AES 7170-C
IP Link Transceiver

(Remote & Local)

Installation and Operation Manual
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40-7170-C Revision 3C  September 15, 2016
1.0 Product Description: AES 7170-C IP Link System

MultiNet is an AES *IntelliNet* system that uses the Internet to forward received radio signals to a central location. At the central location a MultiNet receiver is the central controller. IP Link Transceivers are deployed in local and or remote locations to collect *IntelliNet* radio signals from Subscribers that are then forwarded using the Internet, local network to the central MultiNet Receiver for processing and distribution.

![Typical IP Link Network Configuration](image)

The AES 7170-C IP Link System is available in a single or dual configuration. In a dual configuration, the second IP Link Transceiver acts as the backup. Each IP Link Transceiver will be configured to monitor and be monitored by a MultiNet receiver. Detection of troubles and switching between primary and secondary is automatic.
Following is a list and diagram of key components.

1.1 7170-C IP Link Transceiver

The 7170-C IP Link Transceiver acts as a remotely installed hub or receiver that forwards all the signals received from a cluster of AES Subscriber Units to an AES MultiNet Receiver via a LAN, WAN, the Internet or a backup modem. The MultiNet receiver then forwards the signals to the appropriate system. This allows the customer to expand their geographical market reach without direct radio connectivity to the Central Station Receiver. For AES customers with busy networks, the MultiNet system provides significantly increased capacity for their IntelliNet system without adding a new frequency. It also allows adding a new frequency to a RF congested area.

It is housed in a rugged NEMA style enclosure for positioning near the antenna. This assures minimal RF loss from longer coaxial cables. A battery for backup is located in the same enclosure. The battery powers the IP Link Transceiver in event of a power failure. It also, more efficiently provides extra current the transceiver needs when transmitting. As with any AES central station receiver a Surge Suppressor is recommended. Flanges are provided for wall mounting. Approximate enclosure size is 14”h x 11.5” w x 6”d.
1.1.1 7170-C Modules

1.1.1.1 Board Stack
For details, see item 6.3 - Wiring (Electrical Inputs and Outputs), on page 15.

1.1.1.2 Transceiver
For details see specific transceiver documentation. This module provides the interface between the modulated analog signals generated from the digital data stream and the RF cloud.

1.1.1.3 External LED Board (77LED)
This module allows external visualization of the IPLink status. It is composed by two LEDs, one for power (GREEN) and one for trouble (YELLOW). For details, see item 7.3 - External LED Indicators, on page 20.

1.1.1.4 ASM Antenna Supervision Module (7170-C SWR)
This module is placed in series with the RF connection between the transceiver and the antenna connector and allow the detection of antenna cut by measuring the SWR. It is powered from the board stack. When the antenna is cut, it issues a signal to the board stack that process it and display the trouble on the 77LED (as any other trouble) and also issues a message to the Multinet Receiver. Upon antenna reconnection, a restoral is issued after a pre-defined time has been elapsed without any detection of antenna cut.

1.2 Antenna(s)
Rugged large antenna to maximize the range of the Base station IP Link Transceiver. Size and gain vary according the installation requirements and radio frequency. Typical size for a UHF antenna is approximately 8 feet in height, with 9db gain.

1.3 Cables and Connectors
Low-Loss RG-8 (Belden 9913 type) coax cable is supplied with appropriate “N-Type” connectors for maximum performance.

1.4 Surge Suppressor(s)
A device installed in the coaxial transmission line to help protect components and structure against surges like those produced by lightning. The device dissipates surges to an earth ground that is connected to the device’s mounting bracket. Use only AES part 52-0054.

1.5 Internal Modem
IP Link’s are equipped with an internal Modem for backup communication when TCP/IP communication is delayed or unavailable. During the IP Link’s initialization process the modem is tested using both programmed phone numbers. During those tests the Modem LED will be on and the Console Port unavailable. If either number fails to connect to an assigned MultiNet Receiver, it will be re-
tested randomly every 5 to 10 minutes until it passes or the maximum number of 5 attempts is reached.

If during normal operation TCP/IP heartbeat fails, the IP Link’s RF goes offline transmitting a “Receiver Not in Service” message. That message will notify other IntelliNet devices to select a secondary IP Link for communicating. The modem is again tested; if it passes, any stored messages are passed to the MultiNet receiver and RF goes back online by transmitting a “Receiver Ready” message. Until the TCP/IP connection returns satisfactorily, communication to the MultiNet receiver will occur using the modem. Sending of Alarm messages via modem are attempted immediately after reception. All other less significant messages may be discarded.

The modem, using both phone numbers, is tested daily. Interval between daily test attempts is 24 hours plus a random number of minutes up to 30, after the preceding tests pass. This means that the time of day that the daily modem tests occur, randomly advance. This helps to spread out multiple IP Link testing.

1.6 Typical Unique Installation Tool Requirements

The primary tools required to install an IP Link Transceiver are as follows.

- Power or SWR Meter
- Large Wire Cutters
- Weatherproof Tape
- Coax Connector Crimping Tool
- RG-8U Coax Strippers
- PC Running a Terminal Program
- Silicon Sealant

2.0 Safety Considerations

The following items are safety related precautions that you should take into consideration when installing your AES IntelliNet system. They are for your safety as well as others and the safety of your equipment.

- Use caution when installing antennas to keep them away from electrical wires which could cause serious injury or death if antenna makes contact with live wires.
- All equipment must be installed in accordance with applicable standards and local building codes.
- Be certain to properly ground the antenna and surge suppressor to help dissipate surges away from equipment and personnel. The grounding of the antenna and surge suppressor is for your safety and the safety of your equipment and should not be neglected.
3.0 Environmental Considerations
The following environmental related suggestions are to help insure an installation that will provide you with a system that will operate at its optimum long into the future.

- The provided AES 52-0054 surge suppressor should be installed in a weather tight enclosure.

4.0 Technical Specifications
Listed below are the technical specifications for the 7170-C IP Link Transceiver.

- Electrical Input rating is 16.5 Volts AC at 40 VA.
  - Use only provided ATC-FROST Model FPS4016. For replacement Order AES P/N 1640C
- DC Current Draw: 370mA standby, 1.2A transmit
- 7170-C DC operating voltage is 12 Volts nominal.
- Onboard Fuse; Self Resetting / Not User Serviceable
- Rechargeable Gel Type Battery Required: 12V, 7AH
- Low Battery Condition, AC Fail and Charger Trouble are reported to Central Station.

Recommendations for selecting a Internet service provider:
1. Always select a reputable provider with a local presence.
2. Insure the facility supplies 24hr./ 365 days per year back up power.
3. Insure the provider has back up capability.
4. Insure the supplier has remote redundancy.
5. Insure the supplier has adequate security measures, ports, routers and firewalls.
6. Insure the security measures are updated regularly to insure denial of service attacks.
4.1 **ULC-304 Communication Requirements:** The 7170-C IP Link meets the requirements for Passive Level 3 Control Unit.

