

**INTERNETWORK ROUTING  
SERVICE**

**XEROX**

*Network Administration Library*

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**Purpose** The Internetwork Routing Service (IRS) booklet describes all that you need to know to set up and maintain your Internetwork Routing Service. This booklet explains all the service commands and shows how these commands are used to perform service-related tasks. In addition, this booklet lists all the messages that can be generated while running this service and tells you what to do when a message is displayed.

**Intended audience** This publication is intended for System Administrators who are responsible for starting up and keeping the Internetwork Routing Service running efficiently.

**Before you read this booklet** There is some general information about services that you will need to be familiar with before you can understand this booklet. Read the "Services Executive" section of the *Server Operation and Maintenance* booklet, and the *Introduction to Network Administration* booklet. All of these publications can be found in the *Network Basic Services* volume.

**Before you can use this service** The Internetwork Routing Service needs to be installed before the procedures in the booklet work. You may need to do the procedures described in the *Server Software Installation* booklet. This booklet is also part of the *Network Basic Services* volume.

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An Internetwork Routing Service (IRS) connects one local network to other networks over telephone lines. An IRS links geographically separated Ethernet networks into a single internetwork.

The Internetwork Routing Service gives workstation users on the internetwork the capability to access all network services on the internetwork. This means valuable resources can be shared by many users.

The IRS supports Ethernet networks and cluster networks. Cluster networks (or clusternets) allow remote system elements to access the internetwork and each other via voice-grade dialed phone lines.

A group of RS-232C communication ports is designated as a clusternet and given a network number. An Internetwork Routing Service with the clusternet feature gives the clusternet elements access to the rest of the internetwork.

The Internetwork Routing Service has four types of circuits:

- auto-dialed
- dedicated
- manually-dialed
- X.25 Switched Virtual Circuit (SVC)

The first three types have a one-to-one correspondence between circuits and ports. There can be up to 8 X.25 SVC on an X.25 port.

Use this table for an overview of Internetwork Routing Service circuits:

Circuit Types	Duplexity		Location Options		Clusternet Feature	Autostart Option
	Full	Half	Ports	873 CIU		
Auto-dialed	Yes	Yes*	Yes	No	No	No
Dedicated	Yes	Yes*	Yes	Yes	Yes	Yes
Manually-dialed	Yes	Yes*	Yes	Yes	Yes	Yes
X.25 SVC	Yes	No	Yes	No	No	Yes

The term 873 CIU refers to the Xerox 873 Communication Interface Unit.

\*Note that a CIU port doesn't permit half duplex.

### **Some useful forms**

---

When you plan to add a circuit, fill out the appropriate registration form from Appendix A. There is one for each circuit type. Use the information you enter on the form to respond to the terminal prompts for adding the circuit.



This chapter lists the Internetwork Routing Service commands. The commands below are listed in alphabetical order, followed by a brief explanation. To address the Internetwork Routing Service commands, you must be in the IRS context.

- |                            |  |
|----------------------------|--|
| <b>Add Circuit</b>         | Available to the enabled user when the IRS is started. The External Communication Service must be stopped when adding circuits on a the CIU. Defines a new circuit to the IRS.   |
| <b>Add X.25 Network</b>    | Available to the enabled user when the IRS is started. Defines the HDLC (data link) parameters of an X.25 line.  |
| <b>Change Circuit</b>      | Available to the enabled user when a circuit is stopped. The External Communication Service must be stopped when changing circuits on the CIU. Changes existing lines of the Internetwork Routing Service.                                     |
| <b>Change X.25 Network</b> | Available to the enabled user when the IRS is started and all X.25 circuits are deleted. Changes the existing HDLC (linkage) parameters of an X.25 line.   |
| <b>Delete Circuit</b>      | Available to the enabled user when the circuit to be deleted is stopped. Removes existing IRS circuits.  |
| <b>Delete X.25 Network</b> | Available to the enabled user when no X.25 circuits are defined. Removes an X.25 network connection. IRS must be started, an X.25 network must have been defined, and all X.25 SVC circuits must be deleted in order for this command to work. |
| <b>List Circuits</b>       | Available to any user when the IRS is started. Displays a complete description and the status of IRS circuits.   |
| <b>List Routes</b>         | Available to any user when the IRS is started. Displays a list of networks interconnected to your network through the IRS.   |
| <b>List X.25 Network</b>   | Available to any user when the IRS is started. Displays the current HDLC parameters of an X.25 line.   |
| <b>Rename</b>              | Available to the enabled user when the IRS is started using a non-normal startup. Changes the name of the Internetwork Routing Service. This command displays only when the IRS is started using a non-normal startup.                         |

**Show Statistics** Available to any user when the IRS is started. Shows port/circuit activity on internetwork links.

**Start** Available to the enabled user when the IRS is stopped. Starts the Internetwork Routing Service.

**Note:** The Services System Software **Start Services** command also starts the IRS. The command is available to the enabled user in the IRS context.

**Start Circuit** Available to the enabled user when a circuit is stopped. Allows the IRS to acquire the port and start the the circuit.

**Stop** Available to the enabled user while the IRS is started. Stops the service.

**Note:** The Services System Software **Stop Service** command also stops the IRS. The command is available to the enabled System Administrator in the IRS context.

**Stop Circuit** Available to the enabled user while a circuit is started. Stops a circuit.

## Setting up your

# 3. Internetwork Routing Service

To set up the Internetwork Routing Service, perform the procedures described in this chapter and in the *External Communication Service* booklet.

This chapter contains these procedures:

- Initializing the Internetwork Routing Service
- Adding X.25 through the Internetwork Routing Service. (Complete Form IRS1, Registering an X.25 Network, before configuring an X.25 network.)
- Configuring circuits for the Internetwork Routing Service. (Complete Form IRS2 "Registering an IRS Auto-Dialed Circuit," Form IRS3 "Registering an IRS Dedicated Circuit," or Form IRS4 "Registering an IRS Manually-Dialed Circuit.")

You should also perform these procedures from the *External Communication Service* booklet:

- Initializing the External Communication Service
- Adding a Communication Interface Unit (if necessary)

The External Communication Service maintains and sends configuration information to Xerox 873 Communication Interface Units (CIU's).

Once a CIU has been registered at the External Communication Service, the ECS makes the CIU ports available to the Internetwork Routing Service, provided they have not been assigned to an emulation option or to an incoming asynchronous line.

For example, if your server is to support an Internetwork Routing Service and your organization wants to use a CIU for one or more of the IRS circuits, you will be installing the External Communication Service, registering a CIU, and then configuring the CIU ports by interacting with the IRS.

The IRS that uses CIU ports assigned to a particular External Communication Service must reside on the same server as that ECS.

**Note:** Make sure the Services boot file process limits have not been exceeded when configuring ports and services involving the ECS, IRS, and ITS. Refer to the ECS booklet for more information.

## Initializing the Internetwork Routing Service

If your circuits will be configured on a Xerox 873 Communication Interface Unit (CIU), be sure the External Communication Service is installed and running.

When the Internetwork Routing Service is run for the first time, you will see the following messages:

```
Running Internetwork Routing Service.
IRS: Service name and description unknown.
Enter service name:
```

If your Clearinghouse Service is on a network that is not currently accessible, the IRS displays this message.

```
IRS: Warning - Can't find Clearinghouse. Proceeding.
```

After the Clearinghouse Service becomes available, the Internetwork Routing Service's Clearinghouse database entry can be checked using the SCS Register command.

Here's how to initialize the Internetwork Routing Service. You may find it handy to use Form CHS1, Directory of Services on a Specific Server, to help respond to the questions. This form is in your Clearinghouse Service booklet.

