3. If they have been configured incorrectly, change the configuration to set them correctly.
4. If they have been configured correctly, record the message number and contact your service supplier

ECCBR306E Both adapters are set as primary; set one as the alternate adapter.

Cause: This message is displayed when you have chosen the option to have the Bridge Program installed directly on the bridge computer, and the Installation Program ascertains both adapters are configured as the primary adapter. Only one adapter can be configured as primary. The other adapter must be configured as alternate.

Action: Check the adapter that should be configured as the alternate adapter and configure it as the alternate adapter. If it already is configured as the alternate adapter, record the message number and contact your service supplier.

Note: If you are using a token-ring network adapter and a PC network adapter in the bridge computer, configure the PC network adapter as the primary adapter.

ECCBR307E Both adapters are set as alternate; set one as the primary adapter.

Cause: This message is displayed when you have chosen the option to have the Bridge Program installed directly on the bridge computer, and the Installation Program ascertains both adapters are configured as the alternate adapter. Only one adapter can be configured as alternate. The other adapter must be configured as primary.

Action: Check the adapter that should be configured as the primary adapter and configure it as the primary adapter. If it already is configured as the primary adapter, record the message number and contact your service supplier.

Note: If you are using a token-ring network adapter and a PC network adapter in the bridge computer, configure the PC network adapter as the primary adapter.

ECCBR313E RAM size of primary adapter must be set to 16 KB.

Cause: The RAM size of the IBM Token-Ring Network Adapter/A that is the primary adapter is configured to a setting other than 16 KB, such as 8, 32, or 64 KB.

Action: Reconfigure the primary adapter's RAM size to 16 KB.

ECCBR314E RAM size of alternate adapter must be set to 16 KB.

Cause: The RAM size of the IBM Token-Ring Network 16/4 Adapter/A that is the alternate adapter is configured to a setting other than 16 KB, such as 8, 32, or 64 KB.

Action: Reconfigure the adapter's RAM size to 16 KB.

ECCBR315I Installation in progress, please wait.

Cause: This message is displayed while the Installation Program (packaged with the Bridge Program) is copying its files onto the working diskette or working disk and creating the CONFIG.SYS and AUTOEXEC.BAT files.

Action: None. Wait for subsequent messages. The installation process can take up to 3 minutes.

ECCBR316I Installation complete; exit and run Config. Pgm. to change defaults.

Cause: This message is displayed when the Installation Program has successfully copied its files onto the working diskette or working disk and created the CONFIG.SYS and AUTOEXEC.BAT files.

Action:

1. Exit the Installation Program by pressing the **F3 (Exit)** key.

2. Answer the question on the Installation Program panel asking if you want to use the Bridge Program's configuration parameter defaults or alter them.

   The Installation Program will prompt you to use the Configuration Program to specify the configuration parameter values you want to change.

ECCA0501E Interrupt vector X'5C' is in use.

Cause: This message is displayed when the ECCA0MOD device driver was not the first device driver loaded by the CONFIG.SYS file.

Action: Edit the CONFIG.SYS file and make sure that the ECCA0MOD device driver is loaded before any other bridge device driver.

Make sure the CONFIG.SYS file has been created correctly by the Installation Program (see Chapter 3) or modified according to the manual instructions in Appendix B.

ECCA0502E DOS Version 3.3 or later is required.

Cause: This message is displayed when the device driver determines that the installed DOS version is earlier than 3.3.

Action: Install the correct DOS version and then reload the device drivers and the Bridge Program.

ECCXX503E Interrupt Arbitrator (ECCA0MOD.SYS) device driver is required.

Cause: This message is displayed when one of the device drivers, other than ECCA0MOD, determines that ECCA0MOD is not loaded.

In the message identifier ECCXX503E,

- XX = G0 or
- XX = C0.

Action: Edit the CONFIG.SYS file to make sure that the ECCA0MOD device driver is loaded before the other device drivers.

Make sure the CONFIG.SYS file has been created correctly by the Installation Program (see Chapter 3) or modified according to the manual instructions in Appendix B.