5.0 **Enclosure Label, Inside Cover**

Below is an illustration of the label that is adhered to the inside of the cover. Notes and example connection details are included.
6.0 Installation

The IP Link Transceiver installation site is a critical element of the AES IntelliNet network. Every installation is unique, taking into account structure, geography and other factors. This section covers elements of the system installation and operation. Read the entire document before proceeding with your installation.

- Read the Manual and any other provided documents.
- Study each component to understand its mounting and installation characteristics.
- Decide how each component will be installed in your facility.
- Proceed with the installation in a manner that serves your needs best.
- Test your installation as outlined in Section 8.

6.1 7170-C IP Link Transceiver Enclosure Mounting:

Mount the enclosure on a steady permanent surface. A plywood backboard attached to a wall works well. Locate it so that the coax runs to the surge suppressor and antenna without tight bending, kinking or producing strain on the coax and its connectors. Use mounting hardware of appropriate size to support the weight of the enclosure.

6.2 RF installation

6.2.1 Antenna

It is a requirement in a commercial operation when growing a network to cover a large area. For a professional installation, you can install the major components, run the required cables, and then retain a qualified radio technician to perform the RF portion of the installation:

1- Antenna, Mounts and Connectors
2- All RF Connectors /Terminations
3- RF Lightning Suppressor / Grounding
4- Final Check to assure that your installation is getting maximum performance.

Contact the radio technician BEFORE you begin any part of the installation, which is a mix of science and art. Radio signal distance is in part related to the height of the antenna. Select an antenna height that clears all or as many obstructions as possible. If mounting on the side of a metal tower you should try to place the antenna at least 5 feet off the tower if possible, with 2 ½ feet off the tower as the absolute minimum.

6.2.1.1 Tips on Antenna Placement

Tip 1: Place the antenna as high as this is possible, as your central station receiver. It is suggested that a mast mount is to be used.

Tip 2: Keep the antenna and radials away from all structures, especially metal structures and buildings that would prohibit the ability of the antenna to see the entire radio cloud.
6.2.1.2 Antenna Load

NEVER Energize an IP Link without a RF load attached to it. Either the case mount antenna or an outside antenna needs to be attached to an IP Link to dissipate the energy transmitted by the receiver. You may also use a dummy load for test purposes. However, if nothing is connected to the antenna of an IP Link or subscriber and it is powered-up, THERE IS A HIGH RISK OF DAMAGING THE TRANSCIVER UNIT. Even worst, you may not cause it to not work, but it may be operating marginally and causing issues with RF reception, that are very hard to diagnose.

If you do not have a load, unplug the transceiver before powering the units.

6.2.1.3 9db Antenna

There are a few steps in putting together the antenna that need to be called out. Please see them below.

Step 1: In the two piece section, there is a physical element in the top half of the antenna that needs to be connected to the bottom half of the antenna. The element will bottom out, then you can tighten the screw.

Step 2: Once the elements are attached, slide the top piece into the bottom half. You have to slide the top portion of the antenna down to the mark so that the required amount of antenna is on the top.

Step 3: At the base of the 9db antenna, there are three radials that need to be installed.

Step 4: Bring the Coax up through the base cover, attach it to the base of the antenna. It is advised that you wrap this part of the antenna, once connected, with rubber tape of some sort for weather proofing. Make sure
not to tape beyond the brass fitting, as there are two small openings for condensation.

Step 5: Next, there is a cover that will go over the actual Coax connection to help protect against the weather. This will slide on top of the base. Remove the set screw, place on the cover and then tighten the screw.

6.2.2 Coaxial Cabling and Connections:
The length of the coaxial cable is important. Coax causes loss of signal, the longer the coax the greater the loss. You do not want to sacrifice signal loss for antenna height that is not necessary. Ideally, select an antenna height and the 7170-C IP Link Transceiver location that will use less than 50 feet of coax. If you must exceed 50 feet absolutely do not exceed 100 feet unless you use a lower loss cable than provided with the standard system. AES provides a Belden 9913 or equivalent which is a lower loss cable than standard RG-8/U. 9913 is specified as about 3 dB per 100 feet at 400 MHz, which means a loss of 50% of power in 100 feet of coax.

1- Terminate the 9913 N-Type connectors at the coax ends that connect to the antenna, and the surge suppressor, (if applicable, make sure it faces the right direction) and to the 7170-C IP Link Transceiver. AES pre-installs one connector on the provided spool of coax. Route or pull your coax such that this connector connects to the base of the antenna, if possible.

2- Run the ground cable from surge suppressor to a suitable earth ground in accordance with the local building codes.
Installation of Crimp Style N-Type Connectors:

**Step 1:** Strip cable jacket, braid, and dielectric to dimensions shown. All cuts are to be sharp and square. **Important:** Do not nick braid, dielectric, and center conductor. Tinning of center conductor is not necessary if contact is to be crimped. For solder method, tin center conductor, avoiding excessive heat.

**Step 2:** Slide outer ferrule onto cable as shown. Flare slightly, end of cable braid as shown to facilitate insertion of inner ferrule. **Important:** Do not comb out braid. Place contact on cable center conductor so it butts up against the cable dielectric. The center conductor should be visible through the inspection hole in contact. Crimp or solder contact in place as follows:

**Crimp Method:** Use Die Set Cavity for contact indicated in table above.

**Solder Method:** Soft solder contact to cable center conductor. Do not get any solder on outside surface of contact. Avoid excessive heat to prevent swelling of dielectric.

**Step 3:** Install cable assembly into the body assembly so that the inner ferrule portion slides under braid. Push the cable assembly forward until the contact snaps into place in insulator. Slide outer ferrule over braid and up against connector body. Crimp outer ferrule using Die Set Cavity specified in table above.
Installation of Clamp Style N-Type Connectors:
This style connector is no longer provided by AES. The illustration is provided in case you come across one.

Step 1: Place nut and gasket, with "V" groove toward clamp, over cable and cut off jacket dimension a, .365" (9.2mm).

Step 2: Comb out braid and fold back. Cut off cable dielectric to dimension b, .234" (6.0mm).

Step 3: Pull braid wires forward and taper toward center conductor. Place clamp over braid and push back against cable jacket.

Step 4: Fold back braid wires as shown, tuck braid to proper length and form over clamp as shown. Solder pin to center conductor. Use adequate heat to flow solder. Defects in solder will adversely affect performance. Make sure no braid or less pieces of braid, are shorted to center pin.

Step 5: Insert cable and pins into connector body. Make sure sharp edge of clamp seats properly in gasket. Tighten nut.

Connector Type: N Plug
Amphenol #82-202; AES #12-0101

Coax Type: RG8U / 9813
AES #13-0345 (100 ft)

Dimension a: .365" (9.2mm)
Dimension b: .234" (6.0mm)

6.2.2.1 Coax Bends - WARNING
Coax bends should not have a radius less than 6". No 90° or 360° bends, just soft S-bends should be used. The bending of the coax less than 6” will affect the RF capability of the IP Link.

