Installing and Operating BayStack AN and ANH Routers

Bay Networks

Bay Networks

4401 Great America Parkway	8 Federal Street
Santa Clara, CA 95054	Billerica, MA 01821

USA Requirements Only

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to take whatever measures may be necessary to correct the interference at their own expense.

European Requirements Only

EN 55 022 Statement

This is to certify that the Bay Networks AN/ANH is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class A (CISPR 22).

Warning: This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

EC Declaration of Conformity

This product conforms (or these products conform) to the provisions of Council Directive 89/336/EEC and 73/23/EEC. The Declaration of Conformity is available on the Bay Networks World Wide Web site at www.baynetworks.com.

Japan/Nippon Requirements Only

Voluntary Control Council for Interference (VCCI) Statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Voluntary Control Council for Interference (VCCI) Statement

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Canada Requirements Only

Canadian Department of Communications Radio Interference Regulations

This digital apparatus (AN/ANH) does not exceed the Class A limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique (AN/ANH) respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada.

Canada CS-03 Rules and Regulations

Notice: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent the degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Notice: For equipment using loopstart lines, please note that the Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5. The REN is located on the "FCC Rules Part 68" label located on the bracket of the module, or on the back of the unit.

Canada CS-03 -- Règles et règlements

Avis: L'étiquette d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme aux normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Avertissement: L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

Avis: Veuillez prendre note que pour tout appareillage supportant des lignes de type "loopstart," l'indice d'équivalence de la sonnerie (IES) assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface. La terminaison d'une interface téléphonique peut consister en une combinaison de quelques dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5. Le REN figure sur l'étiquette "FCC Rules Part 68" située sur le support du module ou à l'arrière de l'unité.

FCC Part 68 Compliance Statement

This equipment complies with Part 68 of FCC Rules. All direct connections to telephone network lines must be made using standard plugs and jacks compliant with FCC Part 68. Please note the following:

1. You are required to request service from the telephone company before you connect the unit to a network. When you request service, you must provide the telephone company with the following data:

    • When you request T1 Service, you must provide the telephone company with

       -- The Facility Interface Code

          Provide the telephone company with all the codes below:

          - 04DU9-BN (1.544 MB, D4 framing format)
          - 04DU9-DN (1.544 MB, D4 framing format with B8ZF coding)
          - 04DU9-1KN (1.544 MB, ESF framing format)
          - 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
          - 04DU9-1ZN (1.544 MB, ANSI ESF and ZBTSI without line power)

          The telephone company will select the code it has available.

       -- The Service Order Code(s) (SOC): 6.0F

       -- The required Universal Service Order Code (USOC) jack: RJ48C

    • When you request 56K/64K Service, you must provide the telephone company with

       -- The Facility Interface Code: 04DU5-56/64

       -- The Service Order Code(s) (SOC): 6.0F

       -- The required Universal Service Order Code (USOC) jack: RJ48S

    • When you request V.34 Service, you must provide the telephone company with

       -- The required Universal Service Order Code (USOC) jack: RJ11C

       -- The make, model number, Ringer Equivalence Number (REN), and FCC Registration number of the unit

    The REN helps you determine the number of devices you can connect to your telephone line and still have all of those devices ring when your number is called. In most, but not all, areas, the sum of the RENs of all devices should not exceed 5.0. To be certain of the number of devices you can connect to your line, you should call your local telephone company to determine the maximum REN for your calling area.

    • When you request ISDN "U" Interface Service, you must provide the telephone company with

       -- The Facility Interface Code: 02IS5

       -- The Service Order Code(s) (SOC): 6.0F

       -- The required Universal Service Order Code (USOC) jack: RJ49C

    • When you request ISDN "S/T" Interface Service, you must provide the telephone company with

       -- The Service Order Code(s) (SOC): 6.0N

       -- The make, model number, and FCC Registration number of the NT1

Note: ISDN S/T cannot be directly connected to the network.

- When you request Primary Rate ISDN Service, you must provide the telephone company with
    - The Facility Interface Code: 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
    - The Service Order Code(s) (SOC): 6.0F
    - The required Universal Service Order Code (USOC) jack: RJ48C

2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify you in advance of such changes to give you an opportunity to maintain uninterrupted telephone service.

3. If the unit causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.

4. If you experience trouble with the unit, please contact the Bay Networks Technical Solutions Center in your area for service or repairs. Repairs should be performed only by service personnel authorized by Bay Networks, Inc.

United States	1-800-2LAN-WAN
Valbonne, France	33-4-92-96-69-68
Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5402-0180

5. You are required to notify the telephone company when you disconnect the unit from the network.

Bay Networks, Inc. Software License Agreement

NOTICE: Please carefully read this license agreement before copying or using the accompanying software or installing the hardware unit with pre-enabled software (each of which is referred to as "Software" in this Agreement). BY COPYING OR USING THE SOFTWARE, YOU ACCEPT ALL OF THE TERMS AND CONDITIONS OF THIS LICENSE AGREEMENT. THE TERMS EXPRESSED IN THIS AGREEMENT ARE THE ONLY TERMS UNDER WHICH BAY NETWORKS WILL PERMIT YOU TO USE THE SOFTWARE. If you do not accept these terms and conditions, return the product, unused and in the original shipping container, within 30 days of purchase to obtain a credit for the full purchase price.

1. License Grant. Bay Networks, Inc. ("Bay Networks") grants the end user of the Software ("Licensee") a personal, nonexclusive, nontransferable license: a) to use the Software either on a single computer or, if applicable, on a single authorized device identified by host ID, for which it was originally acquired; b) to copy the Software solely for backup purposes in support of authorized use of the Software; and c) to use and copy the associated user manual solely in support of authorized use of the Software by Licensee. This license applies to the Software only and does not extend to Bay Networks Agent software or other Bay Networks software products. Bay Networks Agent software or other Bay Networks software products are licensed for use under the terms of the applicable Bay Networks, Inc. Software License Agreement that accompanies such software and upon payment by the end user of the applicable license fees for such software.

2. Restrictions on use; reservation of rights. The Software and user manuals are protected under copyright laws. Bay Networks and/or its licensors retain all title and ownership in both the Software and user manuals, including any revisions made by Bay Networks or its licensors. The copyright notice must be reproduced and included with any copy of any portion of the Software or user manuals. Licensee may not modify, translate, decompile, disassemble, use for any competitive analysis, reverse engineer, distribute, or create derivative works from the Software or user manuals or any copy, in whole or in part. Except as expressly provided in this Agreement, Licensee may not copy or transfer the Software or user manuals, in whole or in part. The Software and user manuals embody Bay Networks' and its licensors' confidential and proprietary intellectual property. Licensee shall not sublicense, assign, or otherwise disclose to any third party the Software, or any information about the operation, design, performance, or implementation of the Software and user manuals that is confidential to Bay Networks and its licensors; however, Licensee may grant permission to its consultants, subcontractors, and agents to use the Software at Licensee's facility, provided they have agreed to use the Software only in accordance with the terms of this license.

3. Limited warranty. Bay Networks warrants each item of Software, as delivered by Bay Networks and properly installed and operated on Bay Networks hardware or other equipment it is originally licensed for, to function substantially as described in its accompanying user manual during its warranty period, which begins on the date Software is first shipped to Licensee. If any item of Software fails to so function during its warranty period, as the sole remedy Bay Networks will at its discretion provide a suitable fix, patch, or workaround for the problem that may be included in a future Software release. Bay Networks further warrants to Licensee that the media on which the Software is provided will be free from defects in materials and workmanship under normal use for a period of 90 days from the date Software is first shipped to Licensee. Bay Networks will replace defective media at no charge if it is returned to Bay Networks during the warranty period along with proof of the date of shipment. This warranty does not apply if the media has been damaged as a result of accident, misuse, or abuse. The Licensee assumes all responsibility for selection of the Software to achieve Licensee's intended results and for the installation, use, and results obtained from the Software. Bay Networks does not warrant a) that the functions contained in the software will meet the Licensee's requirements, b) that the Software will operate in the hardware or software combinations that the Licensee may select, c) that the operation of the Software will be uninterrupted or error free, or d) that all defects in the operation of the Software will be corrected. Bay Networks is not obligated to remedy any Software defect that cannot be reproduced with the latest Software release. These warranties do not apply to the Software if it has been (i) altered, except by Bay Networks or in accordance with its instructions; (ii) used in conjunction with another vendor's product, resulting in the defect; or (iii) damaged by improper environment, abuse, misuse, accident, or negligence. THE FOREGOING WARRANTIES AND LIMITATIONS ARE EXCLUSIVE REMEDIES AND ARE IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Licensee is responsible for the security of

its own data and information and for maintaining adequate procedures apart from the Software to reconstruct lost or altered files, data, or programs.

4. Limitation of liability. IN NO EVENT WILL BAY NETWORKS OR ITS LICENSORS BE LIABLE FOR ANY COST OF SUBSTITUTE PROCUREMENT; SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES; OR ANY DAMAGES RESULTING FROM INACCURATE OR LOST DATA OR LOSS OF USE OR PROFITS ARISING OUT OF OR IN CONNECTION WITH THE PERFORMANCE OF THE SOFTWARE, EVEN IF BAY NETWORKS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE LIABILITY OF BAY NETWORKS RELATING TO THE SOFTWARE OR THIS AGREEMENT EXCEED THE PRICE PAID TO BAY NETWORKS FOR THE SOFTWARE LICENSE.

5. Government Licensees. This provision applies to all Software and documentation acquired directly or indirectly by or on behalf of the United States Government. The Software and documentation are commercial products, licensed on the open market at market prices, and were developed entirely at private expense and without the use of any U.S. Government funds. The license to the U.S. Government is granted only with restricted rights, and use, duplication, or disclosure by the U.S. Government is subject to the restrictions set forth in subparagraph (c)(1) of the Commercial Computer Software—Restricted Rights clause of FAR 52.227-19 and the limitations set out in this license for civilian agencies, and subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause of DFARS 252.227-7013, for agencies of the Department of Defense or their successors, whichever is applicable.

6. Use of Software in the European Community. This provision applies to all Software acquired for use within the European Community. If Licensee uses the Software within a country in the European Community, the Software Directive enacted by the Council of European Communities Directive dated 14 May, 1991, will apply to the examination of the Software to facilitate interoperability. Licensee agrees to notify Bay Networks of any such intended examination of the Software and may procure support and assistance from Bay Networks.

7. Term and termination. This license is effective until terminated; however, all of the restrictions with respect to Bay Networks' copyright in the Software and user manuals will cease being effective at the date of expiration of the Bay Networks copyright; those restrictions relating to use and disclosure of Bay Networks' confidential information shall continue in effect. Licensee may terminate this license at any time. The license will automatically terminate if Licensee fails to comply with any of the terms and conditions of the license. Upon termination for any reason, Licensee will immediately destroy or return to Bay Networks the Software, user manuals, and all copies. Bay Networks is not liable to Licensee for damages in any form solely by reason of the termination of this license.

8. Export and Re-export. Licensee agrees not to export, directly or indirectly, the Software or related technical data or information without first obtaining any required export licenses or other governmental approvals. Without limiting the foregoing, Licensee, on behalf of itself and its subsidiaries and affiliates, agrees that it will not, without first obtaining all export licenses and approvals required by the U.S. Government: (i) export, re-export, transfer, or divert any such Software or technical data, or any direct product thereof, to any country to which such exports or re-exports are restricted or embargoed under United States export control laws and regulations, or to any national or resident of such restricted or embargoed countries; or (ii) provide the Software or related technical data or information to any military end user or for any military end use, including the design, development, or production of any chemical, nuclear, or biological weapons.

9. General. If any provision of this Agreement is held to be invalid or unenforceable by a court of competent jurisdiction, the remainder of the provisions of this Agreement shall remain in full force and effect. This Agreement will be governed by the laws of the state of California.

Should you have any questions concerning this Agreement, contact Bay Networks, Inc., 4401 Great America Parkway, P.O. Box 58185, Santa Clara, California 95054-8185.

LICENSEE ACKNOWLEDGES THAT LICENSEE HAS READ THIS AGREEMENT, UNDERSTANDS IT, AND AGREES TO BE BOUND BY ITS TERMS AND CONDITIONS. LICENSEE FURTHER AGREES THAT THIS AGREEMENT IS THE ENTIRE AND EXCLUSIVE AGREEMENT BETWEEN BAY NETWORKS AND LICENSEE, WHICH SUPERSEDES ALL PRIOR ORAL AND WRITTEN AGREEMENTS AND COMMUNICATIONS BETWEEN THE PARTIES PERTAINING TO THE SUBJECT MATTER OF THIS AGREEMENT. NO DIFFERENT OR ADDITIONAL TERMS WILL BE ENFORCEABLE AGAINST BAY NETWORKS UNLESS BAY NETWORKS GIVES ITS EXPRESS WRITTEN CONSENT, INCLUDING AN EXPRESS WAIVER OF THE TERMS OF THIS AGREEMENT.

Contents

Chapter 2
Installing the BayStack 8-Port ANH

Figures

Tables

About This Guide

If you are responsible for installing, starting, and operating a BayStack™ Access Node (AN®) router or a BayStack Access Node Hub (ANH™) router, you need to read this guide.

If you want to	Go to
Physically install an AN or a 12-port ANH router and attach communications equipment.	Chapter 1
Physically install an 8-port ANH router and attach communications equipment.	Chapter 2
Connect the AN or ANH to the network using one of the software configuration options.	Chapter 3
Operate the AN or ANH and interpret the LEDs.	Chapter 4
Configure the AN or ANH for Netboot or Directed Netboot.	Appendix A
Use Local Boot (the Quick-Start procedure).	Appendix B
Review the AN or ANH technical specifications.	Appendix C
Review the requirements for European operation.	Appendix D

➡ **Note:** The 12-port ANH router has the same base module and connectors as the AN router. The term *AN*, when used in this guide, includes the 12-port ANH, unless stated otherwise. Instructions for the 8-port ANH router generally differ and are described separately. The term *AN/ANH,* without reference to ports, means the AN, the 12-port ANH, and the 8-port ANH.

Before You Begin

Before installing the AN or ANH, ensure that all network wiring has been installed on the premises using standard cable-system practices.

Before turning on the AN or ANH for the first time, contact your network administrator to determine which software configuration option to use.

Conventions

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: if command syntax is **ping** *<ip_address>*, you enter **ping 192.32.10.12**
bold text	Indicates text that you need to enter, command names, and buttons in menu paths. Example: Enter **wfsm &** Example: Use the **dinfo** command. Example: ATM DXI > Interfaces > **PVCs** identifies the PVCs button in the window that appears when you select the Interfaces option from the ATM DXI menu.
brackets ([ ])	Indicate optional elements. You can choose none, one, or all of the options.
ellipsis points	Horizontal (. . .) and vertical ($\vdots$) ellipsis points indicate omitted information.
italic text	Indicates variable values in command syntax descriptions, new terms, file and directory names, and book titles.
quotation marks (" ")	Indicate the title of a chapter or section within a book.
screen text	Indicates data that appears on the screen. Example: Set Bay Networks Trap Monitor Filters
separator (>)	Separates menu and option names in instructions and internal pin-to-pin wire connections. Example: Protocols > AppleTalk identifies the AppleTalk option in the Protocols menu.

Example: Pin 7 > 19 > 20

vertical line (|)   Indicates that you enter only one of the parts of the
                           command. The vertical line separates choices. Do not
                           type the vertical line when entering the command.
                           Example: If the command syntax is

                           show at routes | **nets**, you enter either
                           show at routes or **show at nets**, but not both.

Acronyms

ANSI	American National Standards Institute
AUI	Attachment Unit Interface
BootP	Bootstrap Protocol
BRI	Basic Rate Interface
CCITT	International Telegraph and Telephone Consultative Committee (now ITU-T)
CSMA/CD	carrier sense multiple access/collision detection
CSU	channel service unit
CTS	clear to send
DCD	data carrier detect
DCE	data communications equipment
DCM	data collection module
DLCMI	data link control management interface
DSR	data set ready
DSU	data service unit
DTE	data terminal equipment
DTR	data terminal ready
EIA	Electronic Industries Association
GUI	graphical user interface
HDLC	high-level data link control
IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization

ITU-T	International Telecommunications Union-Telecommunication Standardization Sector
LAN	local area network
LED	light-emitting diode
MAC	media access control
MAU	media access unit
MDI	media-dependent interface
MDI-X	media-dependent interface with crossover
NBMA	nonbroadcast multiaccess
NEMA	National Electrical Manufacturers Association
NVFS	nonvolatile file system
OCU	office channel unit
OSI	Open Systems Interconnection
PCMCIA	Personal Computer Memory Card International Association
RLSD	received line signal detection
RTS	request to send
SMDS	Switched Multimegabit Data Service
SNMP	Simple Network Management Protocol
SQE	signal quality error
STP	shielded twisted pair
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial File Transfer Protocol
TPE	twisted pair Ethernet
UTP	unshielded twisted pair
WAN	wide area network

Bay Networks Technical Publications

You can now print technical manuals and release notes free, directly from the Internet. Go to *support.baynetworks.com/library/tpubs*. Find the Bay Networks products for which you need documentation. Then locate the specific category and model or version for your hardware or software product. Using Adobe Acrobat Reader, you can open the manuals and release notes, search for the sections you need, and print them on most standard printers. You can download Acrobat Reader free from the Adobe Systems Web site, *www.adobe.com*.

Documentation sets and CDs are available through your local Bay Networks sales office or account representative.

Bay Networks Customer Service

You can purchase a support contract from your Bay Networks distributor or authorized reseller, or directly from Bay Networks Services. For information about, or to purchase a Bay Networks service contract, either call your local Bay Networks field sales office or one of the following numbers:

Region	Telephone number	Fax number
United States and Canada	800-2LANWAN; then enter Express Routing Code (ERC) 290, when prompted, to purchase or renew a service contract 978-916-8880 (direct)	978-916-3514
Europe	33-4-92-96-69-66	33-4-92-96-69-96
Asia/Pacific	61-2-9927-8888	61-2-9927-8899
Latin America	561-988-7661	561-988-7550

Information about customer service is also available on the World Wide Web at *support.baynetworks.com*.

How to Get Help

If you purchased a service contract for your Bay Networks product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance.

If you purchased a Bay Networks service program, call one of the following Bay Networks Technical Solutions Centers:

Technical Solutions Center	Telephone number	Fax number
Billerica, MA	800-2LANWAN	978-916-3514
Santa Clara, CA	800-2LANWAN	408-495-1188
Valbonne, France	33-4-92-96-69-68	33-4-92-96-69-98
Sydney, Australia	61-2-9927-8800	61-2-9927-8811
Tokyo, Japan	81-3-5402-0180	81-3-5402-0173

Bay Networks Educational Services

Through Bay Networks Educational Services, you can attend classes and purchase CDs, videos, and computer-based training programs about Bay Networks products. Training programs can take place at your site or at a Bay Networks location. For more information about training programs, call one of the following numbers:

Region	Telephone number
United States and Canada	800-2LANWAN; then enter Express Routing Code (ERC) 282 when prompted 978-916-3460 (direct)
Europe, Middle East, and Africa	33-4-92-96-15-83
Asia/Pacific	61-2-9927-8822
Tokyo and Japan	81-3-5402-7041

Chapter 1
Installing the BayStack AN

This chapter describes how to install the BayStack Access Node (AN) router and the 12-port BayStack Access Node Hub (ANH) router and prepare for software installation. For information about installing the 8-port BayStack ANH, go to Chapter 2.