ECCXX504E Program is already loaded.

Cause: This message is displayed when DOS tries to load the same device driver twice.

In the message identifier ECCXX504E,

- XX = G0 or
- XX = C0.

Action: Correct the CONFIG.SYS file so that the name of the device driver does not appear twice.

Make sure the CONFIG.SYS file has been created correctly by the Installation Program (see Chapter 3) or modified according to the manual instructions in Appendix B.

ECCC0512E Token-Ring Network adapter is not installed.

Cause: This message is displayed when ECCC0MOD device driver is loaded and there is no Token-Ring adapter installed.

Action: If you are not using a token-ring network adapter in the bridge computer, correct the CONFIG.SYS file so that the name of the ECCC0MOD device driver is not listed.

Make sure the CONFIG.SYS file has been created correctly by the Installation Program (see Chapter 3) or modified according to the manual instructions in Appendix B.

If you should be using a token-ring network adapter in the bridge computer, verify that the token-ring network adapter has been installed correctly.

ECCG0521E Network error.

Cause: This message is displayed when the ECCG0MOD device driver is loaded and it detects an error on the IBM PC Network. It will be followed by one of the following:

Please record this number YYYY-YY.
Have system serviced.

Please record this number YYYY-YY.
Have network serviced.

Please record this number YYYY-YY.
Adapter not found, have system serviced.

Action:

1. If you receive the "Adapter not found" message,
   a. Ensure that the configuration matches the adapters installed in your computer.
   b. If they do not match, either install an adapter or remove the device driver from the CONFIG.SYS file.
   c. If the configuration in the CONFIG.SYS file matches the adapters installed, record the error number and have the computer serviced.
2. If you receive one of the other messages, record the error number and have either the computer or the network adapter serviced.

ECCBR990E Abnormal system termination (EEEE).

Cause: This message is displayed and logged when the Bridge Program detects an internal failure that prevents further processing. It contains the following additional information:

EEEE = Error code indicating the type of failure (2 bytes, 4 hex characters).

Action: Record the error code, protect the dump file (ECCDUMP.DAT) by copying it to another diskette, and reload the Bridge Program. If this message occurs again, copy the files from your Bridge Program backup copy or the original Bridge Program diskette onto a new working diskette or fixed disk directory. (If you copy the files from the original diskette, you must either create the configuration file again or copy the ECCPARMS.BIN file from the backup copy.) Then start the Bridge Program again using the new working copy.

If the problem still occurs:

1. Write-protect the diskette containing the copy of the ECCDUMP.DAT file.
2. Record the error code.
3. Refer to the "Statement of Service" on page E-10.

ECCBR992I Memory dump was taken.

Cause: This message is displayed and logged when the Bridge Program has successfully written an image of the bridge code and buffers to the ECCDUMP.DAT file on the diskette or fixed disk in the default drive after a system failure.

If the diskette containing the dump file is in the drive when another dump occurs, the ECCDUMP.DAT file will be overwritten.

Action:

1. If the ECCDUMP.DAT file was written on the working disk or diskette, copy the file to another diskette.
2. Write-protect the diskette containing the copy of the ECCDUMP.DAT file.
3. Record the error code.
4. Refer to the "Statement of Service" on page E-10.

ECCBR994W Memory dump was attempted but failed to complete.

Cause: This message is displayed and logged when the Bridge Program was not successful in writing an image of the bridge code and buffers to the ECCDUMP.DAT file on the diskette or fixed disk in the default drive after a system failure.

Action: The dump information has not been saved.

The failure may have been because:

- There was no diskette in the drive specified for the dump
- There was insufficient space on the diskette or fixed disk in the drive specified for the dump.

You must correct that condition in order to obtain any further dump files.

The Bridge Program must be reloaded to continue operation.