### Procedure

1. Type the name for the Internetwork Routing Service from the form and press <RETURN>. If there is no Clearinghouse Service, use the fully-qualified name.
2. Type the Internetwork Routing Service description and press <RETURN>.
3. Type Y and press <RETURN> to confirm your input. (At this point, the IRS attempts to register the service in the appropriate Clearinghouse domain.)

```
Enter service name: OurIRSRETURN
Enter service description: IRS link to San Francisco officeRETURN
Confirm (Y/N): YRETURN
IRS: Validating Clearinghouse entry for OurIRS:OurDomain:OurOrg
IRS: A new Clearinghouse entry was created.
IRS: Done
IRS: No X.25 network has been defined.
IRS: No circuits have been defined.
IRS: Internetwork Routing Service is started.
Internetwork Routing Service run.
```

---

## Adding X.25 through the Internetwork Routing Service

---

X.25 is used to connect Internetwork Routing Services through a public data network.

The Internetwork Routing Service is configured to use X.25 switched virtual circuits in two steps. First, the X.25 network is defined, and then one or more circuits that will use the X.25 network are defined.

You must already have set the software options for X.25 and Internetwork Routing Service. The X.25 commands are available to System Administrators during Genesis installs (first-time server installation on a new network), and when the Internetwork Routing Service is started.

To help answer the prompts, complete Form IRS1, Registering an X.25 Network.

---

### Procedure

---

1. Log on and enable in the Internetwork Routing Service context.

```
>LogonRETURN
  User's Name: MWBRETURN
  Password: ****RETURN
>EnableRETURN
!Internetwork Routing ServiceRETURN
```

2. Type **Add X.25 Network** and press <RETURN>.
3. Respond to the prompts, pressing <RETURN> after each answer, according to the information you entered on Form IRS1.

```
IRSI>Add X25 NetworkRETURN
Enter local port number (0-63) 0RETURN
Should this line be autostarted? (Y/N): NRETURN
Select line speed
1 1200 bps
2 2400 bps
3 3600 bps
4 4800 bps
5 7200 bps
6 9600 bps
Enter choice number: 6RETURN
Local address: 4150005RETURN
Retransmission timeout (3..20): 6RETURN
Maximum number of retransmissions (1..100): 30RETURN
Maximum number of outstanding frames (1..7): 7RETURN
Network types
1 Tymnet, Uninet
2 Tefenet
3 DDX
4 International DDX
Enter Choice Number: 2RETURN
Protocol ID: FFFFFFFFRETURN
Switch virtual circuit range
start (1-4095): 2RETURN
stop (2-4095): 4RETURN
X25 network description: My X.25 networkRETURN
Confirm X25 network information (Y/N): YRETURN
Done.
```

**Note:** Port number is requested only if the MultiPort Options Kit is installed.

**Note:** When configuring a circuit for X.25, select the Tymnet option if you wish to be compatible with Ethernet, British Telecom, or Uninet.

## Configuring circuits for the Internetwork Routing Service

The circuit commands are available to System Administrators and during Genesis conditions. The circuit commands are available only when the Internetwork Routing Service is started. If a circuit uses a Xerox 873 Communication Interface Unit, the External Communication Service must be present on the same server. The ECS must be stopped when any Internetwork Routing Service circuit commands are being used, except for the **Stop Circuit** command.

Complete Forms IRS1, IRS2, IRS3, or IRS4 for the type of Internetwork Routing Service circuits you will add. If a circuit is part of a clusternet, get a network number for the clusternet from the Software Business Center.

### Procedure

1. Log on and enable yourself in the Internetwork Routing Service context.

```
> LogonRETURN
  User's Name: MWBRETURN
  Password: ****RETURN
> EnableRETURN
(Internetwork Routing Service)RETURN
IRS!
```

2. Type **Add Circuit** and press <RETURN>.
3. Type the number corresponding to the type of circuit you want to add and press <RETURN>.

```
IRS!Add CircuitRETURN
  Circuit types
  1 X.25 SVC
  2 Auto-dialed
  3 Manually dialed
  4 Dedicated
  Enter choice number:
```

4. The following pages have examples for adding different types of circuits. Respond to the prompts, according to the information you put on your form.

The above prompt is included in each example so that you can get a better feeling for the complete procedure.

**Note:** Auto-dialed, manually-dialed, and dedicated circuits require port, line speed, and duplexity information.  
**Note:** Auto-dialed and X.25 circuits must use a local port. Manually-dialed and dedicated circuits may use local or CIU ports.

**Note:** For each remote IRS that will be connected to this IRS through the X.25 network, be sure you have already performed the previous procedure, "Adding X.25 through the Internetwork Routing Service". Otherwise, you will see the message "No X.25 network has been defined."

### Circuit type 1. X.25 SVC

Follow this example if you are configuring an X.25 switched virtual circuit. Use Form IRS1, Registering an IRS X.25 Network.

```
IRS!Add CircuitRETURN
Circuit types
1 X.25 SVC
2 Auto-dialed
3 Manually dialed
4 Dedicated
Enter choice number: 1RETURN
```

```
X25 network address of remote host: 004152344455RETURN
Autostart? (Y/N): NRETURN
Circuit description: Link to San DiegoRETURN
Confirm circuit information (Y/N): YRETURN
Done.
```

Circuits that have "autostart" enabled will be started automatically by the IRS each time the IRS is started. Auto-dial circuits and circuits not autostarted must be started manually, using the **Start Circuit** command.



## Circuit type 2. Auto-dialed

Follow this example if you are configuring an auto-dialed circuit. Use Form IRS2, Registering an IRS Auto-Dialed Circuit.

```

IRS>Add CircuitRETURN
Circuit types
1 X.25 SVC
2 Auto-dialed
3 Manually dialed
4 Dedicated
Enter choice number: 2RETURN
  
```

```

Select line speed
1 1200 bps
2 2400 bps
3 3600 bps
4 4800 bps
5 7200 bps
6 9600 bps
7 19200 bps
8 28800 bps
9 38400 bps
10 48000 bps
11 56000 bps
Enter choice number: 3RETURN
The equipment connected to this port is
1 full duplex
2 half duplex
Enter choice number: 1RETURN
Description: Outside lineRETURN
Want to add a number to the current phone list? (Y/N): YRETURN
Phone number: 213-454-2323RETURN
Phone number description: Bldg 2017RETURN
Want to add another number to the current phone list? (Y/N): NRETURN
Confirm circuit information (Y/N): YRETURN
Done.
  
```

## Circuit type 3. Manually-dialed

Follow this example if you are configuring a manually-dialed circuit. Use Form IRS4, Registering an IRS Manually-Dialed Circuit.

```
IRS!Add CircuitRETURN
Circuit types
1 X.25 SVC
2 Auto-dialed
3 Manually dialed
4 Dedicated
Enter choice number: 3RETURN
```

```
Should this line be autostarted? (Y/N): NRETURN
Select line speed
1 1200 bps
2 2400 bps
3 3600 bps
4 4800 bps
5 7200 bps
6 9600 bps
7 19200 bps
8 28800 bps
9 38400 bps
10 48000 bps
11 56000 bps
Enter choice number: 2RETURN
The equipment connected to this port is
1 full duplex
2 half duplex
Enter choice number: 1RETURN
Description: TestingRETURN
Is this circuit part of a clusternet? (Y/N): YRETURN
Clusternet number: 1-045RETURN
Circuit added to clusternet number 1-045.
Confirm circuit information (Y/N): YRETURN
Done.
```

## Circuit type 4. Dedicated

Follow this example if you are configuring a dedicated circuit (on an 8000 processor port). Use Form IRS3, Registering an IRS Dedicated Circuit.

```

IRS!Add CircuitRETURN
Circuit types
1 X.25 SVC
2 Auto-dialed
3 Manually dialed
4 Dedicated
Enter choice number: 4RETURN

```

```

Should this line be autostarted? (Y/N): YRETURN
Select line speed
1 1200 bps
2 2400 bps
3 3600 bps
4 4800 bps
5 7200 bps
6 9600 bps
7 19200 bps
8 28800 bps
9 38400 bps
10 48000 bps
11 56000 bps
Enter choice number: 3RETURN
The equipment connected to this port is
1 full duplex
2 half duplex
Enter choice number: 1RETURN
Description: Line into HQRETURN
Is this circuit part of a clusternet? (Y/N): YRETURN
Clusternet number: 1-044RETURN
Circuit added to clusternet number 1-044.
Confirm circuit information (Y/N): YRETURN
Done.