6.2.3 Surge Suppressor:
Install the Surge Suppressor in the coaxial transmission line outside to help keep surges from entering the building. We recommend installing it in a user provided weather tight enclosure or seal it from moisture with user provided sealant or weather sealing tape such as self-fusing tape.

The surge suppressor needs an enclosure to protect it from the weather or, if inside from lightning strike causing a fire.
6.2.4 Grounding:
Attach a good earth ground to the surge suppressor and the antenna mounting bracket(s). The grounding of the antenna and surge suppressor is for your safety and the safety of your equipment and should not be neglected.

6.3 Wiring (Electrical Inputs and Outputs)
Listed below are the termination points and connectors in the IP Link Transceiver. Each connection is described in detail. All connections need to be completed before the IP Link Transceiver will be fully functional.

Connections on the Interface Board – (This is the 2\textsuperscript{nd} board up from the bottom)
- J2 (16.5VAC) – AC Input. Attach the provided 16.5 VAC 40 VA source to this terminal. Use min. 18 Ga., wiring between transformer and J2 AC Input.
- Telephone – Attach to the phone system for proper line seizure functionality via an RJ-31X jack, using minimum 26 AWG wire. This is used for modem backup communication to IP Link Server. This line must be protected with a UL Listed 497A Secondary Protector. The modem feature has not been evaluated by UL.
- Ethernet Jack – Attach to the LAN or WAN that connects to the IP Link Server. Use standard CAT-5 Ethernet cable. This line must be protected with a UL Listed 497B Secondary Protector.
- Console Port – dB-9 Serial port used to program and configure the IP Link’s parameters. Use standard serial cable appropriate for terminal being used.

Connections on Radio Control Board – (This is the bottom Board) It is an AES 7001 PCB.
- Radio Transceiver Cable – Connect the dB-9 male connector on the end of this cable to the dB-9 female connector on the radio transceiver. No other user connections are required on this board.

- Grounding the IP link Enclosure- Attach a 18 gauge wire with a lug ring to the green #6 Pem stud on the back of the IP link enclosure, attach the other end of the 18Gauge wire to a suitable ground.
An IP Link must be able to survive up to 24 hours after loss of AC, utilizing the required battery backup. A 12v 10 amp battery is supplied by AES Corporation.

AC Power wiring needs to be protected so that the power cannot be cut from the IP Link.

Phone/Network Protection: It is recommended that this is protected so someone cannot come disconnect the phone/network connection.

Listed below are the termination points and connectors in the IP Link Transceiver. Each connection is described in detail. All connections need to be completed before the IP Link Transceiver will be fully functional.

★ CAUTION! Pressing the IP Link Interface Board Reset Button can cause damage to the file system on the Flash Memory. Changes are stored in cache and written at an appropriate time, determined by the operating system out of the control of the user or IP Link specific programs. Contact AES Support for additional information and safe usage of this button.

**NOTE: DO NOT POWER UP THE IP LINK TRANSCEIVER UNTIL ITS MULTINET RECEIVER IS ON-LINE AND READY FOR THIS UNIT TO ATTEMPT TO CONNECT.**
6.3.1 Terminal Block J2 16.5 VAC Connection Details

The terminal designations for the Power Connector terminal block are shown in the diagram at the left. Connect your 16.5 VAC transformer to the designated terminals. Connect Ground to the center terminal. **DO NOT apply power to these until all the connections have been completed.**

6.3.2 Terminal Block TELCO - Phone connection

The terminal designations for the Telephone (TELCO) Connector terminal block are shown in the diagram to the right. These terminals should be properly connected to an RJ-31X phone jack to allow for proper line seizer functions. Refer to telephone company documentation. T and R are to Tip and Ring of phone line. T1 and R1 are for Tip and Ring to premise telephones, if any.

6.3.3 Terminal Block of the RF Control Board Input

The terminal designations for the RF / Radio Controller Board Connector terminal block are shown in the diagram below.
6.4 Communications Requirements

6.4.1 TCP/IP Enabled Network
This TCP/IP connection has to be capable of communicating with the Multinet receiver. It is beyond the scope of this document to define how to achieve TCP/IP connectivity. Please consult AES for details and connection options. This document assumes that this installation is being made at a site that has a TCP/IP connection to the Multinet Receiver network.

6.4.1.1 Static Intranet/Internet Address (TCP/IP Network Information)
If the IP Link is locally on the same network as the MultiNet servers this is an example of an Intranet connection. If the IP Links are remote, not on the same network, then the Internet would be required for a connection to the MultiNet servers. You must have the IP address that will be assigned to the IP Link, the network mask, and the network gateway.

6.4.2 Analog Phone Line (Modem Capable)
The phone line will also be used in the event that the TCP/IP connection of a receiver is down to deliver Alarm messages. A RJ-31X is required to seize phone line if line is not dedicated.

Note: A dedicated phone line is not required although the IP Link will call out once a day to do a modem test.

6.4.3 RS-232 over TCP/IP (for Remote Locations)
For remote locations, where connection to the serial port of the IP Link is hard, AES recommends the installation of a Serial to TCP/IP converter, to allow remote access to the IP Link configuration console. For details, please contact AES.

7.0 Indicators:
There are several LED indicators and one speaker in the IP Link transceiver. Below are descriptions of their functions.

7.1 Interface Board LEDs and Speaker (Inside IP Link)

- SVC (Red LED) – This LED is to indicate the status of the connection to the MultiNet receiver that it is configured to communicate with. If the LED is on, then the heartbeat signal that is sent to the MultiNet Receiver is receiving the proper response in return. If the LED is off, then the IP
Link Transceiver is not receiving the proper acknowledge message back in return to its heartbeat signal and the IP Link is offline.

- **LNK + ACT (Green & Yellow LEDs)** – These LEDs are for indicating the status of the Ethernet link. The LNK LED indicates the status of the Ethernet. When illuminated, the Ethernet port is receiving the Ethernet ‘heartbeat’ and is connected to a live network. If this LED is not illuminated, there is a problem with the Ethernet wiring or the network. The ACT LED indicates activity on the network. The LED will flash when a data packet is received or transmitted.

- **Modem (Red LED)** – This LED indicates which serial device is attached to the available serial port. There is one serial port that is shared between the Console Port and the Modem. Only one device can be attached at a time. When the program wants to use the modem it switches the serial port from the Console Port connector to the on-board modem. When this LED is on, the modem can be used. When it is off, the Console port is active. For this reason, if the port is switched to the Modem in order for the processor to perform communication or modem test functions, commands sent to the serial port through the Console Port Connector, may not get received or cause a response.

- **Modem Testing and Availability of Console Port** – During the IP Link’s initialization process the modem is tested using both programmed phone numbers. During those tests the Modem LED will be on and the Console Port is unavailable. If there is no active phone line attached, testing may take a prolonged period of time during which the Console Port will be unavailable.

- **Speaker (SP1)** – The speaker is controlled by the modem and is used to monitor / troubleshoot the telephone connection. Dial tone, dialing and connection tones can be heard while the IP Link attempts to connect with the designated MultiNet receiver.