➡ **Note:** The 12-port ANH router has the same base module and connectors as the AN router. The term *AN*, when used in this guide, includes the 12-port ANH, unless stated otherwise. Instructions for the 8-port ANH router generally differ and are described separately. The term *AN/ANH,* without reference to ports, means the AN, the 12-port ANH, and the 8-port ANH.

> **Note:** The installation instructions in this chapter assume that wiring is already installed on the premises using standard cable system practices. Your installation procedure may differ slightly, depending on your cable system.

Overview of the AN and 12-Port ANH Hardware

The BayStack AN router is a low-end multiprotocol router/bridge or router/bridge/hub that provides both LAN and WAN connectivity. It is a cost-effective option for branch offices with minimal space and power resources.

The AN product line offers the following network interface configurations:

- Single Ethernet/Dual Synchronous
- Single Token Ring/Dual Synchronous
- Single Ethernet/Single Token Ring/Dual Synchronous

In addition, the AN can include the following upgrade options:

- Integrated Services Digital Network/Basic Rate Interface (ISDN BRI/ST or ISDN BRI/U)
- 56/64K DSU/CSU adapter module
- Third synchronous interface
- Additional token ring interface
- Second Ethernet interface
- N11 RMON data collection module (DCM)
- FT1/T1 DSU/CSU adapter module

For technical specifications of the AN models, refer to <u>Appendix C</u>.

Preparing to Install the AN

Before beginning the installation, verify the following information:

- Your AN shipment is complete and undamaged.
- You have the proper tools and equipment.

The sections that follow provide information to help you prepare for installation

You should also make sure that your installation site meets all AN site requirements. Refer to Appendix C for the physical, electrical, and environmental requirements of the AN.

Verifying Shipment Contents

Verify that the items you receive match the items in the packing list attached to the shipping container.

1. **Inspect all items for shipping damage.**

Caution: Check the AN for any damage to the ports on the back panel. If you detect damage, do not install the AN. Call your local Bay Networks Technical Solutions Center as described in "About This Guide."

2. **Make sure your shipping package contains the following items:**
   - Mounting hardware (Figure 1-1).
   - Power cable and console/modem cable kit (Figure 1-2).
   - Memory card protector (Figure 1-3).
   - Any network cables ordered with the router. If you do not have the appropriate network cables, contact your network administrator.
   - Warranty information.
   - This guide.

Four rubber feet

Two flange backets
(for installing the AN in an
equipment rack or
mounting it on a wall)

Four cagenuts with screws
(for installing the AN in an
equipment rack)

2 wall anchors
(for mounting the AN on a wall)
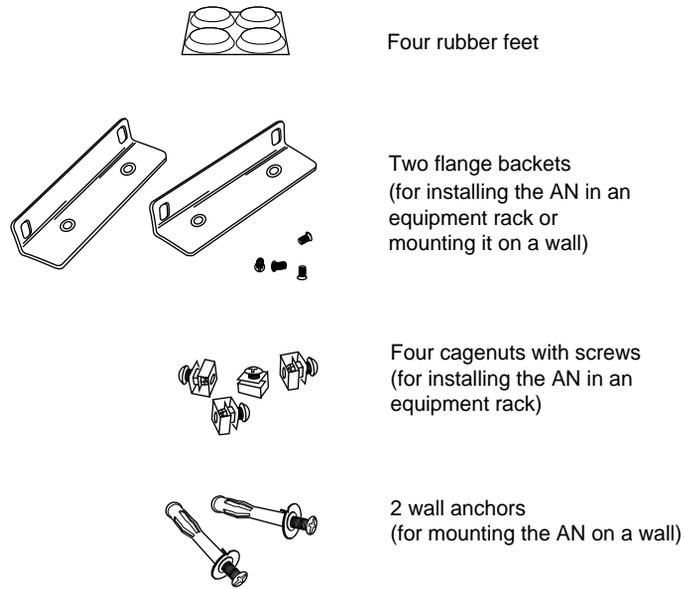
AN0001A

Figure 1-1.   AN Mounting Hardware

Power cable

For connecting to a grounded power outlet

DB-25 receptacle
null nodem adapter

DB-9 receptacle
to DB-25 plug
serial cable

For connecting an optional terminal
or modem to the console service port
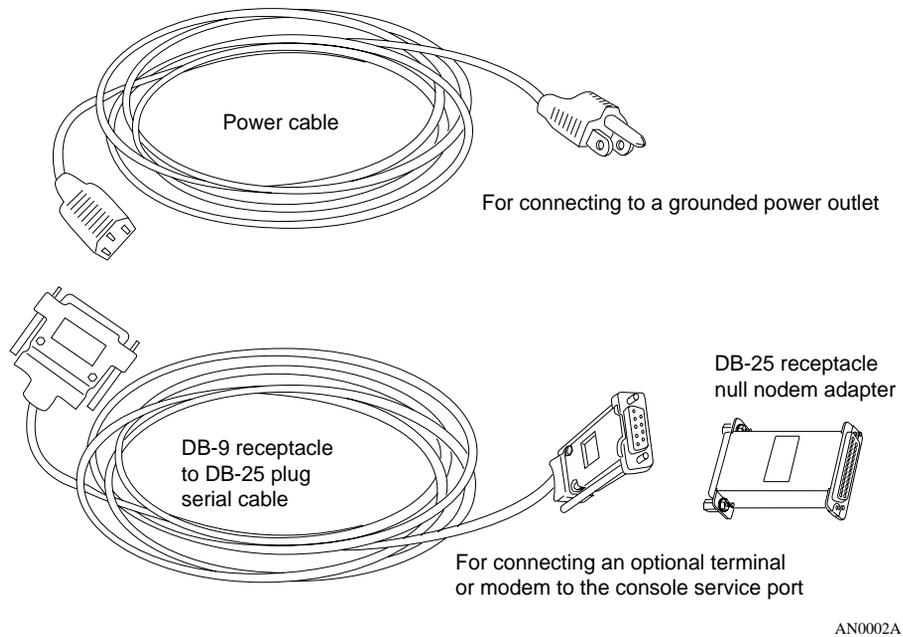
AN0002A

Figure 1-2.   AN Cables
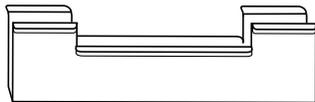
AN0036A

Figure 1-3.   Memory Card Protector

Supplying Tools and Equipment

To install the AN, you need the following tools and equipment:

- Phillips screwdriver, for attaching brackets to mount the AN in an equipment rack or on a wall

- Flat-tip screwdriver, for installing the memory card protector and attaching network cables to the AN

- Electric drill, if you intend to mount the AN on a wall

- Equipment rack that complies with the requirements listed in <u>Appendix C</u>, if you intend to install the AN in a rack

- VT-100 or equivalent console, when using Netboot, Directed Netboot, or Local Boot to start the router

Installing the PCMCIA Memory Card Protector

The AN ships with a memory card protector that you can install in the flash memory card receptacle to prevent removal of a memory card. After the protector is installed, you must remove the AN enclosure to remove or replace a PCMCIA card.

To install the memory card protector:

1. **Remove the AN enclosure.**

2. **Attach the protector.**

3. **Install the flash memory card.**

4. **Replace the AN enclosure.**

The following sections describes these tasks.

Removing the AN Enclosure

To install the memory card protector, remove the AN enclosure from the component tray and attach the metal protector to the front-panel memory card slot.

You need a flat-tip screwdriver or similar tool to install or remove the protector.

Caution: Attempting to install or remove the memory card protector while the AN enclosure is in place could damage an installed PCMCIA memory card.

To remove the AN enclosure from the component tray:

1. **Locate and unscrew the two captive thumbscrews on the back panel ([Figure 1-4](#)).**

⬡ **Caution:** Electrostatic discharge can damage the hardware when the AN enclosure is removed. To protect your equipment from damage, place the AN on an antistatic mat or static-free surface before removing the enclosure.
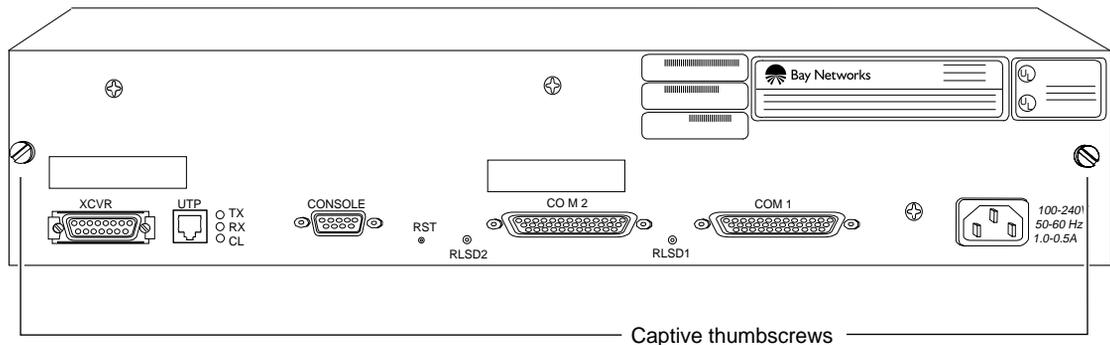
AN0083A

Figure 1-4.   AN Back-Panel Thumbscrews

2. **Grasping both sides of the AN enclosure, pull it away from the back panel and component tray until you can remove it.**

    Move the metal enclosure away from the component tray; do not touch the exposed base module.

Attaching the Protector

To attach the PCMCIA card protector to the front-panel memory card slot on the AN enclosure:

1. **Move the AN enclosure so that you have access to the front panel ([Figure 1-5](#)).**

Memory card slot

AN0088A
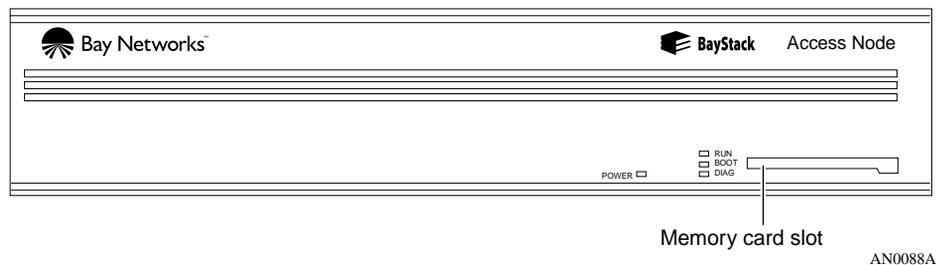
Figure 1-5.   AN Front Panel

2. **Holding the protector horizontally (Figure 1-6), insert two holding tabs into the AN enclosure card slot cutout. Rest the corresponding outer flange against the outside of the enclosure.**

Outside flange (1 of 2)

Inside holding tab (1 of 4)

AN0084A
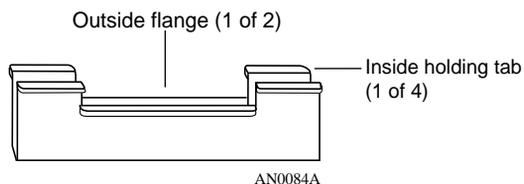
Figure 1-6.   Tabbed Edges and Flanges on Memory Card Protector

The bottom of the enclosure cutout should be between one outside flange and one pair of inside holding tabs.

⚠ **Warning:** Do not hold or press on the metal edges of the protector; the edges are very sharp.

3. **Using a screwdriver or similar tool, press down firmly on the top two holding tabs until they snap inside the cutout.**

The protector is properly installed when both outer flanges rest securely against the front panel (Figure 1-7).

AN0085A
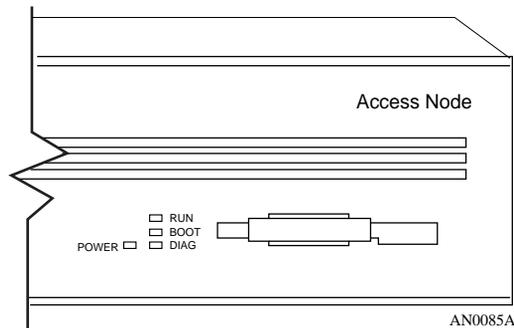
Figure 1-7.   Installed Memory Card Protector

Installing the Flash Memory Card

To install the flash memory card:

1. **Position the card (Figure 1-8) with the label facing up and the INSERT arrow pointing toward the memory card receptacle (refer to Figure 1-5) on the AN component tray.**
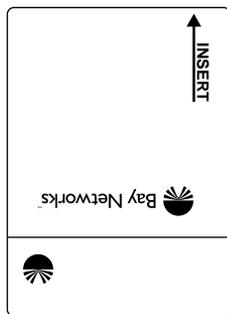
AN0060A

Figure 1-8.   Flash Memory Card

2. **Insert the card into the receptacle.**

3. **Gently push the card until it fits snugly into place.**

Replacing the AN Enclosure

To replace the AN enclosure:

1. **Grasping both sides of the AN enclosure, align the bottom edges with the component tray.**

2. **Push the enclosure toward the back panel.**

3. **Fasten the two captive thumbscrews on the back panel (refer to Figure 1-4).**

> **Note:** In this guide, illustrations of the AN front panel show the router without the memory card protector installed. However, the front panel of your AN should look like the one shown in Figure 1-7.

Installing the AN

You can install the AN in any of the following ways:

- Position the AN on a flat, sturdy surface.

- Install the AN in an equipment rack.

- Mount the AN on a wall.

The following sections provide instructions for each option. Refer to the appropriate section when positioning your AN.

Positioning the AN on a Flat Surface

To position the AN on a flat surface:

1. **Make sure the surface is large enough for the AN to operate properly.**

   The surface must be sturdy enough to support the combined weight of the AN and any cables you connect.

2. **Peel the paper backing off the four rubber feet supplied with the AN and attach them to the embossed feet on the bottom of the AN.**

3. **Set the AN in the chosen location.**

You can now connect the network cables to your AN. Go to "Connecting Communications Cables to the AN," later in this chapter.

Installing the AN in a Rack

For this procedure, you need the contents of the AN shipment, an equipment rack, and a Phillips screwdriver.

To install the AN in a rack:

1. **Attach a flange bracket to each side of the AN (Figure 1-9) as follows:**

    a. **Align the flange holes with the AN mounting holes.**

    b. **Insert a flange screw through each flange hole and into the AN.**

    c. **Tighten each flange screw with a Phillips screwdriver.**

AN0003A
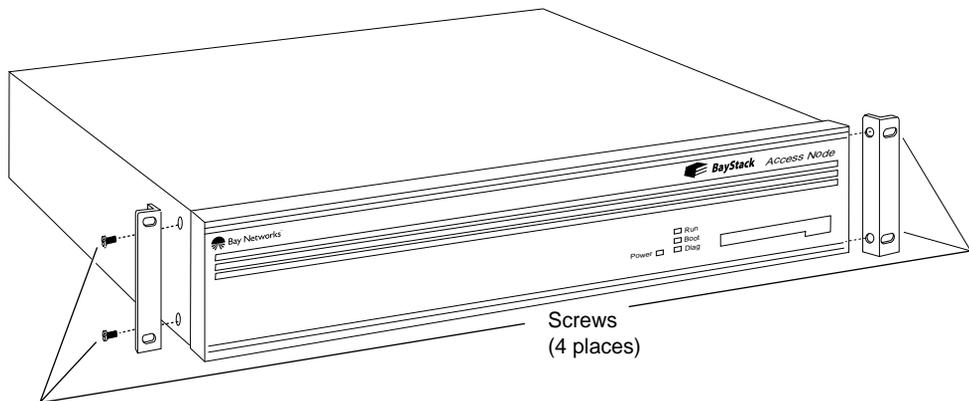
Figure 1-9. **Attaching Flange Brackets to the AN**

2. **Place the AN in the rack, aligning the flange holes with the holes in the front vertical supports of the rack (Figure 1-10).**

3. **Insert a cagenut screw through each flange hole and into the corresponding holes in the front vertical supports of the rack.**

→ **Note:** If the rack does not have threaded rail holes, use the cagenuts along with the cagenut screws.

4. **Tighten each cagenut screw with a Phillips screwdriver.**
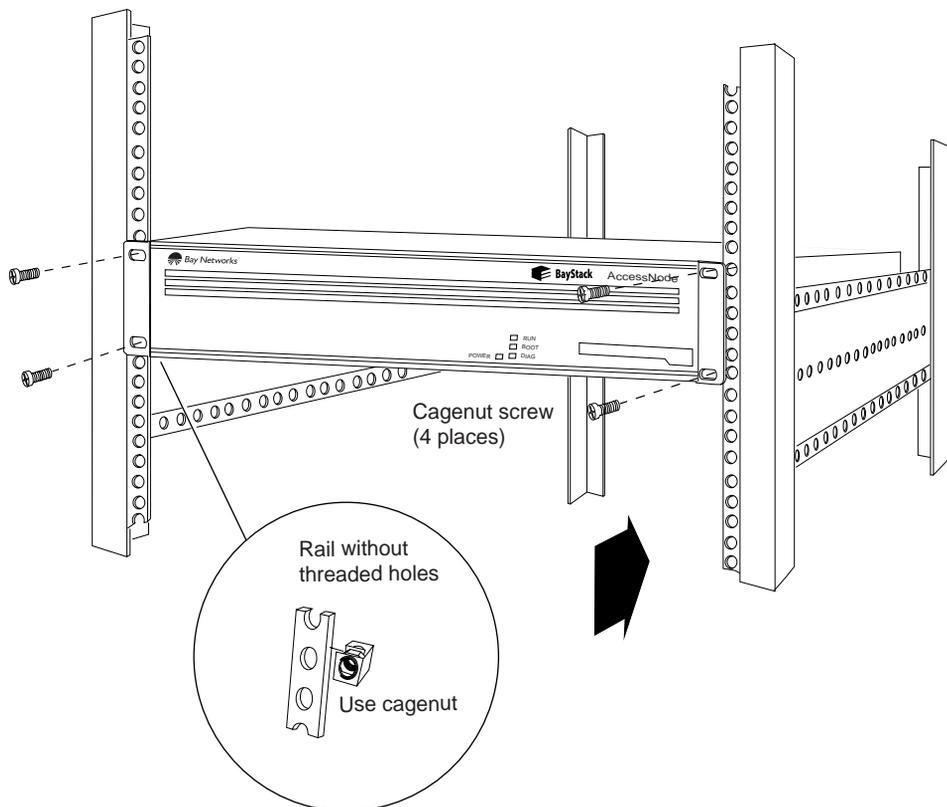
AN0004A

Figure 1-10.   Installing the AN in a Rack

You can now connect the network cables to your AN. Go to "Connecting Communications Cables to the AN," later in this chapter.

Mounting the AN on a Wall

When mounting the AN on a wall, keep the following in mind:

- Make sure that the wall is at least 3/8 inch (in.) (0.96 cm) thick and is made of sheetrock or wood.