```

5. Type **Start Circuit** and press <RETURN>.

```

IRS!Start CircuitRETURN
Circuits
1 Auto-dialed Outside line
2 Dedicated Line to Headquarters
3 Manually dialed Testing
4 X.25 SVC Link to San Diego
5 X.25 SVC Link to Toronto
Enter choice number: 2RETURN
Acquire connection for "Dedicated Line to Headquarters"
Done.

```

Circuits that have autostart enabled will be started automatically by the IRS each time the IRS is started. Auto-dial circuits and circuits not autostarted must be started manually, using the **Start Circuit** command.

If you do a non-normal startup, autostarted lines will not be started. In this case, use the **Start Circuit** command.

## **4. Maintaining your Internetwork Routing Service**

---

These step-by-step procedures will help you keep your Internetwork Routing Service running smoothly:

- Limiting access to remote networks
- Changing circuit configurations
- Deleting circuit configurations
- Listing circuit configurations
- Showing the Internetwork Routing Service statistics
- Renaming the Internetwork Routing Service
- Removing the Internetwork Routing Service from a server
- Testing an internetwork routing/clusternet port on CIU
- Testing an internetwork routing/clusternet port on the local port

---

## Limiting access to remote networks

---

There will be times when you will want to limit access to remote networks. For example, a remote network may be inoperative for several weeks, or you may need to run a diagnostic test on a circuit used by the Internetwork Routing Service, and thus need to release it temporarily.

**Note:** Limiting access for a period of 24 hours or more may cause Clearinghouse databases to become inconsistent. If an IRS is down for 24 hours or more, a **Compare Database** command should be invoked from Clearinghouse to remote Clearinghouse to ensure consistency of CHS databases once the link is brought back up.

---

## Procedure

---

1. Log on and enable yourself in the Internetwork Routing Service context.
2. Type **List Circuits** to find out what circuits are currently being used and press <RETURN>. (You will see messages indicating the current state of each Internetwork Routing Service circuit.)

**CAUTION:** Removing a circuit from service may make all networks previously reached through the circuit unreachable. Use the **List Routes** command before using the **Stop Circuit** command to see which networks are affected.

3. Type **Stop Circuit** to remove a circuit from service (and therefore access to a remote network) and press <RETURN>. Respond to the system prompts.
4. Type **Start Circuit** to return a circuit to service and press <RETURN>. Respond to the system prompts.

## Changing circuit configurations

There may be times when you need to modify information about an existing circuit or X.25 network. To change information about a circuit, use the **Change Circuit** command. To change information about an X.25 network, use the **Change X.25 Network** command. You must delete all X.25 circuits prior to using this command.

**Note:** If the circuit uses a CIU port, you need to stop the External Communication Service before using the IRS **Change Circuit** command. Do step 2 only if the circuit uses a CIU port.

### Procedure

1. Log on and enable in the IRS context.
2. Do this step if the circuit uses a CIU. You must be in the External Communication Service context. Type **Stop** and press <RETURN>.
3. In the IRS context, type **Stop Circuit** and press <RETURN>.
4. Enter the number of the circuit you want to stop. Press <RETURN>.
5. Type **Change Circuit** or **Change X.25 Network** and press <RETURN>.
6. Respond to the prompts by typing in your new information and pressing <RETURN>. You can keep the current information by just pressing <RETURN>.

```

IRS!Change CircuitRETURN
Circuits
1 X.25 SVC Test circuit
2 Dedicated Moon Unit Port B3 of CIU "BCNU"
3 X.25 SVC My Favorite Telenet link to Wbst
Enter choice number: 1RETURN
X25 network address of remote host: 004152344455RETURN
Autostart? (Y/N): NRETURN
Circuit description: New descriptionRETURN
Confirm circuit information (Y/N): YRETURN
Done.

```

---

## Deleting circuit configurations

---

Use the **Delete Circuit** command to remove information about an existing circuit.

After deleting the X.25 circuits, use the **Delete X.25 Network** command to remove information about an X.25 network.

**Note:** If the circuit uses a CIU port, you need to stop the External Communication Service before using the **IRS Delete Circuit** command. Do step 1 only if the circuit uses a Communication Interface Unit port.

---

### Procedure

---

1. Log on and enable in the IRS context.
2. Do this step if the circuit uses a CIU. You must be in the External Communication Service context. Type **Stop** and press <RETURN>.
3. Do this step and step 4 only if the circuit is started. In the IRS context, type **Stop Circuit** and press <RETURN>.
4. Enter the number of the circuit you want to stop and press <RETURN>.
5. Type **Delete Circuit** and press <RETURN>.
6. Enter the number of the circuit you want to delete and press <RETURN>.
7. Type **Y** to confirm the deletion and press <RETURN>.

```
IRS>Delete CircuitRETURN
Circuits
 1 Manually dialed Port1
 2 Dedicated Port2 in room 305
Enter choice number: 1RETURN
Confirm deletion of circuit (Y/N): YRETURN
Done.
```

8. If necessary, type **Delete X.25 Network** and press <RETURN>. Make sure X.25 circuits are deleted first.
9. Start the ECS if necessary to control ports other than that corresponding to the deleted circuit.



---

## Listing circuit configurations

---

You can list the circuits of all ports assigned to the Internetwork Routing Service by using the **List Circuits** command. Circuit description, type, location, port information (duplexity, line speed, and autostart option setting), and status will be displayed.

If a connection with a remote host is established, the **List Circuits** command will display:

- The name (if available) and address of the host at the other end of the circuit.
- A list of the destination networks reached via each circuit.

---

## Procedure

---

1. You should be in the Internetwork Routing Service context.
2. Type **List Circuits** and press <RETURN>.

```
IRS> List CircuitsRETURN
Rabbit Ears Local Port (Auto-dialed, Local port)
  Circuit is full duplex, 3600bps.
  Status: stopped.
Test of CIU async/sync on one board (Dedicated, Port A2 of CIU
"CIU")
  Circuit is full duplex, 9600bps.
  Circuit is auto-started.
  Status: port has been acquired.
Done
```

---

## Showing the Internetwork Routing Service statistics

---

The **Show Statistics** command lists phone line statistics for active circuits. In addition, if an X.25 network exists on the IRS, this command displays X.25 HDLC statistics.

There are three types of phone line statistics: problem indicators, line load statistics, and operational events.

### **Problem indicators**

---

These help to diagnose malfunctioning options boards, modems, cables, and phone lines. Most of them should be used in conjunction with the number of packets successfully sent or received, since they may occur naturally in small numbers.

These indicators should be examined occasionally as preventive maintenance, since higher-level software and protocols attempt to compensate for problems that they represent. The thresholds listed are approximate. Dramatic changes, even while remaining within the threshold, may be an indication that a problem is forthcoming.

### **Load statistics (for the phone line)**

---

These are helpful in monitoring the capacity of an IRS configuration. Using the measures of throughput and the congestion statistics, the configuration can be studied for possible overloading. Since much of the traffic that flows between networks comes in bursts, the statistics should be used with this in mind.

The most useful monitoring can be done with the Incremental Phone Line Statistics, since the observation period can be controlled. Short-term observation of the statistics can be useful when trying to verify whether congestion is presently occurring. Monitoring should be performed over periods long enough to smooth the effect of traffic bursts if it is being done to evaluate long-term load.

### **Operational events messages**

---

These are messages of an explanatory nature.

### **Time interval options**

---

There are three time-interval options for statistics gathering:

**Statistics since server was booted** - A measure of circuit activity since the server was last restarted (booted). The restart time is also displayed.

**Incremental statistics since reset** - A measure of current circuit activity to be obtained. The difference between the current level of activity and the stored "snapshot" of activity is then calculated and displayed. The base time for the monitored

period is the time when *Reset statistics counters* was last selected.

