ERICSSON

*Mobile Communications*

# EDACS®
# Data Gateway

## INSTALLATION AND MAINTENANCE

# TABLE OF CONTENTS

# PREFACE

This is one of four manuals for the EDACS® Data Gateway (EDG). It contains instructions for installing and maintaining an EDG. Network planning and the boot sequence are also documented in this manual. Other relevant documents are:

*EDG Technical Description* (LBI-38961)*:*

This manual contains a detailed description of the EDG capabilities, interfaces, and hardware.

*EDG Configuration Reference Manual* (LBI-38964)*:*

This manual contains the information required to configure the IP Version of the EDG.

*EDG User's Reference Manual* (LBI-38963)*:*

This manual contains information for using the EDG command shell. This command shell services the Diagnostic Terminal and Telnet logins.

*Internetworking with TCP/IP*, Volume I, by Douglas E. Comer:

This is an excellent (but unofficial) source of information about Internet Protocol.

*EDACS CommServ Programmers Guide* (LBI-38835):

This manual documents the CommServ product. CommServ provides an application program interface that simplifies **R**adio **D**ata **T**erminal (**RDT**) programming by providing an RDI Data Link Layer. It is for use with MS-DOS (trademark of Microsoft Corporation) and PC-DOS.

*Landline Data Release Notes* (SRN1036-1):

This manual documents the installation procedure for the IMC and Sites.

*Mobile Data Terminal Interface, Hardware and Protocol, Version 1.92*

This manual documents the RDI Interface. Contact Ericsson-GE for more information.

# NETWORK PLANNING FOR IP HOST CONFIGURATIONS

Prior to configuring and installing the EDG, it is important to determine the IP Addresses that will be used. In addition to this document, the *EDG Technical Description* explains the concepts behind the EDG. Also, the *EDG Configuration Reference Manual* contains several example configurations which are helpful in building the SYSTEM.TXT configuration file once the configuration is known.

## ADDRESS TYPES

### IP Addresses

IP Addresses are made up of four octets separated by periods. The addresses are typically written in decimal, but can be hexadecimal. 1.0.0.2 is an example IP Address. Each octet can range from decimal 0 to 255 or hex 0x00 to 0xff.

IP Addresses contain a **Network ID** portion and a **Host ID** portion. The number of octets in each is based on the **Class** of the address. The Class of the address is determined by the value of the first octet.

| CLASS | First Octet | Network ID Portion | Host ID Portion | Number of Host IDs |
|---|---|---|---|---|
| A | 1-126 | First octet | Last three octets | 16M |
| B | 128-191 | First two octets | Last two octets | 65K |
| C | 192-223 | First three octets | Last octet | 254 |
| D | 224-239 | N/A | N/A | N/A |
| E | 240-255 | N/A | N/A | N/A |

Several conventions and special cases should be noted:

1. If the IP Address is all zeros, it refers to this host.

2. If the IP Address is all ones, the destination is all hosts on the local network.

3. If the Network ID is all zeros, the IP Address refers to a host on this network. This is only valid at system startup and is not a valid destination address.

4. If the Host ID is all zeros, the IP Address refers to the Network ID.

5. If the Host ID is all ones, the IP Address refers to all hosts on the specified network (not valid on the EDACS Network).

6. If the first octet is 127, then this is a local loop-back.

7. Class D addresses are multicast.

8. Class E addresses are reserved.

**EDACS Addresses**

There are two types of EDACS Addresses, **L**ogical **ID**s (**LID**s) and **G**roup **ID**s (**GID**s). LIDs are used to reference a single host, radio, or TSI Master. GIDs are used to reference one or more radios. LIDs and GIDs are programmed into radios and can be changed as desired.

| TYPE | Sub-Type | Range |
|---|---|---|
| LID | Host ID | 1-63 |
| LID | Unit ID | 64-16,382 |
| LID | TSI EDACS ID | 64-16,382 |
| GID | N/A | 0-2047 |

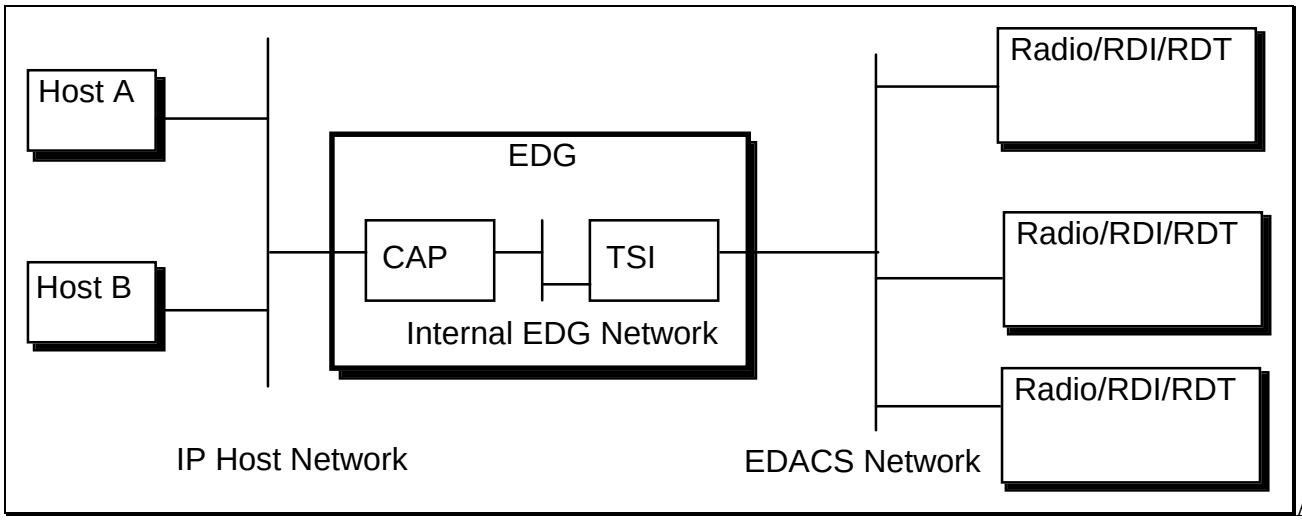
Note: Unit IDs can also be in the range from 1-63, but it is not recommended.

**ETHERNET Addresses**

Ethernet Addresses are 64-bit addresses assigned by hardware vendors. Normally, an Ethernet Address is permanently assigned to a hardware device. The **A**ddress **R**esolution **P**rotocol (**ARP**) that is built into the Internet Protocol allows devices to query each other for their Ethernet Address. For these reasons, Ethernet Addresses are of minor importance when setting up a network, and are not discussed in detail.

## ASSIGNING NETWORK IP ADDRESSES

An **internet** consists of multiple networks connected together, with each network on the internet assigned a unique network address. Therefore, the first step is to determine the IP Network Addresses that will be used. In the simplest case, three network addresses will be used: one each for the IP Host Network, the Internal EDG Network, and the EDACS Network. A Class A, B, or C address can be used for any of the addresses. Class D and E addresses can not be used. **Network Addresses can only be used once in an internet.**



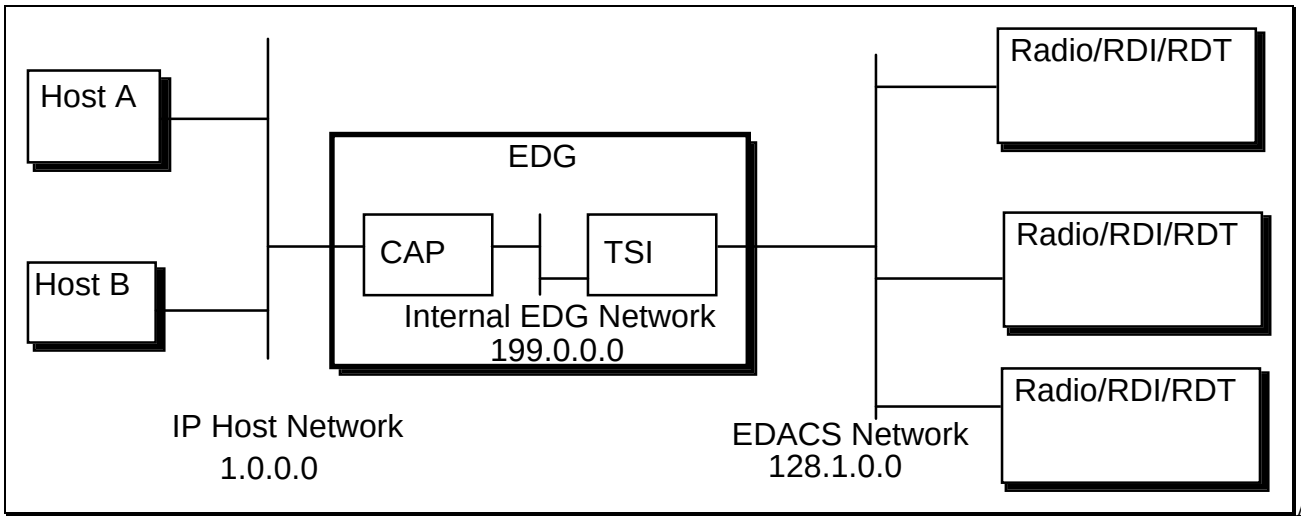

An IP host internet with no IP addresses

If the IP Host Network already exists, its Network Address will have already been assigned. Otherwise it will need to be assigned. For the purposes of this example, the IP Host Network is an existing network with an address of 1.0.0.0.

Next, the internal EDG Network Address needs to be assigned. Since the number of individual addresses required on this network is small (one address per board), a class C address is recommended. The EDG will default its internal Network Address to 199.0.0.0. After verifying that this Network Address isn't used elsewhere in this internet, it should be reserved with your Network Administrator. If this Network Address isn't available, another Class C address can be used to conserve Class A and B Network IDs.

Finally, an available Network Address needs to be chosen for the EDACS Network. A Class C address typically isn't used since each radio must be assigned an address, and most EDACS Networks have more than 254 radios. A Class B address can be used to conserve Class A Network IDs. If an EDACS network ID is not specified, the EDG will default to a value of 140.1.0.0.

For this example, it is assumed that you have chosen to assign Network Address 128.1.0.0 to your EDACS Network. Remember that since each network address must be unique, 128.1.0.0 should be reserved so that it is not used by any one else on the internet.




An IP host internet with Network Addresses assigned

## ASSIGNING INDIVIDUAL ADDRESSES

After the Network Addresses have been decided upon, individual addresses within each network should be assigned.

On the IP Host Network, for the purposes of this example, Host A has previously been assigned an address of 1.0.15.12 and Host B has previously been assigned an address of 1.0.15.13. The EDG CAP Board's Host Network Interface must also be assigned an individual address based upon the Network Address 1.0.0.0. For this example, it is assumed that address 1.0.15.14 has been chosen.

For the EDG Internal Network, the EDG can auto-configure the IP addresses of its CAP, TSI, and HDI boards. While this can be overridden by explicitly assigning individual addresses to each board, it's simplest to let the EDG do the work.

