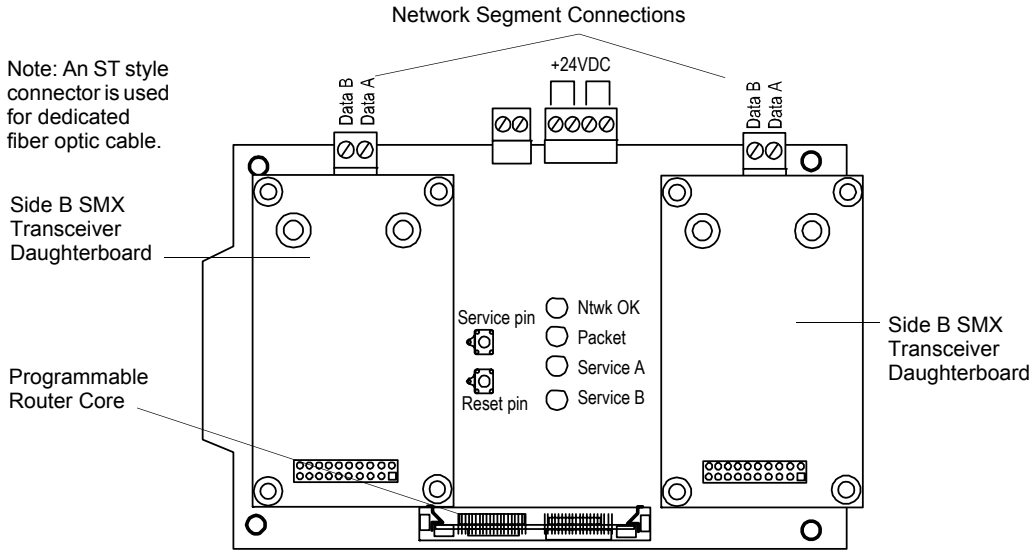

Figure 3.1 ROUTMB Motherboard Layout

NOTE: Attaching two DFXC Fiber Optic Network Transceiver to a Router motherboard is not supported.

LED Descriptions

LEDs are provided to display router operation:

Network OK Flashes slow during normal operation.

Packet Flashes when a network message is received and transmitted.

Service A & B On when the router is unbound or the service pin is pressed.

3.3 ROUTMB Installation

3.3.1 Required Components

- ROUTMB motherboard.
- SMX Echelon network transceiver (ordered separately - FTXC, FOXC, or DFXC).
- A UL listed, battery backed, +24VDC power supply (+24 VDC @ 0.075 A).
- NISCAB-1 enclosure (ordered separately).

3.3.2 Installation Overview

This is the recommend installation order for a ROUTMB:

1. Secure SMX transceiver and wires on router before inserting router into NISCAB-1.
2. Install router in cabinet.
3. Bind router to the Echelon network.

3.3.3 ROUTMB Power Requirements

The ROUTMB requires +24 VDC @ 0.075 A nominal and battery backup in accordance with local code requirements. It can be powered by any power limited +24 VDC source which is UL or ULC listed, as appropriate for your area, for use with fire protective signaling units. Power connections are made via plug-in screw terminals.

3.3.4 NISCAB-1 Installation

This section details how to install the ROUTMB into the NISCAB-1 enclosure. This enclosure is provided with door and key lock.

Mounting the Enclosure to its Wall Position

Step 1. Use the provided key to unlock the enclosure cover.

Step 2. Remove the enclosure cover.

Step 3. Mount the enclosure to the wall. Refer to the enclosure mounting hole layout below.

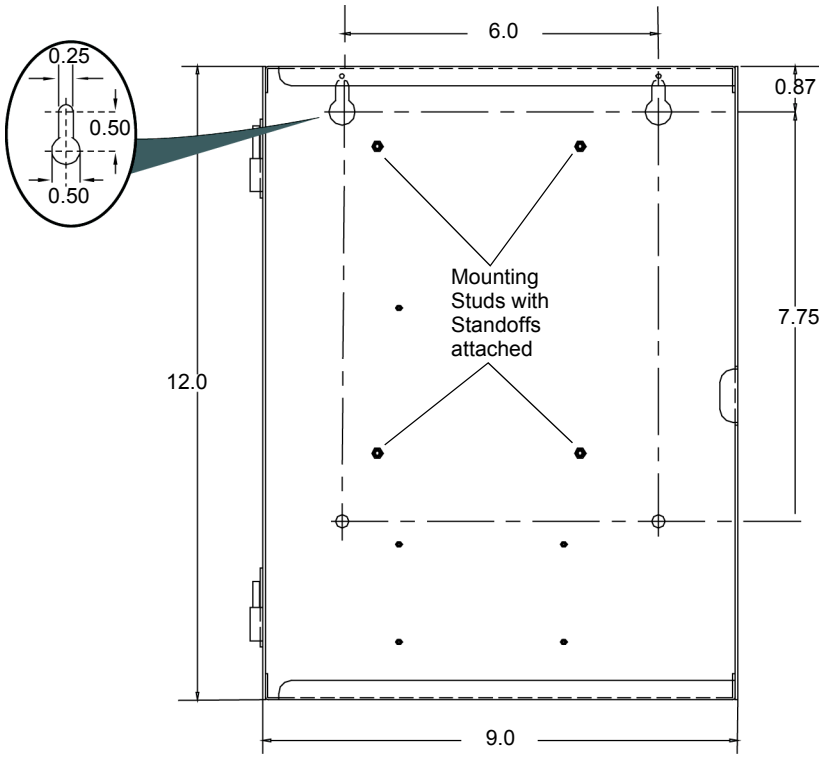

Figure 3.2 NISCAB-1 Mounting Hole Layout

Mounting the ROUTMB in the Enclosure

When installing a single motherboard in this enclosure, be sure to use the inboard set of four mounting studs as shown below.

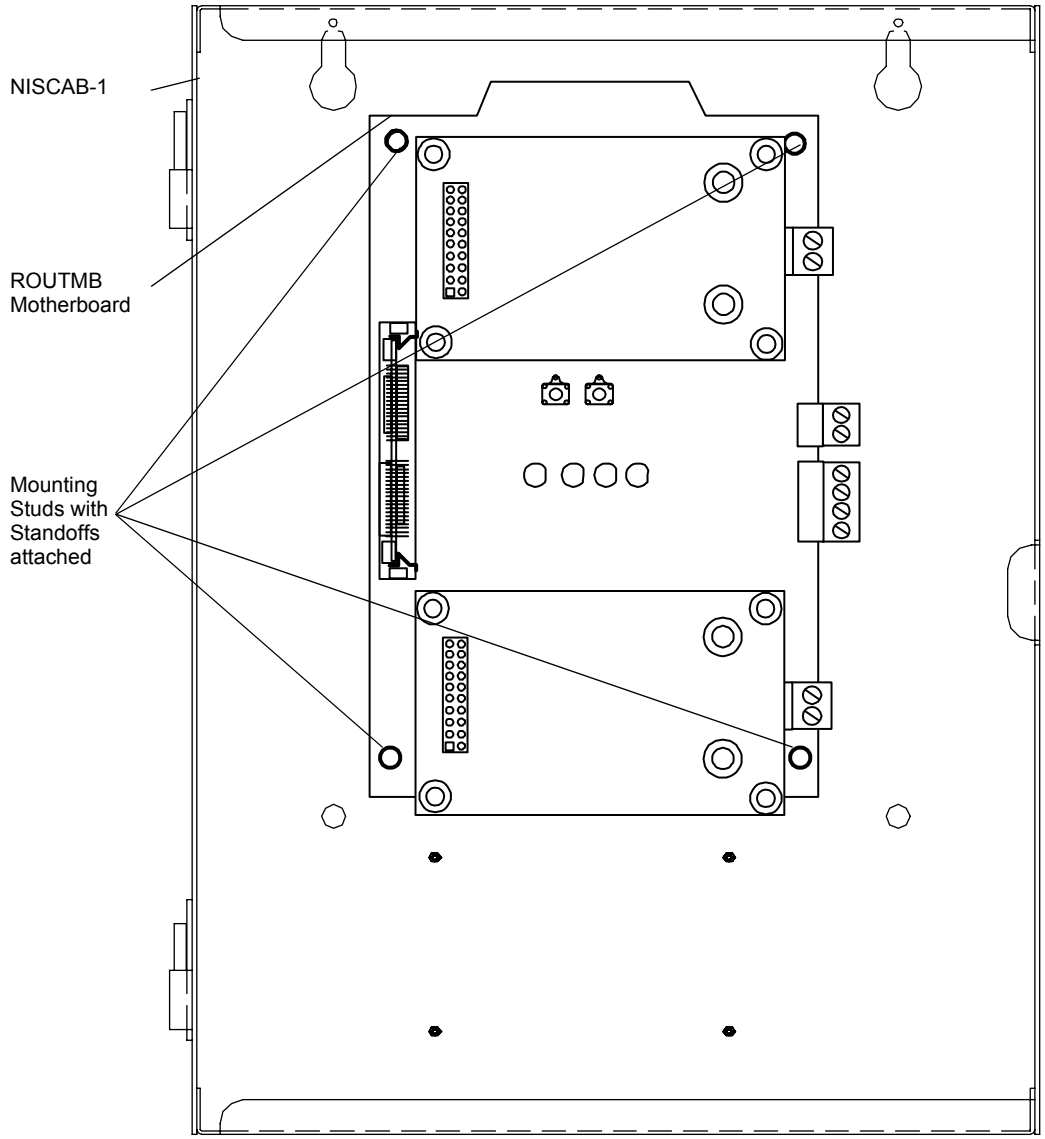

Figure 3.3 ROUTMB Mounting Locations

Section 4 NCB-IM Routers

NOTE: For detailed information about the router, refer to the manufacturer's documentation included with the product.

4.1 About Routers

Routers are used for applications that require network runs with large node counts, extreme distances, and complex configurations.

Typically, a router is required under these conditions:

- Any time more than 64 nodes are to be attached to a network segment.
- When the segment needs to be more than 6000'.
- When a free topology (star) configuration would be more efficient.

Routers regenerate the signal, resulting in no signal degradation. A router is an Echelon network node that can be used to connect differing media types together or to extend the network. These are the supported router types.

4.2 NCB-IM Product Description

This is a router that is used to connect Echelon network channels together via telephone lines. NCB-IMs must be connected in pairs. The telephone lines used may be either leased line (dry copper wires) or dial-up. In the dial-up configuration a telephone number must be programmed in to the router. The NCB-IM's have a neuron chip that is used to configure the router's phone number and to get additional status information from the router. This neuron chip should be linked to the router when it is bound. The NCB-IMs also have DIP switches that are used to configure additional parameters (leased line/dial-up, Originate/Answer, etc.).

NOTE: The NCB-IM the only type of router that support redundant router configuration. Redundant NCB-IMs are used to protect against communication failure if one of the phone lines is disconnected.

NCB-IM routers are devices that when used in pairs allow you to connect multiple Echelon networks in real time, spanning great distances. The communication channel between these devices can be any analog or digitized analog channel capable of supporting V.32 turbo standard modem signalling, including standard dial-up public switched telephone circuits, 2-wire or 4-wire leased-lines or dry copper CAT 5 cable (dry copper mode uses leased-line configuration over shorter distances). Data transfer between routers is delayed only by the transit time through the routers and modem connections.

A typical application would be connection of Echelon networks on multiple campuses.

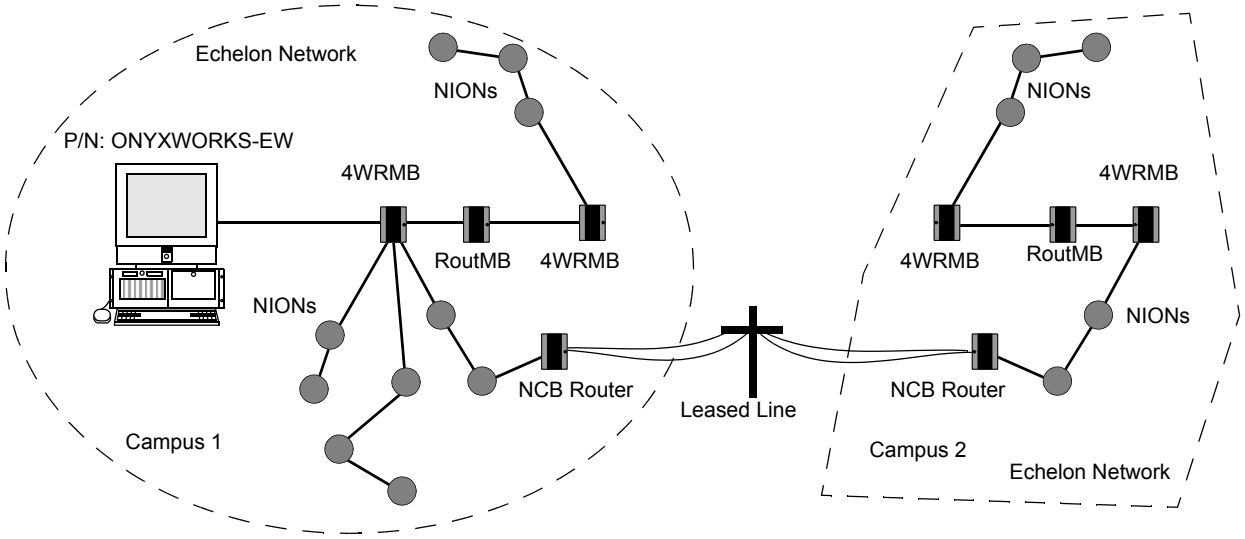

Figure 4.1 Typical Application of NCB-IM Routers

4.3 NCB-IM Component Descriptions

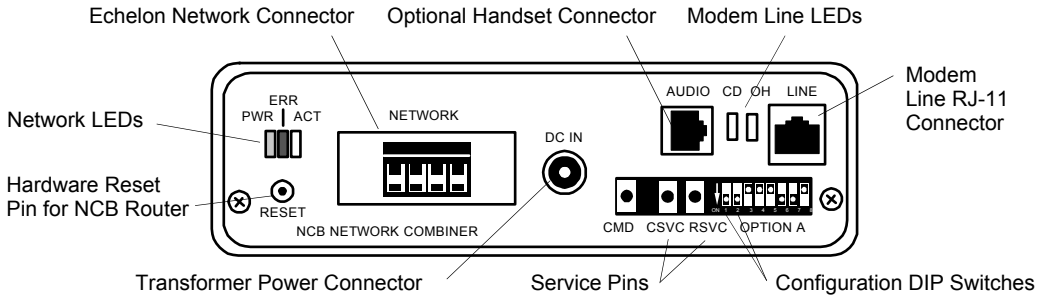

Figure 4.2 NCB Series Front Panel

LED Descriptions

Each NCB-IM router has five LEDs that provide network and modem diagnostic information. These LEDs function as follows:

ACT (yellow) Indicates a packet has been passed by the router.