### 7.2 RF / Radio Control Board LEDs (Inside IP Link)

These LEDs are the status indicators for the various states and functions of the Controller board.

- **TX (Yellow LED)** – This LED indicates that the radio is transmitting.

- **RX (Green LED)** – This LED indicates that the radio is detecting a RF transmission. If the IP Link’s radio receiver is subject to RF Interference, this LED will illuminate steady on and remain on for more than 20 seconds.

- **WA (Yellow LED)** – A steady on, indicates that a radio packet transmission has been attempted and the controller is waiting for an acknowledgement. Blinking indicates the RF communication is off the network. Off is a normal indication.

- **AL (Red LED)** – This LED is a status / Troubleshooting indicator. It is currently not in use and is usually on. This LED can be ignored.
7.3 **External LED Indicators**

<table>
<thead>
<tr>
<th>LED Color</th>
<th>Function</th>
</tr>
</thead>
</table>
| GREEN     | OFF: Unit OFF  
ON: Unit ON, running on AC Power  
BLINKING: Unit ON, AC Fault (running on battery) |
| YELLOW    | OFF: No faults  
ON: Faults  
For details on Faults, use the Terminal program  
Possible faults are:  
• Low Battery  
• Charger Fail  
• Ground Fault  
• Phone Line Cut  
• System Trouble |

The 77LED board is factory installed.

### 8.0 Programming and Setup of the 7170-C

#### 8.1 Configuring a 7170-C-IP Link

To configure the IP Link Transceiver you communicate with it via the Console Serial Port. Use a serial terminal program like Telix or Hyper Terminal (included with or available for Windows) to configure the IP Link Transceiver. Using this software allows you to send ASCII character instructions and view the response on the terminal’s display.

The IP Link Transceiver has a built in 386 DOS computer with 10BASE-T Ethernet Port incorporated into the system. Configuring the IP Link Transceiver is achieved by uploading edited configuration files using a terminal program on a PC plugged into the Console port connector. This section explains how to use a Windows XP PC to and the HyperTerminal program to connect to the IP Link. Refer to later sections for specific instruction on using the Console Port, and a terminal program to transfer files to and from the IP Link’s file storage system.

#### 8.1.1 Notes on the Shared Serial Port:

As noted elsewhere in this manual, the Console Port and the Modem share a single Serial interface. The sharing will not begin until the startup process is allowed to continue beyond the prompt “Type Setup Key…”. Pressing “X” or “S” when prompted will interrupt the startup process and the port will be available for Console use or Setup Menu access respectively. Once past this point, sharing is occurring. If the Modem LED is on, the serial port is switched to the modem and any attached terminal program will have no effect. For this reason, commands sent to the serial port may not get received or cause any response.

If there is no active phone line attached, testing may take an extended period of time while it tries all possibilities to connect to a server via its modem, during which the Console Port will be unavailable.
If the Port is switched to Console (Modem LED off) then the [S] <Enter> option should be available.

- **RF Interference:**

  If the IP Link’s radio receiver is subject to RF Interference, the “RX” LED will illuminate and remain on for more than 20 seconds. The IP Link should not be installed in this location until the source of the interference is cleared. Intermittent on and off of the RX LED is normal operation. A message is sent to the MultiNet receiver when this condition is detected and another when it clears.

### Note: Pressing the Reset Button on the IP Link board at an improper time may result in damage to the file system requiring the need to recreate it and a reload of programs and configuration files.

**Never Press the Reset Button on the IP Link Board until you have been properly instructed by AES on the correct procedure!**

**Generally it is safe to press the reset or remove power from the IP Link, only after accessing the Command prompt.**

### 8.2 Communicating with the 7170-C IP Link Transceiver

Following are instructions for configuring Microsoft Windows XP HyperTerminal terminal emulation program. This program is used to directly communicate with the IP Link Transceiver via the Console port to access a built in Setup menu and to transfer files necessary for modifying essential configuration settings.

#### 8.2.1 Configure Hyper Terminal to Communicate with the 7170-C:

Hyper Terminal is a communication program that is included with many Microsoft Windows installations. It is primarily intended for use with a modem and a phone line but works well as a terminal emulator.

1. On a PC with Microsoft Windows XP, Click on [Start], [Programs], [Accessories], [Communications] and then [Hyper Terminal].

2. Enter a name and choose an icon for this connection. As shown in the example to the right, “IP Link” is a good choice for a name that you would recognize in the future. Select an icon for the connection and then select [OK].
3. Do not enter any Details for the Country/region, Area code or Phone number. Instead just pull down the [Connect using] and choose your available free {Com Port} and select [OK].

4. Under Port Settings change:
   [Bits per second:] to 19200
   Other settings are:
   [Data bits:] 8,
   [Parity:] None,
   [Stop bits:] 1,
   [Flow control:] is Hardware
   then click [OK].

5. You are now ready to use HyperTerminal.
   If the IP Links is already powered and operating, pressing <Enter> may be required to get communication started. The display should be quite active during normal operating mode.
8.3 IP Link Configuration Data (TCP/IP, ID, Phones, Cypher)

You need to know the IP Link ID and the Cypher code. In addition, you will need to know the IP Link IP address, IP Netmask, and IP gateway, as well as the Primary and Secondary Multinet receiver IP addresses, phone numbers, and TCP/IP ports.

For details on the complete set of configuration parameters that you need for the IP Link, please refer to the next section.

Below is a list of information that you will need to provide for proper programming. All of this information will need to be put in the conf.txt file on the B drive of an IP Link.

- IP Link ID #
- CYPHER Code of the IP Link
- Link Layer
- Ack Mode
- Primary Server IP Address
- Secondary Server IP Address
- Server Ports
- Phone Line – Telephone Numbers of MultiNet Servers
- IP Link TCP/IP settings (Static IP Link Address, Netmask and Gateway)
- TCP/IP Timeout
- LED Board Presence
- ASM Module Presence
- ASM Alarm Method
8.4 Understanding the Conf.txt File

It is important to know which fields need to be edited to match your specific installation. Use any text editor and then save the configuration file. You can use any name on the PC, only when you upload you need to use the target name as conf.txt.

NOTE: Do not add spaces or any other comments unless preceded by #, and on lines with data, do not use any comments. Comments work only for the whole line, mixed lines with configuration data and comments ARE NOT ALLOWED.

Do not change the order of data as well, follow the existing CONF.TXT template to create a new one.

8.4.1 Lines Starting with #
These are comment lines. Any text after the # will not be used on the configuration.

8.4.2 IP Link ID
Unique 4 digit account number that identifies this IP Link on the IntelliNet Network. Valid numbers are 0 to 9, and A-F (hexadecimal value).
8.4.3 Cypher Code
Unique code that locks the IP Link to the subscribers, on the transceiver assigned frequency to your subscribers to your IP Link. Valid numbers are 0 to 9, and A-F (hexadecimal value). This can be encrypted (so it cannot be retrieved by looking at the conf.txt file).