For the EDACS Network, an IP address must be assigned to every LID and GID being used in the system.

The simplest way to map IP Addresses to LIDs is to map all of the LIDs to a block of IP Addresses in such a way that there is a one-to-one correspondence between the LIDs and the Host ID portion of the IP Addresses. Assuming the LIDs start at 64, the IP Addresses would start at 128.1.0.64. By allocating an IP Address for all possible LIDs now, future maintenance is reduced.

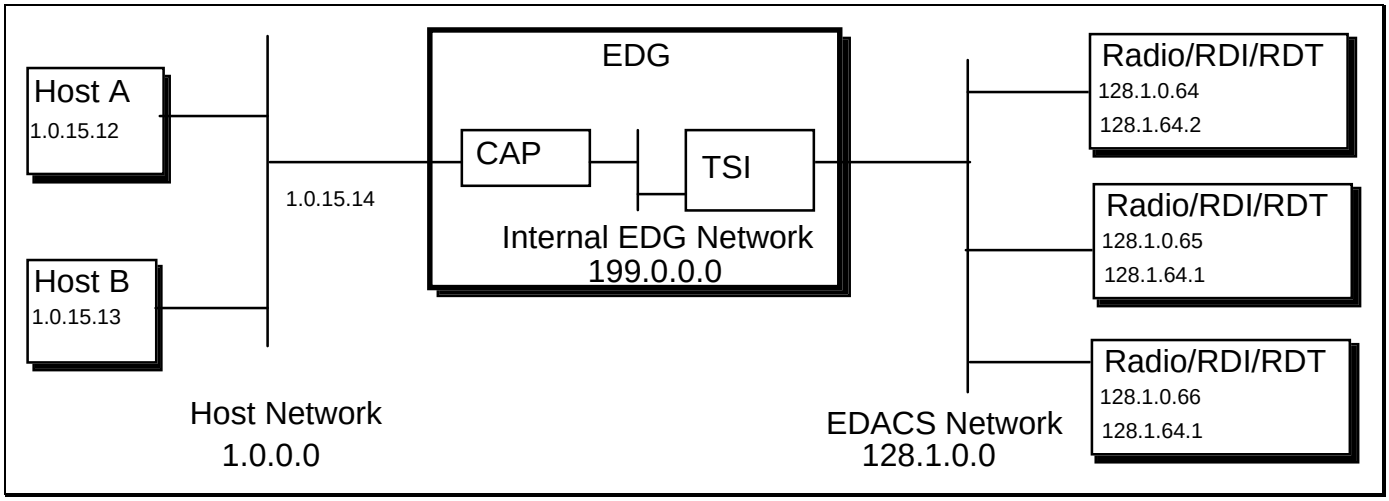
To compute the next available block of IP Addresses for the Groups, the Host ID portion of the IP Address of the highest LID (16382) can be converted to hex to get a value of 0x3ffe. Next, the octets can be individually converted back to decimal to get an IP Address of 63.254 (128.1.63.254). IP Address 128.1.64.0 can be used as the starting address for the GIDs to keep a one-to-one correspondence between the GIDs and the IP Addresses.

**USING NETWORK LAYER RDTS**

If Network Layer **R**adio **D**ata **T**erminals (**RDT**s) are being used, i.e. RDTs with the **E**DACS **N**etwork **D**river (**END**) installed, all message source and destination references are to IP addresses. EDACS addresses are not important or relevant to either the IP host or RDT, and are effectively hidden. This is analagous to an ethernet network, where an ethernet address is assigned to all devices, but the user need not know this address to communicate with other devices on the network - a higher layer addressing scheme such as IP is utilized.

**NOTE**

The mapping of LIDs to IP addresses is static. If a radio's LID is changed, a new IP address will be associated with that radio. To keep the same IP address, the mapping must be modified in the EDG SYSTEM.TXT file.




An IP host internet, using all Network Layer RDTs, with addresses assigned

Notice that each radio/RDI/RDT has two IP addresses associated with it, a unit address and a group address. The unit address is unique to every radio in the system. Host originated data calls to this address will be received by a single radio only. The group address is shared by more than one radio. Host originated data calls to this address may be received by a large number of radios at the same time.

For radio originated data calls, the destination address is also an IP address, whether that of a host, another radio, or a group of radios. The EDACS Network Driver takes care of the underlying EDACS addressing.

In a more complex configuration, there could be multiple gateways between the EDG and the Hosts. Regardless of the configuration, the EDG CAP Board's external IP Address must be a valid address on the network that it is connected to. Routing table entries would be used to allow the EDG and Hosts to communicate.

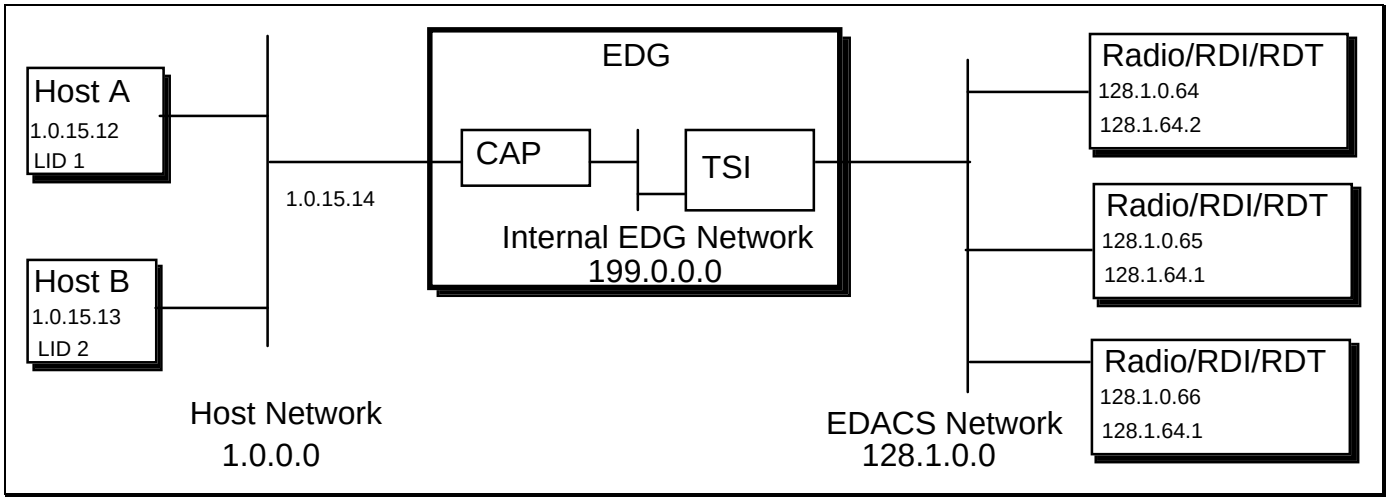
## Sample SYSTEM.TXT File

The following is a SYSTEM.TXT configuration file that would match the example configuration: IP hosts with all network layer RDTs. Note here that since only network layer RDTs are being used, no entries are required in the [ip_map_id_table] for the IP hosts. The *EDG Configuration Reference Manual* contains a detailed explanation of each command.

```
################################################
# SYSTEM.TXT configuration file.
################################################

[board 1]
type cap
load 01.02/loads/CAP.SX

[board 2]
type tsi_master
load 01.02/loads/TSI.SX
port_dir 0 bi
port_dir 1 bi
port_dir 2 bi
port_dir 3 bi
tsi_edacs_id 16382

[ip]
cap_ext_address          1.0.15.14

[imc 1]
ip_network_id 128.1.0.0

[ip_map_id_table]
u 64 - 16381     128.1.0.64      # All possible Radios.
                                 # 16382 is used for the TSI Master.
g 0  - 2047      128.1.64.0      # All possible groups.

[network_layer_rdt_table]
u 64 - 16381
g 0 - 2047
```

**USING NON-NETWORK LAYER RDTs**

If there are any **R**adio **D**ata **T**erminals (**RDT**s) that do not have the **E**DACS **N**etwork **D**river installed, EDACS addresses become important to the user. Specifically, a Host LID needs to be mapped to each of the IP hosts. For this example, it is assumed that LID 1 has been assigned to Host A and LID 2 has been assigned to Host B.




The IP host always references IP addresses whether any network layer RDTs are being used or not. The EDG will convert the IP address of the destination radio to an EDACS address (i.e. LID or GID). Conversely, an RDT without an EDACS™ Network Layer always references an EDACS address. The EDG will convert the EDACS address of the IP host to an IP address.

**NOTE**

An EDACS Host ID must be assigned to any IP host that will be receiving data calls from a non-Network Layer RDT.

Systems may contain a mixture of Network Layer and Non-Network Layer RDTs. The major benefits to using Network Layer RDTs are that radio-to-radio data communications becomes possible, message sizes greater than 512 bytes may be sent, and the capability to use non-proprietary host computer protocols such as TCP and UDP.

In a more complex configuration, there could be multiple gateways between the EDG and the Hosts. Regardless of the configuration, the EDG CAP Board's external IP Address must be a valid address on the network that it is connected to. Routing table entries would be used to allow the EDG and Hosts to communicate.

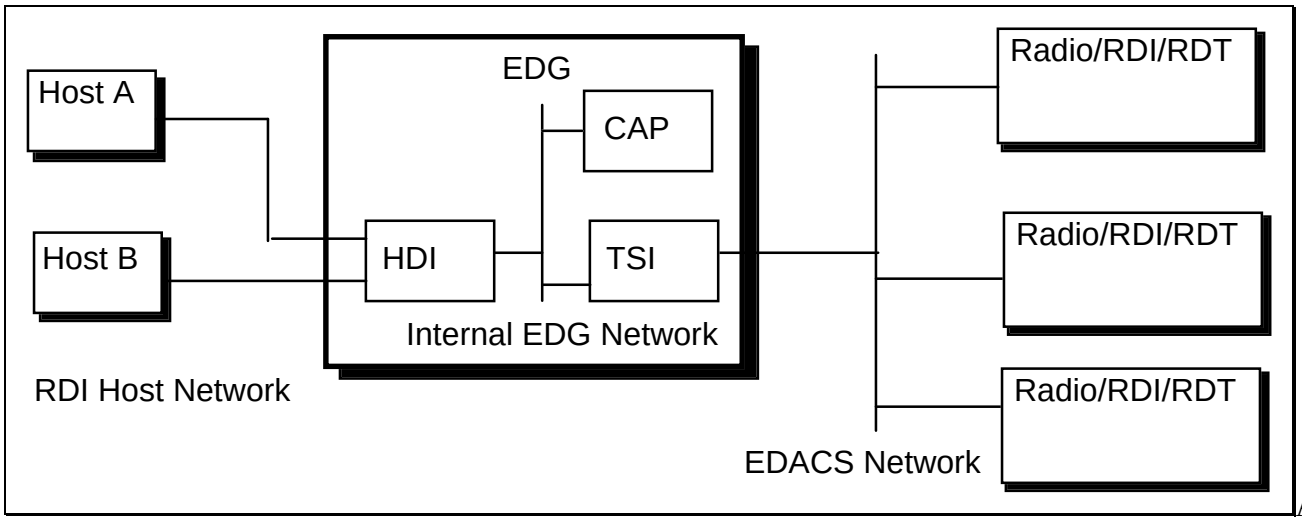
## Sample SYSTEM.TXT File

The following is a SYSTEM.TXT configuration file that would match the example configuration: IP hosts with no network layer RDTs. Note here that since non-network layer RDTs are being used, entries are required in the [ip_map_id_table] for the IP hosts. The *EDG Configuration Reference Manual* contains a detailed explanation of each command.

```
################################################
# SYSTEM.TXT configuration file.
################################################

[board 1]
type cap
load 01.02/loads/CAP.SX

[board 2]
type tsi_master
load 01.02/loads/TSI.SX
port_dir 0 bi
port_dir 1 bi
port_dir 2 bi
port_dir 3 bi
tsi_edacs_id 16382

[ip]
cap_ext_address          1.0.15.14

[imc 1]
ip_network_id 128.1.0.0

[ip_map_id_table]
u 64 - 16381     128.1.0.64      # All possible Radios.
                                 # 16382 is used for the TSI Master.
#
g 0  - 2047      128.1.64.0      # All possible groups.
#
h 1              1.0.15.12       # Host A
h 2              1.0.15.13       # Host B
```

# NETWORK PLANNING FOR RDI HOST CONFIGURATIONS

RDI hosts communicate directly to the EDG, through an HDI board, over 9600 baud asynchronous serial data links using the RDI protocol.