**Reset statistics counters** - Functions the same way as *Incremental statistics since reset*. In addition, it resets the internal snapshot (and base time) for circuit activity.

See the Messages section of this booklet for a complete listing of messages associated with showing the IRS statistics.

## Procedure

---

1. Log on and enable in the Internetwork Routing Service context.
2. Type **Show Statistics** and press <RETURN>.
3. Type the number corresponding to the "Statistics since server was rebooted" option and press <RETURN>.
4. Type **Show Statistics** and press <RETURN>.
5. Type the number corresponding to the "Reset statistics counters" option and press <RETURN>.
6. Wait about 15 minutes. Then, type **Show Statistics** and press <RETURN>.
7. Type the number corresponding to the "Incremental statistics since reset" option and press <RETURN> to determine the current activity.

```
IRS > Show Statistics RETURN
Interval choices
 1 Statistics since server was booted
 2 Incremental statistics since reset
 3 Reset statistics counters
Enter choice number: 1 RETURN
Statistics at January 17, 84 11:20:28 Statistics since server was booted
command
1 days, 1 hours, 32 minutes (since January 16, 84 9:49: 8 )
 5245 packets forwarded
458292 bytes forwarded

Circuit: James' circuit
 18865 packets sent
809200 bytes sent
  1 send error, bad status
 79204 packets received
6336320 bytes received
  12 packets rejected
  2 receive error, data lost
  12 receive error, no get
  1 receive error, unknown
  1 receive error, frame timeout
  1 receive device error
  17 CRC errors
  2 times dsr dropped
  1 congestion count
 10 too long since last receive
  2 connection established count
  1 no response count
 4462 bps sent
 1996 bytes received
 4946 bps throughput (sent plus received)
```

---

## Renaming the Internetwork Routing Service

---

If necessary, you can use the **Rename** command to give the Internetwork Routing Service a different name. The **Rename** command is available only in a non-normal startup.

### Procedure

---

1. Boot the server by pressing the B RESET button. Type **N** to Normal Startup (Y/N) prompt.
2. Type the number corresponding to the "Interrupt before running services" option and press <RETURN>.

**Note:** Do steps 3, 4, and 5 only if the Clearinghouse Service and the Internetwork Routing Service are on the same server. Otherwise, go directly to step 6.

3. Type **Run Service** and press <RETURN>.
4. Type the number corresponding to the Clearinghouse Service and press <RETURN>.
5. Log on and enable.
6. Type **Run Service** and press <RETURN>.
7. Type the number corresponding to run the Internetwork Routing Service and press <RETURN>.
8. Type **N** to the "Normal Startup?" prompt and press <RETURN>.
9. Enter the IRS context.
10. Type **Rename** and press <RETURN>.
11. Type the new Internetwork Routing Service name and description, and press <RETURN> after each response. Confirm by entering **Y**.

```
IRS!RenameRETURN
Enter service name: MagicRETURN
Enter service description: IRS that used to be called OurIRSRETURN
Validating Clearinghouse entry for Magic.OurDomain.OurOrg
Confirm (Y/N): YRETURN
Internetwork Routing Service is started
```

12. Type **Proceed** to complete server validation.

---

## Removing the Internetwork Routing Service from a server

---

If you want to remove the Internetwork Routing Service permanently from a server, you should use the **Expunge Service** command.

This command is used to return any server resources (such as disk space) acquired by the Internetwork Routing Service. For example, currently your Internetwork Routing Service may be sharing a server's resources with another service. If you acquire a new server to support only the Internetwork Routing Service, you would expunge the Internetwork Routing Service from its current server.

---

### Procedure

---

1. Stop and delete all circuits. Delete the X.25 network if there is one.
2. Boot the server by pressing the B RESET button.
3. Type **N** to the "Normal Startup?" prompt and press <RETURN>.
4. Type the number corresponding to the "Interrupt before running services" option and press <RETURN>.
5. Log on and enable. Type **Expunge Service** and press <RETURN>.
6. Type the number corresponding to the Internetwork Routing Service and press <RETURN>.
7. Boot the server again after the prompt '!' returns.
8. Type **Y** to the "Normal Startup?" prompt and press <RETURN>.

---

## Testing an internetwork routing/clusternet port on CIU

---

### Procedure

---

1. From the IRS context, type **Stop Circuit**.
2. Select the circuit to be stopped.
3. Type **Test** to enter the test context and press <RETURN>.
4. Type **RS232C** and press <RETURN>.
5. Select the port to be tested.
6. Select the default data pattern Incrementing.
7. Select the default minimum packet size of 2 and the maximum packet size of 600.
8. Set modem to loopback mode or install a loopback plug.
9. Press any key to begin the test.

The test will begin, and after approximately 30-45 seconds, the terminal will post "Intermediate Results" showing the total number of bytes properly sent and received. Let the test run long enough for it to post at least three sets of intermediate results.

10. After the test has run, press <BREAK> to stop.

The server will post "Final Results" showing the total number of bytes sent and received, as well as the percentage of data transmitted and received correctly.

```
IRS!Stop CircuitRETURN
Circuits
1 Manually dialed IRS Test Port
Enter choice number: 1RETURN
Done.
```

IRS!TestRETURN

The Diagnostics commands are now available.

Test!RS232CRETURN

Choose RS232C port to be tested:

- 1 (Full Duplex Clusternet Port - CIU)
- 2 300 - ITS Filing (300-none-8-1-no dialer-DTE-no flow control  
B2)
- 3 Rascal 1200 In/Out (ITS/TTY-1200-none-8-1-Vadic-Flow Control-B1)
- 4 ITS Filing - 1200 (ITS Port on A3)
- 5 Local TTY (TTY Test Port on Local Port)
- 6 300 In/Out (300-even-7-1-Ventel-DTE-Flow Control-A1)

Enter choice number: 1RETURN

Properties of the selected port:

(Full Duplex Clusternet Port - CIU)

Port usage

Line speed: 1200

Port hardware: CIU CIU-1 Port 4

Port usage mode is Bit-Synchronous

Data pattern:

- 1 Incrementing
- 2 All 0's
- 3 All 1's
- 4 Constant

Enter choice number: 1RETURN

Minimum packet size in bytes (2..600): 2RETURN

Maximum packet size in bytes (2..600): 600RETURN

October 25, 85 11:38:50 RS232C Test Parameters

Mode: Bit-Synchronous

Data pattern: Incrementing

Minimum packet size in bytes : 2

Maximum packet size in bytes : 600

Please set modem to loopback mode or install loopback plug. Press any key when this is done.

Remember that the clock signal must be supplied by the loopback source.

RS232C test is started. Press Break key to stop.



## Intermediate Results

12 Total number of packets sent okay  
7266 Total number of bytes sent okay  
5 Total number of good packets received  
3045 Total number of bytes received okay

## Intermediate Results

23 Total number of packets sent okay  
13800 Total number of bytes sent okay  
9 Total number of good packets received  
5463 Total number of bytes received okay

## Intermediate Results

35 Total number of packets sent okay  
20790 Total number of bytes sent okay  
11 Total number of good packets received  
7859 Total number of bytes received okay  
2 Missing data

## Intermediate Results

47 Total number of packets sent okay  
27636 Total number of bytes sent okay  
17 Total number of good packets received  
15967 Total number of bytes received okay  
10 Missing data: IRS

## Final Results

56 Total number of packets sent okay  
32676 Total number of bytes sent okay  
27 Total number of good packets received  
21612 Total number of bytes received okay  
10 Missing data  
48 Percent data transmitted that were received correctly

Done.

---

## Testing an internetwork routing/clusternet port on the local port

---

### Procedure

---

1. From the IRS context, type **Stop Circuit** and press <RETURN>.
2. Select the circuit to be stopped.
3. Type **Test** to enter the test context and press <RETURN>.
4. Type **RS232C** and press <RETURN>.
5. Select the port to be tested.
6. Select the default data pattern Incrementing.
7. Select the default minimum packet size of 2 and the maximum packet size of 600.
8. Set modem to loopback mode.
9. Press any key to begin the test.