ERR Red error color indicates one of three things:

- Always on: a diagnostic error has occurred.
- Slow flash or always on: insufficient configuration information is present.
- Quick flash: insufficient IP configuration information.

Power Green color indicates when power is present for the router.

- Flashes if DC input to module is below minimum required voltage.
- Flashes for two seconds if a Wink network message is sent to the network processor.

4.4 NCB-IM Installation

4.4.1 NCB-IM Requirements

To use a NCB-IM the following components are required:

- "NCB-IM Components".
- Telephone wire media with RJ11 termination.
- NISCAB-5 enclosure (ordered separately).
- HSP-121 Power Line Surge Suppressor (required and included with NISCAB-5 order).
- DITEK 2MLPL110B or EDCO PC2TEL line protectors (not included).

NCB-IM Components

These are the main components that are shipped with a NCB-EL order:

- NCB-IM Network Combiner Module.
- FTXC Echelon SMX network transceiver (installed).
- NCB transformer power supply (+24 VDC 400mA, center POSITIVE, outer NEGATIVE).

4.4.2 Installation Overview

This is the recommend installation order for a NCB-IM:

- “NISCAB-5 Power Outlet and EDCO HSP-121B Installation” on page 28.
- “NISCAB-5 Shelf Installation” on page 30.
- “Router Installation” on page 31.

4.4.3 NISCAB-5 Power Outlet and EDCO HSP-121B Installation

NCB Series Router Power Supply Requirements

This router requires +24VDC @ 0.050A nominal and battery backup in accordance with local code requirements. It can be powered by any power limited, filtered +24 VDC source which is UL or ULC listed, as appropriate for your area, for use with fire protective signaling units.

NOTE: Each router requires a UPS (Uninterruptable Power Supply) that is rated at requires 115 VAC, 60Hz primary power and is UL listed for use with fire protective signalling units.

Installation Procedure

Step 1. Mount a UL listed, single gang electrical box in the NISCAB-5's back box using self tapping screws provided.

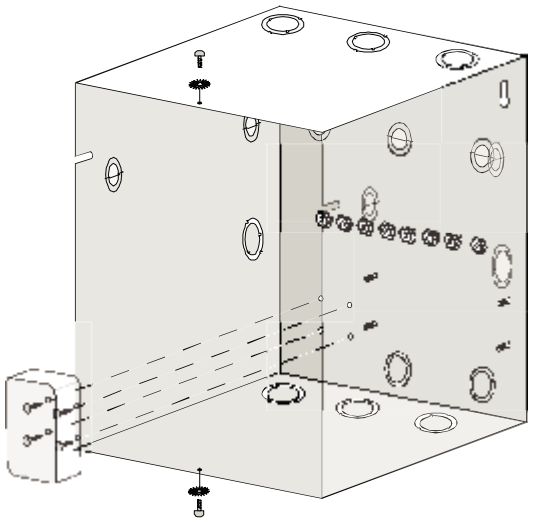

Figure 4.3 Gang Box Installation Diagram

Step 2. Mount the HSP-121 to the box using studs provided.

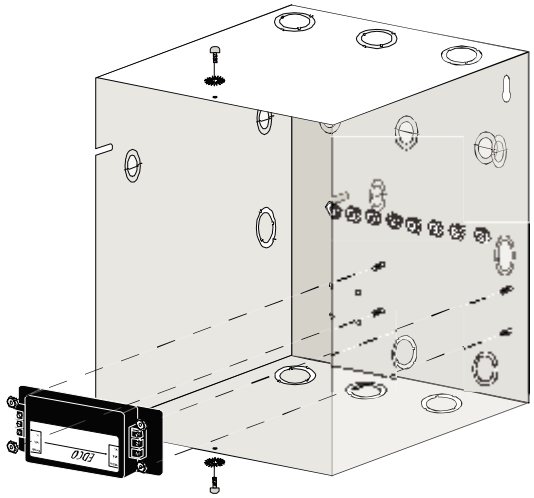

Figure 4.4 HSP-121 Power Line Protector Installation Diagram

Step 3. Route power wiring in conduit through the bottom of cabinet and connect the wiring to the line side (input) of the HSP-121.

NOTE: Use only wire for power limited systems. Power limited wire runs use type FPLR, FPLP, FPL or equivalent cabling per NEC 760.

Step 4. Connect the HSP-121's EQUIP side (output) to single, grounded electrical outlet that will be mounted in the single gang electrical box.

Step 5. Install the outlet into the single gang electrical box.

Step 6. Install the single gang electrical box's plate.

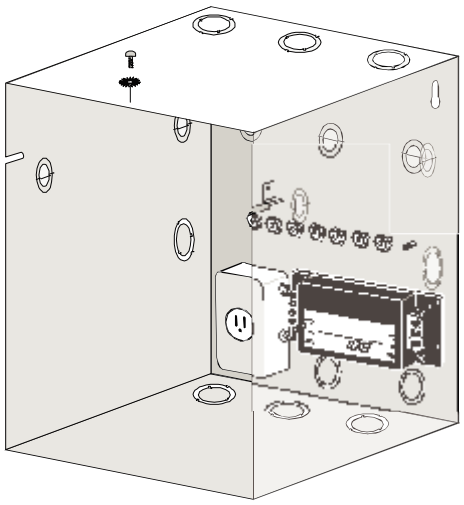

Figure 4.5 Power Outlet Installation Diagram

NOTE: Power-limited and non-power-limited circuits must remain separated in the cabinet. All power-limited wiring must remain at least 0.25 inches from any non-power-limited circuit wiring. Run all non-power-limited wiring along bottom of cabinet. All power-limited and non-power-limited circuit wiring must enter and exit the cabinet through different knockouts and/or conduits.

4.4.4 NISCAB-5 Shelf Installation

The NISCAB-5 is provided with three shelves and stand-offs for assembly of a shelf unit. The top shelf is for the router, and the bottom two shelves house the PNET-1 surge suppressors. Install the shelves as shown.

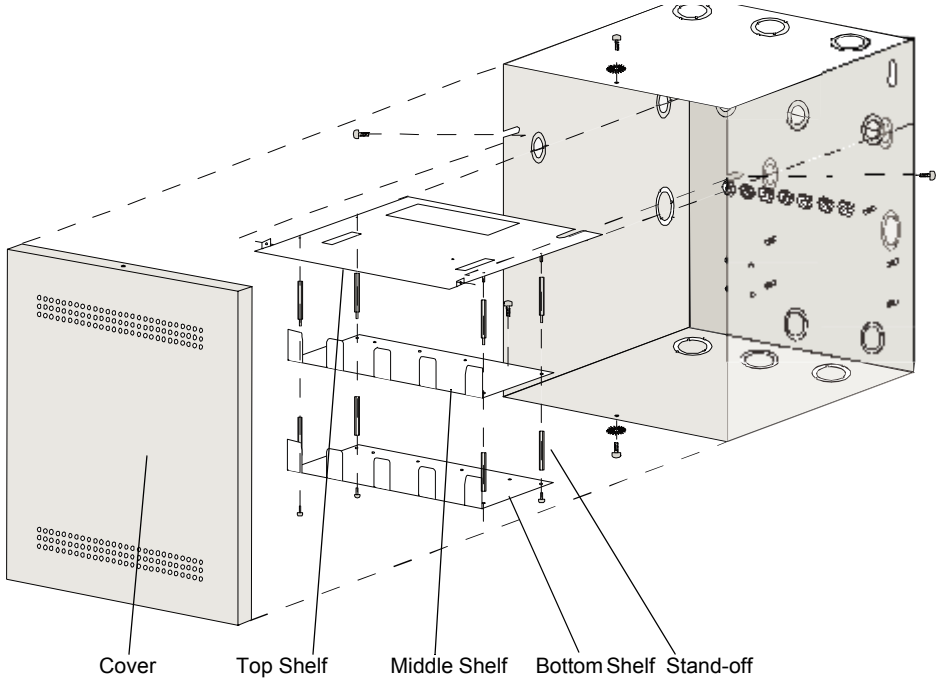

Figure 4.6 NISCAB-5 Shelf Installation Diagram

4.4.5 Router Installation

NCB-IM routers are always used in pairs with one at each end of the telephone line. Consequently, of each pair, one must be set to Originate communication and the other to Answer. This applies to both dial-up and leased-line modes. Perform the installation and cable connections of the router using the following procedure as a guideline.

Procedure

Step 1. Route your the Echelon network wires in conduit into the cabinet.

Step 2. Orient the router on the extended NISCAB-5's top shelf

Step 3. Set the DIP switches as needed for your application:

- Eight router OPTION A DIP switches. You must press the Reset pin on the NCB-IM router after making changes to the Switch settings.

1	• UP: Modem in Answer mode • DOWN: Modem in Originate mode
2	• UP: Modem Dial-up mode • DOWN: Modem Leased-line mode
3	• Not used, leave up
4	• Not used, leave up
5	• UP: Enable setting of the control Neuron processor address • DOWN: Disable setting of the control Neuron processor address
6*	• UP: Control neuron processor sub-net/node address=255/2 • DOWN: Control neuron processor sub-net/node address=255/1
7†	• UP: -10 dBm modem Tx level (normal) • DOWN: -16 dBm modem Tx level (back-to-back leased-line connection)
8	• UP: 2-wire • DOWN: 4-wire

* Only works when Switch 5 is in UP position.

† Should only be placed in the DOWN position for testing purposes where both routers are separated by only a few feet - i.e. on a test bench.

- DIP Switch Settings for Dial-Up and Leased-Line 2 and 4-Wire\

Dial-up	• Unit 1 (Originate): DU UU DD UU • Unit 2 (Answer): UU UU DD UU
2-wire Leased-line	• Unit 1 (Originate): DD UU DD UU • Unit 2 (Answer): UD UU DD UU
4-wire Leased-line	• Unit 1 (Originate): DD UU DD UD • Unit 2 (Answer): UD UU DD UD

Step 4. All telephone line connections are made to the line connector on the NCB-IM router. Wire connections are as follows:

Modem Line RJ11 Pin-outs	
1	No Connection
2	4 wire receive tip (4-wire channels only)

3	2 wire tip/4 wire transmit tip
4	2 wire ring/4 wire transmit ring
5	4 wire receive ring (4-wire channels only)
6	No Connection

- For 4-wire leased-line operation:
  - Connect pins 3 and 4 of NCB module 1 to the circuit carrying audio from NCB1 to NCB2; terminate this circuit to pins 2 and 5 of NCB2.
  - Connect pins 2 and 5 of NCB module 1 to the circuit carrying audio from NCB2 to NCB1; terminate this circuit to pins 3 and 4 of NCB2.

Step 5. All telephone line connections are recommended to use surge suppression devices on the circuit. Accepted manufacturers and models are DITEK, model 2MLPL110B or EDCO, model PC2TEL. These devices must be mounted in their own enclosures to the NISCAB-5 with all connections run in conduit. The following illustration is a typical installation block diagram.

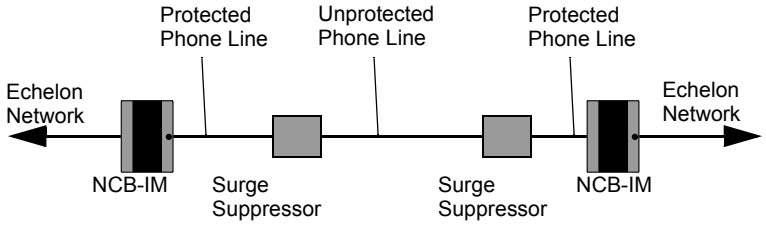

Figure 4.7 Telephone Line Surge Suppression

- The DITEK and EDCO modules are identical in both installation and operation. Figure 4.8 shows wiring terminations for up to 2-pairs of wires and is typical for both manufacturer's models.