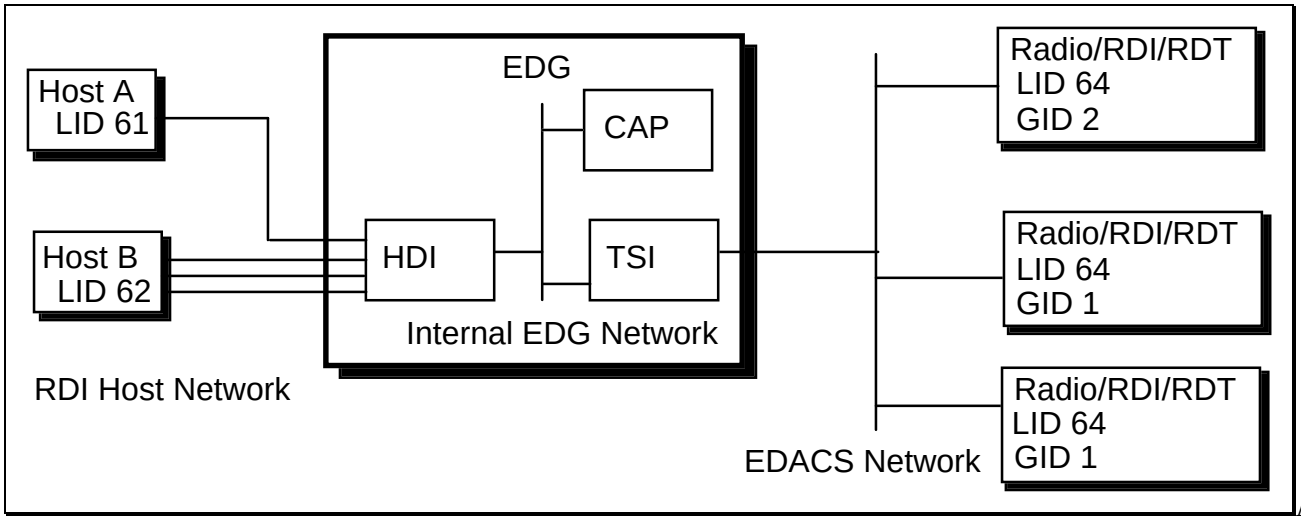

An internet with RDI hosts

RDI hosts use EDACS addresses, rather than IP addresses, as a means of specifying the source and destination for all data messages. Although the EDG still requires IP network addresses to be assigned to each of the three networks, these addresses do not have to be explicitly assigned by the user. In fact, the user need not know anything about IP addressing in order to set up a system that uses only RDI hosts. The EDG will assign default IP addresses to all networks[1], hosts, and radios.

The user still has the job of assigning EDACS Host IDs to every individual RDI host in the system (as well as assigning Unit IDs and Group IDs to the radios). Each RDI host must be assigned a single Host ID, and may be assigned multiple Host IDs if desired.

A host may be connected to one or more ports on a single HDI, or multiple HDIs. Also, up to four separate hosts may be connected to a single HDI.

[1]The current version of the EDG still requires that a CAP external address be specified, even if not being connected to an external IP network. This may be any valid IP address with a network ID that does not match that of any other network directly connected to the EDG (i.e. RDI host network, internal EDG network, EDACS network).




An RDI Host internet with addresses assigned

As mentioned previously, no IP addresses need to be assigned by the user in an RDI host only configuration[2]; the EDG will generate default values. However, these defaults may be overridden. This would be desirable if the EDG will be connected to an IP network in the future. In this case, the default network addresses might conflict with addresses already assigned on the IP network. See the next section, "Network Planning for Combined IP and RDI Host Configurations", for more details.

[2]With the exception of the CAP external address as noted previously.

**Sample SYSTEM.TXT File**

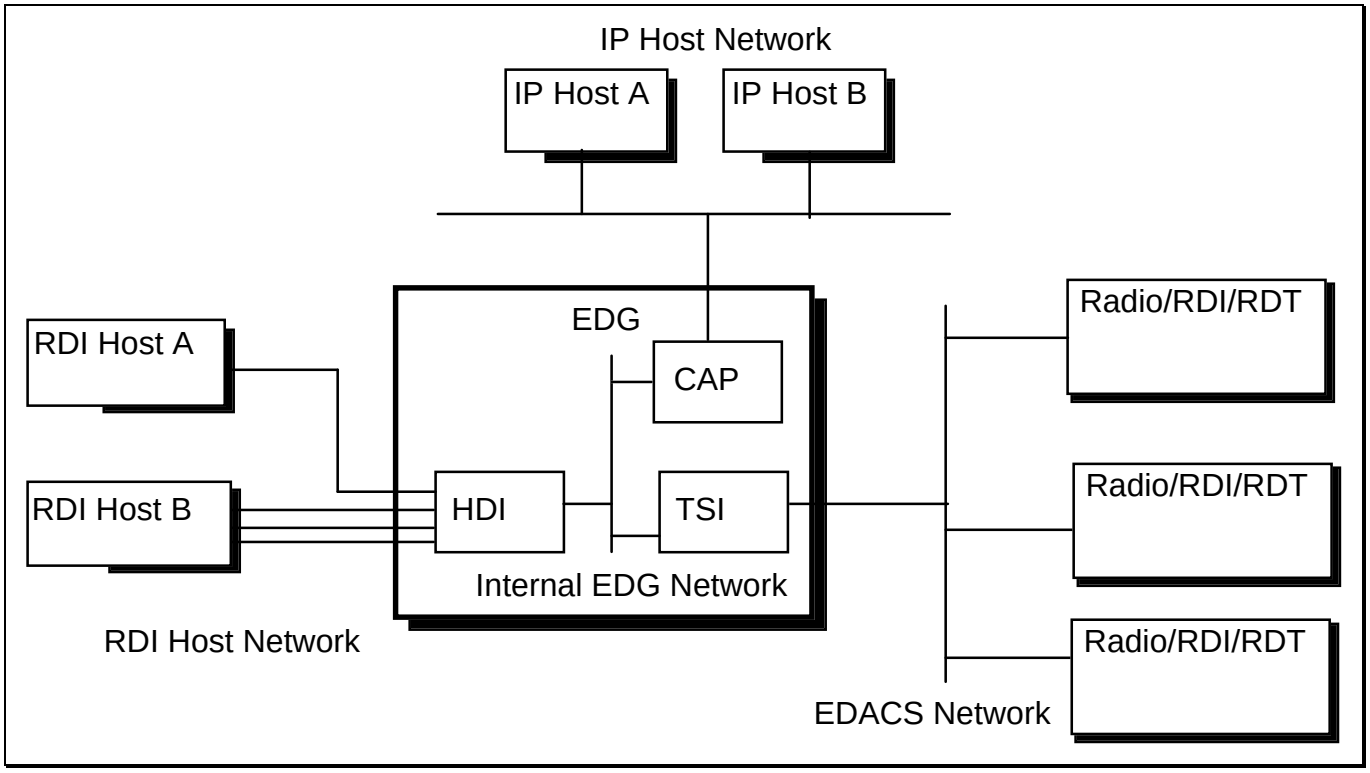
The following is a SYSTEM.TXT configuration file that would match the example configuration. The *EDG Configuration Reference Manual* contains a detailed explanation of each command. During the initial load analysis, it was found that host A would be lightly loaded, with a single serial link sufficient to handle all data traffic. Conversely, it was found that host B would be heavily loaded, requiring three separate serial links.

```
################################################
# SYSTEM.TXT configuration file.
################################################

[board 1]
type cap
load 01.02/loads/CAP.SX

[board 2]
type tsi_master
load 01.02/loads/TSI.SX
port_dir 0 bi
port_dir 1 bi
port_dir 2 bi
port_dir 3 bi
tsi_edacs_id 16382

[board 3]
type hdi
load 01.02/loads/HDI.SX
port_dir 0 bi     # Host A
port_dir 1 bi     # Host B
port_dir 2 bi     # Host B
port_dir 3 bi     # Host B
hdi_port_hosts  0   61   # Host A
hdi_port_hosts  1   62   # Host B
hdi_port_hosts  2   62   # Host B
hdi_port_hosts  3   62   # Host B

[IP]
cap_ext_address          1.0.0.1          # This command must always be specified,
                                          # whether connected to an external IP network
                                          # or not.
```