Appendix B. Using DOS Commands to Create the CONFIG.SYS File

CONFIG.SYS File for Fixed Disk

If you are using DOS commands to create or modify the CONFIG.SYS file so that the Bridge Program can be installed on the fixed disk, the contents of the file depend upon the combination of IBM PC Network or IBM Token-Ring Network segments you are connecting with the Bridge Program. Depending upon this combination of networks, the CONFIG.SYS file must contain the following statements in the order provided:

1. If the bridge connects two IBM Token-Ring Network segments:

   device=c:*dirname*\ecca0mod.sys
   device=c:*dirname*\eccc0mod.sys *addr0, sram0, tok0, addr, sram1, tok1*

2. If the bridge connects one IBM Token-Ring Network segment and one IBM PC Network segment:

   device=c:*dirname*\ecca0mod.sys
   device=c:*dirname*\eccc0mod.sys *addr0, sram0, tok0*
   device=c:*dirname*\eccg0mod.sys *addr0*

3. If the bridge connects:

   - Two broadband IBM PC Network segments using the same or different frequency pairs
   - Two broadband IBM PC Network segments using different frequency pairs on the same broadband IBM PC Network segment
   - Two baseband IBM PC Network segments
   - One IBM Token-Ring Network segment and one baseband IBM PC Network segment
   - One broadband IBM PC Network segment and one baseband IBM PC Network segment:

   device=c:*dirname*\ecca0mod.sys
   device=c:*dirname*\eccg0mod.sys *addr0,,addr1*

where:

dirname	=	the name of the directory containing the ECCx0MOD.SYS modules
addr0	=	the locally administered adapter address for bridge adapter 0
sram0	=	the first 4 digits of a 5-digit hexadecimal shared RAM address for adapter 0
tok0	=	the ETR parameter setting for bridge adapter 0 (0 = use ETR or 1 = do not use ETR)
addr1	=	the locally administered adapter address for bridge adapter 1
sram1	=	the first 4 digits of a 5-digit hexadecimal shared RAM address for adapter 1
tok1	=	the ETR parameter setting for bridge adapter 1 (0 = use ETR or 1 = do not use ETR)

You can specify only those parameters for which you are not using the default values. If you want to specify a parameter value following an unspecified parameter, insert only a comma (no blank) for the unspecified value. Commas are not required for unspecified parameters following the last specified value.

The following example illustrates the statements in a CONFIG.SYS file for a bridge connecting an IBM PC Network segment and an IBM Token-Ring Network segment, with the following specifications:

- A locally administered address for the IBM Token-Ring Network and IBM PC Network adapters in the bridge computer
- A shared RAM address for the IBM Token-Ring Network adapter
- ETR for the IBM Token-Ring Network adapter.

device=c:*dirname*\ecca0mod.sys
device=c:*dirname*\eccc0mod.sys *400000000000,D800,0*
device=c:*dirname*\eccg0mod.sys *400000000001*

CONFIG.SYS File for Working Diskette

If you will be using DOS commands to create or modify the CONFIG.SYS file so that the Bridge Program can be installed on working diskette, the contents of the file depend upon the combination of IBM PC Network or IBM Token-Ring Network segments you are connecting with the Bridge Program. Depending upon this combination of networks, the CONFIG.SYS file must contain the following statements in the order provided:

1. If the bridge connects two IBM Token-Ring Network segments:

   device = ecca0mod.sys
   device = eccc0mod.sys *addr0, sram0, tok0, addr1, sram1, tok1*

2. If the bridge connects one IBM Token-Ring Network segment and one IBM PC Network segment:

   device = ecca0mod.sys
   device = eccc0mod.sys *addr0, sram0, tok0*
   device = eccg0mod.sys *addr0*

3. If the bridge connects:

   - Two broadband IBM PC Network segments using the same or different frequency pairs
   - Two broadband IBM PC Network segments using different frequency pairs on the same broadband IBM PC Network segment
   - Two baseband IBM PC Network segments
   - One IBM Token-Ring Network segment and one baseband IBM PC Network segment
   - One broadband IBM PC Network segment and one baseband IBM PC Network segment:

   device = ecca0mod.sys
   device = eccg0mod.sys *addr0,,addr1*

where:

addr0	=	the locally administered adapter address for bridge adapter 0
sram0	=	the first 4 digits of a 5-digit hexadecimal shared RAM address for adapter 0
tok0	=	the ETR parameter setting for bridge adapter 0 (0 = use ETR or 1 = do not use ETR)
addr1	=	the locally administered adapter address for bridge adapter 1
sram1	=	the first 4 digits of a 5-digit hexadecimal shared RAM address for adapter 1
tok1	=	the ETR parameter setting for bridge adapter 1 (0 = use ETR or 1 = do not use ETR)

You can specify only those parameters for which you are not using the default values. If you want to specify a parameter value following an unspecified parameter, insert only a comma (no blank) for the unspecified value. Commas are not required for unspecified parameters following the last specified value.