The test will begin, and after approximately 30-45 seconds, the terminal will post "Intermediate Results" showing the total number of bytes sent and received. Let the test run long enough for it to post at least three sets of intermediate results.

10. After the test has run, press <BREAK> to stop.

The server will post "Final Results" showing the total number of bytes sent and received okay, as well as the percentage of data transmitted and received correctly.

```
IRS!Stop CircuitRETURN
Circuits
1 Manually dialed IRS Test Port
Enter choice number: 1RETURN
Done
```

IRSItestRETURN

The Diagnostics commands are now available.

Test!RS232CRETURN

Choose RS232C port to be tested:

- 1 (Full Duplex Clusternet Port - CIU)
- 2 300 - ITS Filing (300-none-8-1-no dialer-DTE-no flow control-B2)
- 3 Racal 1200 In/Out (ITS/TTY-1200-none-8-1-Vadic-Flow Control-B1)
- 4 ITS Filing - 1200 (ITS Port on A3)
- 5 300 In/Out (300-even-7-1-Ventel-DTE-Flow Control-A1)
- 6 (IRS Test Port)

Enter choice number: 6RETURN

Properties of the selected port:

(IRS Test Port)

Port usage: IRS

Line speed: 2400

Port hardware: local port.

Port usage mode is Bit-Synchronous

Choose mode:

- 1 Asynchronous
- 2 Bit-Synchronous
- 3 Byte-Synchronous

Enter choice number: 2

Data pattern:

- 1 Incrementing
- 2 All 0's
- 3 All 1's
- 4 Constant

Enter choice number: 1RETURN

Minimum packet size in bytes (2..600): 2RETURN

Maximum packet size in bytes (2..600): 600RETURN

October 25, 85 12:32:05 RS232C Test Parameters

Mode: Bit-Synchronous

Data pattern: Incrementing

Minimum packet size in bytes : 2

Maximum packet size in bytes : 600

Please set modem to loopback mode or install loopback plug. Press any key when this is done.

Remember that the clock signal must be supplied by the loopback source.

Test: DSR signal is now off  
Test: CTS signal is now off  
RS232C test is started. Press Break key to stop.

Test: Carrier Detect signal is now off  
Test: Ring indicator signal is now off  
Test: Ring heard signal is now off

Test: DSR signal is now off  
Test: CTS signal is now on  
Test: Carrier Detect signal is now on  
Test: Ring indicator signal is now off  
Test: Ring heard signal is now off

Intermediate Results

19 Total number of packets sent okay  
11438 Total number of bytes sent okay  
19 Total number of good packets received  
11438 Total number of bytes received okay

Intermediate Results

41 Total number of packets sent okay  
24231 Total number of bytes sent okay  
41 Total number of good packets received  
24231 Total number of bytes received okay

Intermediate Results

65 Total number of packets sent okay  
37635 Total number of bytes sent okay  
65 Total number of good packets received  
37635 Total number of bytes received okay

Final Results

74 Total number of packets sent okay  
42513 Total number of bytes sent okay  
74 Total number of good packets received  
42513 Total number of bytes received okay  
100 Percent data transmitted that were received correctly

Done.

This section contains error and informational messages that you might see during the operation of the IRS. They are listed in alphabetical order. If the probable cause is not obvious, it is given below the message next to the heading: *Probable cause*. If the message is such that action can be taken to resolve the situation, the action is listed next to the heading: *Action*. Messages with <number> appear at the end of the section.

When you see an error or informational message that you don't understand or want additional information about, write it down. Then, look it up in this section. You'll probably be able to solve any problem at this point, but if you need more help, contact the Network Support Center.

---

**Acquired for <circuit type> connection: Port "<port description>".**

---

Informative message which may appear in response to the **Start** and **Start Circuit** commands.

---

**The Auto-dialer did not respond or is not present. Please check the ACU hardware.**

---

The auto-dialed connection has failed.

This is a possible response to the **Start Circuit** command if you are starting an auto-dialed circuit.

---

**The Auto-dialer found the telephone line "off-hook." Please check the ACU hardware and telephone line.**

---

The auto-dialed connection has failed.

This is a possible response to the **Start Circuit** command if you are starting an auto-dialed circuit.

---

**The Auto-dialer reports failure--no answer, busy signal, or line not answered by a modem.**

---

The auto-dialed connection has failed.

This is a possible response to the **Start Circuit** command if you are starting an auto-dialed circuit.

### **The Auto-dialer reports success.**

---

This message appears in response to the **Start Circuit** command when the circuit is auto-dialed. It tells you that the dialing operation was successful (in other words, the number was dialed and control was successfully transferred to the associated local modem). This should not be taken to mean that the modem is ready to transfer data.

### **Bad clusternet network number.**

---

Error message concerning clusternet definition and startup.

### **Cannot acquire < circuit type > connection: ECS is not active.**

---

Informative message which may appear in response to the **Start** and **Start Circuit** commands.

### **Cannot acquire < circuit type > connection: Port "< port description >" is already in use.**

---

Informative message which may appear in response to the **Start** and **Start Circuit** commands.

### **Cannot acquire < circuit type > connection: Unexpected error with port "< port description >."**

---

Informative message which may appear in response to the **Start** and **Start Circuit** commands.

### **Cannot acquire port: Need to restart the ECS.**

---

Informative message which may appear in response to the **Start** and **Start Circuit** commands.

### **Cannot add port entry: CIU number is not defined (add CIU first).**

---

Error message which might appear in response to the **Add Circuit** command.

### **Cannot add port entry: ECS CIU Service isn't active, port is on CIU.**

---

Error message which might appear in response to the **Add Circuit** command. The name of the port may have been specified incorrectly.

The **Add Circuit** command doesn't allow you to reassign a port to the Internetwork Routing Service. This must be done using the External Communication Service. If the port is assigned to another IRS or another service, an attempt to use it will fail.

---

**Cannot add port entry: IRS already has an entry for the line number.**

---

Error message which might appear in response to the **Add Circuit** command.

---

**Cannot add port entry: Line number doesn't map to PortNum/CiuNum.**

---

Error message which might appear in response to the **Add Circuit** command.

---

**Cannot add port entry: Line number has been configured already.**

---

Error message which might appear in response to the **Add Circuit** command.

---

**Cannot add port entry: Port name is already being used.**

---

Error message which might appear in response to the **Add Circuit** command.

---

**Cannot add port entry: Port number is invalid.**

---

Error message which might appear in response to the **Add Circuit** command.

---

**Cannot change X.25 network; there are still X.25 SVCs defined.**

---

Error message issued in response to the **Change X.5 Network** command.

**Action:** All X.25 SVCs must be deleted before the X.25 network definition may be changed.

---

**Cannot delete X.25 network, there are still X.25 SVCs defined.**

---

Error message issued in response to the **Delete X.25 Network** command.

**Action:** All X.25 SVCs must be deleted before the X.25 network definition may be removed.

---

**Can't send, packet discarded.**

---

**Probable cause:** The number of packets was not sent because hardware status is disallowed. This is usually an indication that the data set ready (DSR) signal is up (modem is ready), but there is no clock.

**Action:** Check the modem and cables. Run the RS-232C test. If the number is more than 1 percent of packets sent, notify the Network Support Center. It may be a hardware problem.

---

**Circuit added to clusternet number <clusternet number>.**

---

Informative message issued in response to the **Add Circuit** command if the new circuit is to be part of the clusternet that the Internetwork Routing Service knows about.

**< circuit description > (X.25 SVC, X.25 network "<X.25 network description>").**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

**The circuit has already been deleted.**

---

Unexpected error message.

**Action:** Stop and restart the service.

**The circuit is already defined.**

---

Error message in response to the **Add Circuit** command. This appears if you try to define a circuit using a port for which there is already a circuit defined.