# NETWORK PLANNING FOR COMBINED IP AND RDI HOST CONFIGURATIONS

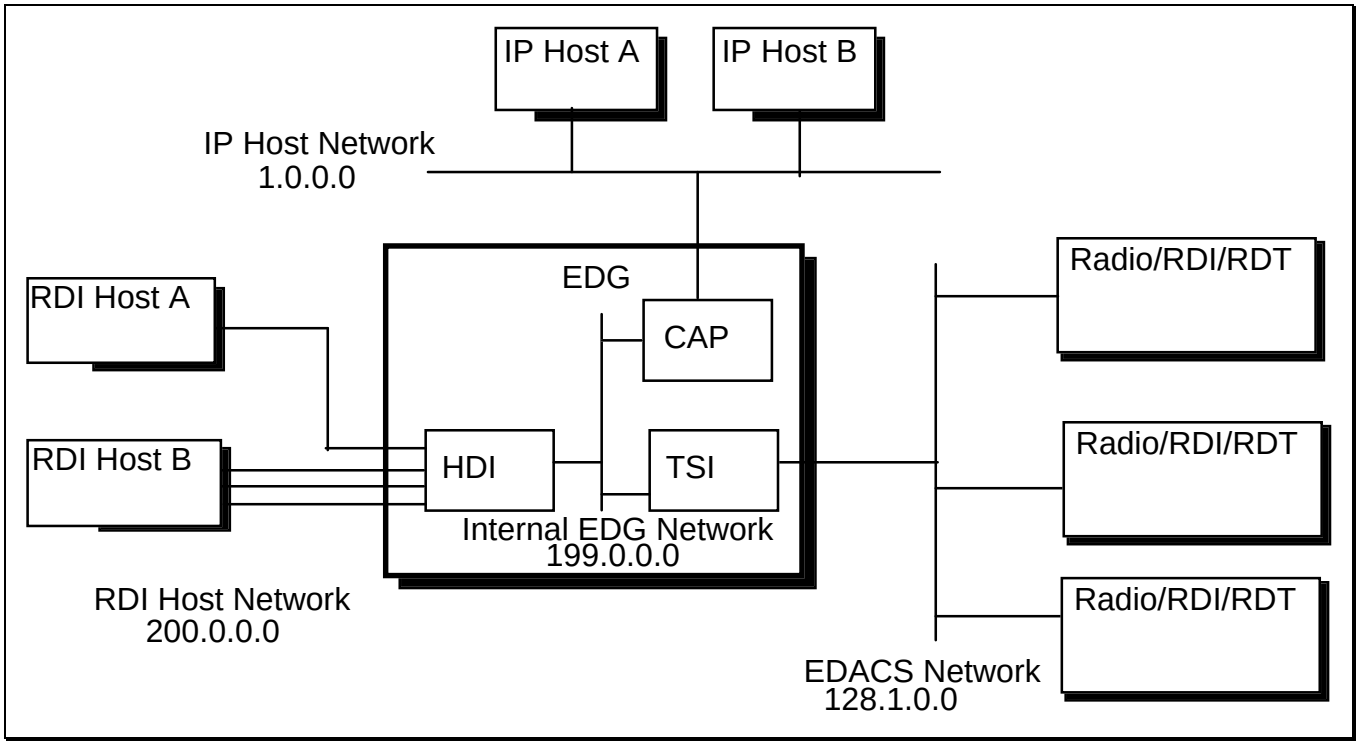
Both IP and RDI hosts may exist in an EDACS system configuration. It is recommended that if you have not read the two previous sections, "Network Planning for IP Host Configurations" and "Network Planning for RDI Host Configurations", that you do so at this time.

As in the IP Host Network Example, the first step is to assign IP addresses to all networks. However, we now have a fourth network, the RDI host network, to which an address must be assigned.




An IP and RDI host internet with no IP addresses

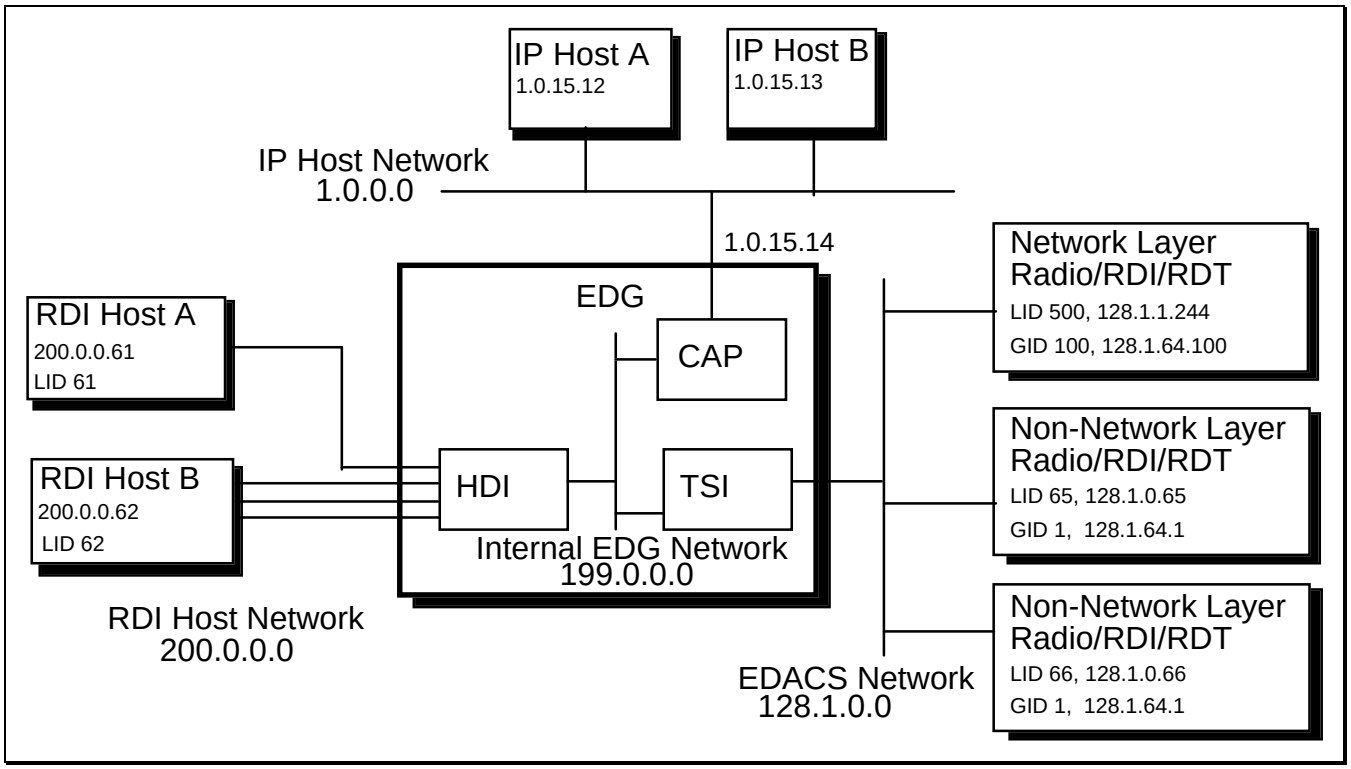
In this example, we will use 200.0.0.0 as the RDI host network address, which is the default assigned by the EDG if none is specified by the user. The addresses for the other networks will be the same as in the IP host example.




An IP and RDI host internet with network addresses assigned

Next, individual addresses should be assigned. As discussed in previous sections, if an IP host is being accessed by an RDT that does not have network layer, an EDACS address must be assigned to it, otherwise an EDACS address is not needed. RDI hosts, on the other hand, must always be assigned EDACS Host IDs under any circumstances. In this example, we will assume there is a mixture of Network Layer and non-Network Layer RDTs. However, the non-network layer RDTs will only be talking to RDI hosts, therefore, EDACS Host IDs do not need to be assigned to the IP hosts.

We will use the same addresses as in the IP and RDI host examples, plus we now need to assign a unique IP address to each RDI host. In this example, we will just use the EDACS LID assigned to the RDI host as the Host ID portion of the IP address Note that this is the default value assigned by the EDG if an individual IP address is not specified for the RDI host.




An IP and RDI host internet with addresses assigned

Now, a Network Layer RDT may communicate with both RDI hosts and IP hosts. From the perspective of the RDT, it does not know, nor does it care, what type of host is at the other end of the network.

**Sample SYSTEM.TXT File**

The following is a SYSTEM.TXT configuration file that would match the example configuration. The *EDG Configuration Reference Manual* contains a detailed explanation of each command.

```
################################################
# SYSTEM.TXT configuration file.
################################################

[board 1]
type cap
load 01.02/loads/CAP.SX

[board 2]
type tsi_master
load 01.02/loads/TSI.SX
port_dir 0 bi
port_dir 1 bi
port_dir 2 bi
port_dir 3 bi
tsi_edacs_id 16382

[board 3]
type hdi
load 01.02/loads/HDI.SX
port_dir 0 bi     # Host A
port_dir 1 bi     # Host B
port_dir 2 bi     # Host B
port_dir 3 bi     # Host B
hdi_port_hosts  0   61  # Host A
hdi_port_hosts  1   62  # Host B
hdi_port_hosts  2   62  # Host B
hdi_port_hosts  3   62  # Host B

[ip]
cap_ext_address          1.0.15.14

[imc 1]
ip_network_id 128.1.0.0

[ip_map_id_table]
u 64 - 16381     128.1.0.64      # All possible Radios.
                                 # 16382 is used for the TSI Master.
g 0  - 2047      128.1.64.0      # All possible groups.
h 61             200.0.0.61      # RDI Host A
h 62             200.0.0.62      # RDI Host B

[network_layer_rdt_table]
u 500 - 16381                    # Units 64 - 499 are non-network layer
g 100 - 2047                     # Groups 0 - 99 are non-network layer
```

# INSTALLATION

## CONTENTS

The EDG is shipped with the following items:

- VT100 compatible terminal with power cord
- Terminal interface cable
- EDACS Data Gateway Technical Description manual
- EDACS Data Gateway Installation and Maintenance Manual
- EDACS Data Gateway Configuration Reference Manual
- EDACS Data Gateway User's Reference Manual
- EDG Loader Diskette on one 3 1/2" floppy, part number - tbd
- EDG Application Diskettes on three 3 1/2" floppies, part number - tbd
- EDG Configuration Diskette on one 3 1/2" floppy, part number - tbd
- EDG Cabinet
- TSI Control Link Cable, part number - tbd
- AC line cord (US version)
- AC line cord (International version)

The following items are ordered and shipped separately:

- Data concentrator cable (e.g. 19D903628P12)
- Audio concentrator cable (e.g. 19D903880P12)

The following items are not provided as part of the EDG:

- IBM compatible printer and cable (optional)
- DB15 AUI Ethernet Transceiver and cable

## INSTALLATION STEPS

A few simple steps are required to install the EDG. The sections that follow describe some of the steps in more detail.

1) Set the board jumpers and install EPROMs.

2) Connect the terminal to the EDG.

3) Connect the printer to the EDG (optional).

4) Connect the Host computers to the EDG.

5) Connect the EDG control line(s) to the IMC.

6) Connect the EDG audio lines to the IMC.

7) Connect the EDG to an AC source.

8) Add the TSI Masters to the System Manager Database.

9) Customize the EDG Configuration.

10) Turn on the EDG.

11) Tighten the EDG's Password Security (optional).