The following example illustrates the statements in a CONFIG.SYS file for a bridge connecting an IBM PC Network segment and an IBM Token-Ring Network segment, with the following specifications:

- A locally administered address for the IBM Token-Ring Network and IBM PC Network adapters in the bridge computer
- A shared RAM address for the IBM Token-Ring Network adapter
- ETR for the IBM Token-Ring Network adapter.

device = ecca0mod.sys
device = eccc0mod.sys *400000000000,D800,0*
device = eccg0mod.sys *400000000001*

Appendix C. Bridge Planning and Administration Information

The network planner or administrator should use this appendix to perform the following tasks:

- Assess the need for using the Bridge Program in your network
- Assign values to some of the Bridge Program installation and configuration parameters
- Evaluate bridge performance.

For more detailed information on planning and administering local area networks, see the following manuals:

- The *IBM PC Network Broadband Planning Guide*
- The *IBM PC Network Baseband Planning Guide*
- The *Introduction to Local Area Networks*
- The *IBM Local Area Network Administrator's Guide*
- The *IBM Token-Ring Network Introduction and Planning Guide*
- The *IBM Token-Ring Network Installation Guide.*

Planning for a Multi-Segment Network

When planning a multi-segment network, you must consider the overall performance of the network and the configuration demands placed upon it by the application programs that you will be using.

You should plan all individual LAN segments so that they provide adequate performance for their users. This may involve organizing the topology (configuration) of the network by location (geographically), or by the function or relationship shared by the users (affinity groups).

Multi-segment networks whose LAN segments are connected by bridges are either hierarchical or mesh configurations. A hierarchical network provides only one path through intermediate LAN segments between a source LAN segment and a destination LAN segment. For example, in Figure C-1 on page C-3 illustrating a hierarchical network, a frame whose source is on LAN segment 3 *must* pass through bridge C, LAN segment 1, and either bridge A or B to reach its destination on LAN segment 2. No other path is possible. For this routing, LAN segment 1 will always be the only possible intermediate LAN segment.

Mesh networks, on the other hand, provide multiple paths through intermediate LAN segments between source LAN segments and destination LAN segments. For example, in Figure C-1 on page C-3 illustrating a mesh network, a frame whose source is on LAN segment 3 and whose destination is on LAN segment 2 has two possible paths. The frame can pass from LAN segment 3, through bridge C, LAN segment 1, and either bridge A or B to LAN segment 2. Unlike the hierarchical example, however, the frame can also pass from LAN segment 3 through bridge E, LAN segment 4, and bridge D to its destination on LAN segment 2. In this case, either LAN segment 1 or LAN segment 4 are both possible intermediate LAN segments.