**The circuit is already started.**

---

Unexpected error message.

**Action:** Stop and restart the service.

**Circuit is auto-started.**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

**Circuit is <duplexity>, <line speed>.**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

**The circuit is not defined.**

---

Unexpected error message.

**Action:** Stop and restart the service.

**Circuit is part of Clusternet # <clusternet number>.**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

**The clusternet is already started.**

---

Error message concerning clusternet definition and startup.

**Connected to a remote workstation.**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.



---

**Connected to an OS 4 release server.**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

---

**Connected to an Internetwork Routing Service.**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

---

**Connected to a Clusternet router.**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

---

**Connection established count.**

---

A statistical message that shows how many times a connection to the remote host at the far end of the circuit was established.

---

**CRC Errors.**

---

The number of packets not successfully received due to transmission errors or sending errors.

**Probable cause:** The problem could be with the phone line, modems, cables, or sending options board. Ignoring this condition will cause general performance degradation of the internetwork link.

**Action:** Run the RS-232C test. Be suspicious of error rates in excess of 1 percent. Reducing the modem speed may also help as a temporary solution.

If the number is more than 5 percent of packets received, notify the Network Support Center. It may be a hardware problem.

---

**Current connection established at <time>.**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

---

**<description> (<circuit type>, <location>).**

---

Informative message displaying location and circuit information, issued in response to the **Show Statistics** command.

**Dialing operation aborted. Please retry.**

---

The auto-dialed connection has failed.

This is a possible response to the **Start Circuit** command if you are starting an auto-dialed circuit.

**Dialing timeout. The Auto-dialer did not respond to a request during dialing. Please check the ACU hardware.**

---

The auto-dialed connection has failed.

This is a possible response to the **Start Circuit** command if you are starting an auto-dialed circuit.

**Driver sending, DSR low.**

---

This is a statistical message that indicates the IRS was sending when the modem was not ready. This is a transient condition, since the IRS will discontinue sending soon after it detects that the DSR (data set ready) signal is low.

**Error while transmitting telephone number to ACU. Please check the ACU hardware.**

---

The auto-dialed connection has failed.

This is a possible response to the **Start Circuit** command if you are starting an auto-dialed circuit.

**Format error in the telephone number.**

---

The auto-dialed connection has failed.

This is a possible response to the **Start Circuit** command if you are starting an auto-dialed circuit.

**HDLC connection to the PSDN is not established, retrying X.25 SVC call.**

---

Informative message in response to a **Start Circuit** command. The connection with the X.25 network is not up. The X.25 call is not attempted but will be tried again later.

**Internetwork Routing Service <IRS name> commands are now available.**

---

Informative message during startup.

**Internetwork Routing Service commands are now available.**

---

Informative message during startup.

**Internetwork Routing Service is started.**

---

Informative message during startup.

---

**Internetwork Routing Service is stopped.**

---

Informative message following shutdown.

---

**Internetwork Routing Service not started.**

---

A critical part of the startup routine failed. The Internetwork Routing Service was not started.

---

**Invalid network number.**

---

Error message concerning clusternet definition and startup.

---

**IRS: <time> Circuit "<description>"-- connection ended.**

---

Informative message.

---

**IRS: <time> Circuit "<description>"-- connection is established to remote host.**

---

Informative message.

---

**IRS: <time> Circuit "<description>"-- connection terminated, circuit is reset.**

---

Informative message indicates that the circuit is no longer connected. In the case of the local port, the DSR is lowered and then raised.

---

**IRS: <time> Circuit "<description>"-- maximum packet size rejected.**

---

**Probable cause:** The maximum packet size was unsuitable.

**Action:** You should try the command again. The connection will be terminated within approximately 20 seconds.

---

**IRS: <time> Circuit "<description>"-- no response after physical medium became available.**

---

Informative message indicates that the circuit came up for 45 seconds but received no packets. The connection will be terminated within approximately 20 seconds.

---

**IRS: <time> Circuit "<description>"-- phone line protocol version mismatch.**

---

Informative message which states that a protocol outside the set supported by the IRS is being used by the phone line. The connection will be terminated within approximately 20 seconds.

---

**IRS: <time> Circuit "<description>"-- physical medium is looped back.**

---

**Probable cause:** A switch-back plug is attached to the local port, or the modem is set to loopback mode.

**Action:** Remove the plug or reset the modem.

**IRS: <time> Circuit "<description>"-- physical medium is now available.**

---

Informative message which indicates that the DSR has been raised for the local port, or a Communication Interface Unit has reported that the modem is available.

**IRS: <time> Circuit "<description>"-- physical medium isn't available.**

---

Informative message which indicates that the DSR has dropped, or a Communication Interface Unit modem has become unavailable.

**IRS: <time> Circuit "<description>"-- remote host type incompatible with this circuit.**

---

Informative message which indicates that a shared interface unit tried to connect to a port, or a remote workstation tried to connect to a non-clusternet port, or a clusternet port tried to connect to another clusternet port.

**IRS: <time> Circuit "<description>"-- remote host type rejected.**

---

Informative message which tells you that the attempt to connect was rejected. The connection will be terminated within approximately 20 seconds. Usually accompanies the message "IRS: <time> Circuit '<description>'-- remote host type incompatible with this circuit."

**IRS: <time> Circuit "<description>"-- too long since last packet received.**

---

Informative message which states that data packets have stopped arriving. The connection will be terminated within approximately 20 seconds.

**IRS: <time> Circuit "<description>"-- unknown error.**

---

Informative message indicates that the error is unknown. The connection will be terminated within approximately 20 seconds.

**IRS: <time> HDLC connection to the PSDN is not established, retrying X.25 SVC call.**

---

Informative message displayed when the IRS retries X.25 calls; <description> is the X.25 SVC circuit description.

**IRS: <time> PSDN reports "all circuits in use" when making X.25 SVC call to <description>, retrying.**

---

Informative message displayed when the IRS retries X.25 calls; <description> is the X.25 SVC circuit description.

**IRS: <time> PSDN reports "call timed out" when making X.25 SVC call to <description>, retrying.**

---

Informative message displayed when the IRS retries X.25 calls; <description> is the X.25 SVC circuit description.

---

**IRS: <time> PSDN reports "connection refused" when making X.25 SVC call to <description>, retrying.**

---

Informative message displayed when the IRS retries X.25 calls; <description> is the X.25 SVC circuit description.

---

**IRS: <time> PSDN reports "link down" when making X.25 SVC call to <description>, retrying.**

---

Informative message displayed when the IRS retries X.25 calls; <description> is the X.25 SVC circuit description.

---

**IRS: <time> X.25 SVC call from <remote host> was rejected.**

---

Informative message displayed when an X.25 SVC call request from an unknown caller is rejected.

---

**IRS: <time> X.25 SVC call to <remote host> has been started.**

---

Informative message displayed when the IRS retries X.25 calls; <description> is the X.25 SVC circuit description.

---

**IRS: <time> X.25 SVC call to <remote host> has been stopped. Clear code: <3> Diagnostic field: <4>.**

---

Informative message displayed when the IRS retries X.25 calls; <description> is the X.25 SVC circuit description.

---

**The last X.25 SVC has been stopped.**

---

Informative message informing you of the disappearance of the last X.25 SVC or X.25 SVC definition. The HDLC connection with the X.25 network will be stopped.

---

**Network <network number> is not currently accessible.**

---

Informative message used to determine the current logical interconnectivity of the internetwork, issued in response to the **List Routes** command.

---

**Network <network number> is the local Clusternet.**

---

Informative message used to determine the current logical interconnectivity of the internetwork, issued in response to the **List Routes** command.

---

**Network <network number> is the local Ethernet.**

---

Informative message used to determine the current logical interconnectivity of the internetwork, issued in response to the **List Routes** command.

---

**Network <network number> is <number> step(s) away via <circuit type> circuit "<circuit description>."**

---

Informative message used to determine the current logical interconnectivity of the internetwork, issued in response to the **List Routes** command.