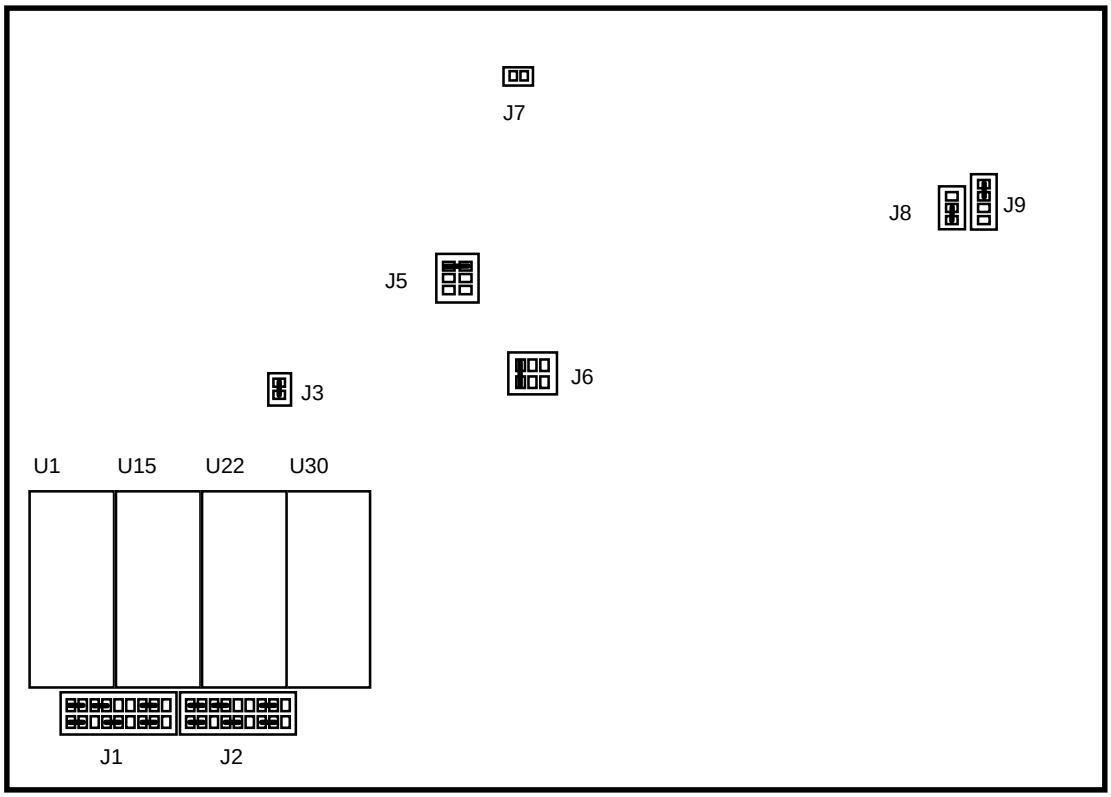
12) Modify the Hosts' configuration (IP Hosts only).

13) Modify the rest of the EDACS System.

## BOARD HARDWARE SETUP

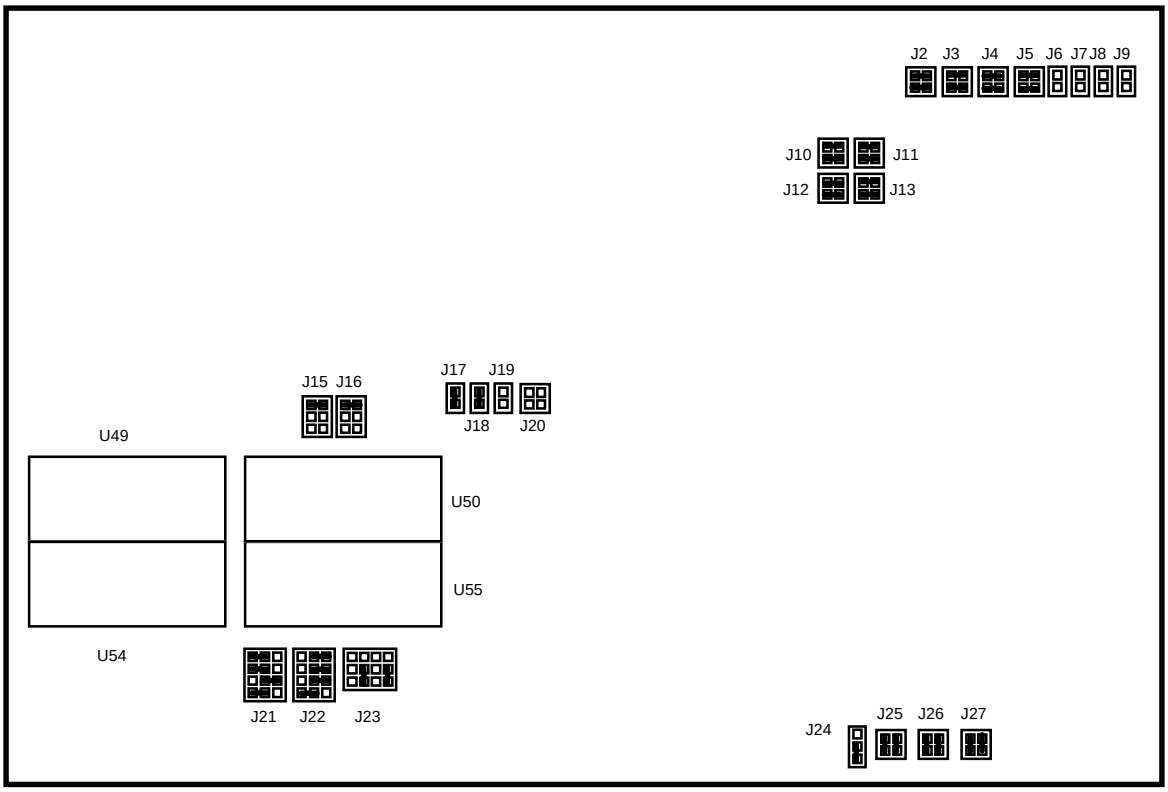
There are two types of boards installed in the EDG: MVME147S and VCOM24. There will be only one MVME147S board, located in the leftmost slot (slot 1). There will be one or more VCOM24 boards, beginning at slot 3. Each of these boards requires the installation of an EPROM set and the correct jumper settings for normal operation.

Shown below are the jumper settings for the MVME147S board. The two EPROMs for this board are to be installed in U22 and U30. U1 and U15 will not have any EPROMs installed.




**MVME147S Board Jumper Settings**

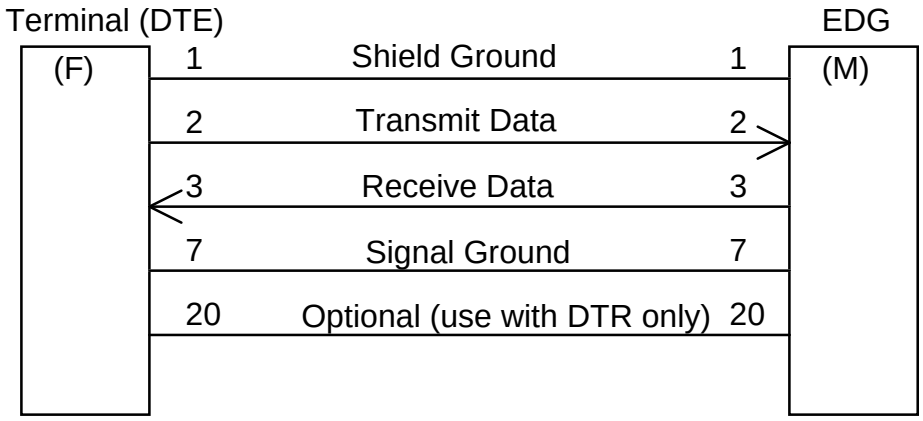
Shown below are the jumper settings for the VCOM24 board. The two EPROMs for this board are to be installed in U49 and U50. U54 and U55 will not have any EPROMs installed.




**VCOM24 Board Jumper Settings**

## CONNECTING THE TERMINAL

A VT100 compatible terminal with a power cord and a terminal cable is included with the EDG. Read the user's manual included with the terminal for information on how to connect the terminal to an AC source and turn it on. The following diagram shows the minimum number of pin connections required in the terminal cable. If DTR handshaking is to be used, pin 20 must also be connected.




**Terminal Cable**

To connect the terminal to the EDG with the terminal cable, use the following instructions.

1) Locate the ***Modem*** connector on the back of the terminal (refer to the terminal user's manual for location).

2) Using the female connector on the cable, connect the terminal cable to the ***Modem*** connector on the terminal.

3) Locate the ***SERIAL PORT 1/CONSOLE*** connector on the rear of the EDG electronics chassis.

4) Connect the male connector on the terminal cable to the EDG ***SERIAL PORT 1/CONSOLE*** connector.

5) Turn on the power to the terminal.

6) Verify that the terminal is in VT100 emulation mode via the setup screen. Change and save the setup if it isn't.

7) Set the tabs to a tab every eight columns via the setup screen.

## CONNECTING THE PRINTER (OPTIONAL)

**NOTE**

A printer and printer cable are NOT included with the EDG.

1) Connect the female end of the printer cable to your printer.

2) Locate the ***PRINTER*** port on the rear of the EDG electronics chassis.

3) Connect the male end of the cable to the EDG ***PRINTER*** port.

4) Turn on the printer.

## CONNECTING THE HOST COMPUTERS TO THE EDG

### IP HOST COMPUTER NETWORK CONNECTION

This is required only if your configuration includes IP hosts.

1) Connect your Ethernet Transceiver to the EDG using the DB15 AUI Ethernet port on the rear of the EDG electronics chassis.

2) Connect your Ethernet Cable to your Ethernet Transceiver.

### RDI HOST COMPUTER CONNECTION

This is required only if your configuration includes RDI hosts.

The EDG has sets of DB25 connectors located on a removable rear panel of the EDG electronics chassis. Each set consists of four of these connectors mounted together vertically, with one set per TSI or HDI board. The set associated with an HDI board is known as a host port set and is used for the serial interfaces to your host computer equipment. Each host port set is located directly behind the HDI board providing the interface. The top connector of a set is port 0 for the corresponding HDI board.