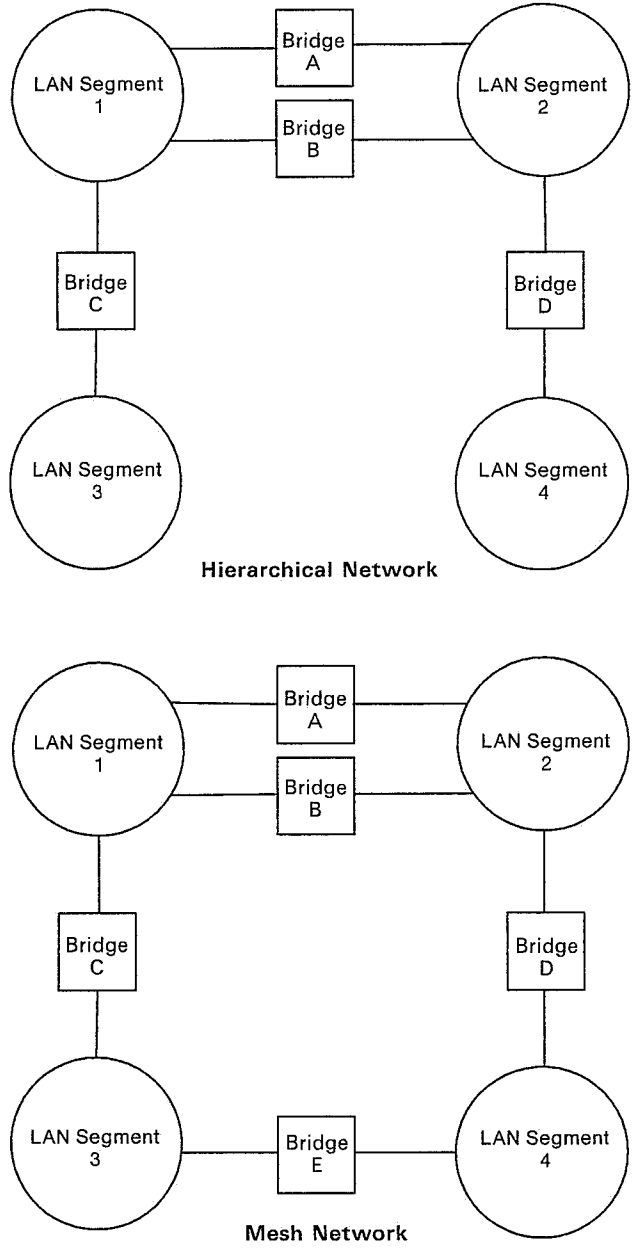


Figure C-1. Hierarchical and Mesh Network Configurations

When used in a multi-segment network, backbone LAN segments improve performance and provide flexibility.

The backbone LAN segment can:

- Provide the shortest average path between any two attaching devices on the network
- Provide the most direct access to shared devices (such as print and file servers or host computers) that are placed on the backbone LAN segment
- Allow placement of host systems on the backbone LAN segment, giving the system administrator the freedom to place new applications on whichever host is most suitable, unless otherwise constrained.

In the following figure, LAN Segment A represents a backbone LAN segment.

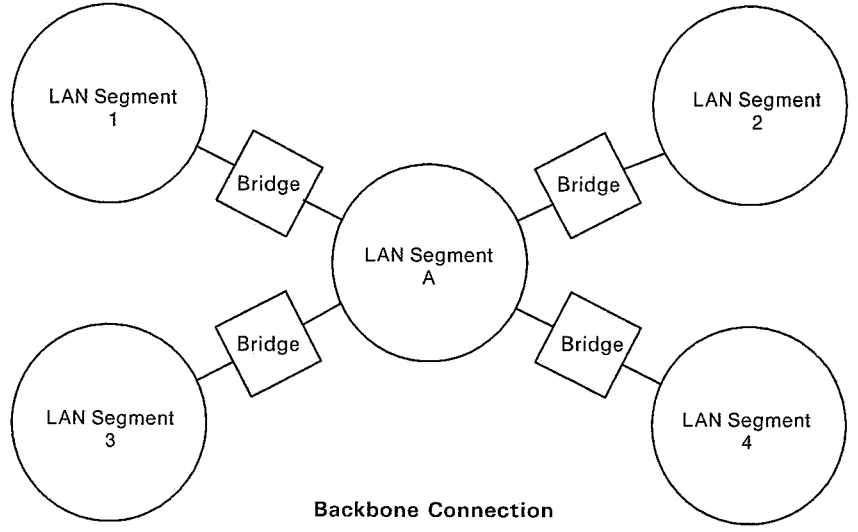


Figure C-2. A Backbone Connection

Bridge Program Configuration Considerations

The following sections deal with understanding the following three parameters, so that you can set them correctly for your network:

1. Locally administered addresses for the primary and alternate adapters in the bridge computer
2. Single-route broadcast
3. Early Token Release.