- You need the following equipment:

    -- Electric drill

-- Phillips screwdriver

-- Two wall-mount anchors

To mount the AN on a wall:

1. **Drill two 5/16-in. (0.8 cm) holes in the wall 5-1/4 in. (13.34 cm) apart, at least 3 feet (ft.) (0.915 m) above the floor.**

2. **Insert one wall-mount anchor into each hole.**

3. **Tighten the anchors with a Phillips screwdriver.**

4. **Back the head of each screw out 1/8 in. (0.32 cm) from the wall.**

5. **Hang the AN on the wall by aligning the keyhole cutouts on the back of the AN with the protruding screw heads (Figure 1-11).**
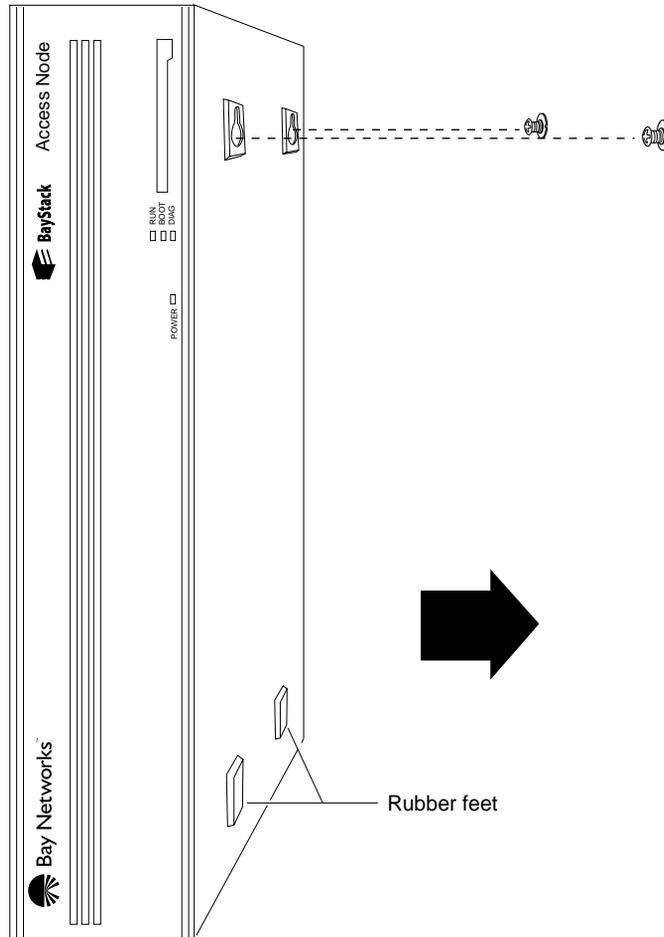
AN0005A

Figure 1-11.   Mounting the AN on a Wall

Connecting Communications Cables to the AN

Figure 1-12 illustrates a sample cable configuration. To connect network cables to the back of the AN or 12-port ANH:

1. **Connect the appropriate network cables to the communications ports on the back of the router (Figure 1-12).**

    For some cables, you may need a flat-tip screwdriver to secure the connector in place.

    Appendix C describes the communications ports that are available on the different AN and 12-port ANH models.
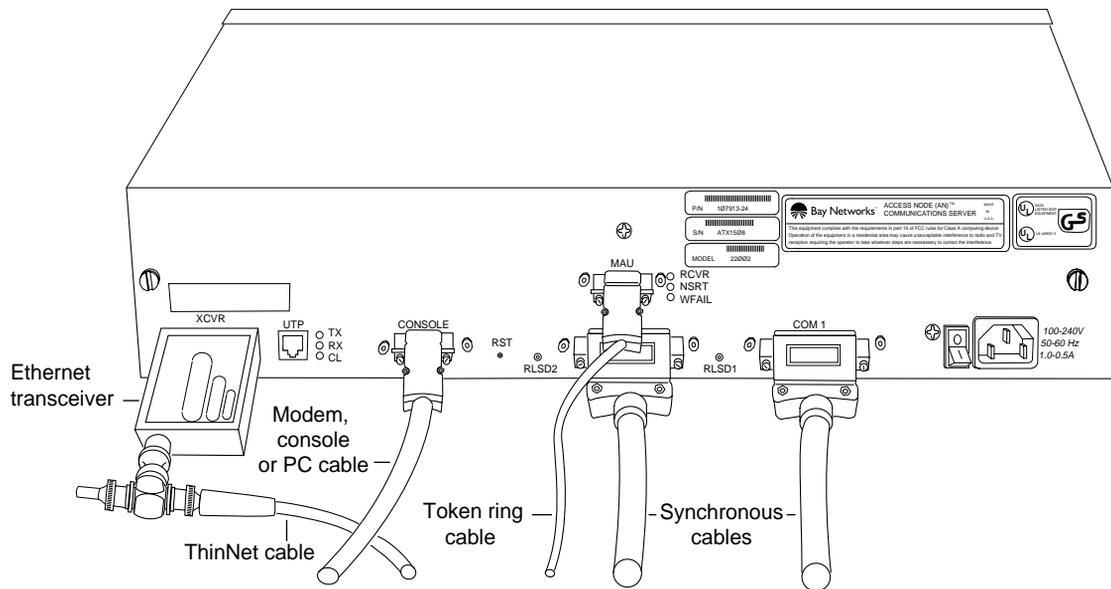
AN0089A

Figure 1-12.   Plugging Cables into the AN

2. **Connect the network cables to the physical network.**

    Contact your network administrator or see the *Cable Guide* if you need assistance in connecting the router to the physical network devices or if you are missing any network cables.

Connecting to a 56/64K DSU/CSU Interface

If you upgraded the AN or 12-port ANH with a 56/64K DSU/CSU adapter module, you can connect a 56/64K DSU/CSU cable to the router as follows:

To connect to a 56/64K DSU/CSU interface:

1. **Insert the 56/64K DSU/CSU cable connector into the DSU/CSU interface labeled DDS ([Figure 1-13](#)).**
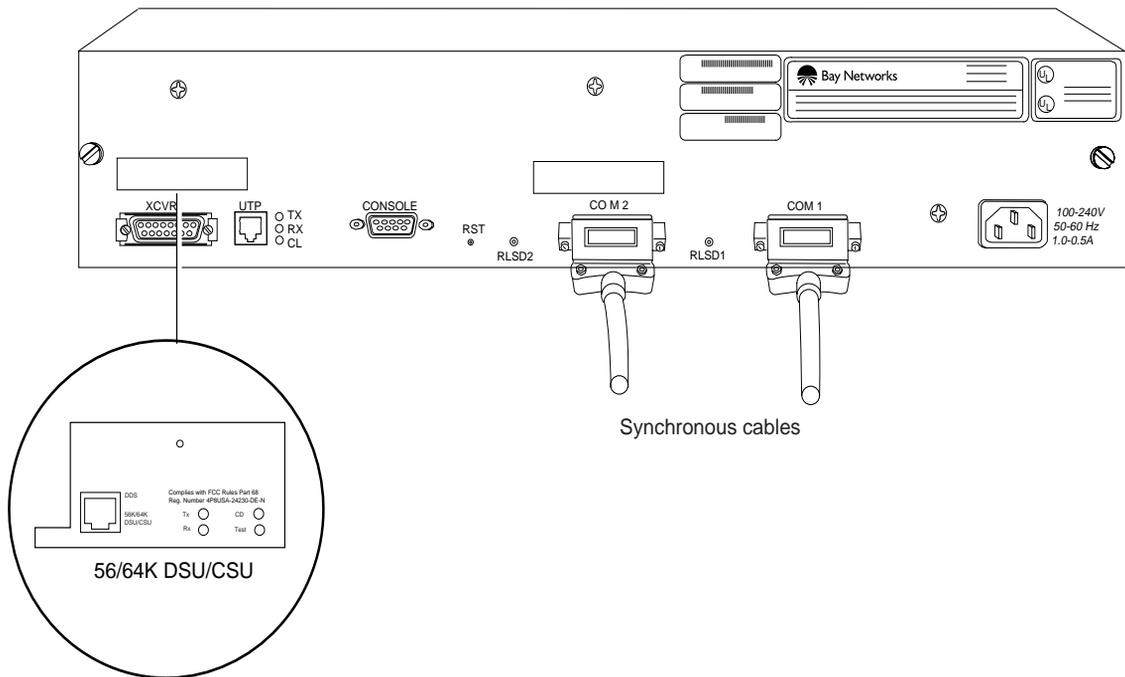
AN0131A

Figure 1-13.   Connecting a 56/64K DSU/CSU Cable

2. **Connect the other end of the cable to a digital line (for example, a digital-line wall jack that connects to an office channel unit [OCU]).**

Connecting an FT1/T1 DSU/CSU Cable

If you upgraded the AN or 12-port ANH with an AN/ANH FT1/T1 DSU/CSU adapter module, you can connect the FT1/T1 DSU/CSU cable to the back of the AN or ANH as follows:

1. **Plug the FT1/T1 DSU/CSU cable into the RJ-48C connector (Figure 1-14).**
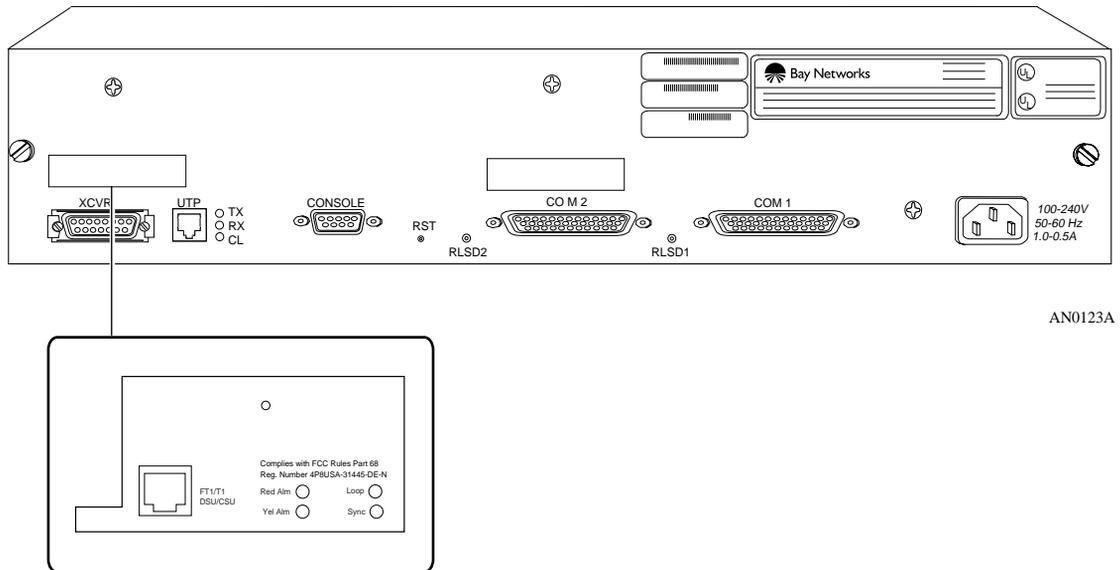
Figure 1-14.   Connecting an FT1/T1 DSU/CSU Cable

2. **Connect the other end of the cable to the T1 communication device.**

Connecting an ISDN Cable

If you upgraded the AN or 12-port ANH with an ISDN Basic Rate Interface (BRI) module, you can connect an ISDN BRI cable to the back of the router as follows:

1. **Plug the ISDN cable into the ISDN-BRI connector ().**
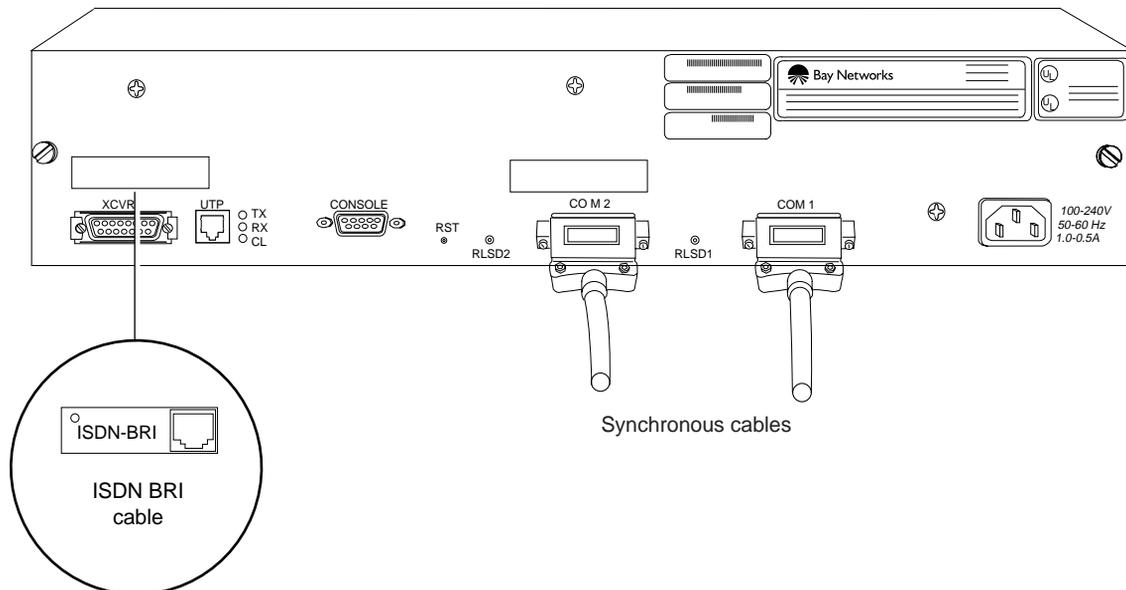
AN0130A

Figure 1-15.   Connecting an ISDN BRI Cable

2. **Connect the other end of the cable to the ISDN communications device.**

Connecting Synchronous Cables

To connect from one to three synchronous interface cables to the back of the AN or 12-port ANH:

1. **Locate the RS-232, RS-422, V.28, V.35, or X.21 interface cable.**

   For information about these cables, see the *Cable Guide*.

2. **Connect the cable to the back panel port labeled COM1, COM2, or COM3 ().**
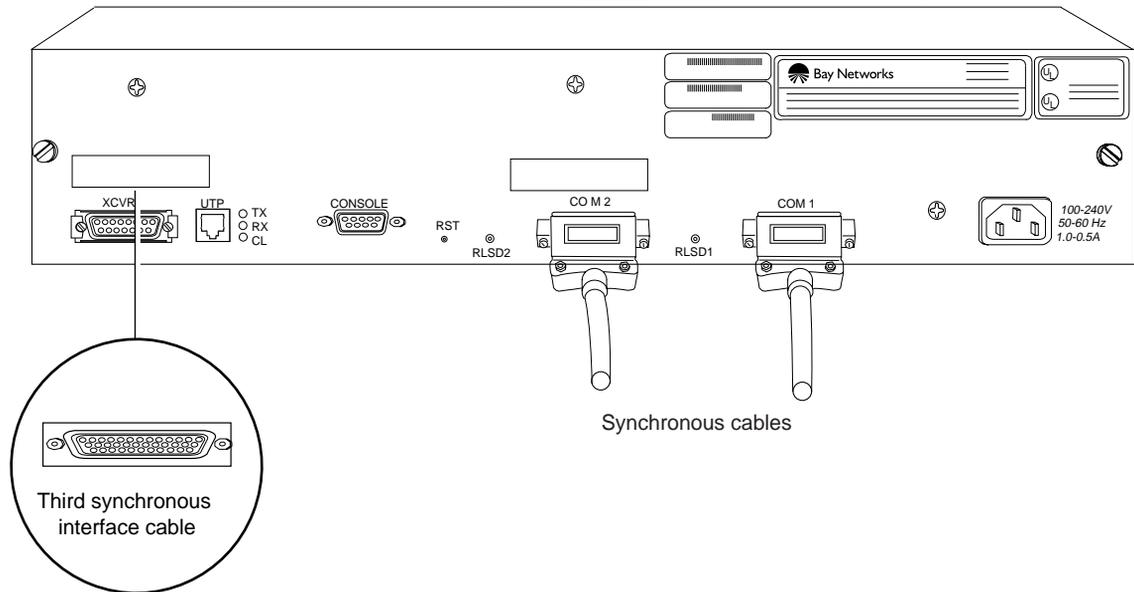
AN0129A

Figure 1-16. **Connecting Synchronous Cables to COM1, COM2, or COM3**

       3. **Secure the screws on the cable's COM connector.**

       4. **Connect the other end of each cable to the appropriate communications equipment.**

Connecting the 12-Port ANH Ethernet Repeater Ports to the Network

➡️ **Note:** This section is specific to the 12-port ANH and cannot be applied to an AN router. See "Connecting Communications Cables to the AN" for connection information common to both router types.

Figure 1-17 shows the 12-port ANH router with dual synchronous interfaces.

Ethernet repeater ports

Synchronous interfaces

AN0007A
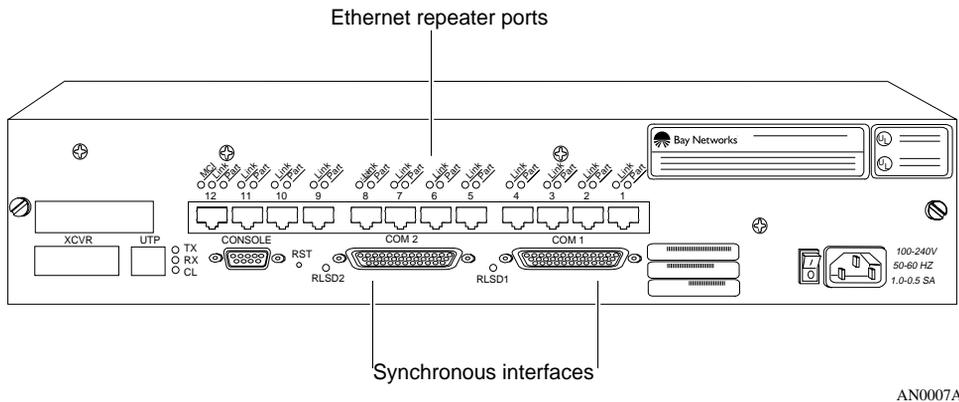
Figure 1-17.   12-Port ANH with Dual Synchronous Interfaces

When connecting cables to the Ethernet repeater ports, note the following:

- The 12-port ANH allows simultaneous connection to any and all of the 12 Ethernet repeater ports.

- Each repeater port ships with an internal crossover connection. This means that you can use a straight-through cable when connecting to other network resources (for example, workstations or other nonrepeating devices).

- A switch on the repeater port module lets you adjust port 12 from a crossed-over to a straight-through configuration when linking to other hubs. See the next section for more information about the crossover switch.

- As a repeater, the 12-port ANH transmits the same information over all Ethernet ports simultaneously.

Using the Crossover Switch

The 12-port ANH has an internal crossover switch that affects repeater port 12. By default, the crossover switch is set to the crossover position.

You can adjust the crossover switch to change port 12 from a crossed-over configuration (media-dependent interface with crossover, or MDI-X) to a straight-through configuration (media-dependent interface, or MDI), as follows:

- In MDI-X (crossover) mode, transmit and receive signal connections are reversed.

- In MDI mode, the port transmits and receives straight-through signals.

You can use port 12 in MDI mode to connect (daisy-chain) the ANH to another 10BASE-T MDI-X port using unshielded twisted pair (UTP) straight-through RJ-45 patch cables (instead of a special crossover cable). You can interconnect as many as four hub units using the Ethernet repeater ports.