The table below shows the pins used on those connectors. The EDG serial interfaces are configured as a DCE talking to a DTE. Only four signals are used. The EDG ignores the rest.

| Pin Number | Signal Name | Direction |
|---|---|---|
| 2 | RxD | From the host |
| 3 | TxD | To the host |
| 4 | CTS* | To the host |
| 5 | RTS* | From the host |
| 7 | Signal Ground | N/A |

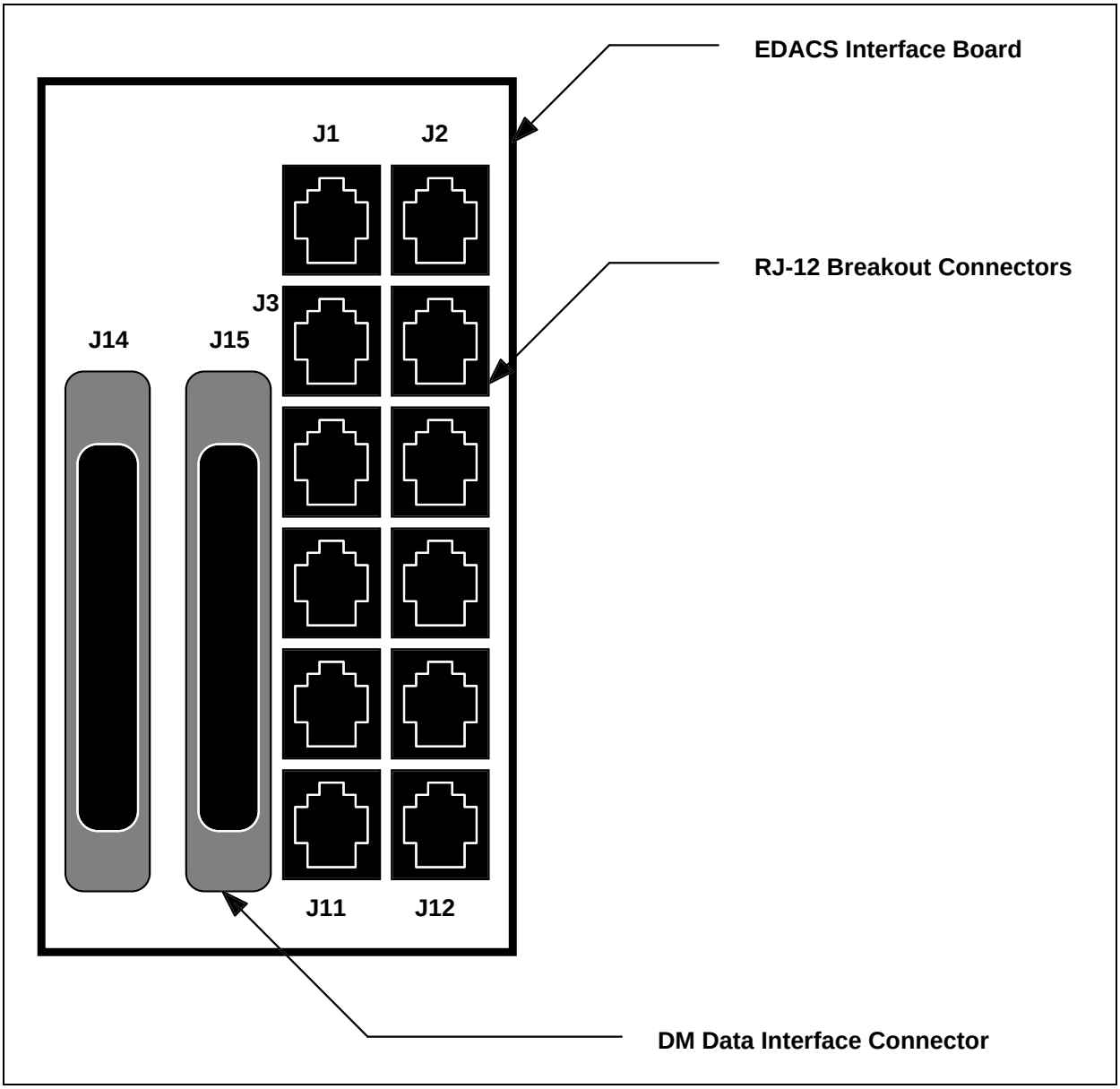
**RDI Host Computer Interface Connector**

**NOTE**

A TSI board has a connector set that is identical to that of an HDI. However, the TSI connector set will already have cables connected to it.

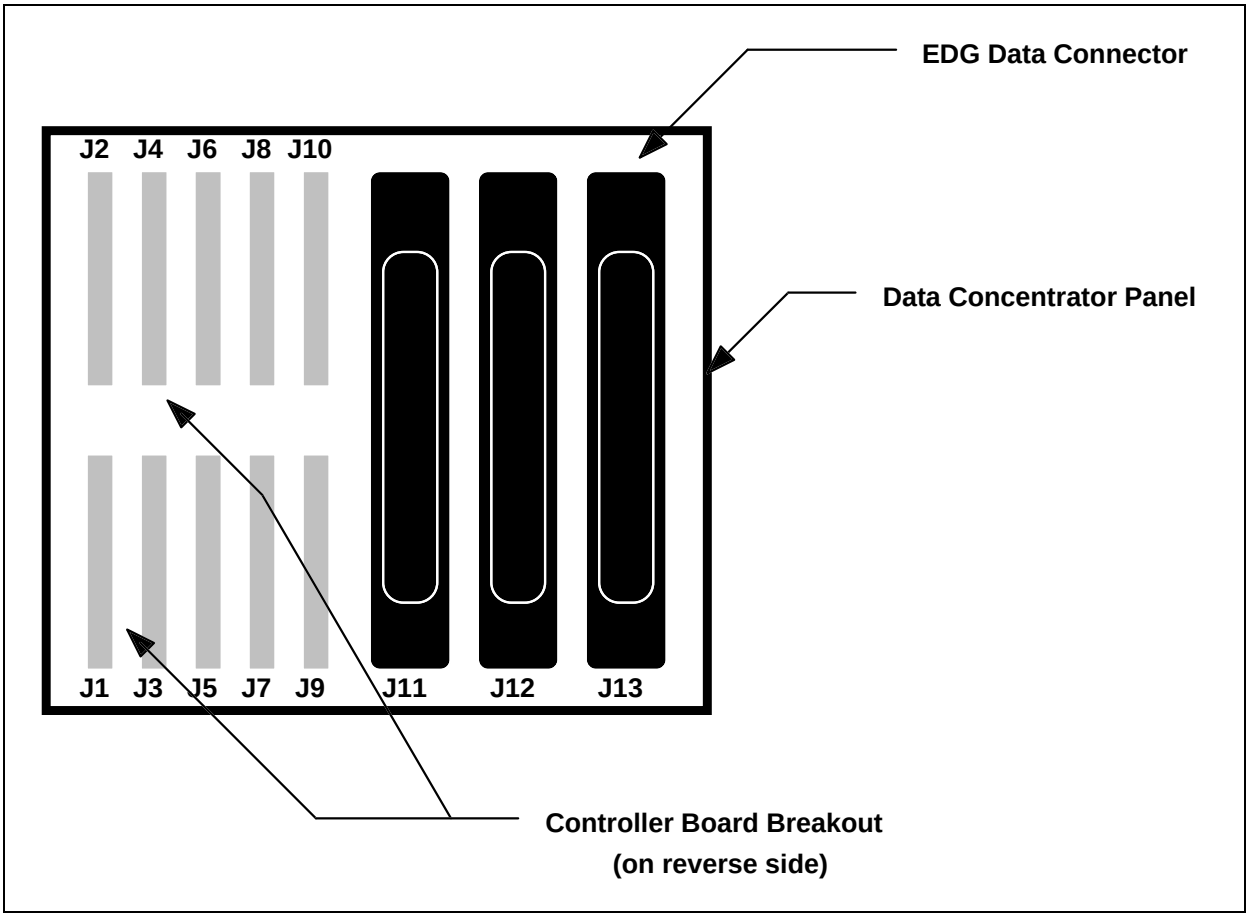
## CONNECTING THE EDG CONTROL LINE TO THE IMC/CEC

On the EDG, the TSI Control Link Cable takes the signals from the front panel connector on the TSI Master Board to one of the RJ-12 connectors on the EDACS Interface board. The EDACS Interface board combines the ten RJ-12 connectors (J11 and J12 aren't used) into Champ connector J15.




EDG EDACS Interface Board

On the IMC/CEC, the EDG control line is connected to a data concentrator panel using a Data Concentrator Cable plugged into J13. The control line is broken out and sent to the **D**ata **I**nterface **M**odule (**DIM**) Controller Board using one of the ten breakout connectors on the concentrator panel.




IMC Data Concentrator Panel

Use the following procedure to correctly install the EDG control line to the IMC/CEC.

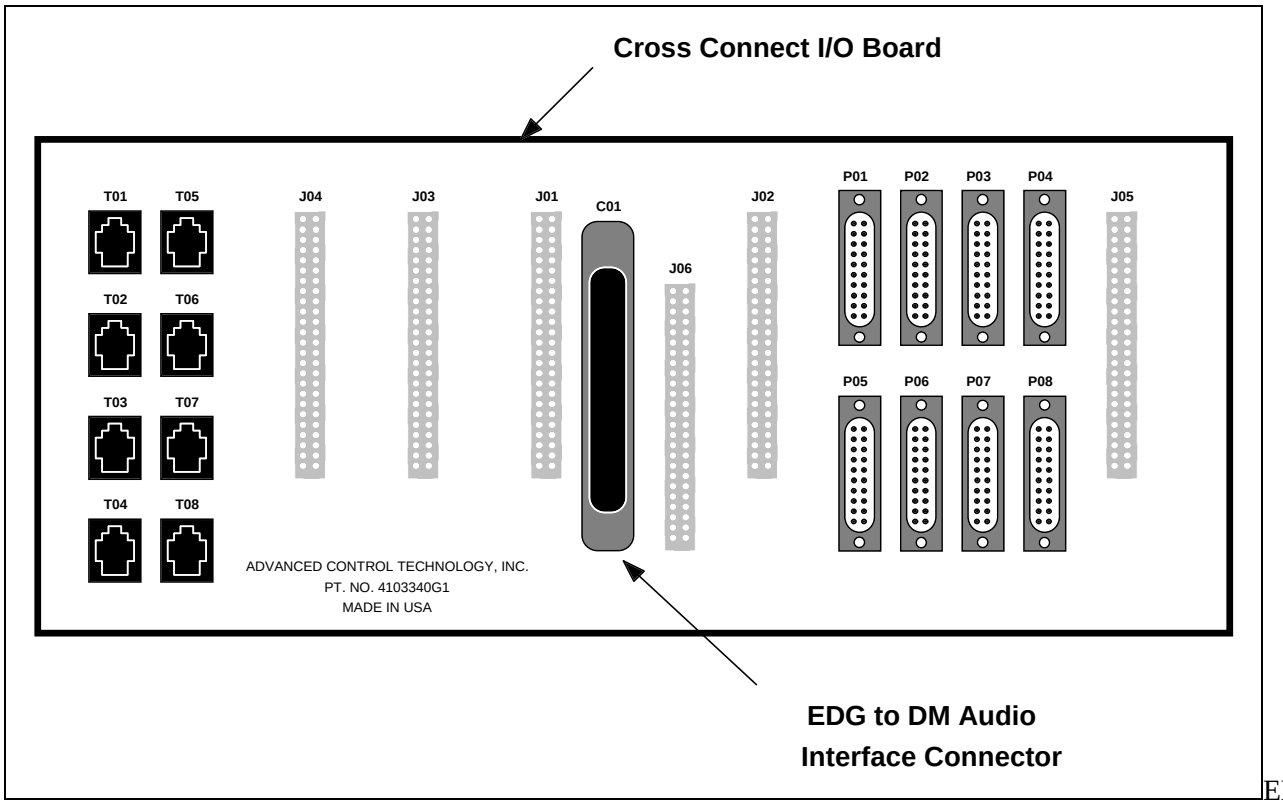
1) Locate the ***J15*** Champ connector on the EDACS Interface board found in rear of the EDG cabinet (see Figure 1). Plug one end of the Data Concentrator Cable into the connector.