**Network <network number> is <number> step(s) away via the local Ethernet and <IRS name or address>.**

---

Informative message used to determine the current logical interconnectivity of the internetwork, issued in response to the **List Routes** command.

**No circuits have been defined.**

---

Informative message during startup.

**No hardware statistics reported by RS-232C hardware (CIU).**

---

Informative message issued in response to the **Show Statistics** command, informing you that CRC error statistics and warnings will not be displayed because the information is not available due to hardware limitations.

This is also an informative message issued in response to the **Show Statistics** command. This appears only the first time following restart of the IRS. An interval requiring incremental statistics is chosen, unless it is for an HDLC network that has not been started. In the latter case, the "No incremental statistics for the HDLC network" message will be displayed each time **Show Statistics** is invoked with an interval requiring incremental statistics.

**No incremental statistics first time around for the circuit.**

---

Informative message issued in response to the **Show Statistics** command. This appears only the first time following restart of the IRS. An interval requiring incremental statistics is chosen, unless it is for an HDLC network that has not been started. In the latter case, the "No incremental statistics for the HDLC network" message will be displayed each time **Show Statistics** is invoked with an interval requiring incremental statistics.

**No incremental statistics first time around for the IRS.**

---

Informative message issued in response to the **Show Statistics** command. This appears only the first time following restart of the IRS. An interval requiring incremental statistics is chosen, unless it is for an HDLC network that has not been started. In the latter case, the "No incremental statistics for the HDLC network" message will be displayed each time **Show Statistics** is invoked with an interval requiring incremental statistics.

---

**No incremental statistics for the HDLC network.**

---

Informative message issued in response to the **Show Statistics** command. This appears only the first time following restart of the IRS. An interval requiring incremental statistics is chosen, unless it is for an HDLC network that has not been started. In the latter case, the "No incremental statistics for the HDLC network" message will be displayed each time **Show Statistics** is invoked with an interval requiring incremental statistics.

---

**No response count.**

---

This is a statistical message showing how often the physical medium became available, but nothing was heard from the remote machine after waiting 45 seconds. If a leased-line modem is used, this statistic will be incremented approximately once every minute that one of the two attached Internetwork Routing Services is not active.

---

**No SVCs started.**

---

Informative message in response to the **Show Statistics** command. There are no X.25 SVC statistics because none are started.

---

**No X.25 network has been defined.**

---

Informative message during startup.

---

**Packets rejected.**

---

A number of packets received were of an unknown packet type.

**Probable cause:** This is most likely due to a transmission error, or a partial packet received during data loss.

**Action:** If the number is more than 5 percent of packets received, notify the Network Support Center. It may be a hardware problem.

---

**Receive device error**

---

A number of packets were not successfully received due to hardware error.

**Action:** If the number is more than 1 percent of packets received, notify the Network Support Center. It may be a hardware problem.

### **Receive error, data lost in hardware.**

---

**Probable cause:** The number of packets not successfully received due to a hardware overrun. Suspect the options board.

If the number is greater than 1 percent of packets received, too many services may be running on the station.

**Action:** If the number is more than 5 percent of packets received, notify the Network Support Center.

### **Receive error, frame timeout.**

---

A number of packets were not successfully received because packets are too long or damaged.

### **Receive error, no get.**

---

**Probable cause:** The number of packets not successfully received due to overly busy software. If the number is greater than 1% of received packets, suspect too many services.

**Action:** Reduce the line speed. Expunge one of the services from the server.

### **Receive error, unknown.**

---

**Probable cause:** There may be a problem with Options Board.

**Action:** If the number is more than 1 percent of packets received, notify the Network Support Center.

### **Send error, bad status.**

---

A number of packets were not transmitted due to a hardware problem.

### **Statistics for X.25 network: <network description>.**

---

Informative message issued in response to the **Show Statistics** command, introducing circuit and X.25 network statistics. The X.25 network statistics will follow the circuit statistics, if there is an X.25 network defined.

### **Operation failed.**

---

Informative message which might appear in response to the selection of an X.25 SVC in the **Start Circuit** command.

### **Problem starting new clusternet.**

---

Error message concerning clusternet definition and startup.



---

**Problem stopping old clusternet.**

---

Error message concerning clusternet definition and startup.

---

**PSDN reports "all circuits in use" when making X.25 SVC call to <remote host>, retrying.**

---

Informative message which might appear in response to the selection of an X.25 SVC in the **Start Circuit** command.

---

**PSDN reports "call timed out" when making X.25 SVC call to <remote host>, retrying.**

---

Informative message which might appear in response to the selection of an X.25 SVC in the **Start Circuit** command.

---

**PSDN reports "connection refused" when making X.25 SVC call to <remote host>, retrying.**

---

Informative message which might appear in response to the selection of an X.25 SVC in the **Start Circuit** command.

---

**PSDN reports "link down" when making X.25 SVC call to <remote host>, retrying.**

---

Informative message which might appear in response to the selection of an X.25 SVC in the **Start Circuit** command.

---

**Status: awaiting physical medium.**

---

Informative message concerning circuit status, which may appear in response to the **List Circuits** command.

---

**Status: connected, but circuit has been deleted.**

---

Informative message concerning circuit status, which may appear in response to the **List Circuits** command.

---

**Status: connecting to the PSDN.**

---

Informative message which may appear in response to the **List X.25 Network** command.

---

**Status: connection established to remote host.**

---

Informative message concerning circuit status, which may appear in response to the **List Circuits** command.

---

**Status: connection established with the PSDN.**

---

Informative message which may appear in response to the **List X.25 Network** command.

**Status: connection is being established to remote host.**

---

Informative message concerning circuit status, which may appear in response to the **List Circuits** command.

**Status: connection is being retried.**

---

Informative message concerning circuit status, which may appear in response to the **List Circuits** command.

**Status: connection is being terminated.**

---

Informative message concerning circuit status, which may appear in response to the **List Circuits** command.

**Status: no response from the PSDN.**

---

Informative message which may appear in response to the **List X.25 Network** command.

**Status: port has been acquired.**

---

Informative message concerning circuit status, which may appear in response to the **List Circuits** command.

**Status: resetting the connection.**

---

Informative message which may appear in response to the **List X.25 Network** command.

**Status: stopped.**

---

Informative message concerning circuit status, which may appear in response to the **List Circuits** command.

**Status: stopped.**

---

Informative message which may appear in response to the **List X.25 Network** command.

**Status: waiting for physical medium.**

---

Informative message which may appear in response to the **List X.25 Network** command.

---

**Times DSR dropped.**

---

Statistical message indicating the number of times the modem became unready (dropped data set ready).

**Probable cause:** The data set ready (DSR) signal drops when a manually-dialed modem interconnection is disconnected. The DSR might drop due to a failing modem, cable, or other hardware or software.

This indication can be used to determine which end disconnected first on a dialed connection, since it will not occur on the side that disconnected first.

**Action:** Verify that the hardware is running properly. Perform the RS-232C test to verify that connection to local port is still established.

---

**Too long since last receive.**

---

The number of times that no packets were received from the remote station for more than 80 seconds. Normally, an IRS will send a packet at least every 30 seconds.

**Probable cause:** The remote station may not be working or the remote IRS has been stopped.

**Action:** Investigate if the remote station is sending, but the local station is not receiving (bad cables or modems).

---

**Transfer timeout after dialing. Please check the ACU hardware.**

---

The auto-dialed connection has failed.

This is a possible response to the **Start Circuit** command if you are starting an auto-dialed circuit.

---

**Validating Clearinghouse entry for: <service name>.**

---

Informative message during startup.

**Action:** If the number is more than 1 percent of packets sent, notify the Network Support Center. It may be hardware problem.

---

**Warning: rate of congestion exceeds 10%.**

---

Message which can appear in response to the **Show Statistics** command.