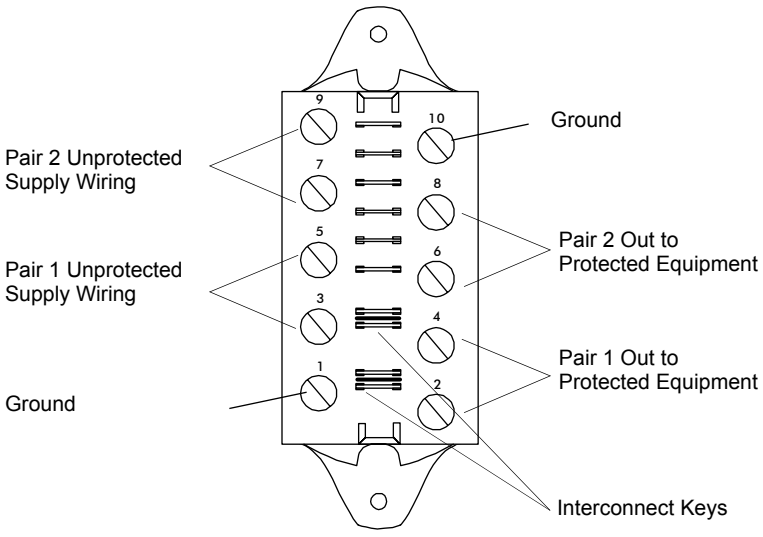

Figure 4.8 DITEK or EDCO Wiring Block

Step 6. Connect your Echelon network wires to the router connector labeled NETWORK.

Step 7. Plug the router's transformer power supply into the router's DC power connector.

Step 8. Slide the router and shelf into the cabinet.

Step 9. Plug the router's power transformer into previously installed electrical outlet.

Telephone Line / Modem Connection Descriptions

The NCB-IM router's on-board modem can operate under PSTN (dial-up) or leased-line modes. Each of these modes has different configuration and connection requirements.

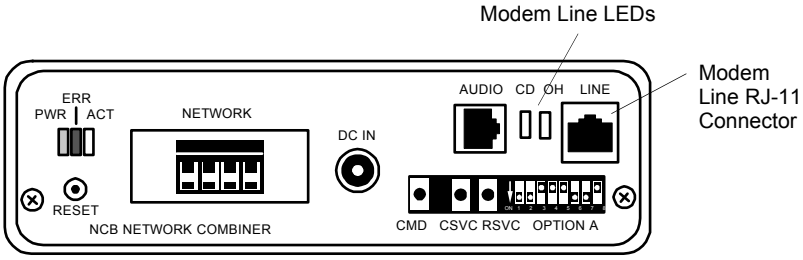

Figure 4.9 NCB-IM Modem

PSTN Dial-up connections use a 2-wire connection to a standard dial-up telephone circuit. A standard telephone cord can be used. Each NCB-IM unit contains a label on the bottom with FCC and Canadian registration numbers, ringer equivalence, and load number information. Refer to the Router Configuration part of this section for configuration information.

Leased-Line This connection style can use either a 2-wire or 4-wire connection to a dedicated leased-line circuit. In 2-wire leased-line mode, the audio circuit must pass audio in both directions simultaneously. Some leased-line audio circuits (most notably microwave RF channels) provide a 4-wire circuit made up of a transmit pair and a receive pair. Use the 4-wire settings in these situations.

NOTE: Telephone circuit technical parameters may vary among service providers in different parts of the country. Therefore, when ordering 2-wire or 4-wire leased-line telephone circuits, be sure to specify an "analog leased-line data circuit for 19.2 kbps modems."

NOTE: 4-wire leased-line circuits must have line protection devices at both modems which are UL listed for this purpose to UL Standard 1459. These devices must be mounted in their own enclosures with all connections run in conduit.

4.5 NCB-IM Programming

For the NCB-IM router, no modem programming is required for leased line or dry copper installations; however, for dial-up operation, some configuration setup must done on the Echelon Gateway. A programming utility is included in the Echelon Gateway that performs this function after all physical connections and switch settings have been made.

Section 5 NCB-EL Routers

NOTE: For detailed information about the router, refer to the manufacturer's documentation included with the product.

5.1 About Routers

Routers are used for applications that require network runs with large node counts, extreme distances, and complex configurations.

Typically, a router is required under these conditions:

- Any time more than 64 nodes are to be attached to a network segment.
- When the segment needs to be more than 6000'.
- When a free topology (star) configuration would be more efficient.

Routers regenerate the signal, resulting in no signal degradation. A router is an Echelon network node that can be used to connect differing media types together or to extend the network. These are the supported router types.

5.2 NCB-EL Product Description

This router is used to connect Echelon network media channels together via UDP/IP. The NCB-EL is used to connect via Ethernet. This router uses Internet Protocol (IP) for data transport. Communication between networks via NCB type router units is "live," delayed only by the transit time through the routers and Ethernet channel.

At least two NCB-EL routers are required for each application, one located on the Echelon Gateway side of the Ethernet network, and the other located at the other end of the Ethernet network.

The NCB-EL router is an external router that communicates over Ethernet cabling with your LAN. A standard CAT5 cable from the router's 10BaseT connector is used to make the connection to your LAN. The router's factory installed SMX transceiver (NETWORK connector) is used to make the connection to your Echelon network..

NOTE: Refer to the ONYXWorks™ *Echelon Gateway* manual for information on SMX Transceivers and segment termination.

NOTE: NCB-EL and NCB-FL routers use UDP messaging on ports 1100 and 1283.

5.2.1 Component Descriptions

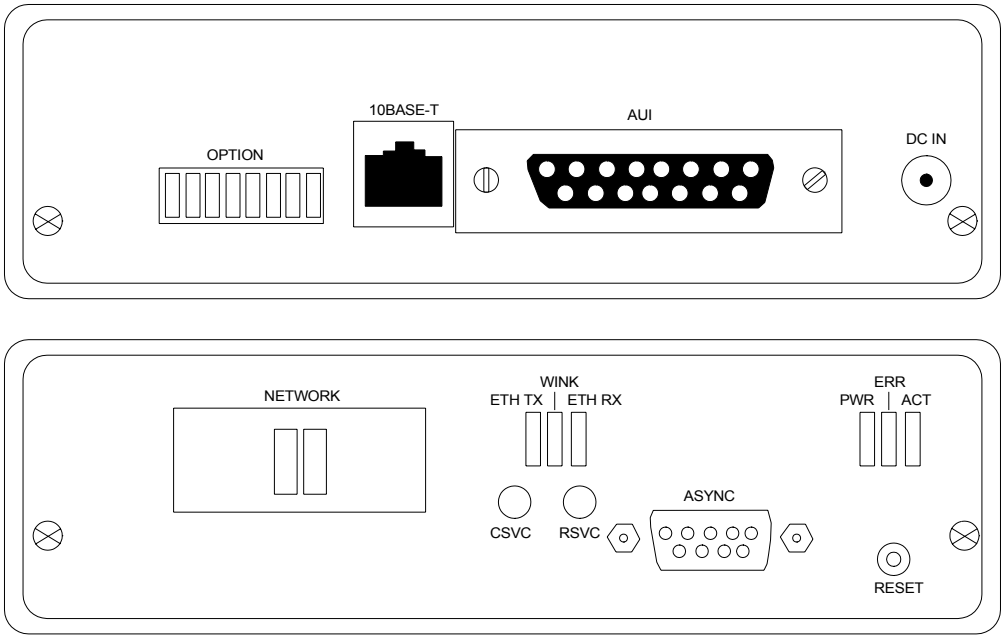

Figure 5.1 NCB-EL Router Diagram

Status LEDs

ACT Yellow activity LED (ACT); indicates a packet has been passed by the router.

ERR Red Error LED that indicates one of the following:

- Always on: a diagnostic error has occurred.
- Slow flash or always on: insufficient configuration information is present.
- Quick flash: insufficient IP configuration information.

Power Green LED that indicates when power is present for the router.

Network LEDs

ETH RX Yellow Ethernet Receive LED that indicates when a packet has been detected on the Ethernet port.

WINK Red LED that flashes for two seconds when the Control Neuron receives a Wink Network Management command.

ETH TX Green Ethernet Transmit LED that indicates when a packet is transmitted on the Ethernet port.

Buttons

Reset Hardware button that resets the entire NCB router.

CSVC Service button for the router's Neuron processor (not used for NCB-EL/NCB-FL).

RSVC Service button for the router module.

5.3 NCB-EL Installation

5.3.1 Required Components

To use a NCB-EL the following components are required:

- "NCB-EL Components".
- NISCAB-5 enclosure (ordered separately).
- HSP-121 Power Line Surge Suppressor (required included with NISCAB-5 order).
- Direct connection to your Network with a customer supplied Ethernet cross-over cable or a standard Ethernet cable.

NCB-EL Components

These are the main components that are shipped with a NCB-EL order:

- NCB-EL Network Combiner Module.
- FTXC Echelon SMX network transceiver (installed).
- NCB transformer power supply (+24 VDC 400mA, center POSITIVE, outer NEGATIVE).

5.3.2 Installation Overview

These are the recommend installation steps for the router:

1. “NISCAB-5 Power Outlet and EDCO HSP-121 Installation” on page 38.
2. “NISCAB-5 Shelf Installation” on page 40.
3. “PNET-1 Installation” on page 41.
4. “Router Installation” on page 42.

5.3.3 NISCAB-5 Power Outlet and EDCO HSP-121 Installation

NCB Series Router Power Supply Requirements

This router requires +24VDC @ 0.050A nominal and battery backup in accordance with local code requirements. It can be powered by any power limited, filtered +24 VDC source which is UL or ULC listed, as appropriate for your area, for use with fire protective signaling units.

NOTE: Each router requires a UPS (Uninterruptable Power Supply) that is rated at requires 115 VAC, 60Hz primary power and is UL listed for use with fire protective signalling units.

Installation Procedure

Step 1. Mount a UL listed, single gang electrical box in the NISCAB-5's back box using self tapping screws provided.

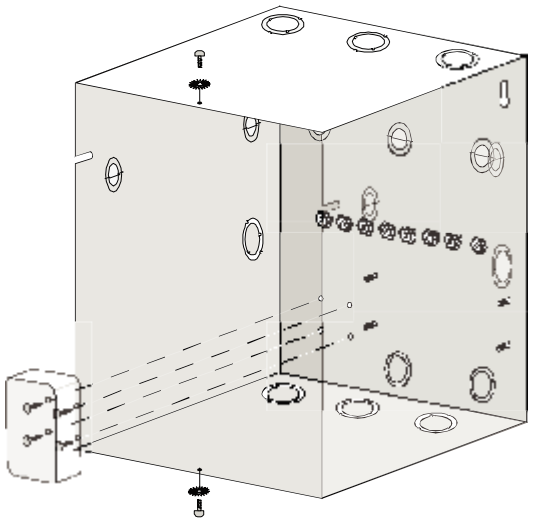

Figure 5.2 Gang Box Installation Diagram

Step 2. Mount the HSP-121 to the box using studs provided.

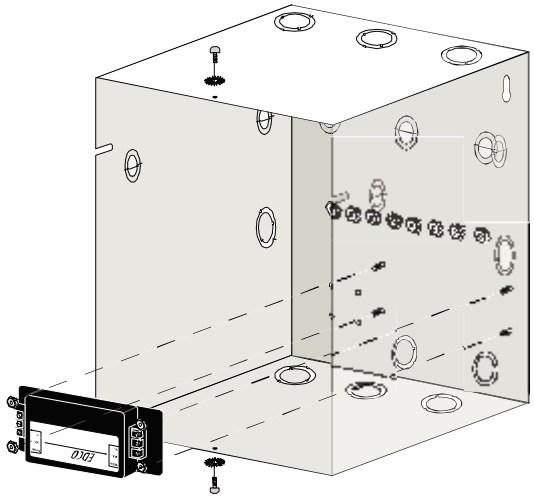

Figure 5.3 HSP-121 Power Line Protector Installation Diagram

Step 3. Route power wiring in conduit through the bottom of cabinet and connect the wiring to the line side (input) of the HSP-121.

NOTE: Use only wire for power limited systems. Power limited wire runs use type FPLR, FPLP, FPL or equivalent cabling per NEC 760.

Step 4. Connect the HSP-121's EQUIP side (output) to single, grounded electrical outlet that will be mounted in the single gang electrical box.

Step 5. Install the outlet into the single gang electrical box.

Step 6. Install the single gang electrical box's plate.

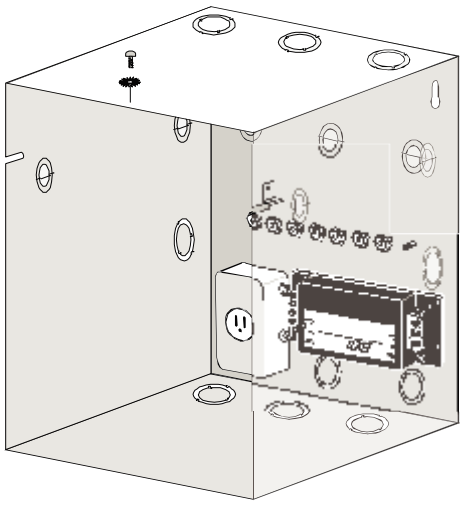

Figure 5.4 Power Outlet Installation Diagram

NOTE: Power-limited and non-power-limited circuits must remain separated in the cabinet. All power-limited wiring must remain at least 0.25 inches from any non-power-limited circuit wiring. Run all non-power-limited wiring along bottom of cabinet. All power-limited and non-power-limited circuit wiring must enter and exit the cabinet through different knockouts and/or conduits.