2) Locate the ***J13*** Champ connector on the IMC data concentrator panel assigned to the EDG. Plug the other end of the Data Concentrator Cable into the connector.

3) Determine which of the IMC controller board breakout connectors is used between the DIM assigned to the EDG and the concentrator panel. Also determine which RJ-12 connector on EDACS Interface board is used by the EDG. If the connector numbers do not match, move the EDG's TSI Control Link Cable to the correct RJ-12 connector.

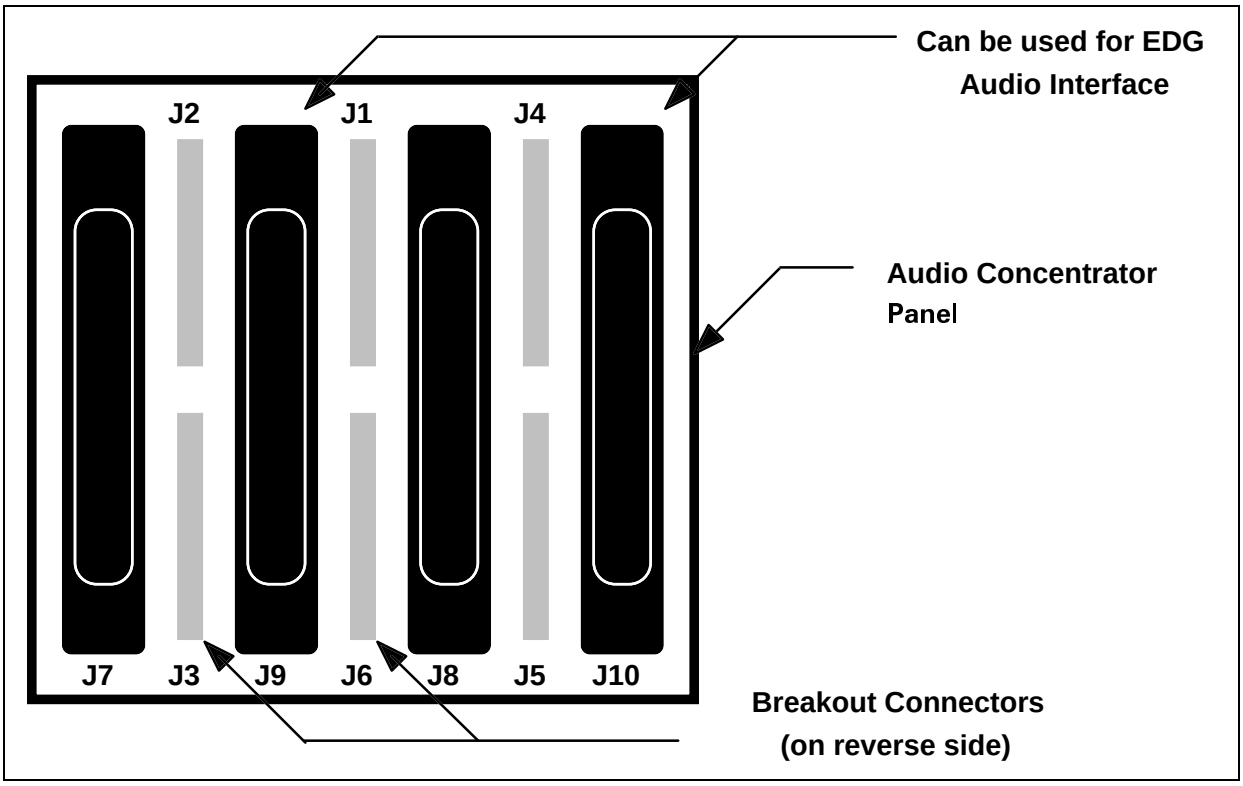
## CONNECTING THE EDG DATA LINES TO THE IMC/CEC

At the EDG, the modem audio lines are combined into a Champ connector (***C01***) on the **C**ross **C**onnect **I/O** **B**oard (**CCIOB**). The CCIOB, shown in below, mounts onto the rear of the modem rack.




EDG Cross Connect I/O Board

On the IMC/CEC, the EDG audio lines are connected to an audio concentrator panel using an audio concentrator cable. The concentrator panel has four Champ connectors of which only two (J9 & J10) can be used for the EDG audio lines.




IMC Audio Concentrator Panel

Each Breakout Connector supports up to 4 EDG ports. The table below shows the mapping between a Champ connector and its Breakout Connectors for the EDG audio interface. The first Breakout Connector that is used is plugged into the DIM Audio Board closest to the DIM Controller Board.

| | Breakout Connector | |
|---|---|---|
| Champ Connector Used | First Four EDG Ports | Additional Four EDG Ports |
| J9 | J2 | J3 |
| J10 | J4 | J5 |

Champ to Breakout Connector Mapping

Use the following procedure to connect the data lines between the EDG and the IMC.

1) Locate the Champ connector labeled ***C01*** on the rear of the EDG modem rack. Plug one end of the Audio Concentrator Cable into the connector.

2) Locate the Champ ***J9( or J10)*** connector on the IMC audio concentrator panel assigned to the EDG. Plug the other end of the Audio Concentrator Cable into the connector.

   A cable should run from each breakout connector used to a DIM Audio Board associated with the DIM Controller Board that was connected in the previous section.

## CONNECTING TO AN AC SOURCE

The EDG comes with two different AC line cords: one for use in the United States and the other for international use. One end of the international line cord does not have a plug on it so that you can add the connector needed for your country. Use the following instructions to connect the EDG to an AC source.

1) Open the back door of the EDG cabinet and locate the ***J1*** connector on the back of the power supply subassembly.

2) Insert the twist lock connector on the line cord into the ***J1*** connector and turn it clockwise to lock it in place.

3) Plug the other end of the line cord into the wall outlet.

## UPDATING THE SYSTEM MANAGER DATABASE

For each TSI Master, enter a LID in the System Manager Database in the range from 64 to 16,382. Since the System Manager doesn't currently support an EDG TSI as a valid type, add them as radio types but assign labels such as "EDG TSI 1" for reference.

## CUSTOMIZING THE EDG CONFIGURATION

1) Copy the files on the Configuration diskette to a working diskette using a MS-DOS PC.

2) Edit the SYSTEM.TXT configuration file to customize it. The TSI EDACS IDs entered into the System Manager must be entered in this file using the TSI_EDACS_ID command. The other items changed in most installations are:
   - IP Addresses ([IP] CAP_EXT_ADDRESS, [IP] INT_NETWORK_ID, and [IMC] EDACS_IP_NETWORK_ID commands)
   - Host entries in the [IP_MAP_ID_TABLE] section, if using IP hosts
   - HDI host entries ([BOARD] HDI_PORT_HOSTS command), if using RDI hosts
   - Transport Layer Protocol ([SYSTEM] TRANSPORT_LAYER_PROTOCOL command), if any non-network layer RDTs are being used.
   - Identification of GIDs and LIDs assigned to network layer RDTs, if used ([NETWORK_LAYER_RDT_TABLE] heading)

   In addition, security can be increased by setting the maximum number of Telnet and FTP sessions to 0. This disables Telnet and FTP sessions into the EDG.

3) Verify your configuration when done by entering "syscheck" at the DOS prompt, while on the working diskette.

4) Insert your configuration working diskette in the EDG floppy drive prior to turning on or rebooting the EDG.

Refer to the EDG Configuration Reference Manual for more information.

## TURNING ON THE EDG

To turn the EDG on, turn the key on the power supply to the UNLOCK position and flip the circuit breaker to the ON position. The following sequence occurs when the EDG is booted (via power cycle, reset key, or reboot command):

## EDG BOOT SEQUENCE

| Step | CAP Board | VCOM24 Board(s) |
|---|---|---|
| 1. | Board Initializes Itself.<br>The FAIL, STATUS, and SCON LEDs are lit for 1 second.<br>FAIL is turned off, STATUS flickers, and RUN is lit for around 10 seconds.<br>RUN flickers.<br>If the hard disk has never been formatted, or has been replaced, a prompt will appear asking if a high level format should be performed. If the response is 'Y', a high level format will begin. | Board Initializes Itself.<br>SYSFAIL and all of eight small LEDs flash on for 1 second.<br>The RUN LED is lit and all others are turned off for around 10 seconds.<br>The sixth LED is lit to indicate that the VCOM24 Board has posted an interrupt to the CAP Board. |
| 2. | If present, LOADER.SX is copied from the floppy to the hard drive.<br>The LOADER.SX from the hard drive is loaded into RAM and executed.<br>If present, CAP.SX, TSI.SX, HDI.SX, and SYSTEM.TXT are copied from the floppy to the hard drive. | |
| 3. | Board extends multiprocessor OS across all boards. | Board joins the multiprocessor OS.<br>The small LEDs walk from 0 to 7 and back to indicate that the board will accept a download. |
| 4. | The Loader parses the SYSTEM.TXT file for the application pathnames. It then copies the applications to the CAP Board and VCOM24 Boards. | Board accepts download.<br>When the download completes, the board number (2 through 10) is displayed on the small LEDs. If the board isn't configured, they sequence indefinitely. |

| | | |
|---|---|---|
| 5. | A banner is displayed on the Diagnostic Terminal.<br>SYSTEM.TXT is parsed a second time.<br>/cnfg/system.rpt is built with the results.<br>Phase 1 verifies each command and its parameters.<br>Phase 2 verifies that the commands are valid for the board type and that all required commands are present.<br>Phase 3 supplies default values as necessary.<br>Phase 4 does a complete check of the configuration.<br>Phase 5 builds the internal routing tables. | Board waits for parser to complete.<br>On configured boards, all small LEDs are lit. |
| 6. | Application is started on board.<br>Board reports when it is ready. | Application is started on board.<br>If no errors, the board number is redisplayed, otherwise an error code is displayed.<br>Board reports when it is ready. If it is a TSI Master, the DIM Link must be established.<br>If the board is a TSI Master, LED 7 cycles on & off every 7 seconds if DIM Link established. |
| 7. | If all boards have reported that they are ready, all boards are told to start accepting data calls.<br>If after 30 seconds, all boards haven't reported that they are ready, an error is displayed on the Diagnostic Terminal and written into the Activity Log. | Boards starts accepting data calls when told to.<br>If board is a TSI Master and DIM Link is down or goes down, board continually attempts to reestablish link. |

### VCOM24 Boot Error Codes

If an error is detected while starting the application on the VCOM24, one of the following LED patterns will be displayed on the eight small LEDs.

| LEDs | Error | Severity |
|---|---|---|
| 7 and 0 | OS Clock could not be started. | Fatal |
| 7 and 1 | Memory Manager could not be initialized. | Fatal |
| 7 and 3 | Object could not be created. | Fatal |
| 6 and 1 | User Interface Gateway could not be started. | Non-fatal |
| 6 and 3 | Task could not be started. | Fatal |

Fatal errors will prevent the proper operation of the EDG, and is usually indicative of a board hardware failure. Non-fatal errors will still allow the core EDG features, such as call processing, to operate correctly. However, reduced functionality may result. For example, if the User Interface Gateway cannot be started on a VCOM24 board, the User Interface 'network' command will not be able to obtain statistics from that board.