8.4.4 Security and Encrypt Settings
Do not change these settings.

8.4.5 Link Layer and Ack Mode
These are settings related to the RF network topology. Do not change unless instructed by an AES Technical Support person.
Options for Ack Mode:
0x83 = FAST (default) or 0x82 = NORMAL

8.4.6 Server TCP/IP Configuration
These are the IP address and ports of the Multinet servers. There is also the TCP/IP heartbeat rate, do not change this value. These would be either a local IP address of the server for local links or a remote IP address for remote links. Depending on your network configuration, the IP needs to be port forwarded in to an inside address. Consult you IT support to provide the best configuration to be used.

The reason for two port values (one for each server), is for the cases when only one static IP is available at the server site. That way, the router can dispatch the packets to the specific non-public IP inside the LAN when the remote IP Link contacts either the primary or the secondary.

8.4.7 Server Phone Numbers
These are the phone numbers used by the IP Link to connect to the server when the TCP/IP is non-functional.

8.4.8 IP Link TCP/IP Settings
IP settings of the IP Link, IP, Netmask, and Gateway are needed to provide a complete data set for the TCP/IP stack.

TCP/IP Time-Out: number of seconds before the TCP/IP stack declares a problem, depending on the nature of the problem (it may be immediate in the case of a cable disconnection or it may take 30 seconds, depending on the stage where the failed occurred).

8.4.9 LED Board Presence
The LED board receives commands from the IP Link when the CONF.TXT file has the line [LEDBOARD_PRESENT:1]. When enabled, it will display the status of the IP Link via the LEDS.

8.4.10 Antenna Supervision Module Presence
The ASM issues signals that are interpreted by the IP Link when the CONF.TXT has the line [ASM_MODULE_PRESENT:1]. It will monitor the antenna and upon cut, will issue an alarm. Depending on how another entry on the CONF.TXT, this
alarm will be translated as an IP Link tamper [ASM_ALARM_TO_TAMPER:1], or as a new Antenna Cut Code [ASM_ALARM_TO_TAMPER:0].

9.0 IP Link Initialization and Configuration Sequence

This section will guide you on configuring your IP Link. Please follow the steps below to successfully proceed with your IP Link installation. It assumes that:

- Multinet server is not configured yet
- TCP/IP connectivity exists but has not been tested

Once your terminal program is ready (see previous pages), the 7705i-C MultiNet Receiver is on-line and your 7170-C IP Link Transceiver is installed and wired, you are ready to power up the 7170-C IP Link Transceiver and begin the configuration. It is advisable to not make final connections to the Network, Phone or Transceiver until after the IP Link has been configured. This is to prevent unexpected communication or interference on those systems.

The current method for configuring an IP Link, as of this writing, requires that files be manually uploaded to the IP Link file storage system. Most of the functions in the Setup menu activated in these instructions are only used to display the current settings. To work with the files, requires accessing the command prompt. While the IP Link is in the boot up process, and when prompted to press S, instead press [X] to access the command prompt.

9.1 Power Off IP Link (if not already)

The battery and the AC wall wart SHOULD BE disconnected.

9.2 Make Sure that a RF Load is Connected to the Transceiver

For details, see Section 6.2.1.2 - Antenna Load, on page 11. If you do not have a load, unplug the transceiver.

9.3 Unplug the TCP/IP Cable from IP Link

Even if the TCP/IP is already set, and the Multinet is also set, unplug the TCP/IP cable from the IP Link to avoid any signal to go into the Multinet (if one already has been configured).

9.4 Connect the PC to the IP Link

Confirm that an RS 232 Cable is connected between the serial input of the 7170-C “Console” and the COM port of your PC running a terminal program.

Make sure the Windows PC terminal program is running and the terminal port of the PC is programmed and connected to the IP Link serial port. (19200, N, 8, 1, no HW flow control).

For details on how to configure a terminal program on the PC see Section 8.2 - Communicating with the 7170-C IP Link Transceiver, on page 21.
9.5 Power Up the IP Link and Interrupt IP Link Code from Executing

Connect the battery leads and the AC wall wart. As soon as the IP Link powers up, press the [X] key at the PC terminal program, and you should see the B prompt at the terminal window. You have to press it in the first 5 seconds after the IP Link powers up.

If you miss it, just press the RESET button on the IP Link board stack (close to the DB9 connector).

9.6 Copy the IP Link conf.txt File to the PC

In order to get the conf.txt file onto your Windows machine, follow the steps below.

Step 1: Enter \{down conf.txt\} in the B prompt and press <Enter>.

Step 2: It is now ready to start X-mode download, so next go to [Transfer] in the top tool bar.
Step 3: Choose [Receive file]
Step 4: Choose where you would like to save the file. Then change protocol to Xmodem, then click [Receive].
Step 5: Enter a file name, then click [OK]

9.7 Edit the File conf.txt

Get this template off of the IP Link and onto your Windows machine so that you can edit, with notepad, the appropriate settings: IP address, phone numbers and account numbers. For details, see Section 8.4 - Understanding the Conf.txt File, on page 24.

9.8 Send the conf.txt File Back to IP Link

Step 1: In the prompt, type \{up conf.txt\}, then press <Enter> (there is a time limit on this Step, so make sure to get moving onto the next step).
Step 2: Choose [Transfer] from the Tool bar
Step 3: Choose [Send file]
Step 4: Find the file by Browsing, choose the file, click [Open]
Step 5: Make sure the Protocol is Xmodem, then click [Send]
Step 6: Enter \{dir\} in the prompt
Step 7: To view the file, enter the command \{type conf.txt\}, then hit <Enter>
9.9 Reset the IP Link

When you reset the IP Link (still with the TCP/IP cable disconnected and without a Multinet receiver to answer the modem) it should engage in a process of testing TCP/IP (and it should fail), then testing the modem (and it should dial and then fail), and remain in this process forever, resetting from time to time. This is ALL GOOD and indicates a healthy IP Link.

9.9.1 Startup Screen Messages

The Example below shows the typical startup messages sent to a connected terminal during initialization. The example includes a message instructing an operator to press the [S] key within 3 seconds to bring up the Setup Menu. If you miss the 3 second window, you can still press [S] during normal operation to get the Menu. Refer to the Note on a previous page about the shared port, which will explain why sometimes pressing [S] will appear not to work.

```
Bios Version 3.3c for uFlashTCP with NE2000 Ethernet
DOC Socket Services - Version 0.2
(C) Copyright 1992-1996, M-Systems Ltd.
TrueFFS-BIOS -- Version 3.3.9 for DiskOnChip 2000 (V4.2)
Copyright (C) M-Systems, 1992-2000
DOS Version 3.3c for JK microsystems Flashlite
(C) HBS Corp and JK microsystems 1991-1999
Packet driver for NE2000, version 11.4.3
Packet driver skeleton copyright 1988-93, Crynwr Software.
This program is freely copyable; source must be available; NO WARRANTY.
See the file COPYING.DOC for details; send FAX to +1-315-268-9201 for a copy.
System: [345]86 processor, ISA bus, Two 8259s
Interrupt number 0x9 (9)
I/O port 0x300 (768)
My Ethernet address is 00:90:C2:40:43:9A
AES UIPLink UCMD Version 0.03
Running uiplink -v
Setting Watchdog 70 Sec
Command line arg0 [B:\BIN\UIPLINK.EXE]
*** PROCESSING CONFIGURATION FILE ***
EOF detected and bNextMustEOF
Success: Text configuration file [b:\CONF.txt] loaded OK.
Cypher as ID updated on LLR [nnnn]
Type Setup Key within 3 Sec. for Setup Menu
```