The following sections explain how to:

- Access and adjust the internal crossover switch.

- Connect the 12-port ANH to another 10BASE-T hub, such as the Bay Networks Model 2800 Hub.

Accessing and Adjusting the Crossover Switch

To access and adjust the crossover switch:

1. **Loosen the two captive thumbscrews on the ANH back panel (refer to Figure 1-4).**

2. **Grasping both sides of the ANH enclosure, pull it away from the back panel and component tray until you can easily reach the crossover switch (Figure 1-18).**

3. **Adjust the crossover switch to either the crossover or straight-through position (Figure 1-18).**
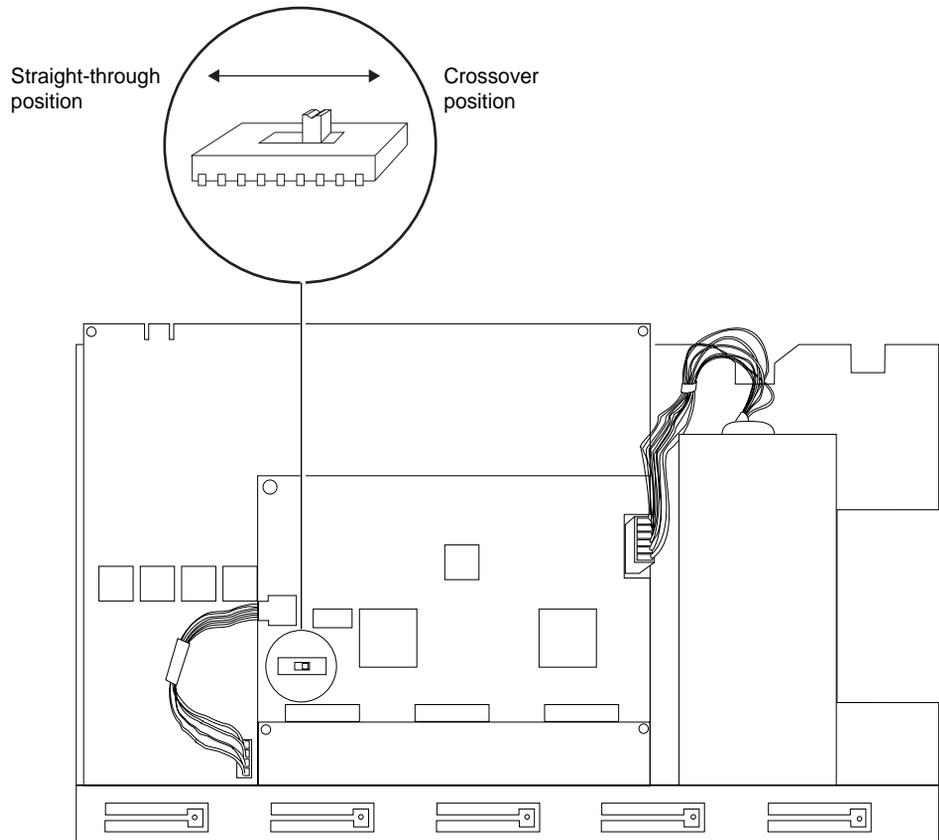
Figure 1-18. **Accessing and Adjusting the Crossover Switch**

→ **Note:** By default, the switch is in the crossover position.

4. **Slide the ANH back panel into the chassis.**

5. **Tighten the thumbscrews.**

Connecting the 12-Port ANH to Other 10BASE-T Hubs

If you plan to daisy-chain a 12-port ANH to other repeater/hub systems, you must make sure your network complies with Ethernet operating standards. For more information, contact your network administrator.

→ **Note:** In addition to a 12-port ANH, you can also connect an 8-port ANH to other 10BASE-T hubs as described in "Connecting the ANH to Other Repeaters/Hubs" in Chapter 2. You cannot make such a connection, however, with an AN router.

To determine whether you need to use a crossover cable or a straight-through cable to interconnect hub units, consider the following:

- If the Ethernet UTP ports on both hubs are in MDI mode, use a crossover cable.

- If the UTP ports on both hubs are in MDI-X mode, use a crossover cable.

- If the UTP port on one hub is in MDI mode, and the UTP port on the other hub is in MDI-X mode, use a straight-through cable.

For example, suppose you want to link your 12-port ANH to a Bay Networks Model 2800 Hub and you have only a straight-through cable. You could do the following:

1. **Set the crossover switch to MDI mode on the ANH.**

2. **Connect one end of the straight-through cable to port 12 on the ANH.**

3. **Connect the other end of the straight-through cable to any MDI-X port on the Bay Networks Model 2800 Hub.**

Or, you could set the appropriate port on the Model 2800 Hub to MDI mode and connect the straight-through cable from that port to any port on the 12-port ANH (including port 12 if the crossover switch is in the default position).

Figure 1-19 shows a 12-port ANH connected to a Bay Networks Model 2800 Hub.

12-Port ANH

AN0009A
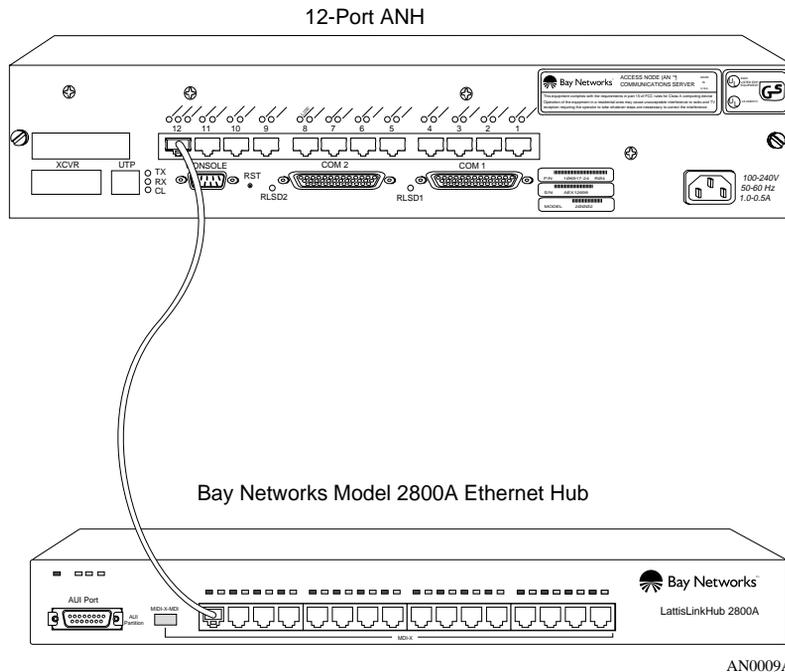
Figure 1-19.   Connecting an AN to a Bay Networks Model 2800 Hub

Connecting a Management Console or Modem

To connect an ASCII-based terminal, a PC terminal emulator, or a modem to the AN or 12-port ANH, use the back-panel console port. Using a local terminal, you can monitor the results of startup diagnostics and set the boot configuration. Using an attached modem, you can allow remote dial-in access to diagnostics.

To determine whether you need to connect a console to the AN or 12-port ANH, contact your network administrator to find out which software configuration option (EZ-Install, Netboot, Directed Netboot, or Local Boot) is best for your site. Refer to Chapter 3, "Starting the AN and ANH" for information about the software configuration options.

Although you do not need a console or modem connection to use EZ-Install, Bay Networks strongly recommends that you connect a console or modem to the AN. From the console or modem, you can issue commands to the AN and view messages.

→ **Note:** To use the Netboot, Directed Netboot, or Local Boot software configuration options, you must connect a console the first time you turn on the AN, as described in Chapter 3.

Complete the steps in one of the following sections:

- Connecting a Terminal Console
- Connecting a PC Console
- Connecting a Modem

Connecting a Terminal Console

To connect a console, you need both pieces in the AN console/modem cable kit (Order No. 110310) that shipped with the router (refer to Figure 1-2):

- Serial console/modem cable with 9-pin receptacle to 25-pin plug connectors (Order No. 110307)

- Null modem crossover adapter with two 25-pin receptacle connectors (Order No. 110308)

After you have the appropriate equipment, complete the following steps:

1. Turn on and configure the console, using the parameters in Table 1-1.

Refer to the console user manual for instructions.

Table 1-1. Console Parameters

Parameter	Value
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

2. **Attach the null modem crossover adapter to the 25-pin cable connector (Figure 1-20).**

3. **Insert the screws on the cable connector into the receptacle on the adapter connector and tighten each screw.**
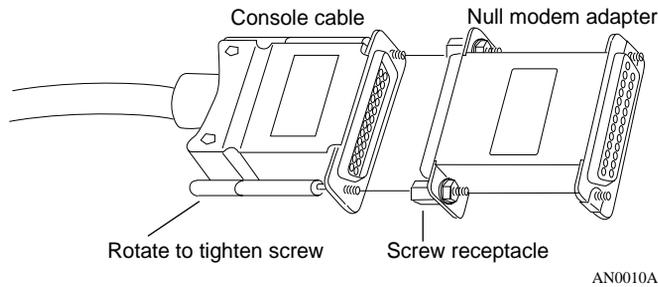
Figure 1-20.   Attaching the Null Modem Adapter to the Console Cable

4. **Insert the 9-pin receptacle end of the console cable into the CONSOLE port on the back panel of the AN (Figure 1-21).**
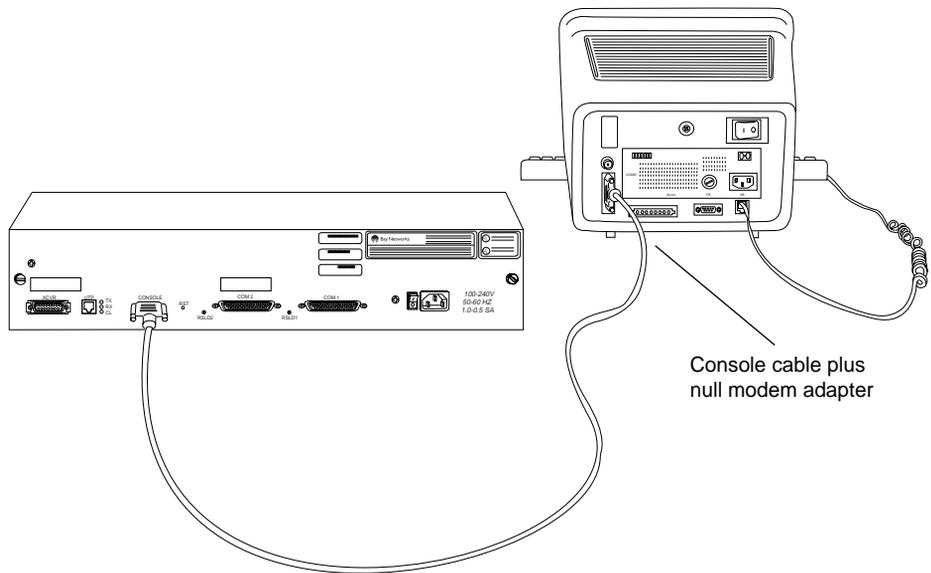
Figure 1-21.   Connecting a Terminal Console to the AN

5. **Attach the 25-pin receptacle connector on the combined cable and adapter to the terminal's host connector.**

The console is now connected to the AN. Go to "Connecting the Power Cable" at the end of this chapter.

Connecting a PC Console

To connect a PC, you need both pieces in the AN console/modem cable kit (Order No. 110310) that shipped with the router (Figure 1-2):

• Serial console/modem cable with 9-pin receptacle to 25-pin plug connectors (Order No. 110307)

• Null modem crossover adapter with two 25-pin receptacle connectors (Order No. 110308)

You also need another standard AT serial cable with a 25-pin plug connector. After you have the appropriate equipment, complete the following steps:

1. **Turn on and configure the PC concole, using the parameters in Table 1-1 and the instructions in the PC documentation.**

2. **Turn off the PC.**

3. **Insert the 9-pin receptacle end of the console cable into the CONSOLE port on the AN back panel (Figure 1-22).**

4. **Attach the null modem crossover adapter to the other end of the console cable, then tighten the screws (Figure 1-20).**

5. **Attach the 25-pin receptacle end of the cable-plus-adapter to the PC console cable's 25-pin plug connector (Figure 1-22).**

6. **Connect the complete cable unit to the communications port on the back of the PC (Figure 1-22).**
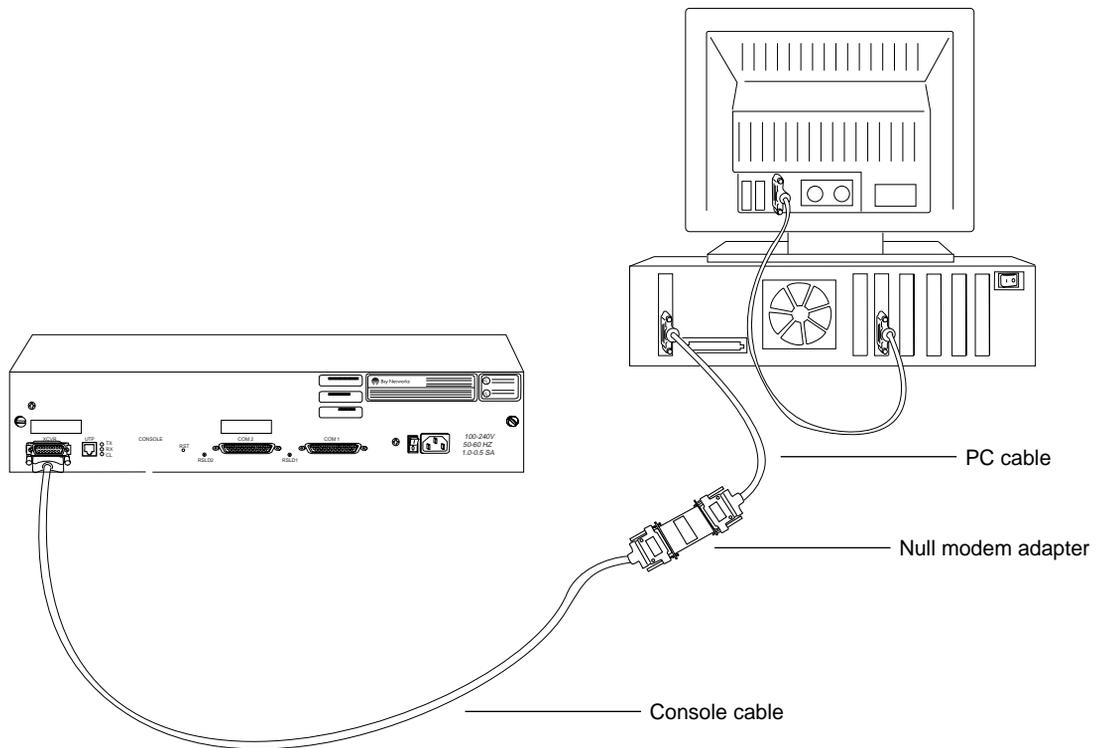
AN0012A

Figure 1-22.   Connecting a PC Console to the AN

The PC console is now connected to the AN. Go to "Connecting the Power Cable" at the end of this chapter.

Connecting a Modem

A modem provides remote access to the AN for a network administrator. Bay Networks recommends that you connect a modem in case the AN experiences system problems.

→ **Note:** Netboot, Directed Netboot, and Local Boot require a terminal or PC console connection. After the AN is on the network, you can replace the console connection with a modem connection. When using EZ-Install, you can connect a modem to the AN before or after you connect the AN to the network.

To connect a modem to the AN, you need:

- AT (or Hayes) compatible modem
- Modem cable in the AN console/modem cable kit (Order No. 110307)

Do *not* use the null modem adapter (Order No. 110308) from the AN cable kit.

After you have the appropriate equipment, complete the following steps:

1. **Configure the modem, using the parameters in Table 1-2.**

   Refer to the modem user guide for instructions.

Table 1-2.   **Modem Parameters**

Modem Signal/Parameter	Value
Clear to send (CTS)	On
Data terminal ready (DTR)	Dependent on the modem type. Set DTR to require the modem to answer incoming calls.
Data carrier detect (DCD) or RLSD	On while carrier is present (the AN uses DCD to detect modem connect and disconnect).
Data set ready (DSR)	On
Ready to send (RTS)	Ignore
Synchronous/asynchronous mode	Asynchronous
AutoAnswer	Set on *n* rings with DTR active (*n* must be greater than 0).
Local character echo	Off
Supervisory functions	Off
Baud rate	9600 (or less)
Data bits	8
Stop bits	1
Parity	None

Caution: Do not connect a modem to the AN until you are certain that the modem is configured as described in Table 1-2. Connecting to the AN with an improperly configured modem could cause the router to fail or lose data.

2. Insert the 9-pin receptacle end of the modem cable into the back-panel CONSOLE port of the AN <u>(Figure 1-23)</u>.
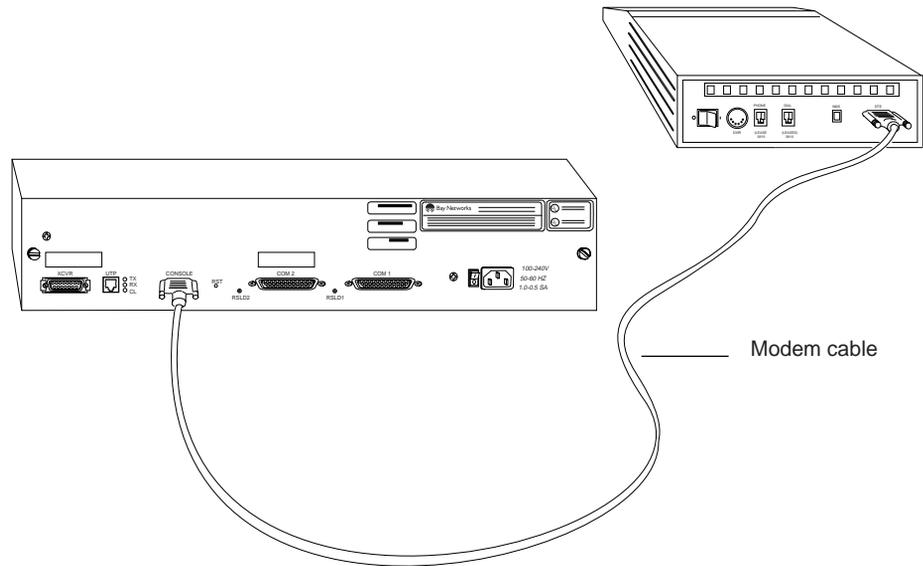
AN0013A

Figure 1-23.   Connecting a Modem to the AN

3. Insert the 25-pin plug at the other end of the modem cable into the modem's RS-232 data communications port.

The modem is now connected to the AN. Connect the power cable, as described next.

Connecting the Power Cable

To connect the power cable:

1. **Connect the power cable to the connector located on the far right of the AN back panel (Figure 1-24).**

⚠ **Danger:** Be sure that the power switch is in the OFF (0) position before you connect the power cable to the outlet.