5.3.4 NISCAB-5 Shelf Installation

The NISCAB-5 is provided with three shelves and stand-offs for assembly of a shelf unit. The top shelf is for the router, and the bottom two shelves house the PNET-1 surge suppressors. Install the shelves as shown.

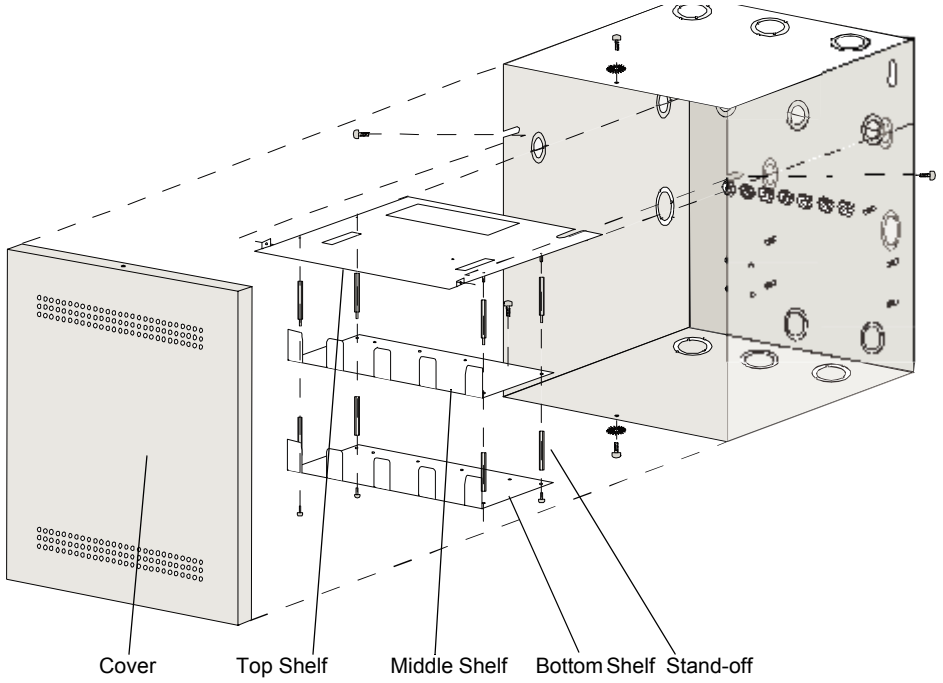

Figure 5.5 NISCAB-5 Shelf Installation Diagram

5.3.5 PNET-1 Installation

The PNET-1 is a surge suppressor that protects an Ethernet line from power surges. The bottom two shelves house PNET-1 surge suppressors Install the PNET-1 surge suppressor into the NISCAB-5 as shown in the figure.

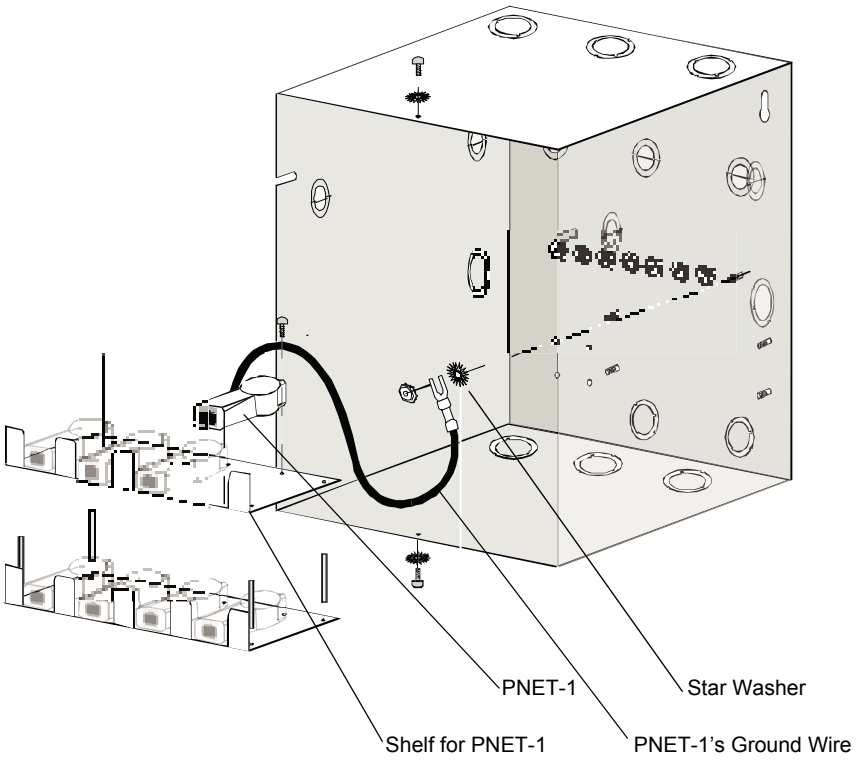

Figure 5.6 PNET-1 Installation Diagram

5.3.6 Router Installation

Perform the installation and cable connections of the router using the following procedure as a guideline.

Procedure

Step 1. Set all eight of the router's OPTION DIP switches to the UP position.

The router reads DIP switch settings at power-up or after you press the RESET button.

Step 2. Route your the Echelon network wires in conduit into the cabinet.

Step 3. Orient the router on the extended NISCAB-5's top shelf.

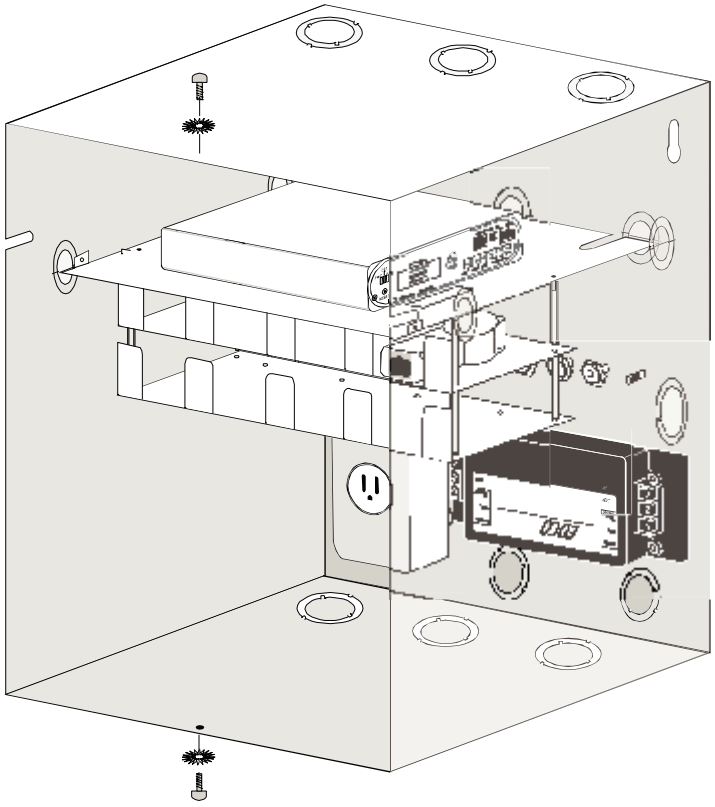

Figure 5.7 NCB Series Router Installation into the NISCAB-5

Step 4. Connect the Ethernet cable from the router's 10Base-T Ethernet connector to the PNET-1's IN connector (square end).

Step 5. Connect your Local Area Network line to the PNET-1's OUT connector (round end).

For information about using hubs with the PNET-1 refer to "Network Hub use with the NCB-EL Router" on page 44.

Step 6. Connect your Echelon network wires to the router connector labeled NETWORK.

Step 7. Plug the router's transformer power supply into the router's DC power connector.

Step 8. Slide the router and shelf into the cabinet.

Step 9. Plug the router's power transformer into previously installed electrical outlet.

■ NCB Series Router Disassembly/Assembly Procedure

If you find it necessary to disassemble and reassemble your NCB series router for any purpose use this procedure as a guideline.

Step 1. Disconnect any power from the router.

Step 2. Disconnect any external network wiring and cables.

Step 3. Remove the phillips screws from both router plates.

Step 4. Remove the two hex nuts surrounding the ASYNC connector.

Step 5. Remove the two flat head screws inside the AUI connector.

Step 6. Grasp the plate with the AUI connector and gently pull to remove the router's boards/plates. Then place them on a ESD safe surface.

WARNING: NCB Router Disassembly
DO NOT grasp the NETWORK connector plate and pull to remove the router's boards/plates from the router's cabinet. Doing so may damage the unit, causing the unit to malfunction when powered on. Doing so will void the unit's warranty.

Step 7. Perform your tasks related to you removing the router's internal parts (i.e. jumper termination change, remove existing and attach new transceiver).

Step 8. Grasp the plate with the AUI connector and gently reinsert the router's boards/plates (NETWORK connector side first).

WARNING: NCB Router Assembly
DO NOT grasp the NETWORK plate to insert the router's boards/parts into the router's cabinet. Doing so may damage the unit, causing the unit to malfunction when powered on. Doing so will void the unit's warranty.

Step 9. Replace removed screws, hex nuts, and the back plate and screws.

5.4 Network Hub use with the NCB-EL Router

A multi-port network hub (UL 864 Listed) that connects multiple devices to an Ethernet network can be used with this router. In your routing make sure to do the following:

Step 1. Make sure all power is disconnected and verify the ground connection on the PNET-1 was made.

Step 2. Connect the router's 10BaseT connector to a PNET-1's IN (square end).

Step 3. Connect the PNET-1's OUT connector (round end) to one of the hub's PNET-1 OUT connector.

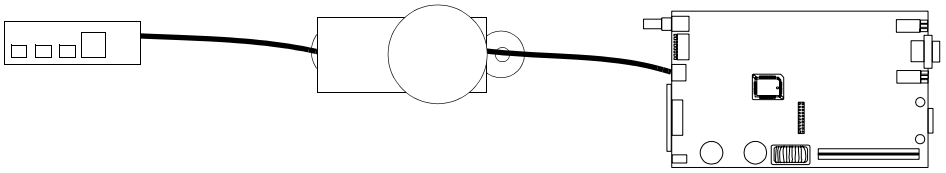

Figure 5.8 Network Hub Connection Diagram

NOTE: Power-limited and non-power-limited circuits must remain separated in the cabinet. All power-limited wiring must remain at least 0.25 inches from any non-power-limited circuit wiring. Run all non-power-limited wiring along bottom of cabinet. All power-limited and non-power-limited circuit wiring must enter and exit the cabinet through different knockouts and/or conduits.

5.5 NCB Router TCP/IP Configuration Using Ether/Plug

Once the hardware is installed and all wiring connections made, this router must then be configured for communication over the TCP/IP and Echelon networks. Refer to Section 7, "NCB-EL/FL Configuration" on page 53 for information.

Section 6 NCB-FL Routers

NOTE: For detailed information about the router, refer to the manufacturer's documentation included with the product.

6.1 About Routers

Routers are used for applications that require network runs with large node counts, extreme distances, and complex configurations.

Typically, a router is required under these conditions:

- Any time more than 64 nodes are to be attached to a network segment.
- When the segment needs to be more than 6000'.
- When a free topology (star) configuration would be more efficient.

Routers regenerate the signal, resulting in no signal degradation. A router is an Echelon network node that can be used to connect differing media types together or to extend the network. These are the supported router types.

6.2 NCB-FL Product Description

This router is used to connect Echelon network media channels together via UDP/IP. The NCB-FL is used to connect via fiber. This router uses Internet Protocol (IP) for data transport. Communication between networks via NCB type router units is "live," delayed only by the transit time through the routers and Ethernet channel.

At least two NCB-FL routers are required for each application, one located on the Echelon Gateway side of the Ethernet network, and the other located at the other end of the Ethernet network.

The NCB-FL router is an external router that communicates over Ethernet cabling with your LAN. A dedicated fiber optic cable from the router's AUI port is used to make the connection to your LAN. The router's factory installed SMX transceiver (NETWORK connector) is used to make the connection to your Echelon network..

NOTE: Refer to the ONYXWorks™ *Echelon Gateway* manual for information on SMX Transceivers and segment termination.

NOTE: NCB-EL and NCB-FL routers use UDP messaging on ports 1100 and 1283.