9.9.2 To Restart an IP Link from a Command Line Prompt

If you pressed [X] during startup of the IP Link and are at a command prompt, enter the {UCMD} <Enter> command, without parameters and the IP Link programs will start and it will attempt connecting to your MultiNet Server.
9.10 Configuring the 7170-C IP Link Transceiver:

All of the settings that need to be modified to configure an IP Link are contained in configuration files located on the IP Link’s file storage system. This includes the TCP/IP parameters needed to communicate with your networked components. Refer to “Appendix A” for instruction on modifying any necessary configuration files.

There is a Setup Menu available to the terminal program connected to the Console Port. Most of the functions in the Setup Menu are to view only, the current settings. Only a few of the menu functions are available to perform a task.

9.10.1 Set Up Menu:

There are several methods to access the Setup Menu using a terminal program attached to the Console port.

- During the initial power-up of the IP Link, press [S] following the prompt: “Type Setup Key within 3 Sec. For Setup Menu”
- During normal operation, when the Modem is not selected for testing or backup communication, press [S] plus <Enter>.

Once the Menu is displayed you press a selected highlighted letter or number and then press <Enter> to access the function. If the function is unavailable to modify the setting, an error message indicating “Unknown or Disabled Menu Command!…” is displayed.

- 1 - Disabled. This Menu item displays the IP address of this IP Link. Each device on a network needs a unique IP address. One method is to utilize a DHCP (*) server on the network to automatically assign an available address. The other is to configure the device internally to use a particular address. You must consult with the administrator of your network to determine which method is best and to get an available unused IP address. Examples: 192.168.1.11, 10.0.4.11, DHCP (* requires a DHCP server)

* Contact AES Support before using DHCP over the Internet.
• 2 - Disabled. This Menu item displays the Gateway IP address. The Gateway is typically used to access an outside network like the Internet. Consult with the administrator of your network to determine the correct Gateway.

• 3 - Disabled. This Menu item displays the Netmask appropriate for the attached network. Incorrectly setting this could make other devices on the same network unreachable. Consult with the administrator of your network to determine the correct Netmask.

• 4 - Disabled. This Menu item displays Debug Logging mode. This should only be used at the direction of AES Technical Support or Engineering. It is typically used to troubleshoot or understand a problem.

• I - Disabled. This Menu item displays the 8 digit Hexadecimal IPLinkNode ID of which the last four digits is the ID reported for this device in Radio Packets. It must be unique in the network. The 4 digit ID is used by the attached RF Board to identify the IP Link in its Radio Network. Included are leading four digits which typically are four zeroes. The leading 0x signifies a Hexadecimal number and is only for display purposes. Hexadecimal digits are 0-9 and A-F (uppercase).

Although the IPLinkNode ID can be 8 hex digits in length, and will be properly reported to the MultiNet receiver, it is suggested that you always use 0000 as the radio network only uses the last or lower 4.

Example: Using the IPLinkNode ID of “12345678” will identify the IP Link in the MultiNet Receiver as “12345678” but it will be identified in the local IntelliNet network as ID 5678. To avoid confusion use an IPLinkNode ID such as “00005678”. In many displays the leading 4 zeroes will be stripped off and not displayed.

• R - Resets the IP Link. There is up to a 70 second delay as the unit waits for the watchdog timer to initiate the reset. This is useful if you are connected using a remotely controlled computer that is attached to the IP Link via one of its COM ports. Never should the Reset Button be pressed or power be removed on the IP Link without first using this function and then pressing [X] during boot process to get to the Command Prompt.

• S - Disabled. This Menu item displays Primary Server IP1 and Backup Server IP2 addresses for the Primary and Backup (Secondary) MultiNet Receivers.

• T - Disabled. This Menu item displays “Server Port1” and “Server Port2” IP port numbers used by the receiver that allows the IP Link Transceiver to connect. Default is 7070.

• P - Disabled. This Menu item displays the “Primary Modem Server1 Phone#” and “Backup Server2 Phone#” numbers. The IP Link Transceiver will use these phone numbers if TCP/IP fails, as well as, during periodic modem tests.

• M - Forces a test of the modem. Same as is automatically run at program start and daily.
- **F** - Used to activate the RF Transceiver’s transmitter for up to 10 seconds to perform RF testing on the transmission line and antenna installation using a Watt Meter or SWR Meter.

Note: This option may not be available if the installed firmware does not support the feature. Internal 5 second max transmit timer will control actual transmit time.

- **D** - Displays a scrollable log with the results of the last modem test.

- **W** - Runs tests on the power supply. Follow prompts on display.

- **U** - TCP/IP Socket Timeout is the time that the unit waits for an ACK for a sent TCP/IP packet. Default is 30 seconds. Setting this to greater than 30 seconds could delay the switch over to Backup Modem to greater than 90 seconds. Contact AES Technical support before attempting to modify this value.

- **L** - Disabled. This Menu item displays the Link Layer or Level. All IP Links should be set to 0. Link Layer or Level’s purpose is to indicate the RF hops to the Central Receiver. Where an IP Link is the last RF device in a network, 0 is the level that will properly identify that to the Network, allowing Subscribers reporting a Link Layer of 1 to identify itself as being 1 final RF hop in a path to the MultiNet Receiver.

- **C** - This function allows you to verify the system Cypher (Cipher) Code configured in the IP Link. It will not change the code. An entered Cypher code will be compared with the IP Links Cypher code. The results of the comparison will be displayed. Press [C] <Enter> {code} <Enter>. After viewing the results press <Enter> to return to normal operation.

The Cypher code is stored in the attached RF Board and is used to authenticate transmissions by other IntelliNet devices that must use the same cipher code. The Cypher code is a 4 digit Hexadecimal number. Therefore only Hexadecimal characters 0-9 and A-F can be used. Letters must be entered in upper case (Capital) format. Any Subscriber that is to communicate to or through this IP Link must have the identical Cypher Code programmed.

- **A** - Disabled. This Menu item displays the RF Acknowledgement / ACK Mode. Quick ACK or Normal ACK. Only one IP Link Transceiver in a radio cloud should be set to Quick ACK. Quick ACK means that the IP Link Transceiver is sending a Packet Acknowledgement on the heels of a reception without listening for a clear frequency.

Having two IP Links in the Quick ACK mode could cause Packet Acknowledgments to be jammed or blocked.