---

2. **Connect the remote end of the power cable to a grounded outlet.**
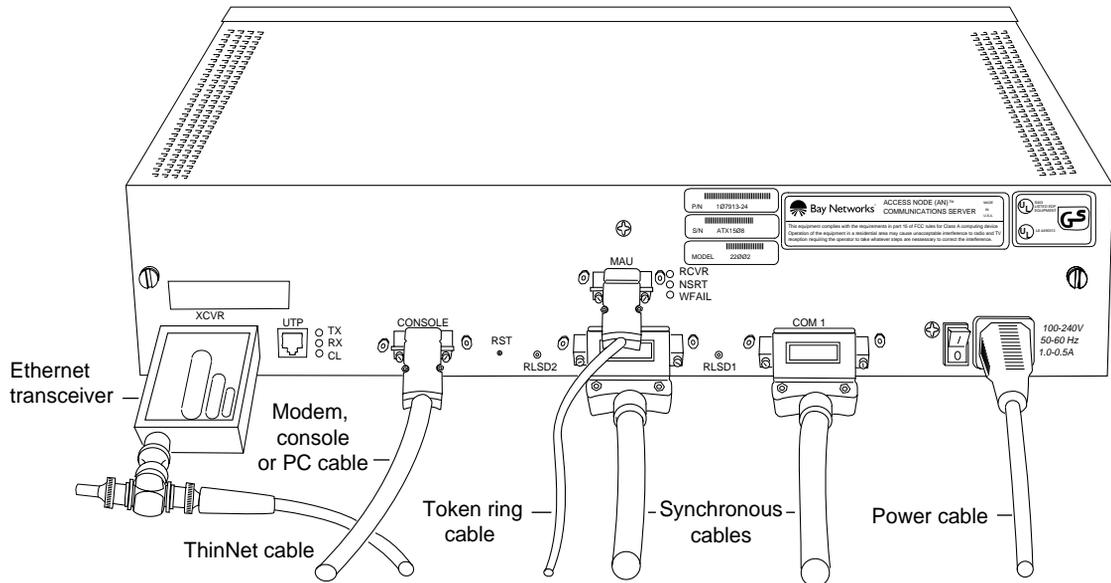
AN0006A

Figure 1-24.   **Connecting the Power Cable**

Chapter 2
Installing the BayStack 8-Port ANH

This chapter describes how to install the BayStack 8-port ANH router. Topics include the following:

Topic	Page

➡ **Note:** The installation instructions in this chapter assume that wiring is already installed on the premises using standard cable system practices. Your installation procedure may differ slightly, depending on your cable system.

Preparing to Install the 8-Port ANH

The installation of the 8-port ANH differs from that of an AN or 12-port ANH, which is described in Chapter 1, "Installing the BayStack AN."

Before beginning the installation, verify the following information:

- Your shipment is complete and undamaged.
- You have the proper equipment and tools.
- Your installation site meets the physical, electrical, and environmental requirements.
- You have the communication devices and the cables that you need to attach to the ANH.

The sections that follow provide information to help you prepare for installation.

Verifying Shipment Contents

To verify your 8-port ANH shipment:

1. **Inspect all items for shipping damage.**

    If you detect any damage, do not install the ANH. Call the Bay Networks Technical Solutions Center in your area, as described in "About This Guide."

2. **Verify that the items you received match the items on the packing list.**

    The packing list is usually affixed to the shipping container.

    The ANH shipping package contains the following items:

    - One **power cable** for connecting the ANH to a power outlet.
    - One **cable kit** (Order No. 110310) for connecting an optional local console or modem. The console/modem cable kit contains one 15-foot AT standard molded serial cable (with DB-9 receptacle to DB-25 plug connectors) and one null modem crossover adapter (with DB-25 to DB-25 receptacle connectors).
    - Two **flange brackets** with four #10 cagenut screws and washers for mounting the ANH.
    - Eight #6 Class B self-threading flathead **screws** (for mounting the ANH in an equipment rack).

- Four #6 Class B self-threading roundhead **screws** (for mounting the ANH on a wall).

- Four press-on rubber **feet** (for positioning the ANH on a flat surface).

Figure 2-1 illustrates the ANH shipping accessories.

For connecting to a grounded power outlet
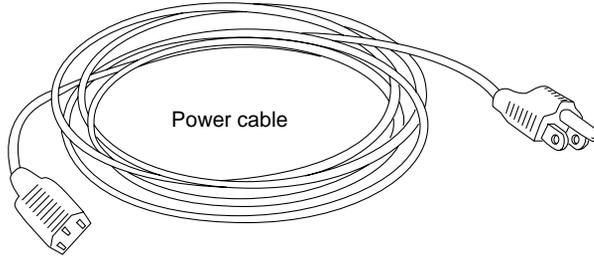
Power cable

For connecting an optional terminal or
modem to the console service port

DB-9 receptacle
to DB-25 plug cable

DB-25 receptacle
null modem adapter
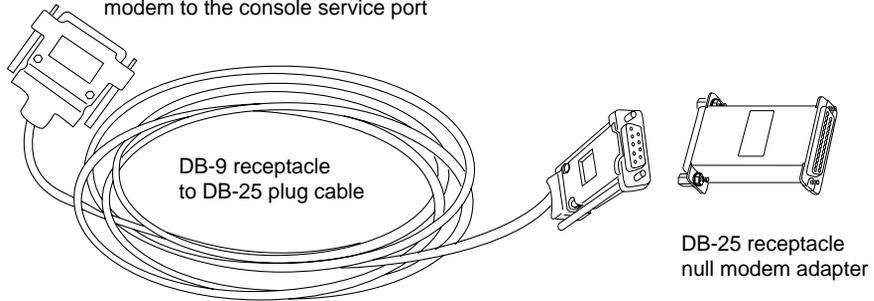
For installing the ANH in an
equipment rack or
mounting it on a wall
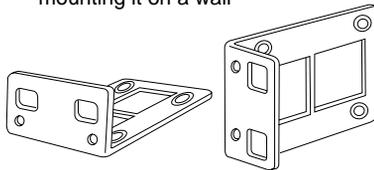
Two flange brackets

Eight #6 flathead screws

Four #6 roundhead screws

Four #10 cagenut screws and washers

Four rubber feet

AN0037A

Figure 2-1.   Accessories in the ANH Shipping Container

Supplying Equipment

You may need items that are not included in the ANH accessory package. Before installing the ANH hardware, ensure that you have all the cables, tools, and other equipment you need.

Cables

Unless you specifically ordered them, the Ethernet and synchronous cables required for your network configuration are not included in the ANH accessory package. If you do not have the proper cables, contact your network administrator or see the *Cable Guide.*

Management Console

You can attach an optional VT-100 console (or equivalent) to the ANH to monitor the results of startup diagnostics and perform manual boot configurations, or you can attach any AT compatible modem to allow remote dial-in access to diagnostics and configuration.

→ **Note:** To use the Netboot, Directed Netboot, or Local Boot configuration options (see Chapter 3), connect a console the first time you turn on the ANH.

Mounting Hardware

To mount the 8-port ANH in an equipment rack, you need a Phillips screwdriver and a rack that meets the following specifications:

- Heavy-duty steel construction
- Electronic Industries Association (EIA) standard hole-spacing
- Width of 19 in. (48.26 cm) and depth of 24 in. (60.96 cm)

If the rack does not have threaded rail holes, you must supply cagenuts to use with the cagenut screws (Figure 2-2).
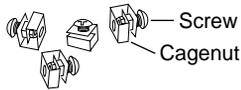
AN0038A

Figure 2-2.   Sample Cagenuts and Screws for Unthreaded Rack Rails

To mount the ANH on a wall, you need at least four wall-mount anchor screws (Figure 2-3).
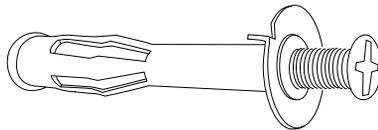
AN0039A

Figure 2-3.   Sample Wall-Mount Anchor Screw

Verifying Site Requirements

The installation site must provide sufficient space around the ANH to ensure proper ventilation and access for servicing, as detailed in Table 2-1.

Table 2-1.   Installation Space Requirements

Width	Minimum Depth	Depth for Servicing
19.25 in. (48.9 cm)	17.25 in. (43.8 cm)	26.25 in. (66.7 cm)

In addition, the installation site must meet the electrical and environmental specifications listed in Appendix C.

Caution: You must use grounded electrical power outlets with the ANH.

Installing the 8-Port ANH

When you are ready to install the 8-port ANH, you can do one of the following:

- Position the ANH on a flat, sturdy, horizontal surface.

- Install the ANH in an equipment rack.

- Mount the ANH on a wall.

The following sections provide instructions for each option. Refer to the appropriate section when positioning your ANH.

Positioning the ANH on a Flat Surface

To position the ANH on a flat surface, first apply the four press-on rubber feet to the bottom of the ANH chassis.

Make sure that the surface is large enough for the ANH to operate properly and sturdy enough to support the combined weight of the ANH and any cables you connect.

You can now connect the network cables to your ANH. Go to "Connecting Communications Cables."

Installing the ANH in a Rack

For this procedure, you need the following items:

- Four #10 cagenut screws and washers (shipped with the ANH)

- Two flange brackets and eight #6 flathead screws (shipped with the ANH)

- Phillips screwdriver

- Standard equipment rack

→ **Note:** If the rack does not have threaded rail holes, you must supply and attach four cagenuts.

To install the 8-port ANH in a rack:

1. **Attach a flange bracket to each side of the ANH as follows:**

   a. **Align the holes in the longer end of the bracket with the mounting holes near the front of the ANH (<u>Figure 2-4</u>).**

   b. **Insert a #6 flathead screw through each hole and into the ANH.**

   c. **Tighten the 4 screws with a Phillips screwdriver.**
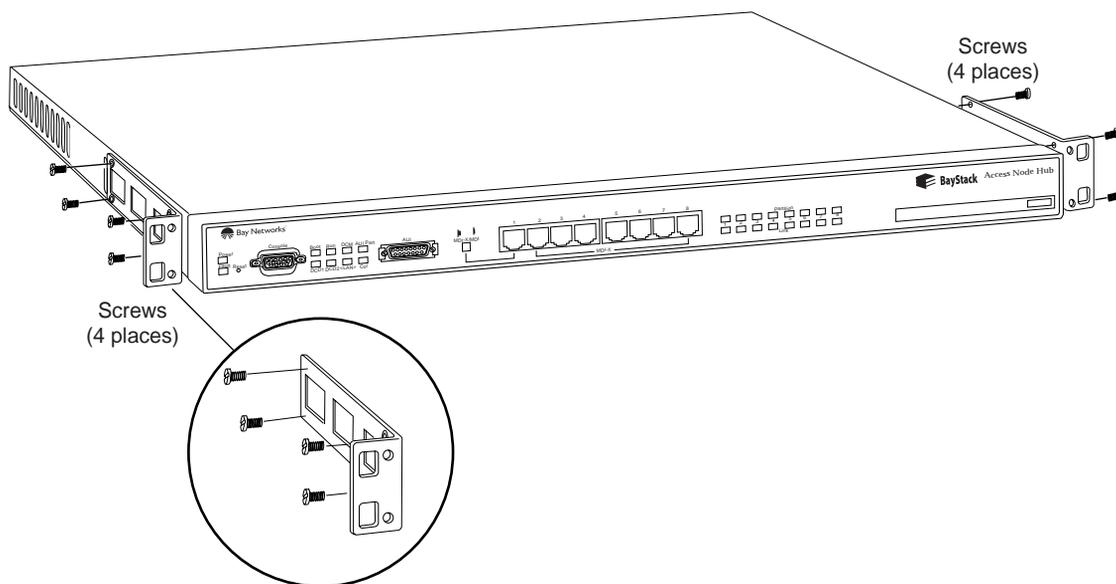
AN0040A

Figure 2-4. **Attaching Flange Brackets to Install the 8-Port ANH in a Rack**

2. **Align the flange bracket holes with the holes in the front vertical supports of the rack <u>(Figure 2-5)</u>.**
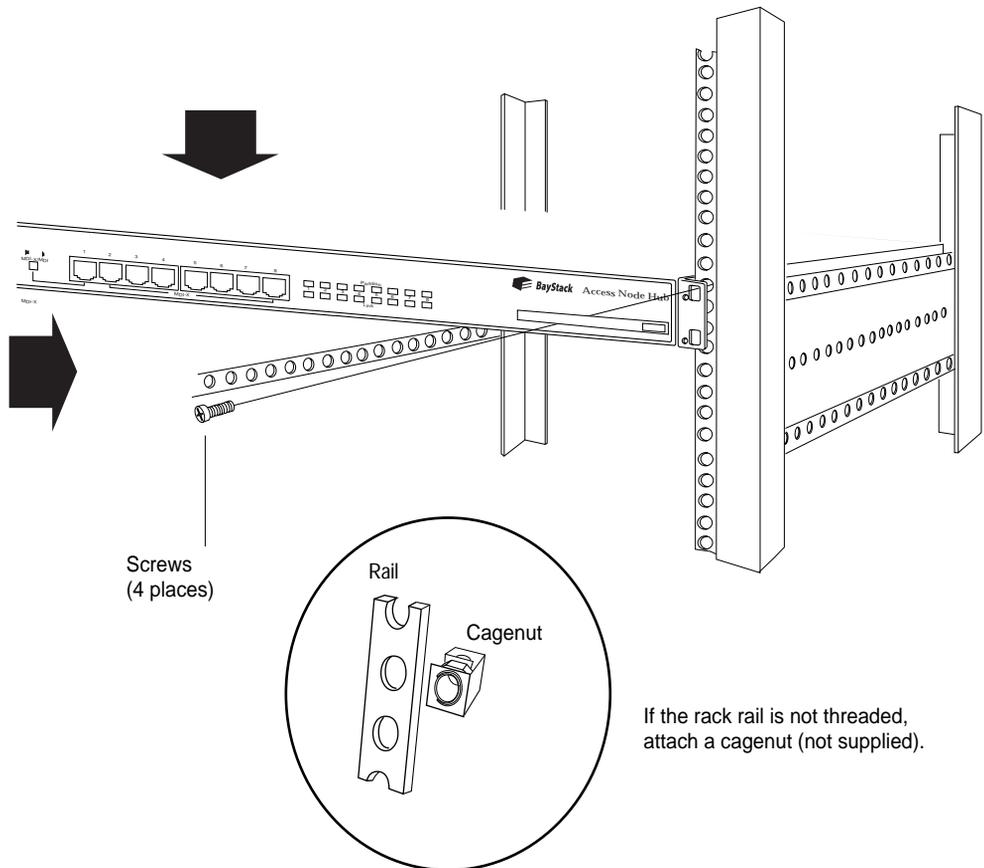
AN0041A

Figure 2-5.   Installing the ANH in an Equipment Rack

3. **Insert a cagenut screw through each bracket hole and into the corresponding holes in the rack.**

4. **Tighten each cagenut screw with a Phillips screwdriver.**

You can now connect the network cables to your ANH. Go to "Connecting Communications Cables."

Mounting the ANH on a Wall

For this procedure, you need the following items:

- Two flange brackets and four #6 roundhead screws (shipped with the ANH)
- Four to eight wall anchor screws (not shipped with the ANH)
- Phillips screwdriver

→	**Note:** The sides of the ANH include screw holes at both ends, providing three ways to attach the brackets for wall-mounting. You can attach both brackets toward the front of the ANH, both brackets toward the back, or you can offset the two brackets, as shown in Figure 2-6, for the most secure installation.

To mount the ANH on a wall:

1. **Attach a flange bracket to each side of the ANH as follows:**

   a. **With the longer bracket piece lying flat, align the holes in the shorter end of the bracket with two of the mounting holes on the side of the ANH (Figure 2-6).**

   b. **Insert a screw through each hole and into the ANH.**

   c. **Tighten the 4 screws with a Phillips screwdriver.**
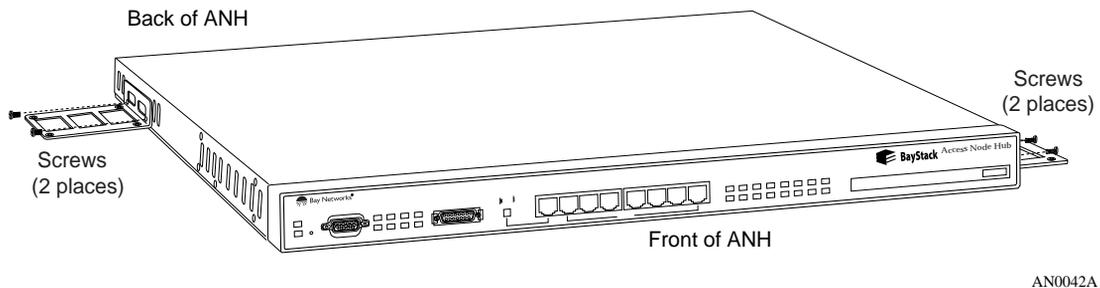
Figure 2-6. **Attaching Flange Brackets to Install the 8-Port ANH on a Wall**

2. **Place the ANH with installed brackets against the wall to determine the location of the anchor screws (Figure 2-7).**
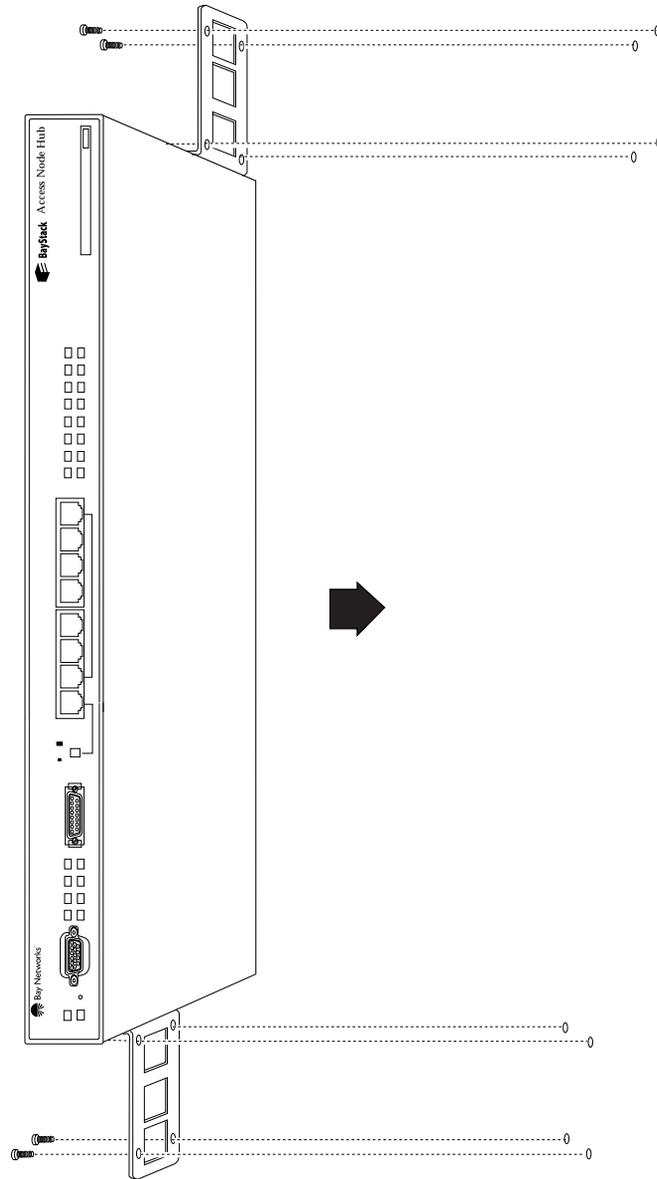
AN0043A

Figure 2-7.   Mounting the 8-Port ANH on a Wall

3. **Insert 2 to 4 wall anchor screws through the holes in each flange bracket, and fasten each screw securely in the wall.**

Connecting Communications Cables

Gather the communications equipment and cables that you will attach to the ANH. If you do not have the proper cables, contact your network administrator or see the *Cable Guide*. Appendix C describes the ANH cable interfaces.