6.2.1 Component Descriptions

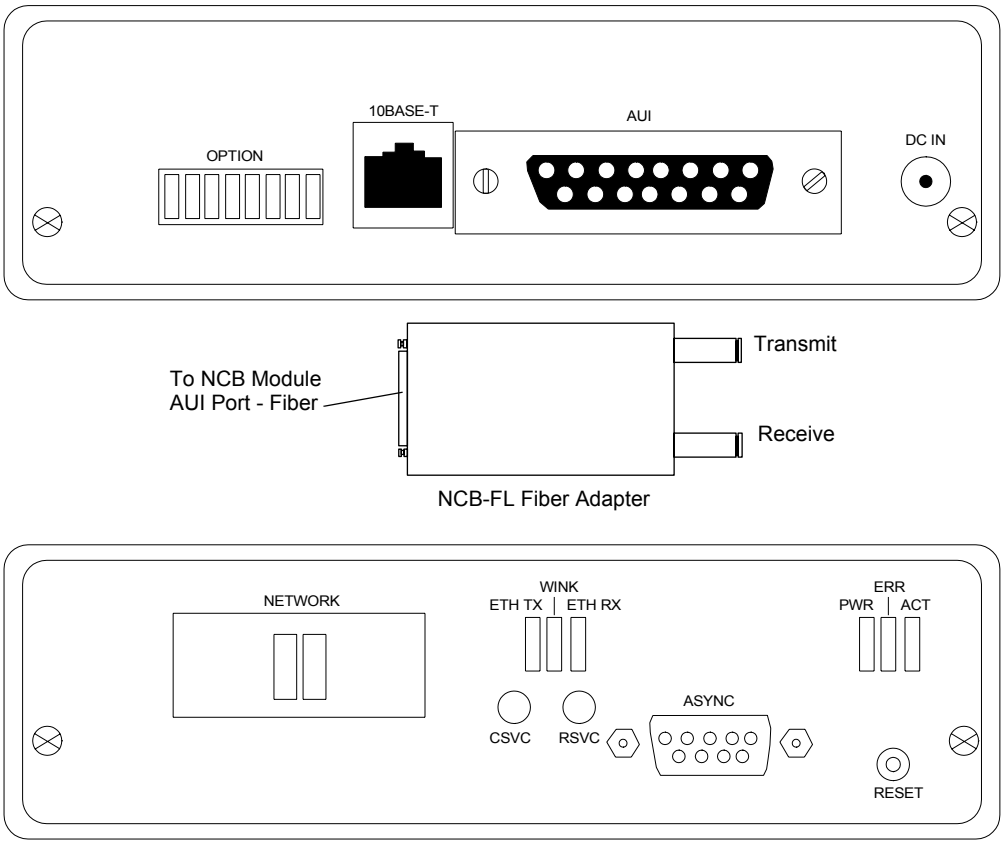

Figure 6.1 NCB-FL Router Diagram

Status LEDs

ACT Yellow activity LED (ACT); indicates a packet has been passed by the router.

ERR Red Error LED that indicates one of the following:

- Always on: a diagnostic error has occurred.
- Slow flash or always on: insufficient configuration information is present.
- Quick flash: insufficient IP configuration information.

Power Green LED that indicates when power is present for the router.

Network LEDs

ETH RX Yellow Ethernet Receive LED that indicates when a packet has been detected on the Ethernet port.

WINK Red LED that flashes for two seconds when the Control Neuron receives a Wink Network Management command.

ETH TX Green Ethernet Transmit LED that indicates when a packet is transmitted on the Ethernet port.

Buttons

Reset Hardware button that resets the entire NCB router.

CSVC Service button for the router's Neuron processor (not used for NCB-EL/NCB-FL).

RSVC Service button for the router module.

6.3 NCB-FL Installation

6.3.1 Required Components

To use a NCB-FL the following components are required:

- "NCB-FL Components".
- NISCAB-5 enclosure (ordered separately).
- EDCO HSP-121 Power Line Surge Suppressor (required and included with NISCAB-5 order).
- Direct connection to your LAN with a customer supplied Ethernet cross-over cable or a standard Ethernet cable.

NCB-FL Components

These are the main components that are shipped with a NCB-FL order:

- NCB-FL Network Combiner Module.
- FTXC Echelon SMX network transceiver (installed).
- CentreCOM Fiber Optic Transceiver.
- Fiber cable extension.
- NCB transformer power supply (+24 VDC 400mA, center POSITIVE, outer NEGATIVE).

6.3.2 Installation Overview

1. “NISCAB-5 Power Outlet and EDCO HSP-121 Installation” on page 48.
2. “NISCAB-5 Shelf Installation” on page 50.
3. “Router Installation” on page 51.

6.3.3 NISCAB-5 Power Outlet and EDCO HSP-121 Installation

NCB Series Router Power Supply Requirements

This router requires +24VDC @ 0.050A nominal and battery backup in accordance with local code requirements. It can be powered by any power limited, filtered +24 VDC source which is UL or ULC listed, as appropriate for your area, for use with fire protective signaling units.

NOTE: Each router requires a UPS (Uninterruptable Power Supply) that is rated at requires 115 VAC, 60Hz primary power and is UL listed for use with fire protective signalling units.

Installation Procedure

Step 1. Mount a UL listed, single gang electrical box in the NISCAB-5's back box using self tapping screws provided.

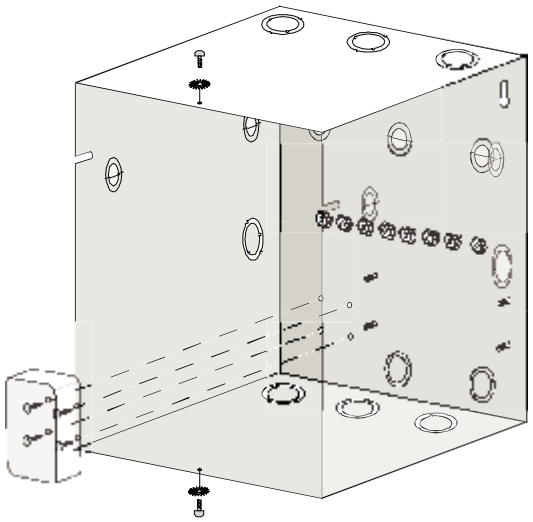

Figure 6.2 Gang Box Installation Diagram

Step 2. Mount the HSP-121 to the box using studs provided.

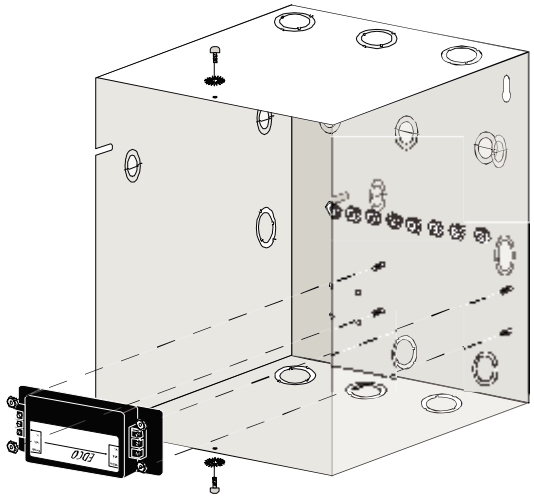

Figure 6.3 HSP-121 Power Line Protector Installation Diagram

Step 3. Route power wiring in conduit through the bottom of cabinet and connect the wiring to the line side (input) of the HSP-121.

NOTE: Use only wire for power limited systems. Power limited wire runs use type FPLR, FPLP, FPL or equivalent cabling per NEC 760.

Step 4. Connect the HSP-121's EQUIP side (output) to single, grounded electrical outlet that will be mounted in the single gang electrical box.

Step 5. Install the outlet into the single gang electrical box.

Step 6. Install the single gang electrical box's plate.

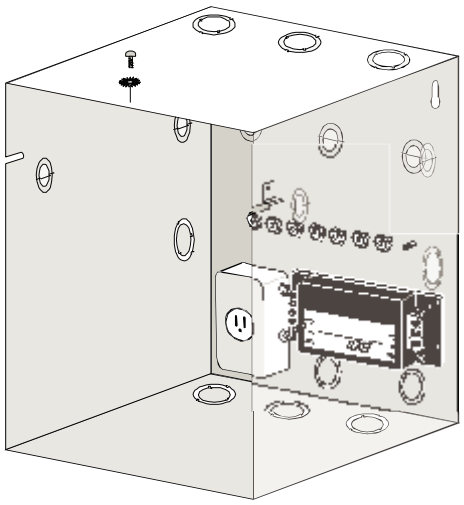

Figure 6.4 Power Outlet Installation Diagram

NOTE: Power-limited and non-power-limited circuits must remain separated in the cabinet. All power-limited wiring must remain at least 0.25 inches from any non-power-limited circuit wiring. Run all non-power-limited wiring along bottom of cabinet. All power-limited and non-power-limited circuit wiring must enter and exit the cabinet through different knockouts and/or conduits.

6.3.4 NISCAB-5 Shelf Installation

The NISCAB-5 is provided with three shelves and stand-offs for assembly of a shelf unit. The top shelf is for the router, and the middle shelf is for the CentreCOM Fiber Optic Transceiver. Install the shelves as shown.

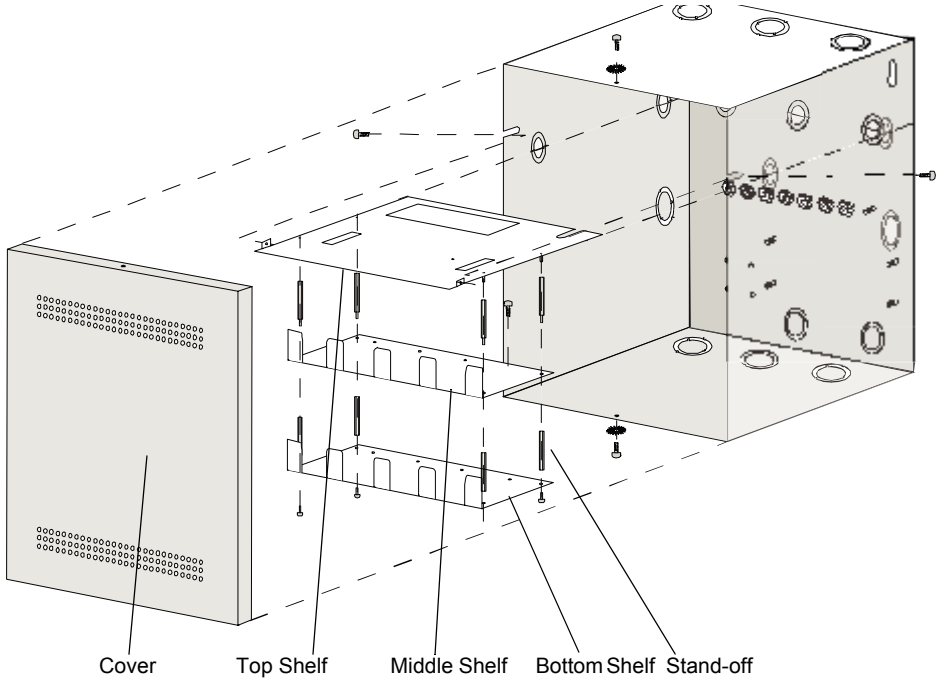

Figure 6.5 NISCAB-5 Shelf Installation Diagram

6.3.5 Router Installation

The NCB-FL router requires the installation of the fiber cable extension between the router module and the CentreCOM Fiber Optic Transceiver. Perform the installation and cable connections of the router using the following procedure as a guideline.

Procedure

Step 1. Set the eight router OPTION DIP switches as follows:

a. Set switches 1 through 6 to the UP position.

b. Set switch 7 and 8 to the DOWN position.

The router reads DIP switch settings at power-up or after you press the RESET button.

Step 2. Route your the Echelon network wires in conduit into the cabinet.

Step 3. Orient the router on the extended NISCAB-5's top shelf.

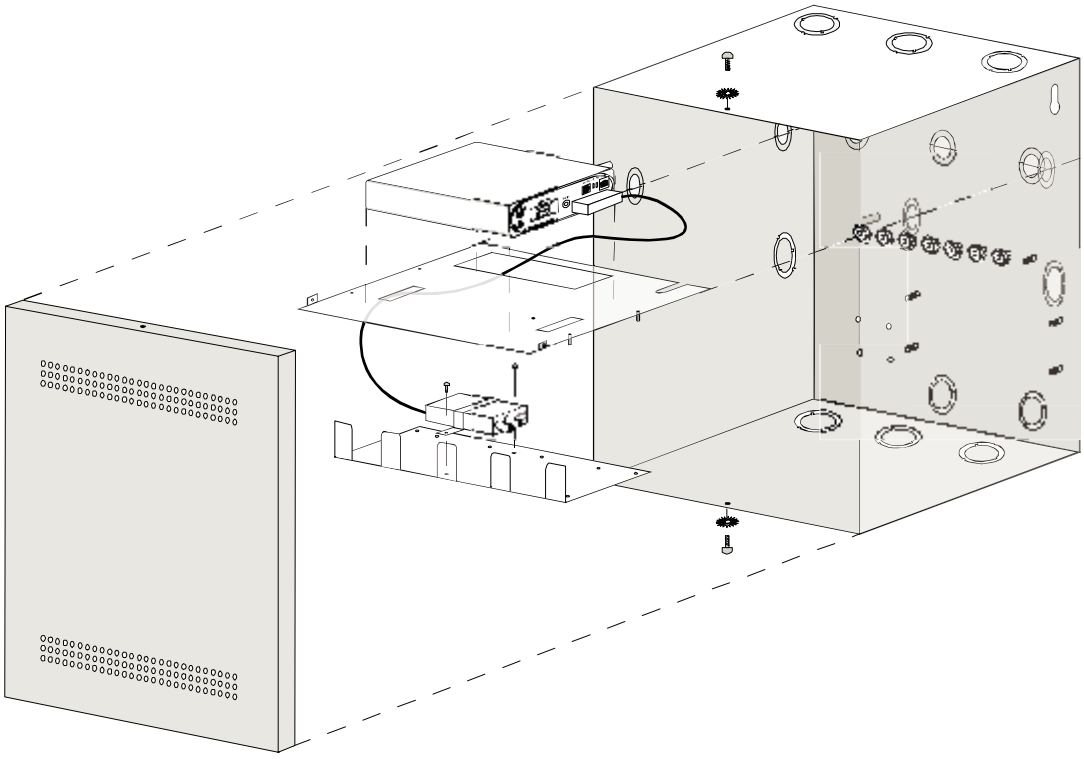

Figure 6.6 Fiber Cable Extension Installation Diagram

Step 4. Connect the fiber cable extension to the CentreCOM transceiver's DB9 connector

Step 5. Orient and place transceiver on the middle shelf as shown in the figure.