- **G** - Disabled. This Menu item displays RF Ping Mode. This option when enabled (On), will instruct the IP Link Transceiver to Monitor RF traffic and report to the MultiNet receiver if it appears to be lost or silent.

Less than 200 seconds after the frequency goes silent (≈150 Seconds), an RF Test is initiated by the IP Link to verify its RF operation. This test verifies the IP Link, Radio, Coaxial Cable, connectors, surge protectors, Antenna and anything in the transmission line, by transmitting a Poll Test. The test is directed to the ID of the last device the IP Link sent a Packet.
ACK. A failure to receive an Acknowledgement Packet for the transmitted Test results in the reporting of an RF failure or RF Silence. The MultiNet Receiver will generate a code to send to the Alarm Monitoring System or annunciate the RF Failure. The Ademco 685 emulation code will be “E355 00 C906”. The message indicating that the RF may be lost will be annunciated at the MultiNet Receiver or transmitted to the Alarm Monitoring System less than 200 seconds after the frequency goes silent.

- Q - To Quit menu and return to normal operation.

9.10.2 Test the Network Connection:
From a command prompt, accessed by pressing [X] during boot up, when prompted with “AES UIPLink UCMD Version 0.03”, after a reset initiated from the Setup Menu, you can confirm communication with the assigned MultiNet receiver by issuing the command:
ping {MultiNetReceiverIPaddress} and looking for successful transmissions and replies. Press <Enter> to stop pinging and get a summary result.

Some Examples of using ping:
ping 192.168.0.101<Enter> This is the factory default setting of a 7705i-C
ping 10.0.1.1<Enter> Ping default gateway in a 10.0.1.xxx network

9.10.3 IP Link Information:
During normal operation, when the Modem is not selected for testing or backup communication, and you are connected via a terminal, you can press [I] plus <Enter> to receive a brief output showing information about the IP Link configuration and its current status.

Information shown includes: IP Configuration, Connected Server, Date and Time, Software Versions, Link Layer, Modem and Test Info.

Example of Info Output

```
HwVer:10.0.4.12, UTCTime:17:58:34, Date:08/07/09 Connected to Primary
Primary ServerIP:10.0.4.101, SendNow:0, Linklayer:00, HeartRate:5
IP Link Ver. SB1.6.16e, Radio Mode (LR) Version = 2.53
Both Modem Servers Failed (Pri#:NOMODEM, Sec#:NOMODEM)
Mode1Default in 1645 Secs, Mode1Retry = 0
```

9.10.4 Request IP Link to Switch from Backup to Primary Server
During normal operation, when the Modem is not selected for testing or backup communication, and you are connected via a terminal, you can press [P] plus <Enter> to request the IP Link to reconnect to the Primary Server. A message is displayed indicating if it is already connected to the Primary Server.

9.10.5 Unknown Terminal Commands
If you attempt to enter a command into the terminal that the IP Link does not understand, you will be prompted as such and the suggestion to enter [?] is offered. Type a [?] and then hit <Enter> to get a list of commands that will be accepted by the IP Link’s terminal interface.
Unknown Command “..” Try Typing [?]
The response to entering [?] <Enter> produces the following response:
Valid Commands: Setup, Info, Primary Server

10.0 Testing the 7170-C IP Link Transceiver

There are several functions of the IP Link Transceiver that can be tested to confirm that it is operating properly. Testing is broken up into parts with focus on increasingly advanced functionality with each part.

10.1 Test Basic Board Functionality:

The tests in this part are intended to check that there is power to the boards and that they have at least basic functionality.

1. Testing RF Board Local operation.
   - After performing a power up or Radio Reset the RX, WA, and AL LEDs will come on for about one second during the self-test process.
   - Once self-test is complete, the AL LED will come on steady.

2. Testing Interface Board Local operation.

   The board has two LEDs that indicate the status of the Ethernet link. The LNK LED indicates the status of the Ethernet. When illuminated, the Ethernet Port is receiving the Ethernet ‘heartbeat’ and is connected to a live network. If this LED is not illuminated, there is a problem with the Ethernet wiring or the network. The ACT LED indicates activity on the network. The LED will flash when a data packet is received or transmitted.
   - If the Ethernet port your IP Link Transceiver is correctly attached to another functioning Ethernet port there should be activity on the LNK and/or ACT LEDs as indicated above. This does not indicate connectivity to a MultiNet server, only that it is attached to an active network port.

10.2 Test Local Board Functionality with Terminal:

The tests in this part check the interaction between each board and the attached terminal.

A terminal connected to the “Serial Input” Port is required to perform testing of the IP Link Transceiver at the local installed location. In this configuration, the connector to be used is the one on the 77LED board.

Receiving the output on your terminal’s display as shown in Section 9.9.1 - Startup Screen Messages, on page 28, confirms most of the basic functionality of the IP Link Transceiver.
10.3 Test RF Signal:

Tests in this part are intended to check the transmission line and components for proper operation and problems. **This is a very important test and should be performed as soon after power up as feasible.** Operating the unit with a faulty transmission line or component could cause damage to electronics in the unit. As a precaution, you could disconnect the dB9 connector from the transceiver inside the IP Link until this test can be performed.

To test your IP Link’s RF signal you need to connect a Power Meter or SWR meter in the coax line to read power. As with other tests, you need a terminal connected to the “Serial Input” of the IP Link.

1. With the unit powered and messages scrolling in the terminal’s display, press [S] then <Enter> to access the Setup Menu.
2. Press [F] then <Enter> to access the RF test function. (Not listed in the Menu)
3. Response is: “Warning will key Transmitter for Up to 10 Seconds. Press Y to Continue”. Press [Y] then <Enter>
4. The next prompt asks “Tone or 1/0 Pattern: T/1”. If you want to include a Tone with the carrier press [T] then <Enter>. If you want a data pattern of alternating 1’s and 0’s, press [1] then <Enter>.
5. During the up to 10-second transmission, while the display prompts “Test in progress. Please Wait,” observe your meter’s reading.
6. An SWR reading of less than 3 to 1 is acceptable.
7. If the reading is greater than 3 to 1, then replace the antenna, coax and or coaxial connectors until the reading falls below the acceptable level.
8. If using a Wattmeter, the reflected power should not be more than 10% of the forward power.
9. When the transmit function is complete the Setup Menu will return.
10. Press [Q] then <Enter> to return to normal IP Link operation.

10.4 IPComm – IP Link Basic RF Test Using a SWR Meter

You can perform a local RF test on the IP Link without any subscriber installation using the pre-installed IP Link application (IPCOMM) and a SWR meter. Once you activate IPCOMM, you get to a prompt where you enter a command asking the IP Link to broadcast for ten seconds. You will then make use of a SWR meter that will be in line between the IP Link and the antenna. That will provide the following information about this IP Link RF installation:
Identify if there is any reflectance on the RF installation. Reflectance indicates that part of RF power is not being used for effective radio communication. A low reflectance ensures that the transmission capabilities will be used to its maximum possible power and as a consequence, range. However, it does not prove how effective your network will be in terms of reception. You need other tests to ensure range based on antenna height, topography, building, and man made structures.