**Probable cause:** Packets unsuccessfully received due to transmission errors or sending errors.

**Action:** If the number is more than 5 percent of packets sent, notify the Network Support Center.

**Warning: rate of CRC errors exceeds 5%.**

---

**Probable cause:** Message which can appear in response to the **Show Statistics** command.

**Action:** Notify the System Administrator.

**The X.25 network already is defined.**

---

Error message in response to the **Add X.25 Network** command. An Internetwork Routing Service may have only one X.25 network defined.

**X.25 network not started.**

---

Informative messages issued in response to the **Show Statistics** command explaining the lack of X.25 network statistics. This is displayed only if the interval does not require incremental statistics.

**X.25 SVC call to <remote host> has been started.**

---

Informative message which might appear in response to the selection of an X.25 SVC in the **Start Circuit** command.

**X.25 SVC call to <remote host> has been stopped. Circuit: <circuit description>**

---

Informative message in response to the selection of an X.25 SVC in the **Stop Circuit** command.

**<number> bps received.**

---

Line load statistics message reflecting the utilized throughput in the receiving direction.

**Action:** If this number is greater than 25 percent of the line speed for a period greater than 10 minutes, the phone line is being heavily used, and you may want to increase the line speed. This statistic is available in the incremental mode only.

**<number> bps sent.**

---

Line load statistics message reflecting the utilized throughput when sending from this station.

**Action:** If this number is greater than 25 percent of the line speed for a period greater than 10 minutes, the phone line is being heavily used, and you may want to increase the line speed.

The statistic "Congestion, packet discarded" should be examined for associated congestion due to overuse. This statistic is available in the incremental mode only.

---

**<number> bps throughput.**

---

Line load statistics message reflecting the relative total phone line traffic. It is the sum of the "bps sent" and "bps received" statistics.

---

**<number> bytes forwarded.**

---

Line load statistics message reflecting the number of 8-bit bytes that were forwarded through this internetwork router. Use this statistic to measure relative total traffic load through the Internetwork Routing Service.

---

**<number> bytes received.**

---

Line load statistics message reflecting the number of successfully received 8-bit bytes.

---

**<number> bytes sent.**

---

Line load statistics message reflecting the number of successfully transmitted 8-bit bytes.

---

**<number> congestion count.**

---

Line load statistics message reflecting the number of packets discarded in order to prevent congestion in the Internetwork Routing Service.

**Probable cause:** The IRS has a sending queue for each phone line. If a new packet is delayed too long while waiting on the queue, it is discarded instead. Higher-level software compensates for packets discarded at this level.

**Action:** If this number is greater than 10 percent of the line speed, consider increasing the line speed. If this is not possible, have users reduce remote network activity (relocate remote services, if possible).

---

**<number> packets forwarded.**

---

Line load statistics message reflecting the number of packets forwarded through this internetwork router.

---

**<number> packets received.**

---

Line load statistics message reflecting the number of successfully received packets. Use this statistic for its relative value.

**<number> packets sent.**

---

Line load statistics message reflecting the number of successfully transmitted packets. Use this statistic for its relative value.

- Asynchronous** Transmission of data in which time intervals between transmission are unequal. Transmission is sent a character at a time, and is controlled by start and stop elements at the beginning and end of each character.
- Bit synchronous** Optional software on the External Communication Service that supports information exchange between compatible workstations and a TTY-oriented host.
- Binary Synchronous Communication** (**BSC**) A data link control procedure developed by IBM. A variation of synchronous data transmission that includes specific control characters and procedures for controlling the establishment of a valid connection. Also called *Bisync* and *Bisynchronous*.
- Byte Synchronous** A form of synchronous transmission in which a sequence of successive 8-bit characters are handled and transmitted as a unit. The byte synchronous protocol is available only through the 8000 port configuration.
- Communication Interface Unit** (**CIU**) The 873 Communication Interface Unit is an optional RS-232C port extender that supports up to eight additional ports. The CIU attaches directly to the network, and can be configured for either asynchronous or bit synchronous communication (TTY, 3270 SNA, or IRS-to-IRS phone communications).
- Clusternetwork** A collection of one or more communication circuits. It is assigned a network number which allows remote workstations access to the rest of the internetwork.
- Clusternet router** An option of the Internetwork Routing Service that allows remote workstations to access each other and internetwork services via voice-grade dialed phone lines.
- Dedicated line** A type of communication circuit, such as a leased line, that remains connected and does not have to be dialed. Often used for internetwork links and mainframe connections for 3270 emulation.
- External Communication Service** (**ECS**) Maintains and initiates emulation sessions between network workstations and various terminals. The ECS emulates three kinds of terminals: 3270 BSC and 3270 SNA synchronous terminals, and standard asynchronous-type terminals. The servers and workstations are enabled by having the different emulation software installed on them.

<b>High-level Data Link Control</b>	<b>(HDLC)</b> A set of procedures specified by the International Organization for Standardization (ISO) for link access across the DTE/DCE interface.
<b>System element</b>	These are synonyms for devices which have been assigned 48-bit IDs. System elements are capable of implementing the full range of NS protocols and can be both the source and destination of packets. Servers, 8000 workstations, 860's, 820's, and PCs are all considered system elements. Also referred to as Host element.
<b>Internetwork</b>	A composite of interconnected networks in which network resources are shared. Any network can have multiple connections to other networks. (See <b>Internetwork Routing Service</b> for more information.)
<b>Multiport options kit</b>	The multiport option extends the local port to four ports. It can be configured for bit-synchronous communications (IRS, Clusternet, 3270 SNA, External Mail Gateway, and X.25).
<b>Packet</b>	A collection of data to be transmitted. Packets typically contain routing and error-correction information. Large amounts of data are often broken into smaller packets for transmission.
<b>Packet Switched Data Network</b>	<b>(PSDN)</b> A network accessed through the X.25 protocol which is implemented by the IRS. Telenet, Tymnet, and Japan's DDX are all examples of PSDNs.
<b>Permanent Virtual Circuit</b>	<b>(PVC)</b> A circuit supported by X.25 networks. They are set up at subscription time to the network and do not require call establishment before being used. PVCs are used for applications that would normally use leased lines on non-X.25 networks.
<b>Remote workstation</b>	A workstation attached to an internet using RS-232C protocol and leased or manually-dialed lines.
<b>Self-registration</b>	This is a feature whereby each service registers itself (and any other resources it may control) in the Clearinghouse database.
<b>Shared Interface Unit</b>	<b>(SIU)</b> Allows one or two remote workstations to access to the internet by using the SIU's RS-232C ports. The SIU itself is directly attached to an Ethernet. The synchronous point-to-point protocol is used by the SIU ports. Workstations can be directly attached to the SIU's ports or can use dial-up or leased line modems. The Xerox 860, 820-II and 16/8 computers can be attached to an SIU. Each SIU has two RS-232C ports and is not expandable.
<b>Switched Virtual Circuit</b>	<b>(SVC)</b> In this document, switched virtual circuits refer to those supported by X.25 networks. These circuits give the illusion of providing point-to-point connections as though they share the physical link to the X.25 network. SVCs are set up at call establishment time. They are used for applications that would normally use dial-up and dial-out lines on non-X.25 networks.



**X.25** An international standard protocol that defines an interface between data terminal equipment (in this case, the Internetwork Routing Service) and data circuit terminating equipment (DCE) for terminals operating in the packet mode on public data networks. The X.25 link between an Internetwork Routing Service and a public data network is an RS-232C leased line supplied by the network vendor. X.25 is structured to allow the multiplexing of many virtual circuits over a single physical link.

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This section contains the forms for setting up and maintaining your Internetwork Routing Service. You may want to make copies of these forms and fill them out by hand. It is important to update the forms with service or network configuration changes as they occur.

The forms are:

IRS 1: Registering an X.25 Network

IRS2: Registering an IRS Auto-Dialed Circuit

IRS3: Registering an IRS Dedicated Circuit

IRS4: Registering an IRS Manually-Dialed Circuit

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