Step 6. Mount the CentreCOM transceiver to the shelf using the bracket provided.

Step 7. Route the fiber cable extension under and behind the top shelf up and attach it to the router's AUI connector.

Step 8. Connect the Ethernet fiber cables to the CentreCOM transceiver's XMT and RCV connectors.

Step 9. Connect your Echelon network wires to the router connector labeled NETWORK.

Step 10. Plug the router's transformer power supply into the router's DC power connector.

Step 11. Slide the router and shelf into the cabinet.

Step 12. Plug the router's power transformer into previously installed electrical outlet.

If you find it necessary to disassemble and reassemble your NCB series router for any purpose use refer to"NCB Series Router Disassembly/Assembly Procedure" on page 43.

Section 7 NCB-EL/FL Configuration

CAUTION: TCP/IP Settings
Configure the TCP/IP settings on the router before connecting to a TCP/IP network.

7.1 TCP/IP Settings

TCP/IP settings are configured for the router using the Ether/Plug application that is supplied with the router. This Ether/Plug application configures the router using a direct RS-232 serial connection to each router to be configured.

- Install the Ether/Plug application (supplied on CD) according to the manufacturer's instructions.
- Once installed, start the application by selecting Start >Programs >CTI products >Ether/Plug.

  When using Ether/Plug the first time, a message box will display prompting the user for a directory.

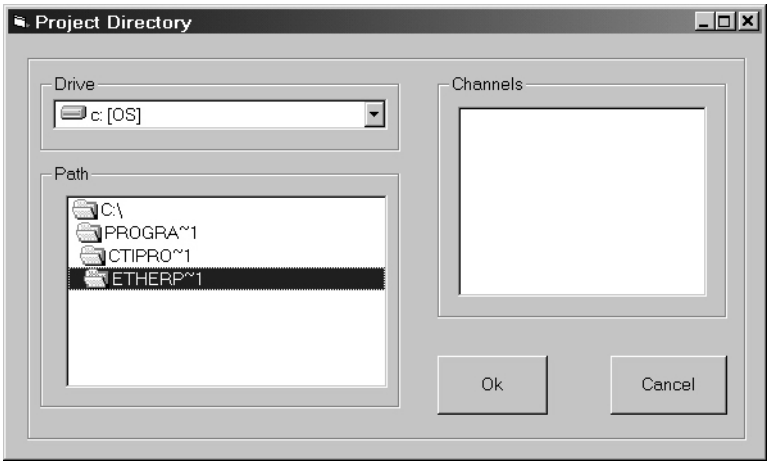

Figure 7.1 Ether/Plug Directory Selection

- Once the directory is set, the user will then be prompted to create a new channel by entering a name for the channel.

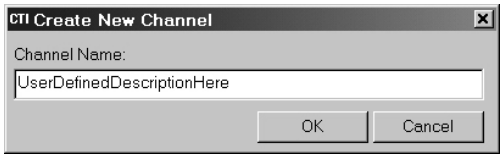

Figure 7.2 Ether/Plug New Channel Name

- The channel is the TCP/IP network connecting the NCB-EL/FL routers.
  - Each router can only exist in a single channel.
  - A group of NCB-EL/FL routers can only communicate with the routers in its channel.
  - The maximum number of routers that can be configured for a single channel is 50; however, this number will vary depending on the TCP/IP and Echelon networks.

NOTE: For more information on using the Ether/Plug application, refer to the manufacturer's documentation.

Ether/Plug Application

Figure 7.3 shows the Ether/Plug application's main screen.

- The channel name is the description that was set when the Ether/Plug application was run for the first time; it is a description of the TCP/IP network shared by all the NCB-EL/FL routers.
- The global IP sub-net mask will depend on the TCP/IP network. The available settings in the drop-down menu for the IP Address will be detailed in the individual examples found in Section 8, "NCB-EL/FL Network Applications", on page 57.

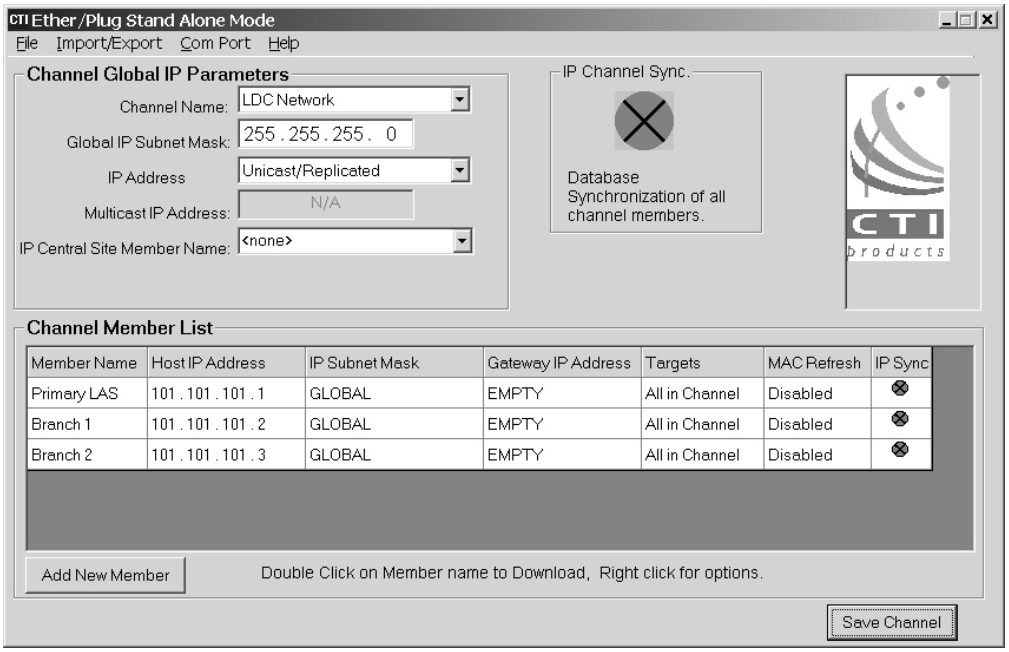

Figure 7.3 Ether/Plug Application Main Screen

7.2 Adding and Binding the NCB-EL/FL to the Echelon Network

NCB-EL routers must be added in the Echelon network like any standard router and bound using the Echelon Gateway. No additional programming is required for the NCB-EL/FL in the Gateway.

CAUTION: TCP/IP Settings
Configure and connect to the TCP/IP network before binding the router from the Echelon Gateway.

7.2.1 Adding a Router

Step 1. Verify that no nodes on the channel that the router is going to be added to are in fault.

Step 2. Verify that the routers on the network are functioning. Note that if the nodes on the other side of the router are not in fault, then the router is functioning.

Step 3. Select Tools >Add Node in the Gateway Configuration Tool, or right-click on the node you want to add.

Step 4. Select the desired node number and select the correct connect node. The Connect Node is the node that the router you are adding is connected to.

- If the node is connected through a repeater, then it is the node closest to the Gateway.
- If the node is connected on a DFXC ring, then the connect node is the most recently bound node of the nodes the new node is connected to.

Step 5. Select OK, and the new router will be added to the node list.

7.2.2 Binding a Router

Binding is a process of uniquely identifying and initializing a node so that all other nodes may recognize and communicate with it. This binding table is stored within the Echelon Gateway. Only bound nodes are detected by the network and annunciated by the ONYXWorks™ Workstation.

Step 1. Select the new router and select Tools >Bind Node. The router will indicate that it is waiting to bind.

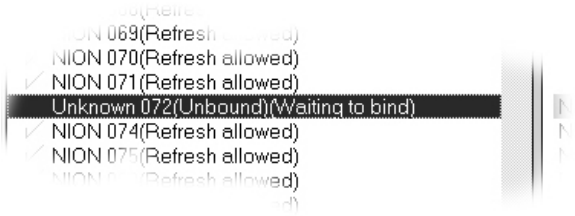

Figure 7.4 Echelon Gateway Service Pin Prompt Message

Step 2. Press the service pin on the new router.

Step 3. If the router fails to bind, then note any warnings or error messages listed in the configuration tool. Delete the node. Address the error messages and attempt to add and bind the node again.

Step 4. If the router has a DFXC transceiver, then press the service pin on the DFXC transceiver to link the router to the transceiver.

Step 5. Click on the new router and verify that the Node State is Configured, Online in the diagnostic information section of the node properties.

Step 6. If termination is required on the far side of the router then it is recommended that the far side of the router be terminated.

NOTE: A router cannot have DFXC transceivers on both sides. It is recommended that side A be the near side (side closest to the gateway) of the router.

NOTE: For more information on binding routers, refer to the ONYXWorks™ *Echelon Gateway* manual.

Section 8 NCB-EL/FL Network Applications

This section provides examples for supported configurations for TCP/IP connection. The examples will also include a discussion of pros and cons for each scenario.

8.1 Configuration One - Basic Configuration

The simplest configuration of the NCB-EL/FL routers can be achieved when only two or three NCB-EL/FL routers are in use. This network may contain any combination of NIONs and a backup Echelon Gateway. Figure 8.1 shows this connection.

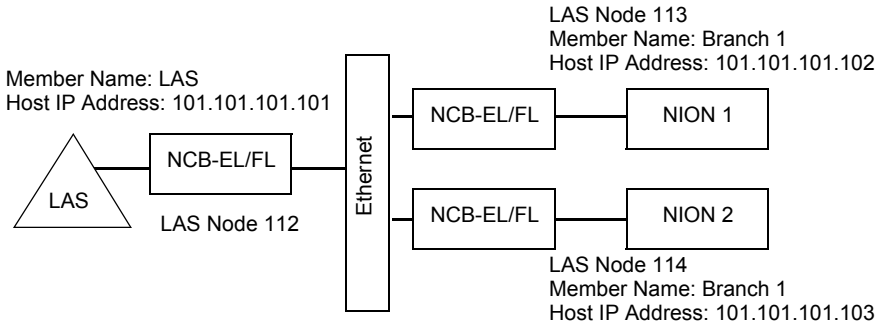

Figure 8.1 NCB-EL/FL Configuration One Example

The following figure shows the corresponding configuration that would be seen in the Ether/Plug application for Configuration One:

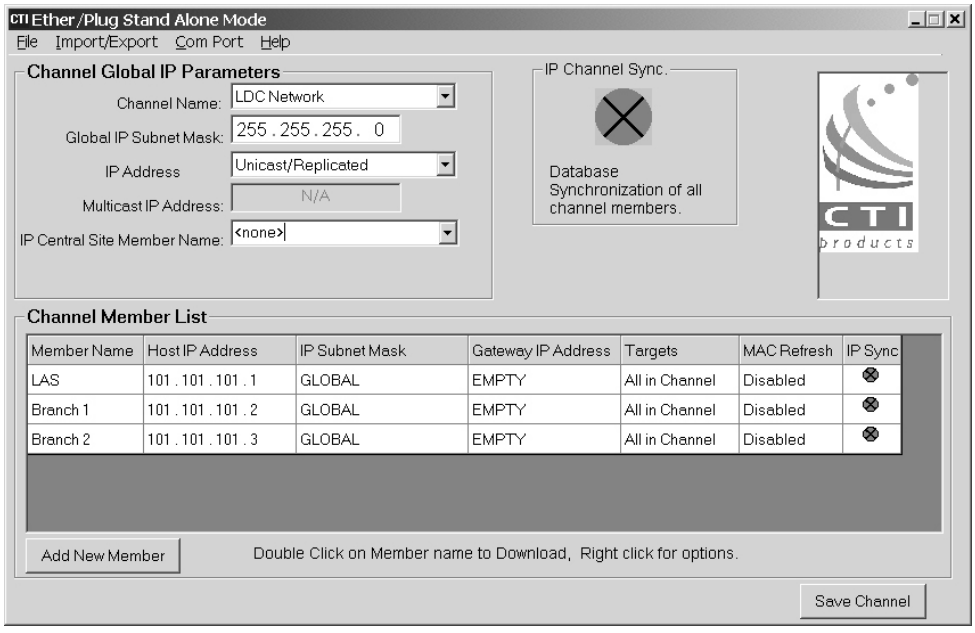

Figure 8.2 Configuration Example 1 View in Ether/Plug Application

Field Descriptions for Configuration One

- The channel name is simply a description of the TCP/IP network shared by all the NCB-EL/FL routers.
- The global IP sub-net mask will depend on the TCP/IP network.
- The available setting in the drop down menu for the IP Address will be described as various TCP/IP connections are discussed.