Connecting an AUI Cable

Caution: Connecting the ANH AUI port directly to the AUI port on an Ethernet station violates IEEE 802.3 standards. The AUI port is designed only for connection to a transceiver.

To connect an Ethernet AUI transceiver cable to the front of the ANH:

1. **Connect an Ethernet AUI drop cable to the port labeled AUI (Figure 2-8).**

   The cable must have a female 15-pin D-SUB connector.
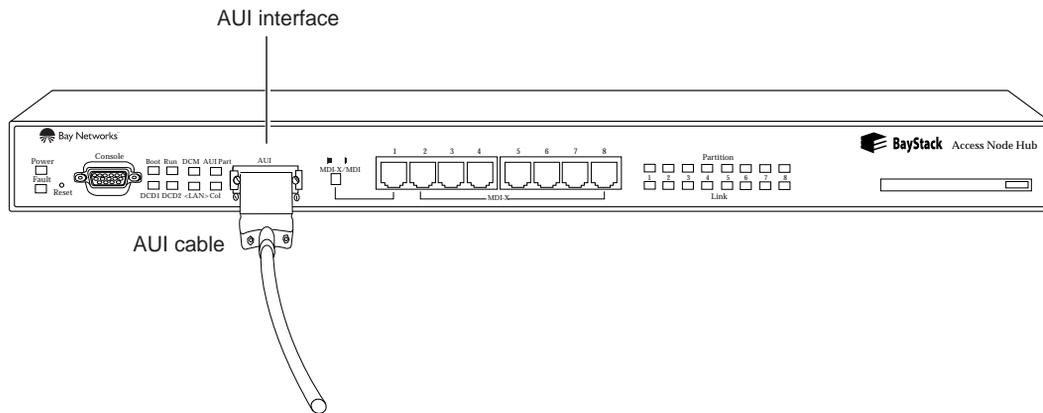
AN0044A

Figure 2-8. **Connecting an AUI Cable**

2. **Secure the AUI cable using the connector slide lock.**

3. **Connect the other end of the cable to the transceiver device.**

Connecting Ethernet Repeater Port UTP Cables

To connect UTP cables to the front-panel 10BASE-T repeater ports, attach the UTP cables to the front-panel RJ-45 connectors (Ethernet repeater ports 1-8), as shown in Figure 2-9.
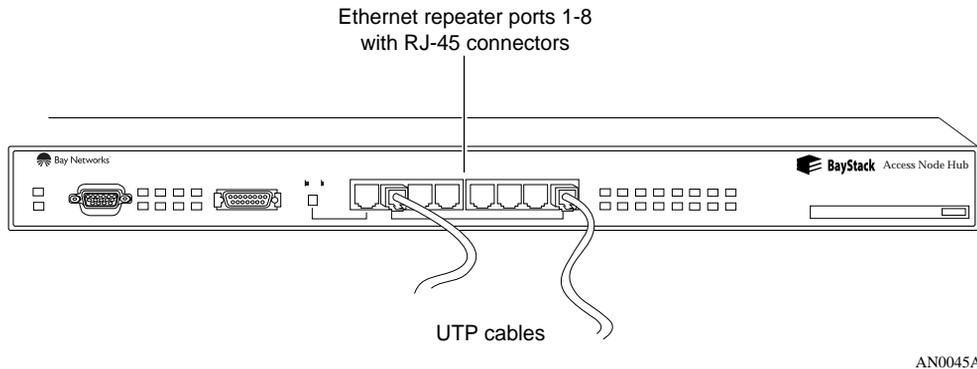
Figure 2-9.   Connecting Repeater UTP Cables

Using the MDI-X/MDI Switch

The 8-port ANH front panel includes an external MDI-X/MDI switch (Figure 2-10) that allows you to change transmit and receive signals for 10BASE-T repeater port 1 from normal repeater input mode (media-dependent interface with crossover, or MDI-X) to repeater cascade out (media-dependent interface, or MDI) configuration. In MDI-X mode, transmit and receive signal connections are reversed; in MDI mode, the port transmits and receives straight-through signals.

With a standard (straight-through) UTP cable in port 1, press the switch *in* for MDI operation.

With a crossover cable in port 1, keep the switch *out* for MDI-X operation.
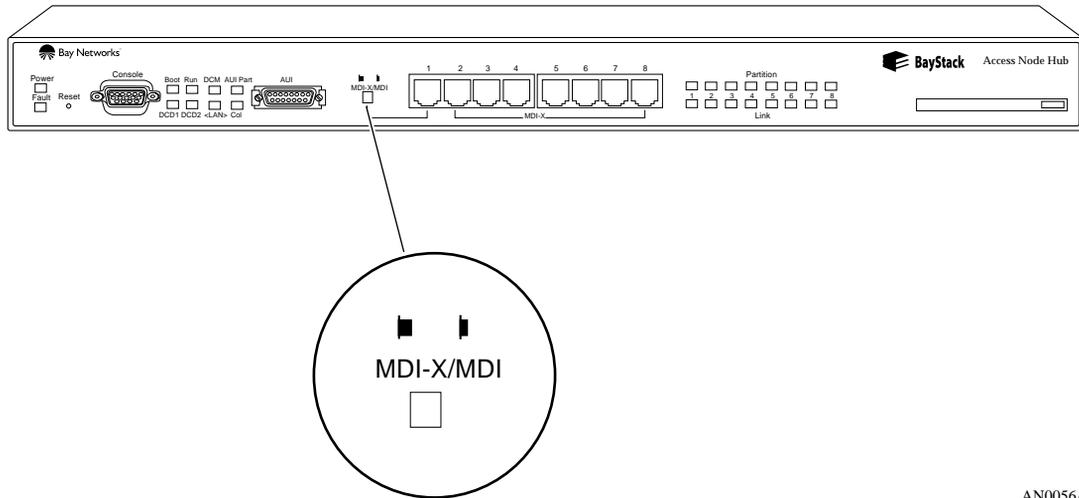
Figure 2-10. **8-Port ANH Front-Panel MDI-X/MDI Switch**

Connecting the ANH to Other Repeaters/Hubs

You can use port 1 in an MDI configuration to connect to a 10BASE-T MDI-X port on another router/hub/bridge device using UTP straight-through RJ-45 patch cables (instead of a special crossover cable). You can interconnect (daisy-chain) as many as four 8-port ANH or other hub systems.

To determine whether you need to use a crossover cable or straight-through cable to interconnect hub units, consider the following:

* If the Ethernet UTP ports on both hubs are in MDI mode, use a crossover cable.

* If the UTP ports on both hubs are in MDI-X mode, use a crossover cable.

* If the UTP port on one hub is in MDI mode, and the UTP port on the other hub is in MDI-X mode, use a straight-through cable.

When you configure a network with multiple ANH (or other repeater/hub) systems, you must comply with the following rules:

* Connect no more than four hubs.

* Make sure each UTP connection is no longer than 100 m (109.4 yards).

- If a transceiver is connected to the AUI port, disable the signal quality error (SQE) test function of the transceiver.

Figure 2-11 shows three ANH systems connected with straight-through cables.
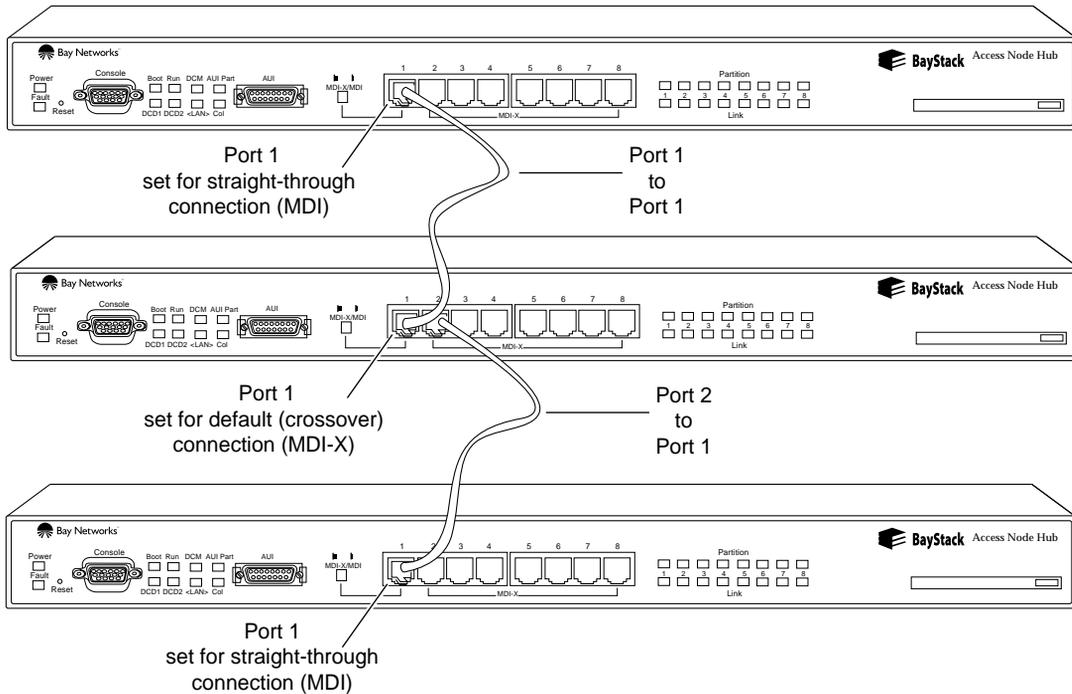
AN0046A

Figure 2-11.   Linking ANH Routers

Figure 2-12 shows an 8-port ANH linked with two other Ethernet hubs. A UTP cable connects each MDI port to an MDI-X port on another hub.
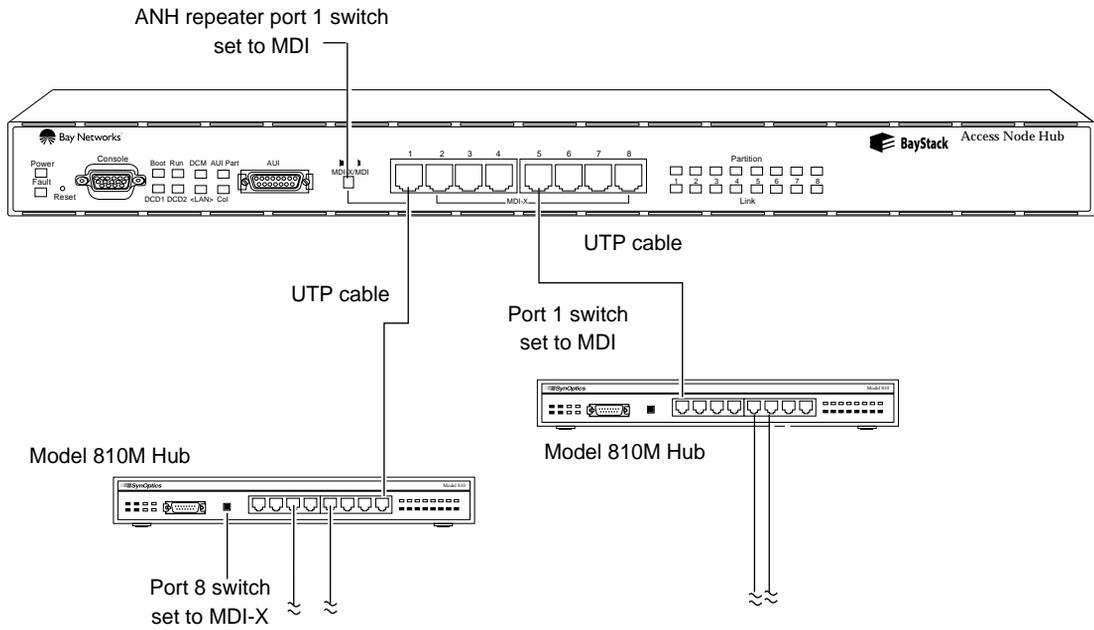
Figure 2-12. Linking Hubs

For more information, refer to "10BASE-T Repeater Ports" in <u>Appendix C</u>.

Connecting a Second Ethernet Interface UTP Cable

If you upgraded the 8-port ANH with a second Ethernet interface module, you can connect a UTP cable to the back-panel UTP-2 port as follows:

1.   Attach a UTP cable to the back-panel RJ-45 connector (Figure 2-13).
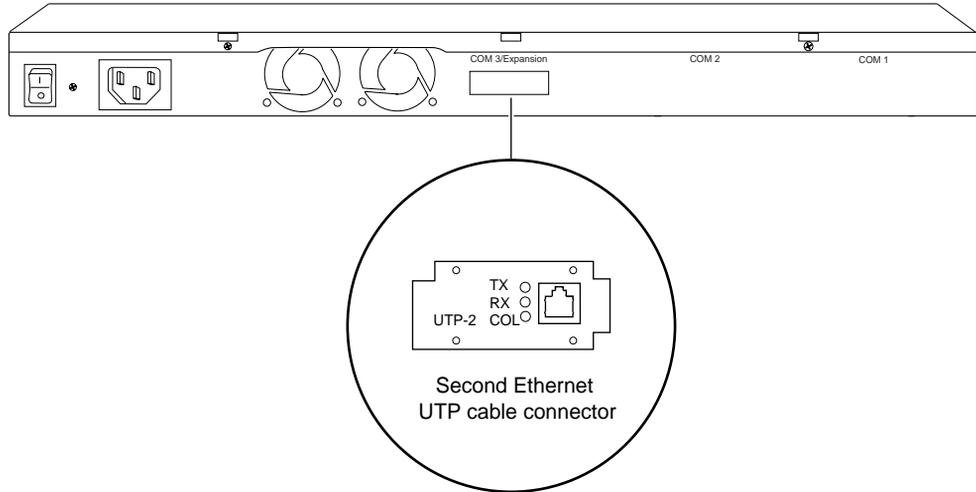
AN0047A

Figure 2-13.   Connecting a Second Ethernet Interface Cable

2.   Connect the other end of the cable to the communication device.

Connecting Synchronous Cables

To connect from one to three synchronous interface cables to the back of the 8-port ANH:

1. **Locate the RS-232, RS-422, V.28, V.35, or X.21 interface cable.**

   For information about these cables, see the *Cable Guide*.

2. **Connect the cable to the back-panel port labeled COM1, COM2, or COM3 ([Figure 2-14](#)).**

→ **Note:** Your ANH may not have a third synchronous interface. The COM3/Expansion port may be empty or contain another cable interface.
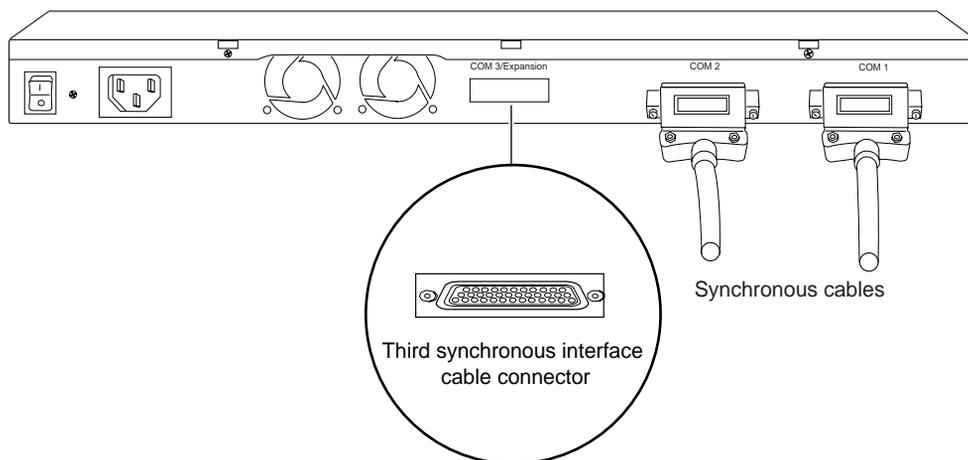
AN0048A

Figure 2-14. Connecting Synchronous Cables to COM1, COM2, or COM3

→ **Note:** The orientation of the COM3 connector is reversed from that of the other COM ports.