You also need to use the laptop to execute the IPComm test. If you do experience any reflection, you should check connections, starting at the Coax IP Links. Look
at the connection going from the IP Link to the Surge and finally the Surge to the Antenna.

10.4.1 Connect the SWR Meter

Look at the arrow on the front of the SWR meter; you should see an arrow that can point to each cable connection on the SWR meter. When the arrow is pointing to the cable, which is connected to the antenna, then it is measuring transmission capabilities of the IP Link. When the arrow is pointing in the direction of the IP Link or Subscriber, you are measuring reflectance.

Note: Make sure the element of SWR is a 10 times element (that would provide the best scale range for a 2 WATT transceiver). It is a good option for the 5 WATT as well.

Step 1: You will need a known good cable with n-style connections on each end. One end will connect to the IP Link, the other to the SWR meter, allowing you to physically test for reflectance between the IP Link and antenna.

Step 2: Connect one end of the “known good” cable to the SWR meter and the other end to the IP Link or Subscriber. Next connect the larger cable from the antenna to the other connection on the SWR meter. The meter will be reading in UHF/VHF range, which is the used most.

Note: Never open the coax connection with a running IP Link. Turn off the IP Link or remove the 9-pin connection.
10.4.2 Test Reflectance

Turn the knob so the arrow points the IP Link, to measure reflectance.

10.4.3 Connect the Laptop to the IP Link

For details, see Section 8.2 - Communicating with the 7170-C IP Link Transceiver, on page 21.

10.4.4 Activate the IP Link Test

You will command the IP Link to transmit through the antenna. Anything that cannot get out will come back as reflectance power. Please make sure the arrow is pointing to the IP Link for the next steps.

- Power cycle the IP Link
- On the HyperTerminal, press [X] to stop execution
- Make sure you are at B:> 
- Go to the /bin folder (type `{cd bin}`, then press <Enter>)
- Locate the file named IPCOMM. (type `{dir}`, then press <Enter>)
- Activate IPcomm (type `{IPCOMM}`, then press <Enter>)
- Go into Computer mode. (press the `<Esc>` + `[S] keys together)
- Go to the command prompt (press `<Ctrl>` + `[J] then `<Shift>` + `[!!]`, then press <Enter>)
- At the AES command prompt, start the test (type `{TEST 10}` then press <Enter>.

You will be doing a transmission of RF from the IP Link.

The meter should not move during this transmission (make sure the arrow is pointed towards the IP Link). That indicates that you have a good connection.

If the meter needle moves, then you have reflectance and should check your RF connections.
10.4.5 Test the Antenna
Move the SWR knob arrow towards the antenna. Repeat the step above for TEST 10 (type \{TEST 10\} then press <Enter>). The watt meter should go up to about 20 (twenty) assuming you are measuring a two watts transceiver with an element of 10. If it reaches or passes the 20 reading, you have a good connection. Any reading less than 20 should be investigated as a potential RF problem.

10.4.6 Restore IP Link to Normal Operation
- Exit the program (type <CTRL> [X], then press <Enter>)
- Restart the IP Link, if needed, by pressing reset.

10.5 Test TCP/IP Communication Functionality:
To test that your TCP/IP configuration works, you can utilize a program called PING, which is included in the on-board PC and accessible from the C:\> prompt. You will want to ping the IP address of the new gateway that was entered during setup. Type \{ping <gateway IP>\} and hit <Enter>. You should get a successful response. If not, check your Ethernet connection and with the IT administrator to resolve this issue.

10.6 Test RF Communication Functionality:
The easiest method to locally test RF functionality is to have a programmed AES Subscriber unit with a 7041 Hand Held Programmer available. Use the “Display Status” function (<Shift> + <F4>) to determine if your subscriber is connected to the network and most importantly that “RT1: #### contains the ID of the IP Link Transceiver and that the Link Layer (Level) and NETCON are as expected. The level should be 1 higher than the Link Layer setting in the IP Link Transceiver.

Contact an operator with access at the location of the AES MultiNet Receiver to confirm that signals are coming in from this IP Link Transceiver. This test of course is also confirming TCP/IP communication or complete end-to-end testing as well.

Addendum 1
Note: The Battery pack must be inspected once per year to insure proper performance.

Battery Replacement Procedure:
1. Remove positive battery lead from battery (red).
2. Remove negative battery from battery (black).
3. Remove the 16.5 Vac power source form the wall.
4. Insure all the LED indicators are NOT illuminated.
5. Remove battery from enclosure,
6. Discard battery in accordance with local disposal codes,
7. Install new battery into enclosure
8. Connect 16.5Vac power source.
9. Connect negative battery lead to battery
10. Connect positive battery lead to battery.
11. Perform self test procedure.
11.0 Warranty / Service Procedures / Technical Support

OWNER WARRANTY - AES CORPORATION

LIMITED PRODUCT WARRANTY AND TECHNOLOGY LICENSE

LIMITED PRODUCT WARRANTY:
AES Corporation ("AES") warrants to the original purchaser that each AES Subscriber Product will be free from defects in material and workmanship for three (3) years from date of purchase and all other products purchased from AES including central station receivers and accessories will be warranted for one (1) year from the date of purchase. At no cost to the original purchaser for parts or labor, AES will repair or replace any AES Product or any, part or parts thereof which are judged defective under the terms of this Warranty.

Defective AES Products must be returned to AES directly, provided they are properly packed, postage prepaid. Or exchange may be made through any authorized direct factory representative for any AES Products that are judged defective under the terms of this Warranty. Improper or incorrectly performed maintenance or repair voids this Warranty. This Warranty does not cover replacement parts that are not approved by AES. This Warranty does not apply to any AES Product or any part thereof that has been altered in any way to affect its stability or reliability, or that has been subjected to abuse, misuse, negligence, accident or act of God, or that has had the serial number effaced or removed.

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AES makes no warranty, express or implied, other than what is expressly stated in this Warranty. If the law of your state provides that an implied warranty of merchantability, or an implied warranty of fitness for particular purpose, or any other implied warranty, applies to AES, then any such implied warranty is limited to the duration of this Warranty.

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Some states do not allow the exclusion or limitation of the durations of implied warranties or the limitation on incidental or consequential damages, so the above limitations or exclusions may not apply to you.

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AES SERVICE PROCEDURE: Contact AES by Phone (978) 535-7310, Fax (978) 535-7313 or Email service@aes-intellinet.com, to receive a Return Material Authorization Number. Have the AES part number and serial number ready. Repack equipment in original or equivalent packaging. Inside the box, please include a contact name, telephone number, address and a brief description of the reason for return.

Ship items freight-prepaid to:
Repairs Services, RMA#___________
AES Corporation,
## 12.0 Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2010JUN06</td>
<td>Initial draft</td>
</tr>
<tr>
<td>2</td>
<td>2010DEC21</td>
<td>Inclusion of LED board and removal of Cav.</td>
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