You must set the ETR and single-route broadcast parameters correctly to maintain the correct performance level of the network.

Locally Administered Addresses

Each adapter installed in a device on the network is recognized by one or more addresses in communications on the network.

Network adapters used in the bridge computer have a 12-digit hexadecimal universally administered address that is permanently encoded in the adapter's microcode as it is manufactured. You may choose to override the universally administered address on the adapter by assigning a locally administered address to that adapter.

You can choose to use locally administered addresses to do the following actions:

- More easily identify the bridge adapters by assigning values that have significance in your establishment (such as location)
- Replace adapters without having to modify the bridge configuration.
- Satisfy some product requirements for addresses with decimal digits only.

The adapter's locally administered address must consist of 12 hexadecimal digits that range from 4000 0000 0000 through 4000 7FFF FFFF.

For typical network installations, it is recommended that the address be restricted to decimal values. The locally administered address would then range from 4000 0000 0000 to 4000 7999 9999.

The use of a locally administered address to override the universally administered adapter address is indicated to an adapter by specifying the locally administered address as a parameter in the Configuration File before loading the Bridge Program. (See Chapter 2 for more information about the Configuration Program.)

Be sure to record the adapter's locally administered addresses on the "IBM Token-Ring Network Bridge Program Planning Chart" on page 2-31 and any other documentation associated with your network.

Warning: Each adapter address must be unique on the network. An error will result when two or more adapters with the same address try to use the network.

Single-Route Broadcast Information

Some programs and interfaces send a special type of broadcast message called single-route broadcast. The message is transmitted once and received by some or all users on the network. The programs that use single-route broadcast messages generally require that only one copy of a message arrive on each LAN segment of the network. On a multi-segment network connected by bridges, the configuration could allow several paths to the same LAN segment, thus allowing receipt of duplicate messages.

Note: The NETBIOS interface uses single-route broadcast messages to set up sessions. Any programs in your network that use the NETBIOS interface require a single path between any two LAN segments to prevent duplicate messages.

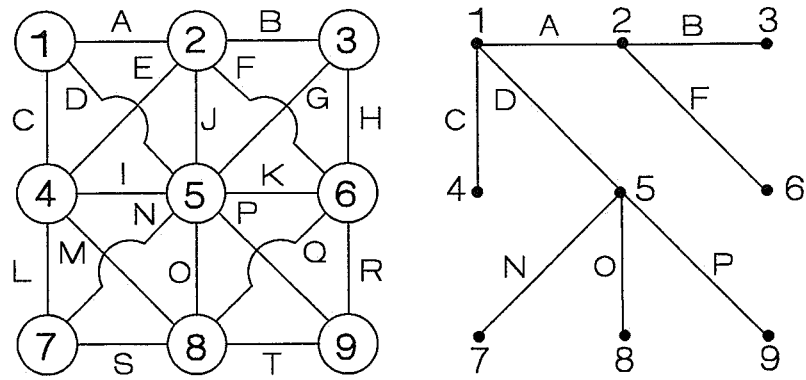
If you elect to use a network with certain configurations, such as parallel bridges, you will need a method of designating a single path between any two LAN segments. The Bridge Program provides the single-route broadcast function, which allows a single-route broadcast message to cross a bridge only if single-route broadcast is active on that bridge. The Bridge Program provides the function to do the following actions:

- Let you manually enable or disable single-route broadcast in each direction for a bridge in your network
- Let the Bridge Program automatically set single-route broadcast for a bridge in your network.

Single Route Broadcast — Manual Mode

You must determine which bridges in the network should have the single-route broadcast function active, and in which direction. Single-route broadcast is set active or inactive for each bridge adapter. "Active" for an adapter means that the Bridge Program will forward single-route broadcast messages through the bridge from that adapter to the other adapter. Although only one direction through the bridge could have single-route broadcast active, both directions are usually named the same (both single-route broadcast or neither single-route broadcast).