## TIGHTENING THE EDG'S PASSWORD SECURITY (OPTIONAL)

Tighten EDG password security if desired. The EDG comes with three user id's installed; "root", "user", and "guest". The passwords for these user id's are the same as the user id. All of the user ids and passwords are in lower case. The passwords can be changed using the "passwd" command. See the EDG User's Reference Manual for more information.

## MODIFYING THE HOSTS' CONFIGURATION (IP HOSTS ONLY)

For most computers, a routing entry must be added to instruct the host computer to use the EDG as the next gateway for the IP Network ID assigned to the EDACS Network. Symbolic names can also be defined as desired for the EDG CAP External Address, radios, and groups. These changes will normally be made by the System Administrator of the host computer(s). The following example commands will work on most Unix (trademark of Unix System Laboratories, Inc.) systems. Refer to the host computer's documentation for the actual commands to use.

Assuming that the CAP External Address had been assigned to 1.0.15.14, the following statement could be added to the /etc/host file to assign a symbolic name to the EDG Ethernet Network Interface.

```
1.0.15.14  edg_gateway
```

Assuming that the IMC IP Network ID had been assigned to 128.1.0.0, the following statement could be added to the /etc/rc.local file to route all messages destined to radios or groups through the EDG.

```
route  add  net  128.1.0.0  edg_gateway  5
```

## MODIFYING THE REST OF THE EDACS SYSTEM

Section 4 of the *Landline Data Release Notes* (SRN1036-1) contains the complete installation procedure for Landline Data using the RDI Only version of the EDG. Execute Section 4 with the following exceptions:

Section 4.1 Installation Order:
Steps 4 (Install the EDG) and 5 (Connect the host computers) have already been performed.

Section 4.5 Install the EDG:
Skip (already performed).

Section 4.6 Connect Host Computers:
Skip (already performed).

Section 4.14 Feature Performance Verification:
Replace the Host computer interfaces paragraph with the following:

> This feature is operating correctly if the EDG can receive and send data to data application host computers using IP/Ethernet.

Skip the Host Rotary verification.

# MAINTENANCE

## PASSWORD MAINTENANCE

Passwords can be changed by logging in and using the *passwd* command.

They can be added when logged in as root by entering the *passwd* command with the new User-id as the first parameter.

They can be deleted by coping the /etc/passwd file to diskette, removing the line containing the user-id, coping the file back to the EDG and rebooting the EDG.

## ACTIVITY LOG MAINTENANCE

The logs in the /activity directory should be periodically deleted to prevent the disk from filling up. The amount of data written to them can be reduced by disabling informational messages using the log command. In general, warning messages should always be logged to a file.

## LOADING NEW SOFTWARE RELEASES

1) Insert the Loader diskette into the floppy drive.

2) Enter "reboot -h" from the Diagnostic Terminal, press the reset button on the CAP Board, or turn on the EDG.

3) Each time the EDG prompts for a diskette, insert an Application diskette or Configuration Working diskette. When all disks have been loaded, press return with no diskette inserted.

**NOTE**

Do NOT press the reset button on the MVME147S board while the hard disk is active. Doing so may lock up the drive, requiring power to be cycled on the EDG.

# ICMP MESSAGES RETURNED BY EDG

This section is relevant only to those configurations containing IP hosts.

| ICMP TYPE | ICMP Code | Reason |
|---|---|---|
| Echo Reply | N/A | Echo Request received |
| Destination Unreachable | Network Unreachable | 1. EDG has failed to sync with the IMC on Startup.<br>2. EDG is in Shutdown mode.<br>3. Incorrect routing table entries in Host and/or EDG. |
| Destination Unreachable | Host Unreachable | 1. Radio not on, not logged in, or out of range.<br>2. Excessive number of transmission errors.<br>3. Address conversion error in EDG.<br>4. LID/GID not valid at site.<br>5. EDG has lost sync with the IMC during operation.<br>6. One or more EDACS components down, configured incorrectly, or contain the wrong software.<br>7. Other less common errors in EDG, IMC, Site, Radio, RDI, or RDT. |
| Destination Unreachable | Protocol Unreachable | Attempt to send an ICMP message other than an Echo Request to an RDT. |
| Destination Unreachable | Fragmentation Needed and DF set | Message exceeds 512 bytes. |
| Source Quench | N/A | 1. Maximum Number of messages exceeded on a TSI Master.<br>2. All channels on a Site are busy (4 attempts/msg).<br>3. An EDG board is out of memory.<br>4. Message rate too high for CAP. |
| Time Exceeded for a Datagram | Fragment reassembly time exceeded | Maximum message timeout exceeded for a message. |
| Timestamp Reply | N/A | Timestamp Request received. |
| Information Reply | N/A | Information Request received. |
| Address Mask Reply | N/A | Address Mask Request received. |

# TROUBLE-SHOOTING GUIDE

When trying to correct problems, the activity log, /cnfg/system.rpt, ICMP messages, and Site Reports can be useful in locating problems. If the problem can't be resolved, contact your EGE Service Representative.

| Problem | Corrective Actions |
|---|---|
| EDG Fails to power up | 1. Verify that circuit breaker is in **ON** position.<br>2. Verify that key is in **UNLOCKED** position.<br>3. Verify that power supply is plugged into a live source. |
| FAIL, SYSFAIL, or HALT LED(s) are on. | Contact EGE Service Representative. |
| EDG Fails to successfully boot | 1. Check /cnfg/system.rpt for problem parsing SYSTEM.TXT.<br>2. Check Diagnostic Terminal for problem with LOADER.SX. Reload from floppy if necessary.<br>3. Check Diagnostic Terminal for problem accessing hard drive. Power cycle EDG if access light stays on (reset may have been pressed while the disk was active).<br>4. Check Diagnostic Terminal for other problems and attempt to correct. |
| DIM Link could not be initialized. | 1. Check physical connections.<br>2. Verify that EDG configuration in SYSTEM.TXT matches physical connections.<br>3. Verify that the IMC or CEC is operational.<br>4. Disconnect DIM link for 10 seconds and reconnect.<br>5. Reset IMC or CEC.<br>6. Reboot EDG. |
| EDG Fails System Startup | 1. Verify that EDG booted successfully (see above).<br>2. Verify that DIM Link was initialized (see above). |
| Diagnostic Terminal Fails to respond. | 1. See if terminal is in block mode. If it is, press the block mode key again.<br>2. Check Terminal power and cable to EDG.<br>3. Check Terminal fuse (if present).<br>4. Verify that EDG is operational.<br>5. Restore factory setup, change emulation to vt100, and set tabs to every 8 columns. |
| Diagnostic Terminal display doesn't line up correctly. | 1. Set tabs to every 8 columns.<br>2. Restore factory setup, change emulation to vt100, and set tabs to every 8 columns. |
| Printer doesn't work. | 1. Verify that printer is on-line and has paper.<br>2. Check power and cable to EDG.<br>3. Check for other alarms on printer and correct.<br>4. Verify that the EDG is operational. |

| Problem | Corrective Actions |
|---|---|
| Telnet or FTP are not accepted | 1. Verify that host has the correct IP Address of the EDG CAP External Address.<br>2. Verify that the Host and EDG can reach each other by using "ping" or equivalent.<br>3. Verify both the EDG's and host's network connections.<br>4. Verify that both the EDG and host are operational.<br>5. Verify that the Max Telnet or FTP sessions is greater than 0 on the EDG. |
| Login not accepted. | 1. Verify spelling and case of login name and password.<br>2. Verify that login name is still valid in /etc/passwd. |
| Radio fails to receive an Individual Data Call | 1. Verify that radio is on, in range, and logged into the site.<br>2. Verify that radio is programmed correctly.<br>3. Check mic. Some radios display 'nd' or 'no data' when mic is connected or when it is off the hook, preventing data calls.<br>4. Verify that the LID is registered in the System Manager.<br>5. Verify that the EDG successfully started up.<br>6. Verify that the DIM Link hasn't failed.<br>7. Check for other errors in EDG activity log or site reports and correct problem. |
| Radio fails to receive a Group Data Call | 1. Verify that the data group has been programmed into the radio (using the RDI interface).<br>2. Verify that the group is either forced at the site or that at least one radio has logged in with the same voice group.<br>3. Check mic. Some radios display 'nd' or 'no data' when mic is connected or when it is off the hook, preventing data calls.<br>4. Verify that the radio supports Group Data Calls.<br>5. See Individual Call Problems. |
| Radio receives data call, but message doesn't reach RDT. | 1. Check the cabling on the radio, RDI and RDT.<br>2. Verify that RDT is on and executing the correct application software.<br>3. Cycle power on the radio and RDT.<br>4. EDACS Network Driver is installed on RDT, but radio LID or GID is not defined as a network layer RDT in SYSTEM.TXT.<br>2. TSI_ANTI_BIASING command in SYSTEM.TXT is set to TRUE, but RDI is not set up to use BREN. |
| Excessive Error Rate | 1. Verify that the radio is in range and isn't being interfered with.<br>2. Verify that the SYSTEM.TXT Msg_Timeout value is long enough.<br>3. Verify that the SYSTEM.TXT Max_Msgs value is set high enough.<br>4. Verify that the SYSTEM.TXT Outbound_Msg_Delay value is large enough.<br>5. Verify that the TSI Board isn't running out of memory. |

| Problem | Corrective Actions |
|---|---|
| Time interval between consecutive calls is excessive. | 1. Verify that the radio is in range and isn't being interfered with.<br>2. Verify that the SYSTEM.TXT Outbound_Msg_Delay value isn't too large. |
| TSI Boards run out of memory. | 1. Reduce the SYSTEM.TXT Max_Msgs or the Msg_Timeout values. |
| Radio originated message doesn't reach the host | 1. Radio LID is defined as a network layer RDT in SYSTEM.TXT, but EDACS Network Driver is not installed at RDT.<br>2. EDACS Network Driver is installed at RDT, but radio LID is not defined as a network layer RDT in SYSTEM.TXT.<br>3. RDI set up to use BREN, but TSI_ANTI_BIASING command in SYSTEM.TXT is not set to TRUE. |
| Extra data bytes prepended to data received at RDT. | 1. Radio LID or GID is defined as a network layer RDT in SYSTEM.TXT, but EDACS Network Driver is not installed at RDT. |
| Data received at RDT or host is garbled. | 1. RDI set up to use BREN, but TSI_ANTI_BIASING command in SYSTEM.TXT is not set to TRUE.<br>2. TSI_ANTI_BIASING command in SYSTEM.TXT is set to TRUE, but RDI is not set up to use BREN. |

ERICSSON

**Ericsson-GE Mobile Communications Inc.**
Mountain View Road • Lynchburg, Virginia 24502

Printed in U.S.A.