- The setting “Unicast/Replicated” simply indicates that when any of the NCB-EL/FL routers receives an Echelon message, a separate TCP/IP message will be sent individually to each of the other NCB-EL/FL routers on the network. For this example, a setting of “<none>” will be used for the IP Central Site Member Name.

Channel Member List

- Each router must be added as a channel member. Initially, the “Channel Member List” is empty. Pressing the Add New Member button will display a box where the member name is to be added. Referring to Figure 8.1, “NCB-EL/FL Configuration One Example” on page 57, the router connected directly to the Echelon Gateway was added with the member name “Ech GW.”
- Initially, the member does not have a “Host IP Address”. This is the IP address that will be programmed into the router. This address will depend upon the TCP/IP network. The TCP/IP network will also determine the IP Sub-net mask and the Gateway IP address. To remove the Gateway IP Address, enter the address 0.0.0.0, then “EMPTY” will be displayed.
- It is not recommend changing the Targets from “All in Channel” to “Central Site” for Configuration One example.
- The MAC Refresh setting may be required depending on the TCP/IP network. This setting will depend on IP MAC layer switches on the TCP/IP network. The value may be edited by double-clicking and has a value from 1 to 255 seconds.
- After all the members are added to the channel, save the configuration by pressing the Save Channel button. The configuration must also be downloaded to each router. This is accomplished by using the cable provided with the router and a COM port on the PC. Double-click a member name to display Figure 8.3.

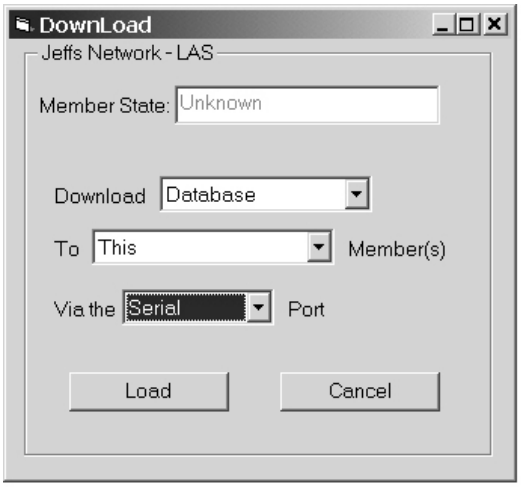

Figure 8.3 Downloading Network Data

- Use the drop-down menu “To” and change the “This” setting to “Channel”.
- After clicking the “Load” button, a dialog box will display prompting for the connection. Each router must be connected individually to the serial port on the PC.
- After the data has been downloaded to the routers, the icon next to “IP Channel Sync” and the icons in the column “IP Sync” will change from X’s to checks. If changes to the programming are performed, the individual channels may be displayed as requiring an “IP Sync”; however, using this programming, when members are added or deleted, all channel members must be updated.
- If members are to be updated, the PC with Ether/Plug must be attached to each member individually using the provided cable. During this time network communications will be interrupted.

Using Figure 8.1 with the configuration shown in Figure 8.2, when NION 1 sends an event, it is received by the NCB-EL/FL described as Branch 1. Branch 1 NCB-EL/FL will send two TCP/IP messages.

- One message will be sent to the Branch 2 NCB-E/FLL. This NCB-EL/FL will determine that the message is not to be sent on this particular segment of the Echelon network.
- A second TCP/IP message is sent from the Branch 1 NCB-EL/FL to the Echelon Gateway NCB-EL/FL. This router will send the message on this segment of the Echelon network to be received by the Echelon Gateway.

The "Unicast/Replicated" setting is the only setting recommended when only two NCB-EL/FL routers are used. When the "Unicast/Replicated" setting is used, a large amount of TCP/IP traffic may be generated. This is especially true if a network contains several NCB-EL/FL routers, stand-alone printer NIONs, and a backup Echelon Gateway; however, this will depend upon the placement of the NIONs on the network. When using the Unicast/Replicated configuration, there are no restrictions regarding placement of stand-alone printer NIONs or a backup Echelon Gateway.

Again using Figure 8.1, when binding the Echelon Gateway's NCB-EL to the Echelon Gateway, the setting for "Router Connects To" in the LAS "Add Router to Network" dialog box must be "This Computer." Please see the ONYXWorks™ *Echelon Gateway* manual for detailed instructions on adding a router to the Echelon Gateway. When Branch 1 and Branch 2 routers are added to the Echelon Gateway, each of them must be set to connect to the "Ech GW" router. For example, the NCB-EL/FL router named "Ech GW" is bound to the Echelon Gateway as node 112. When Branch 1 and Branch 2 routers are added to the Echelon Gateway, they are both "connected" to node 112.

8.2 Configuration Two

The network shown in Figure 8.1, “NCB-EL/FL Configuration One Example” on page 57 will again be used. This configuration will differ from the previous discussion because the IP Central Site Member Name will be used. Figure 8.4 shows the Ether/Plug Configuration settings.

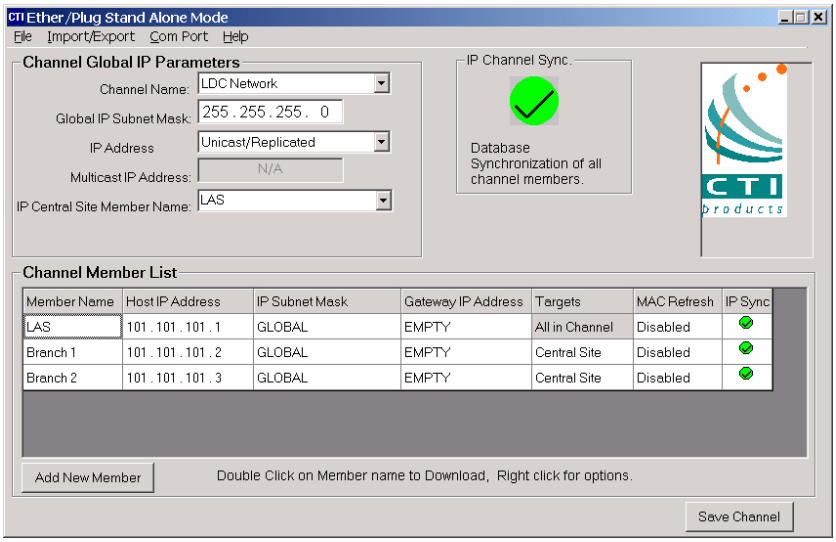

Figure 8.4 Configuration Example 2 View in Ether/Plug Application

The member “Ech GW” is designated as the IP Central Site Member. When the “Ech GW” router receives a message from its Echelon segment, it will send one message to each of the other routers on the TCP/IP network. When the other routers on the TCP/IP network receive a message on their respective Echelon segments, they will only send one TCP/IP message to the “LAS” router. This setting will only support SAP(s) or a backup LAS attached to the same Echelon segment as the primary LAS. This configuration is shown in Figure 8.5.

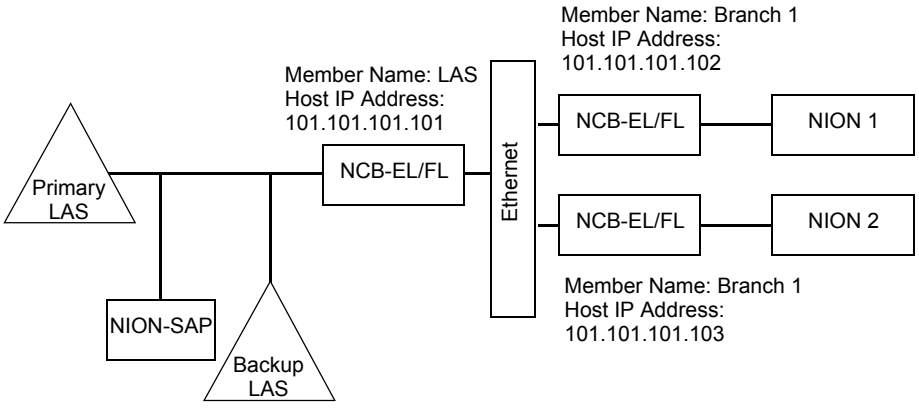

Figure 8.5 NCB-EL Configuration Example 2

Using the IP Central Site setting may reduce the configuration when channel members are added or removed from the TCP/IP network. Typically, the IP Central Site Member will have to be modified as well as any members that are to be added to this channel. When using this configuration, the “Targets” value for the IP Central Site Member should be “All in Channel,” and the remaining member “Targets” value should be set to “Central Site.”

8.3 Configuration Three

Figure 8.1 will again be used to describe using Multicast messages between the NCB-EL/FL routers. Using Multicast messages, one single TCP/IP message that originates at one of the NCB-EL/FL routers will be received by all other NCB-EL/FL routers in the channel. The Ether/Plug configuration settings are shown in Figure 8.6.

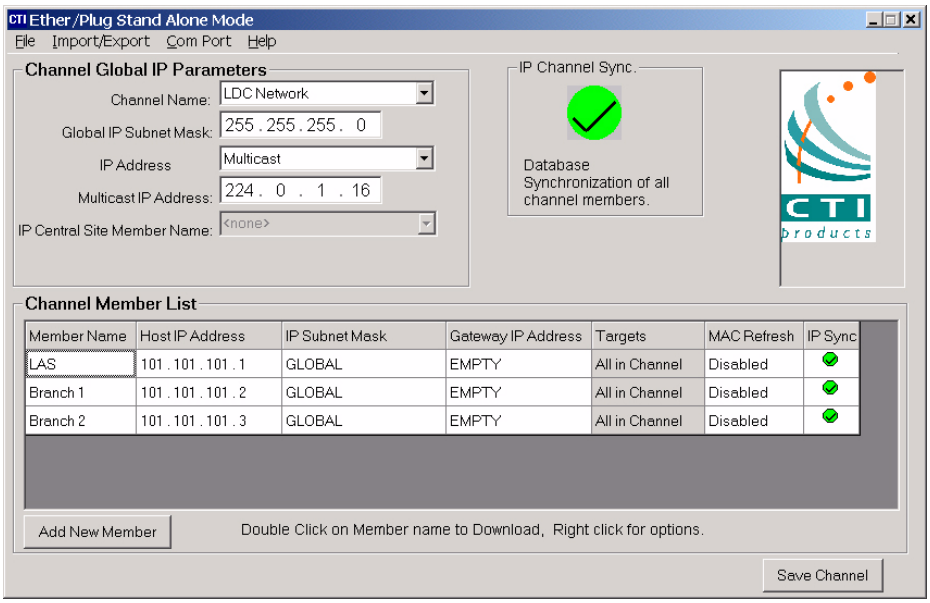

Figure 8.6 Configuration Example 3 View in Ether/Plug Application

When using Multicast addressing, the TCP/IP network requires the following:

- IP routers must be capable of handling IP Multicast traffic.
- IP routers must have IP Multicast enabled.
- IP routers must forward the NCB Multicast port numbers of 1100 and 1283.

When using the Multicast configuration, there are no restrictions regarding placement of stand-alone printer NIONs or a backup Echelon Gateway.

8.4 Configuration Four

An NCB-EL/FL router can be used as a redundant router for another NCB-EL/FL. A sample diagram is shown in Figure 8.7.

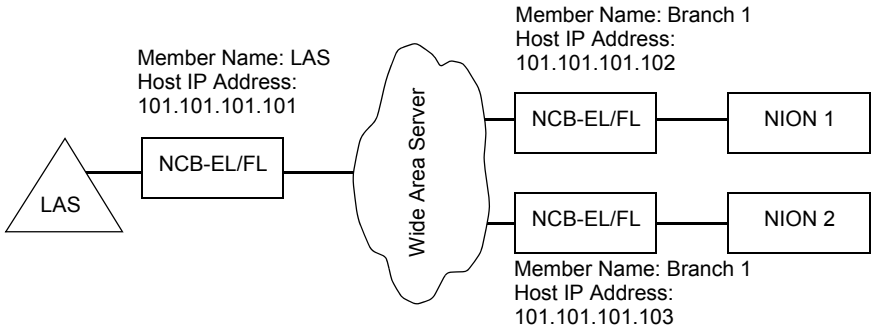

Figure 8.7 Example 4 Network Diagram

The Ether/Plug configuration settings for this channel is shown in Figure 8.8.