To determine manually which bridges need single-route broadcast active, you can draw a diagram like the one in Figure C-3. The illustration on the left side of the figure shows a nine-segment, mesh network. The diagram on the right is the planner's determination of which bridges should have single-route broadcast active.



Letters = Bridges
Numbers = LAN Segments

Figure C-3. Single-Route Broadcast Bridges

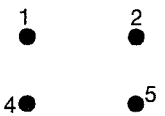
To prepare a similar diagram, follow the steps below:

1. Starting with any LAN segment, make a dot that represents that LAN segment and label it with the LAN segment number.

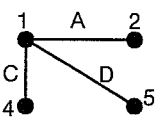
   The diagram in Figure C-3 on page C-7 began with LAN segment 1.

2. Make a dot for each LAN segment to which the first LAN segment is connected by a bridge. Label each new dot with its LAN segment number.

   In Figure C-3 on page C-7, LAN segment 1 connects to LAN segments 2, 4, and 5.

3. Draw a line from the dot for LAN segment 1 to each new dot; each line indicates a bridge. Label each line with the bridge identifier.

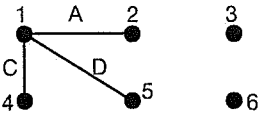
   

   In Figure C-3 on page C-7, bridges A, C, and D connect LAN segment 1 to LAN segments 2, 4, and 5 respectively.

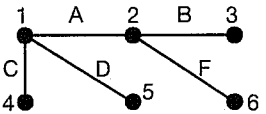
4. Taking each new dot in turn, make a dot for each LAN segment connected to it in the network that is not already shown in the diagram. Label each dot with the LAN segment number. Connect the dots with lines representing bridges; label the lines with bridge identifiers.

   In the example:

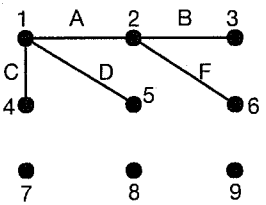
a. In Figure C-3 on page C-7, LAN segment 2 connects to LAN segments 3, 4, 5, and 6. Add dots for LAN segments 3 and 6; LAN segments 4 and 5 already appear on the diagram.



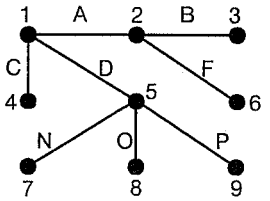
b. In Figure C-3 on page C-7, bridges B and F connect LAN segment 2 to LAN segments 3 and 6 respectively. Draw and label the lines for bridges B and F.



c. In Figure C-3 on page C-7, LAN segment 5 connects to LAN segment 1, 2, 3, 4, 6, 7, 8, and 9. Add and label dots for LAN segments 7, 8 and 9; the other LAN segments already appear in the diagram.



d. In Figure C-3 on page C-7, bridges N, O, and P connect LAN segment 5 to LAN segments 7, 8, and 9 respectively. Draw and label the lines for bridges N, O, and P.



e. In Figure C-3 on page C-7, LAN segment 4 connects to LAN segments 2, 5, 7, and 8. No new dots or lines are needed; all of these LAN segments already appear in the diagram.

   This completes the example; all of the LAN segments now appear on the diagram.

Each of the bridges shown in the completed example should have the single-route broadcast function active. The number of bridges with the single-route broadcast function active will always be equal to one less than the total number of LAN segments in the network.

While this procedure automatically takes care of parallel bridges, you should make sure that in all cases of parallel bridges, only one of the parallel bridges between two LAN segments has single-route broadcast active.

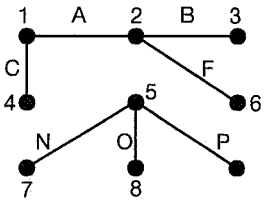
This procedure must be repeated each time:

- A bridge is added to or removed from the network for any reason, including bridge failures
- The single-route broadcast parameter setting is changed for any bridge in the network.