---

3. **Secure the screws on the cable's COM connector.**

4. **Connect the other end of each cable to the appropriate communications equipment.**

Connecting an ISDN Cable

If you upgraded the ANH with an ISDN Basic Rate Interface (BRI) module, you can connect an ISDN BRI cable to the back of the ANH as follows:

1. **Plug the ISDN cable into the ISDN-BRI connector (Figure 2-15).**
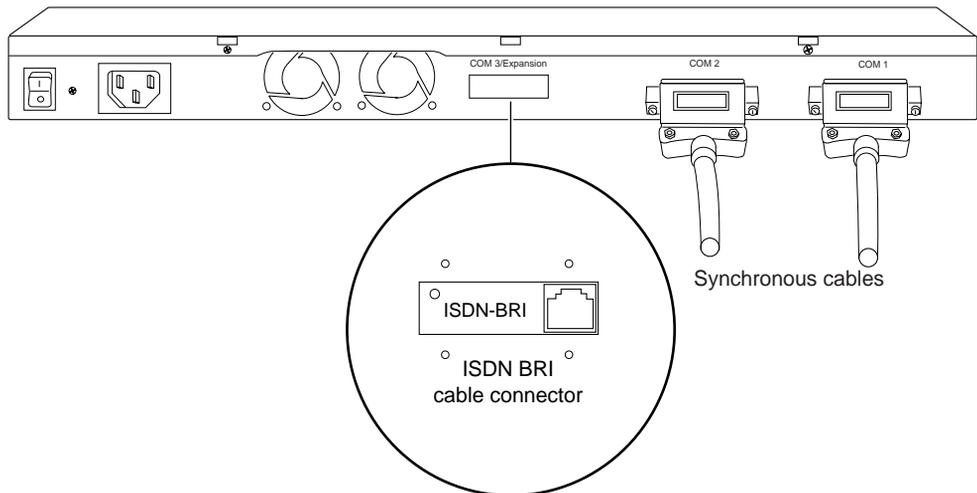
AN0049A

Figure 2-15.   Connecting an ISDN BRI Cable

2. **Connect the other end of the cable to the ISDN communication device.**

Connecting to a 56/64K DSU/CSU Interface

If you upgraded the 8-port ANH with a 56/64K DSU/CSU adapter module, you can connect a 56/64K DSU/CSU cable to the ANH as follows:

1. **Insert the 56/64K DSU/CSU cable connector into the DSU/CSU interface labeled DDS ([Figure 2-16](#)).**
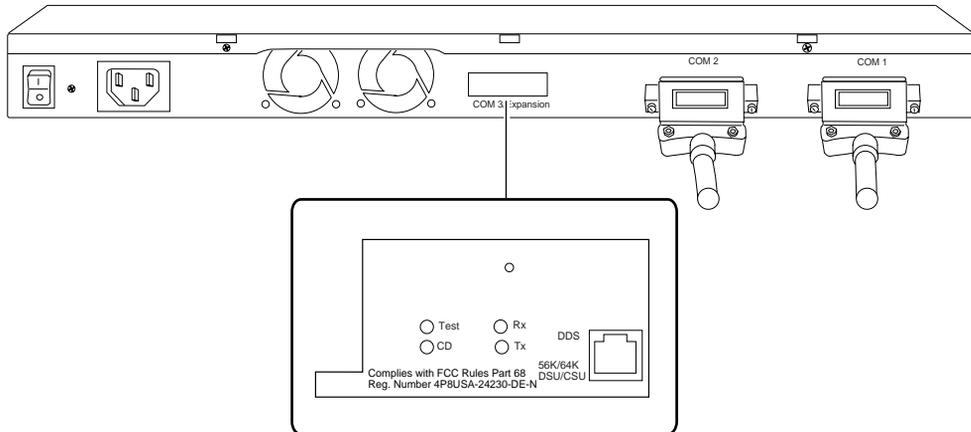
AN0127A

Figure 2-16.   Connecting a 56/64K DSU/CSU Cable

2. **Connect the other end of the cable to a digital line (for example, a digital-line wall jack that connects to an office channel unit [OCU]).**

Connecting an FT1/T1 DSU/CSU Cable

If you upgraded the 8-port ANH with an AN/ANH FT1/T1 DSU/CSU adapter module, you can connect the FT1/T1 DSU/CSU cable to the back of the ANH as follows:

1. **Plug the FT1/T1 DSU/CSU cable into the RJ-48C connector ([Figure 2-17](#)).**
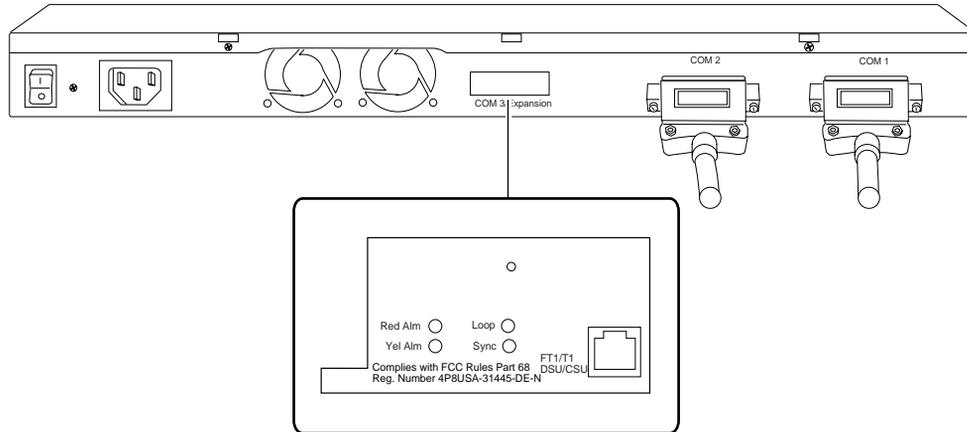
AN0124A

Figure 2-17.   Connecting an FT1/T1 DSU/CSU Cable

2. **Connect the other end of the cable to the T1 communication device.**

Connecting a Management Console or Modem

To connect an ASCII-based terminal, a PC terminal emulator, or a modem to the ANH, use the front-panel console port.

Using a local terminal, you can monitor the results of startup diagnostics and set the boot configuration. Using an attached modem, you can allow remote dial-in access to diagnostics.

→ **Note:** To use the Netboot, Directed Netboot, or Local Boot software configuration options, you must connect a console the first time you turn on the ANH, as described in Chapter 3, "Starting the AN and ANH."

Connecting a Terminal Console

To connect a console, you need both pieces in the ANH console/modem cable kit (Order No. 110310) that shipped with the router (Figure 2-1):

- Serial console/modem cable with 9-pin receptacle to 25-pin plug connectors (Order No. 110307)

- Null modem crossover adapter with two 25-pin receptacle connectors (Order No. 110308)

After you have the appropriate equipment, complete the following steps:

1. **Turn on and configure the console, using the parameters in Table 2-2.**

   Refer to the console user manual for instructions.

Table 2-2.   Console Parameters

Parameter	Value
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

2. **Attach the null modem crossover adapter to the 25-pin cable connector (Figure 2-18).**

3. **Insert the screws on the cable connector into the receptacle on the adapter connector and tighten each screw.**

AN0010A
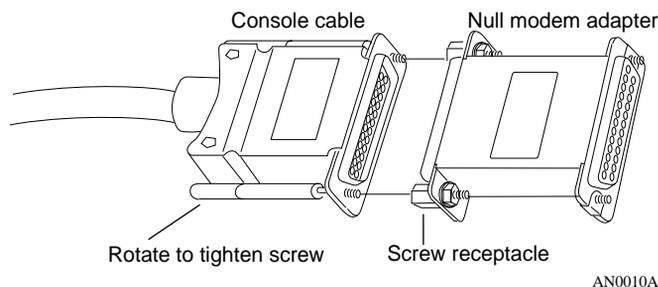
Figure 2-18.   Attaching the Null Modem Adapter to the Console Cable

4. **Insert the 9-pin receptacle end of the console cable into the ANH Console port connector.**

5. **Attach the 25-pin receptacle connector on the combined cable and adapter to the terminal's host connector (Figure 2-19).**

Console cable plus
null modem adapter
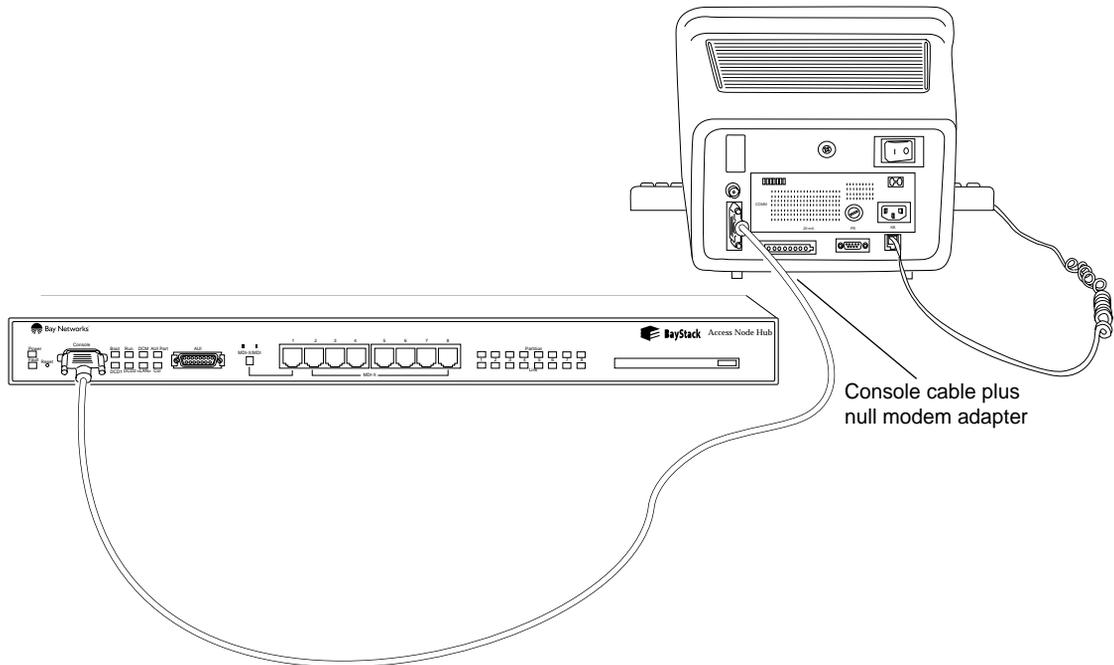
AN0050A

Figure 2-19.   Connecting a Terminal Console to the 8-Port ANH

The console is now connected to the ANH. Go to"Connecting the Power Cable."

Connecting a PC Console

To connect a PC console, you need both pieces in the ANH console/modem cable kit (Order No. 110310) that shipped with the router (Figure 2-1):

• Serial console/modem cable with 9-pin receptacle to 25-pin plug connectors (Order No. 110307)

• Null modem crossover adapter with two 25-pin receptacle connectors (Order No. 110308)

You also need another standard AT serial cable with a 25-pin plug connector.

After you have the correct equipment, complete the following steps:

1. **Turn on and configure the PC console, using the parameters in Table 2-2 and the instructions in the PC documentation.**

2. **Insert the 9-pin receptacle end of the console cable into the front-panel Console port (Figure 2-20).**

3. **Attach the null modem crossover adapter to the other end of the console cable (Figure 2-18).**

4. **Attach the 25-pin receptacle end of the cable-plus-adapter to the PC console cable's 25-pin plug connector (Figure 2-20).**
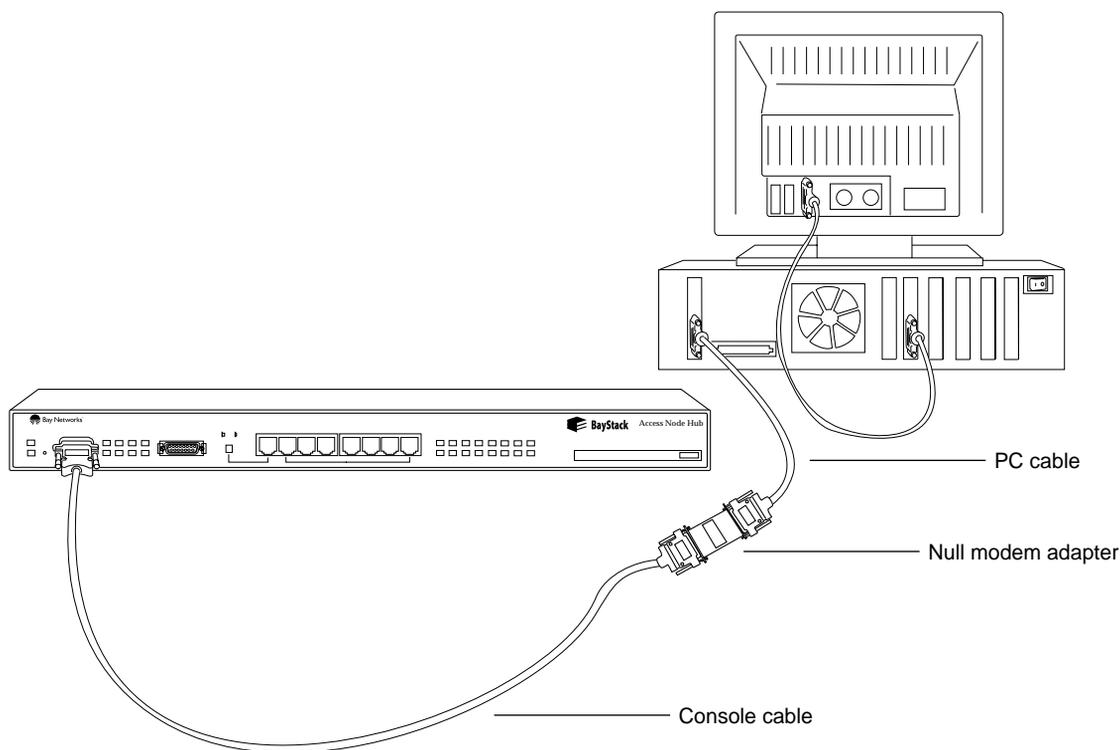
AN0051A

Figure 2-20.   Connecting a PC Console to the ANH

5. **Connect the complete cable unit to the communications port on the back of the PC.**

The PC console is now connected to the ANH. Go to "Connecting the Power Cable" at the end of this chapter.

Connecting a Modem

A modem provides remote access to the ANH for a network administrator. Bay Networks recommends that you connect a modem in case the ANH experiences system problems.

→ **Note:** Netboot, Directed Netboot, and Local Boot require a terminal or PC console connection. After the ANH is on the network, you can replace the console connection with a modem connection. When using EZ-Install, you can connect a modem to the ANH before or after you connect the ANH to the network.

To connect a modem to the ANH, you need an AT (or Hayes) compatible modem and the modem cable (Order No. 110307) that came in the ANH console/modem cable kit. Do *not* use the null modem crossover adapter (Order No. 110308) in the ANH cable kit.

After you have the appropriate equipment, complete the following steps:

1. **Configure the modem, using the parameters in Table 2-3.**

Refer to the modem user guide for instructions.

Table 2-3.   Modem Parameters

Modem Signal/Parameter	Value
Clear to send (CTS)	On
Data terminal ready (DTR)	Dependent on the modem type. Set DTR to require the modem to answer incoming calls.
Data carrier detect (DCD) or RLSD	On while carrier is present (the ANH uses DCD to detect modem connect and disconnect).
Data set ready (DSR)	On
Ready to send (RTS)	Ignore

(continued)

Table 2-3. **Modem Parameters** *(continued)*

Modem Signal/Parameter	Value
Synchronous/asynchronous mode	Asynchronous
AutoAnswer	Set on *n* rings with DTR active (*n* must be greater than 0).
Local character echo	Off
Supervisory functions	Off
Baud Rate	9600 (or less)
Data bits	8
Stop bits	1
Parity	None

2. **Insert the 9-pin receptacle end of the modem cable into the front-panel Console port .**

Caution: Do not connect the modem to the ANH until you are certain that it is configured as described in Table 2-3. Connecting to the ANH with an improperly configured modem could cause the router to fail or lose data.
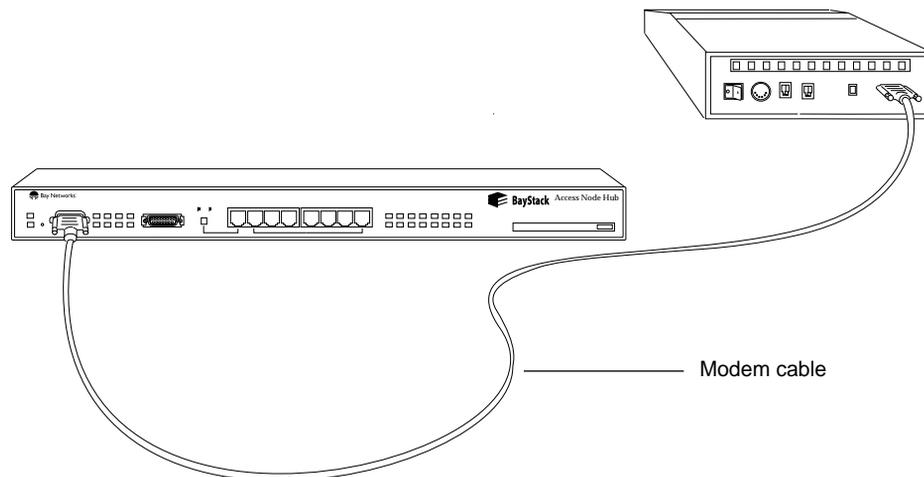
AN0052A

Figure 2-21. **Connecting a Modem to the ANH**

3.   **Insert the 25-pin plug at the other end of the modem cable into the modem's RS-232 data communications port.**

The modem is now connected to the ANH. Connect the power cable as described next.

Connecting the Power Cable

To connect the power cable:

1.   **Connect the power cable to the power connector on the ANH back panel (Figure 2-22).**

⚠ **Danger:** Be sure that the power switch is in the OFF (0) position before you connect the power cable to the outlet.

COM 3/Expansion   COM 2   COM 1

AN0053A
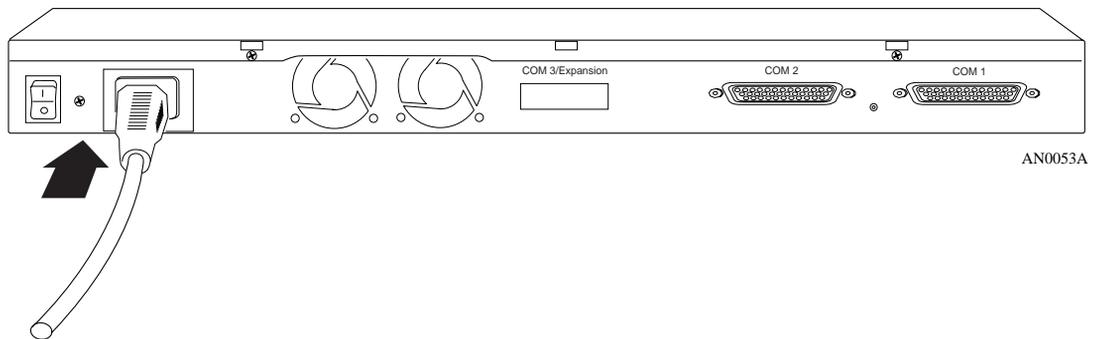
Figure 2-22.   Connecting the Power Cable

2.   **Connect the remote end of the power cable to a grounded outlet.**

Chapter 3
Starting the AN and ANH

The first time you start the AN or ANH, you complete an important software configuration process -- you provide the router with the files it needs to operate over the network. Refer to the following sections:

Topic	Page

➡ **Note:** Coordinate the initial boot and startup of the AN/ANH with your network administrator. This person refers to *Configuring BayStack Remote Access* to determine which software boot method is best for your site and for instructions on setting up a boot server.

Software Installation

Before it can operate, the AN/ANH hardware must boot a router *software image.* The software image is a group of executable files that operate the protocols that the network requires. The process of installing and using this image is called *booting*. The software image that the AN/ANH uses is called *an.exe*.

To bridge and route traffic, the AN/ANH also needs a *configuration file* that is tailored to the network. A configuration file is a binary system file that contains hardware and software configuration data. The default configuration file is named *config*.

Bay Networks ships the software image and a default configuration file on PCMCIA flash memory cards. Your network administrator may also download these files to your router using a Bootstrap Protocol (BootP) or Trivial File Transfer Protocol (TFTP) device.

To obtain the software image and default configuration file and connect the AN/ANH to the network, you must complete an initial startup procedure. Obtaining files for this procedure over the network is called network booting, or *netbooting*. Obtaining files from the AN/ANH file system, stored on the PCMCIA flash memory card, is called *local-booting*.

Caution: The AN/ANH must contain a flash memory card if you plan to obtain any startup files through the Local Boot procedure. If you attempt to local-boot the AN/ANH without the flash memory card inserted, the router does not operate. Refer to "Installing the Flash Memory Card," later in this chapter, for instructions.

Understanding Your Boot Options

Table 3-1 describes the boot options available for AN/ANH routers.

Table 3-1. **Boot Options for AN/ANH Routers**

Option Name	Source for Software Router Image	Source for Configuration File	Description and Requirements
EZ-Install	Local	Network	The default option. The AN/ANH boots from local flash memory, then obtains its configuration file from a remote workstation that is configured as a BootP server. The AN/ANH saves the configuration to the flash memory card. Requires a high-level data link control (HDLC) or frame relay synchronous connection.
Netboot	Local or Network	Local or Network	The AN/ANH obtains at least one startup file from a remote workstation that is configured as a BootP server. Requires a communications connection over an HDLC, frame relay, or Ethernet interface and a local console connection.
Directed Netboot	Local or Network	Local or Network	The AN/ANH obtains at least one startup file from a remote workstation that is configured as a TFTP server. You specify the IP address of the TFTP server and the path name of the startup files before booting. Requires a communications connection over an HDLC, frame relay, or Ethernet interface, and a local console connection.
Local Boot	Local	Local	The AN/ANH boots from a local software image and generic startup configuration file. You can create a customized configuration file by running the Quick-Start installation script. Requires a local console connection and an installed flash memory card that contains the startup files.