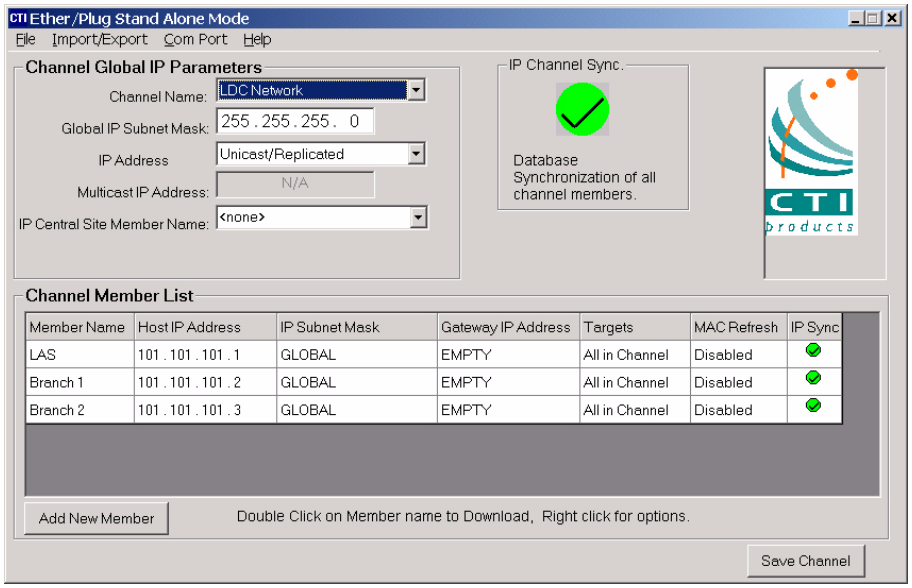

Figure 8.8 Configuration Example 4 View in Ether/Plug Application

The IP Central Site Member Name MUST be set to "None." The member name Ech GW1 is to be bound into the Echelon Gateway first. Then, Branch 1 is to be bound into the Echelon Gateway as connected to the member Echelon Gateway. When the router that has the member name Branch 2 is bound into the Echelon Gateway, it must be set to "Redundantly Pair with an existing Router." Branch 2 will then be redundantly paired with the router Branch 1. This configuration will function if either Branch 1 or Branch 2 router becomes inoperable.

Multicast addressing may be used on this channel with the same results. Refer to Figure 8.9 to see what the Ether/Plug configuration settings would look like for this Multicast setup.

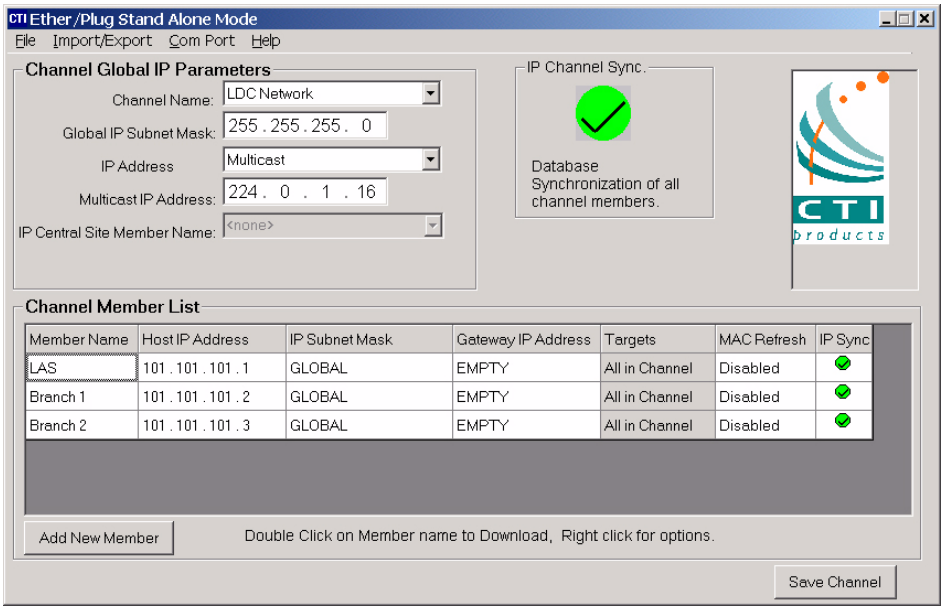

Figure 8.9 Ether/Plug Example 4 - Multicast

8.5 Configuration Five

Multiple NCB-EL/FL routers can be used in a redundant setup to provide multiple paths to the Echelon Gateway. A sample diagram is shown below.

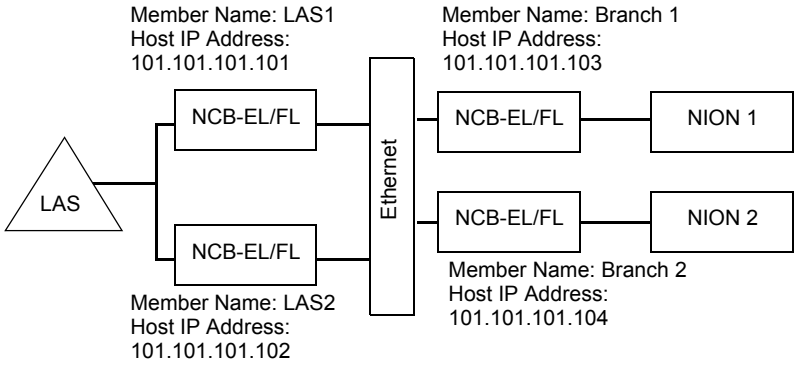

Figure 8.10 Example 5 Network Diagram

The Ether/Plug configuration settings for this example are shown in Figure 8.11:

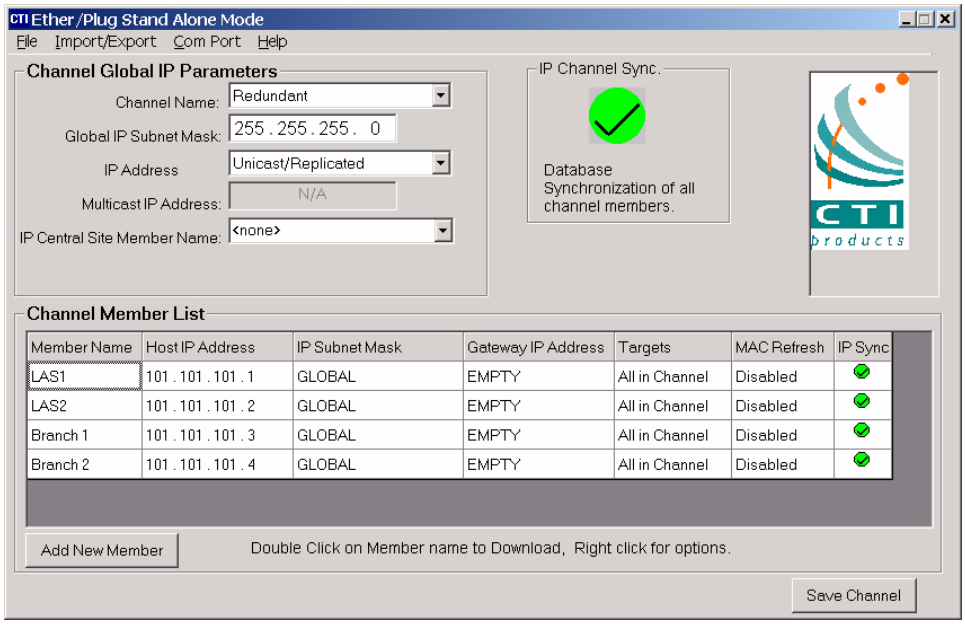

Figure 8.11 Configuration Example 5 View in Ether/Plug Application

The IP Central Site Member name must be set to NONE. The member name Ech GW1 is to be bound into the Echelon Gateway first. When the router who has the member name Ech GW2 is bound into the Echelon Gateway, it must be set to "Redundantly Pair with an existing Router." Ech GW2 will then be redundantly paired with the router Ech GW1. When Branch 1 is added to the Echelon Gateway, it will be connected to the router Ech GW1. Then, Branch 2 will be redundantly paired with Branch 1. This configuration will allow as many as two routers to become inoperable and still provide a path for event annunciation. If Ech GW1 or Ech GW2 and Branch 1 and Branch 2 are still operable, events will still be received by the Echelon Gateway.

Multicast addressing may be used on this channel with the same results. A sample Multicast Ether/Plug configuration setting is shown in Figure 8.12.

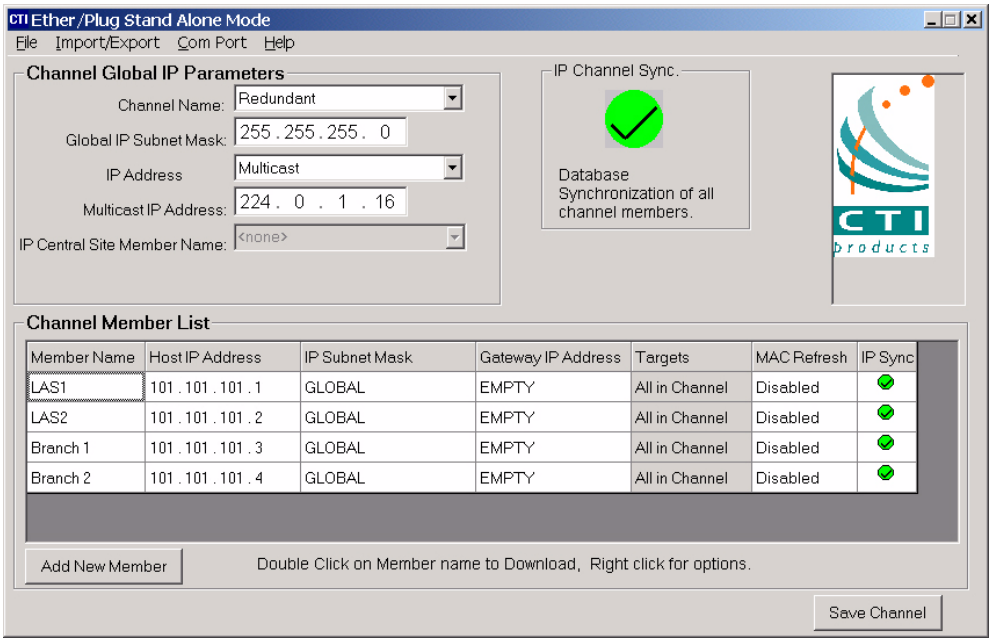

Figure 8.12 Ether/Plug Example 5 - Multicast

8.6 Configuration Six

Multiple TCP/IP channels may exist on the same Echelon network. A sample network diagram is shown in Figure 8.13. The TCP/IP channels may or may not share a common Ethernet network. This setup does not have any restrictions regarding the placement of stand-alone printers or a backup Echelon Gateway.

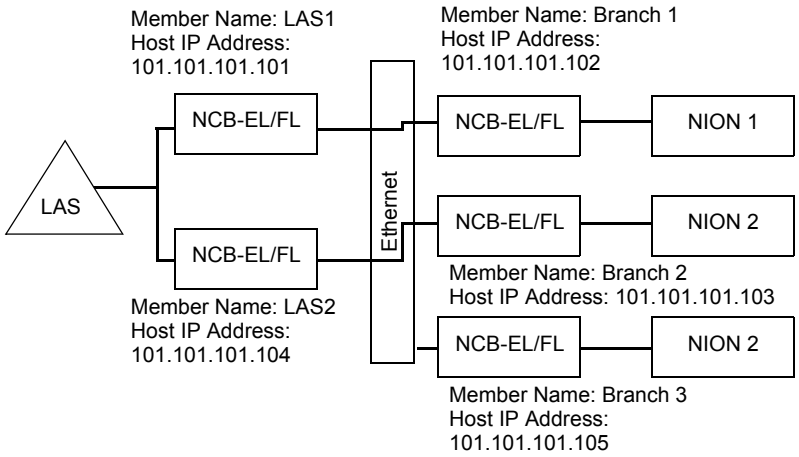

Figure 8.13 Example 6 Network Diagram

8.7 Non-Supported Configurations

Using a NAT (Network Address Translation) or IP masquerading on the border gateways, as shown in Figure 8.14 and Figure 8.15, is not supported.

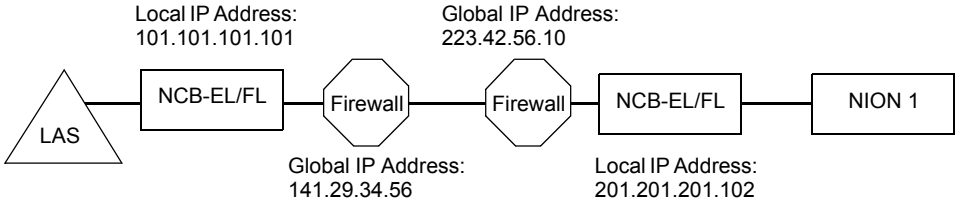

Figure 8.14 Non-Supported Configuration 1

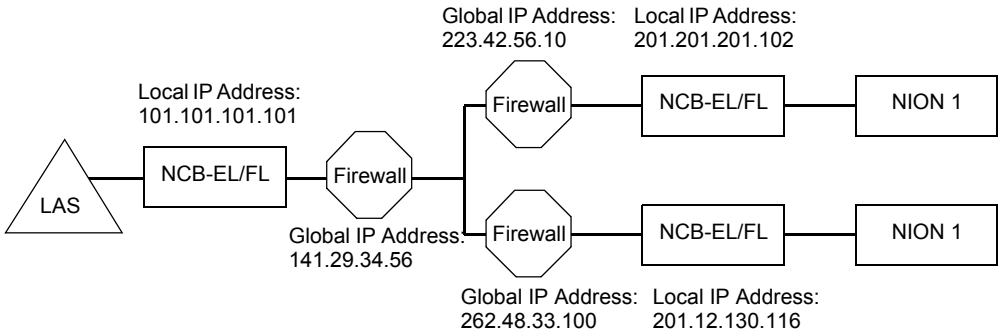

Figure 8.15 Non-Supported Configuration 2

Index

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