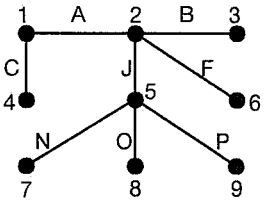
If one bridge's single-route broadcast parameter is changed, the procedure should be repeated to redraw the diagram for the entire network and determine which other bridges also need the single-route broadcast parameter changed. Otherwise, single-route broadcast communication between portions of the network will be either disconnected where it is needed or connected where it should not be.

In the completed example shown on page D-9:

If the single-route broadcast parameter is changed to inactive for bridge D or bridge D is not operating in the network, the diagram changes to the one shown at the right. Bridge D is not shown.



Bridge J must have its single-route broadcast parameter changed to active to maintain single-route broadcast communication over all nine LAN segments. Bridge J is added to the diagram.



You must be sure to keep a single path between any two LAN segments in the network when adding bridges, removing bridges, or changing bridge single-route broadcast parameter settings.

Single-Route Broadcast — Automatic Mode

You can configure the Bridge Program to perform the following actions automatically and dynamically:

- Communicate with the other bridges in a network to determine which bridges should have single-route broadcast active and which should not.
- Set the single-route broadcast configuration parameters for each bridge so that there is always a single path between any two LAN segments in the network.

Each bridge has a **bridge ID** that is recognized by the Bridge Program's automatic single-route broadcast function. The bridge ID consists of:

- A 2-byte bridge label, for which you can assign a value or use the default value during the Bridge Program configuration

  See page 2-25 in the "Automatic Mode" section of the single-route broadcast parameter description for more information about bridge IDs and bridge labels.

- The adapter address of the bridge adapter connected to the LAN segment with the lowest LAN segment number.

  The adapter addresses can be universally or locally administered addresses.

Path Cost

Each bridge also maintains a value called **path cost**, which indicates the relative length of the path between a bridge and a centrally located bridge (the *root bridge*). The path cost for the root bridge is zero. During Bridge Program configuration, you can assign a value or use the default value for a bridge's path cost increment. Each bridge's path cost is equal to the sum of the path cost increments of the bridges between it and the root bridge, plus its own path cost increment. See page 2-26 for additional information about path cost, including a table with path cost increment default values used by the Bridge Program.

Bridge Roles

In a network using automatic single-route broadcast, each bridge assumes one of three roles:

- The root bridge
  - There is at any one time only one root bridge in the network.
  - The root bridge is the active bridge with the lowest bridge ID in the network.
  - The responsibility of the root bridge is to send a "hello" message (containing its bridge ID, a path cost of zero, and timing information) every 2 seconds on both LAN segments to which it is connected.
  - The root bridge has single-route broadcast set to active in both directions.
- A designated bridge
  - A designated bridge has single-route broadcast active in both directions.
  - A designated bridge is either not parallel to any other bridge, or is the only bridge of two or more parallel bridges that has single-route broadcast active.

- The responsibility of a designated bridge is to recognize and receive "hello" messages from the root bridge, update the path cost and timing information in each message, and forward the "hello" messages to its other LAN segment.

- A standby bridge
  - A standby bridge has single-route broadcast set to inactive in both directions; it cannot forward single-route broadcast frames.
  - The responsibility of a stand-by bridge is to monitor, but not update and forward, the "hello" messages. As bridges enter and leave the network, a standby bridge may need to assume the role of designated or root bridge and begin forwarding single-route broadcast frames. The "hello" message will indicate when this is necessary.
  - A standby bridge is directly parallel to a designated or root bridge, or is at the end of a path that is parallel to a designated bridge.

In each bridge in the network, the Bridge Program uses path cost, bridge ID, and timing information to:

- Determine which role a newly active bridge should assume
- Determine whether a bridge is a parallel bridge or in a parallel path
- Determine which one of two or more parallel bridges should have single-route broadcast active
- Detect when the root bridge or a designated bridge has left the network
- Reassign the bridge roles as necessary when bridges enter and leave the network.

To use automatic single-route broadcast in your network, you will need to consider the following:

- Automatic mode, manual mode and non-automatic bridges

  If you use Bridge Programs in your network that do not provide the automatic single-route broadcast function, it is recommended that all bridges in the network be set to manual single-route broadcast.