You may not be able to use all methods described in this chapter to boot over certain interfaces on your router; for example, you cannot netboot over an FT1/T1 DSU/CSU interface. In some cases, you can use one interface, for example, Ethernet, to boot your router and then use a different interface, such as an FT1/T1 DSU/CSU, to establish your initial IP network connection to the management workstation (Table 3-2).

Table 3-2.   Supported Boot Options by Interface

Module Name	Supported
Synchronous interface	EZ-Install, Netboot, Directed Netboot, Local Boot
Second Ethernet	EZ-Install, Netboot, Directed Netboot, Local Boot
56/64K DSU/CSU	EZ-Install, Netboot, Directed Netboot, Local Boot
ISDN S/T (leased line)	EZ-Install, Local Boot*
FT1/T1 DSU/CSU	EZ-Install, Local Boot

* Although you can locally boot from the ISDN interface, you cannot create an initial IP interface from it using the Quick-Start procedure.

After you determine which boot/startup method to use, install the flash memory card and refer to the detailed instructions later in this chapter.

- Using EZ-Install
- Using Netboot, Directed Netboot, or Local Boot

Understanding Your Configuration Options

You retrieve existing configuration files from local or network sources as part of the boot operation. In most cases, these files are either up-to-date or modified for upgrade installations by the network administrator using Site Manager or the Technician Interface. The Local Boot option lets you run an installation script called Quick-Start to configure an initial IP interface to the network. After you configure this interface, your network administrator can customize your configuration file as needed.

→ **Note:** This chapter describes the startup/configuration tasks for customers who plan to use Site Manager to configure the AN/ANH on the network. If you plan to use Quick2Config® as your configuration tool, see *Configuring Your Router Using the Quick2Config Tool*. Quick2Config is a Microsoft® Windows® based application that you can use to create or modify configuration files.

Installing the Flash Memory Card

A PCMCIA flash memory card (Figure 3-1) provides storage capability for the nonvolatile file system (NVFS) in the AN/ANH.
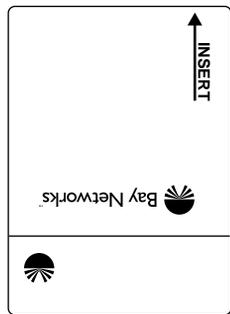
AN0060A

Figure 3-1.   Flash Memory Card

→ **Note:** If you installed a memory card protector in your AN (as described in Chapter 1), you should have installed your flash memory card at that time. If you did not install the flash memory card, refer to Chapter 1 for instructions on removing the AN enclosure so that you can install the memory card.

Before starting the AN/ANH, install the flash memory card supplied with the router by following these steps:

1. **Position the card with the label facing up and the INSERT arrow pointing toward the card receptacle.**

2. **Insert the card into the receptacle.**

    Figure 3-2 shows how to insert the flash memory card in an AN that does not have a flash memory card protector installed.

    Figure 3-3 shows how to insert the flash memory card in an ANH.

3. **Gently push the card until it fits snugly into place.**

If the card is new, and you did not obtain it from Bay Networks, you must format the card before attempting to write to it. You can format the card using Site Manager software or the **format** command available with the Bay Networks Technician Interface. (Refer to *Using Technician Interface Software* for instructions.)

Caution: If you attempt to boot the AN/ANH without the flash memory card inserted, the router will not operate.
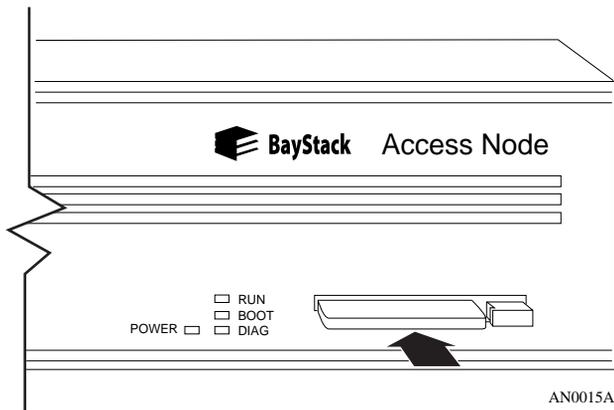
Figure 3-2. **Inserting a Flash Memory Card in the AN or 12-Port ANH Card Receptacle**
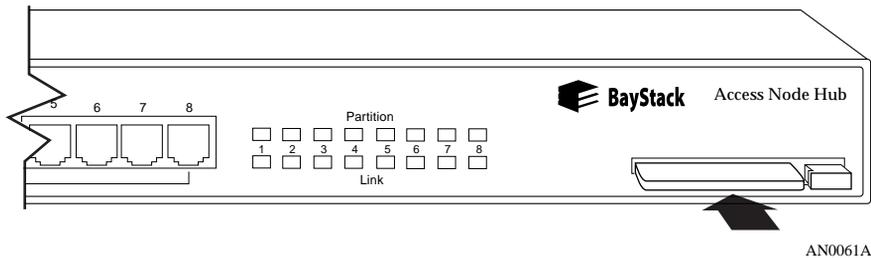
Figure 3-3. **Inserting a Flash Memory Card in the 8-Port ANH Card Receptacle**

Using EZ-Install

To use EZ-Install:

1. **Install the AN or ANH and attached communications equipment as described in <u>Chapter 1</u> (AN and 12-port ANH) or <u>Chapter 2</u> (8-port ANH).**

   There must be at least one synchronous or Ethernet connection to a remote BootP server.

   Although you do not need a modem or console connection for EZ-Install, Bay Networks strongly recommends that you connect a modem or console to the AN or ANH so that you can issue commands to the router and view messages.

2. **Contact your network administrator to verify that the remote network is set up so that you can start the EZ-Install procedure.**

3. **Make sure the flash memory card is installed, as described in <u>"Installing the Flash Memory Card</u>," earlier in this chapter.**

4. **Press the power switch on the AN/ANH back panel to the On position.**

➡️ **Note:** If you turn on the AN/ANH before the network administrator is ready or without a memory card installed, EZ-Install will fail. Restart the router as described in <u>Chapter 4</u>.

After you turn on the AN/ANH, it begins diagnostic tests. Your console displays the message `*****Testing Memory*****` with the amount of memory available.

After it passes the diagnostic tests, the AN/ANH activates and completes EZ-Install. (The AN/ANH obtains a software image from the local file system, its IP address from the upstream router, and a configuration file from the BootP server.) The AN/ANH then starts bridging and routing traffic.

When you boot the AN/ANH, its LEDs flash in a particular order. To interpret the LED sequence and troubleshoot any potential problems, refer to<u>Chapter 4, "Operating the AN and ANH</u>."

Using Netboot, Directed Netboot, or Local Boot

To netboot or local-boot the AN/ANH, you use a command interface to the router software called the Diagnostic Monitor. (You can also use the Technician Interface or Site Manager for the Directed Netboot procedure.)

The AN/ANH ships with its configuration source set to *network* and its image source set to *local*. Using the Diagnostic Monitor, you change the default configuration, bypassing the EZ-Install procedure. The Diagnostic Monitor **bconfig** command enables you to specify the source for the configuration file and boot image.

Logging In to the Diagnostic Monitor

You begin the Netboot, Directed Netboot, or Local Boot process by logging in to the Diagnostic Monitor. Complete the following steps:

1. **Install the AN or ANH and attached communications equipment as described in <u>Chapter 1</u> (AN) or <u>Chapter 2</u> (8-port ANH).**

2. **Turn on the local management console.**

   For instructions on connecting a management console, see <u>Chapter 1</u> (AN or 12-port ANH) or <u>Chapter 2</u> (8-port ANH).

3. **Make sure the flash memory card is installed as described in <u>"Installing the Flash Memory Card</u>," earlier in this chapter.**

4. **Press the power switch on the AN/ANH back panel to the On position.**

   After you turn the router on, your console displays the message `*****Testing Memory*****` with the amount of memory available.

   Next, diagnostic software (AN Diagnostics) begins to test the router. The console displays:

   • Diagnostic software version

   • Information about the AN or ANH hardware (model, revision, and serial numbers)

   • Size of flash memory and dynamic random access memory (DRAM)

   • Results of diagnostic tests as each test completes

   <u>Figure 3-4</u> shows sample output from diagnostic tests.

```
AN Diagnostics: Version - 7.xx - Wed Aug 30 16:29:38 EDT 1996

MOD ID = 0x41A (1050)    Rev = 0x00 (00)     S/N = 0xxxxxxxxx
Flash Card instal                           Memory = xMB

TYPE "?" or "h" for HELP

Test      Description                               Status
TEST 001  SNPROM Checksum Test ------------------- PASSED
TEST 002  DIAG PROM Checksum Test ---------------- PASSED
TEST 003  OS PROM Checksum Test ------------------ PASSED
TEST 004  Memory Alignment Test ------------------ PASSED
TEST 005  Control Register 0 Test ---------------- PASSED
TEST 006  Control Register 1 Test ---------------- PASSED
TEST 007  Control Register 2 Test ---------------- PASSED
TEST 008  Control Register 5 Test ---------------- PASSED
TEST 009  Sts Registers Test --------------------- PASSED
TEST 00A  EEPROM Test (5 msec per byte write)------ BYPASS
TEST 00B  Novram Battery Check ------------------- PASSED
 .
 .
 .
```

AN0062A

Figure 3-4.   Running AN Diagnostics

5.   Before diagnostics are complete, press Control-c to bypass the automatic boot process.

→ **Note:** Be sure to press Control-c before the diagnostic tests complete. To display the AN Diagnostics login prompt, you must interrupt the power-up sequence before the AN/ANH boots.

The AN Diagnostics login prompt appears .

```
TEST 00E  Sync Port2 Int Loop TX Chain Test ------- PASSED
TEST 00F  Sync Port2 Int Loop RX Chain Test -------

   AN Diagnostics: Version - 6.01 - Mon July 24 07:54:00 EDT 1996

Login:  Manager

   AN Diagnostics: Version - 6.01 - Mon July 24 07:54:00 EDT 1996
MOD ID = 0x40D (1037)    Rev = 01            S/N = 015693
     Flash =  4MB                            Memory =  4MB



AN_DIAG>>
```

Control-c
invoked

AN00063A

Figure 3-5.   Logging In to the Diagnostic Monitor

6. **Enter the following command at the login prompt:**

   Manager

   You must type **Manager** with an uppercase "M."

   The Diagnostic Monitor command-line prompt (AN_DIAG) appears (Figure 3-5). You are now using the Diagnostic Monitor.

7. **To use the Netboot, Directed Netboot, or Local Boot option, refer to the specific section that describes the procedure you want to use.**

   • Continuing with Netboot

   • Continuing with Directed Netboot

   • Continuing with Local Boot

Continuing with Netboot

To use Netboot:

1. **Contact your network administrator to verify that the network is set up for the Netboot procedure.**

2. **Ask your network administrator (or refer to<u>Appendix A, "Configuring the AN or ANH for Netboot and Directed Netboot</u>") for the interface configuration command to use in step 3. Write the command in <u>Figure 3-6</u> for reference.**

   The **ifconfig** command configures the IP address for the connection you will use for Netboot.

Figure 3-6.   Your ifconfig Command

3. **Enter the appropriate command at the Diagnostic Monitor prompt to configure the router's interface to the network.**

   <u>Figure 3-7</u> shows a sample command.

```
AN_DIAG>> ifconfig xcvr1 192.32.37.125 255.255.255.224
AN_DIAG>>
```

AN00017A

Figure 3-7.   Sample Interface Configuration Command

4. **Enter the following command to verify the configuration you specified in step 3:**

   getcfg

   As <u>Figure 3-8</u> shows, the **getcfg** command displays the location of the boot image and the network configuration file, as well as the interface configuration you specified using the **ifconfig** command.

```
AN_DIAG>> getcfg

Boot Options:
        boot image=local
        boot config=network

NetBoot Parameters:
        XCVR1...IP=192.32.37.125, Mask=255.255.255.224
        COM1....EZ-Install
        COM2....EZ-Install
        XCVR2...None

AN_DIAG>>
```

Verify

AN0065A

Figure 3-8.   Verifying the Interface Configuration

➡ **Note:** The location of the image and configuration files is either local or network. *Local* means that the required file (*an.exe* or *config)* is stored on the router's local file system (flash memory card). *Network* means the required file is stored on a workstation located across the network.

5. **If the configuration information is correct, go to the next step. Otherwise, reenter the correct ifconfig command. Contact your network administrator if you need assistance.**

6. **Type the following command and press the Return key to run the diagnostic tests and boot the AN:**

    reset

    Or, type **boot** and press the Return key to boot the AN/ANH without running the diagnostic tests.

Figure 3-9 shows sample output from a **boot** command.

```
AN_DIAG>> boot

 Booting Access Node...
 Starting OS Kernel for network boot...
 Attempting Netboot on XCVR1
 Attempting EZ-Install on COM1, using Wellfleet Pt-to-Pt
 Attempting EZ-Install on COM2, using Wellfleet Pt-to-Pt
 IP interface active on XCVR1, attempting BOOTP
 Received BOOTP response from server 192.32.3.9 on XCVR1
 Retrieving config 'config' from network. done
 Found image '1:an.exe' on local file system...booting
 Image is in compressed format... decompressing

Bay Networks, Inc. and its Licensors.
Copyright 1992, 1993, 1994, 1995, 1996, 1997, 1998.
All rights reserved.
Login:
```

AN0018A

Figure 3-9.   AN/ANH Netboot

➡ **Note:** If the AN/ANH tries to netboot and cannot find a software image or configuration file, it attempts to local-boot once. If both attempts fail, the AN Diagnostic Monitor login prompt (AN_DIAG>>) appears on the AN console. In this case, you or your network administrator must troubleshoot the problem.

When you boot the AN/ANH, its LEDs flash in a particular order. To interpret the LED sequence and troubleshoot any potential problems, refer to Chapter 4, "Operating the AN and ANH."

After connecting the AN/ANH to the network, you can replace the local console with a modem connection to enable remote dial-in access. For instructions on connecting a modem, see Chapter 1 (AN or 12-port ANH) or Chapter 2 (8-port ANH).

Continuing with Directed Netboot

Before you can use the Directed Netboot procedure, you must execute the **ifconfig** command (as described in the previous section) to configure the interface from which you plan to use Directed Netboot.

You can use the Diagnostic Monitor, Technician Interface, or Site Manager to perform Directed Netboot. This guide assumes that you are at the AN/ANH site and are using the Diagnostic Monitor. To manage the AN/ANH from a remote site, refer to *Configuring BayStack Remote Access.*

To use Directed Netboot:

1. **Contact your network administrator to verify that the remote network is set up for the Directed Netboot procedure.**

2. **Ask your network administrator (or refer to Appendix A, "Configuring the AN or ANH for Netboot and Directed Netboot") for the appropriate boot configuration (bconfig) commands. Write the commands in Figure 3-10 for reference.**

   The **bconfig** command lets you specify either local or network access to the router software image and configuration file you want to use for booting the router.

AN0128A

Figure 3-10.   Your bconfig Commands

3. **At the Diagnostic Monitor prompt, enter the appropriate bconfig commands.**

   You must enter one **bconfig** command to specify the location of the software image and another to specify the location of the configuration file. Figure 3-11 shows sample commands.

```
AN_DIAG>> bconfig image network 192.32.x.x /usr/anstartup/krnl_an.exe
Done.
AN_DIAG>> bconfig config network 192.32.x.x /usr/anstartup/config
Done.
AN_DIAG
```

AN0019A

Figure 3-11.   Specifying the Source for Directed Netboot

4. **Enter the following command to verify the configuration you specified in step 3 :**

    getcfg

```
Boot Options:
     boot image=network
     boot config=network
     host IP address=192.32.x.x
     image pathname=
          "/usr/anstartup/krnl_an.exe"
     config pathname=
          "/usr/anstartup/config"
NetBoot Parameters:
     XCVR1...IP=192.32.x.x, Mask=255.255.255.224
     COM1....EZ-Install
     COM2....EZ-Install
     XCVR2...None

AN_DIAG>>
```

AN0020A

Figure 3-12.   Verifying Directed Netboot Configuration

The Boot Options section displays the following information:

• The IP address of the server where the software image and configuration file reside

• The path names of the software image and configuration file

5. **If the configuration information is correct, go to step 6. Otherwise, reenter the correct bconfig command. Contact your network administrator if you need assistance.**

6. **Enter the following command to run the diagnostic tests and boot the AN/ANH:**

   reset

   Or, type **boot** and press the Return key to boot the AN/ANH without running the diagnostic tests. Figure 3-13 shows sample output from the boot process.

```
 Booting Access Node...

Starting OS kernel for network boot...
Attempting Directed Netboot.
Directed Netboot using active IP interface XCVR1.
Retrieving config 'config' from network.   done
Retrieving image 'krnl_an.exe' from network......done


Bay Networks, Inc. and its Licensors.
Copyright 1992, 1993, 1994, 1995, 1996, 1997, 1998.
All rights reserved.

Login:
```

AN0070A

Figure 3-13.   AN/ANH Directed Netboot

➡ **Note:** If the AN/ANH cannot find a software image or configuration file via Directed Netboot, it attempts to local-boot once. If both attempts fail, the AN Diagnostic Monitor login prompt (AN_DIAG>) appears on the AN/ANH console. In this case, you or your network administrator must troubleshoot the problem.

When you boot the AN/ANH, its LEDs flash in a particular order. To interpret the LED sequence and troubleshoot any potential problems, refer toChapter 4, "Operating the AN and ANH."

After connecting the AN/ANH to the network, you can replace the local console connection with a modem connection to enable remote dial-in access. For instructions on connecting a modem, see Chapter 1 (AN or 12-port ANH) or Chapter 2 (8-port ANH).

Continuing with Local Boot

You need to use both the Diagnostic Monitor and the Technician Interface to local-boot the AN/ANH. Before starting the Local Boot procedure, ask your network administrator for assistance in completing the Quick-Start worksheets. See Appendix B, "Using Local Boot (the Quick-Start Procedure)."

To use Local Boot:

1. **Contact your network administrator to verify that the network is set up for the Local Boot procedure.**

2. **At the Diagnostic Monitor prompt, type the following command and press the Return key to configure the AN/ANH to use its local** *config* **file:**

   bconfig config local

3. **Type the following command and press the Return key to run the diagnostic tests and boot the AN/ANH:**

   reset

   Or, type **boot** and press the Return key to boot the AN/ANH without running the diagnostic tests.

   Figure 3-14 shows sample output from the Local Boot process.

```
 Booting Access Node...

Attempting local configuration and boot...
Configuration file '1:config' successfully loaded.

Found image '1:an.exe' on local file system...booting
Image is in compressed format... decompressing


Bay Networks, Inc. and its Licensors.
Copyright 1992, 1993, 1994, 1995, 1996, 1997, 1998.
All rights reserved

Login:
```

AN0071A

Figure 3-14.   AN/ANH Local Boot

→	**Note:** If the AN/ANH tries to local-boot and cannot obtain a software image, it attempts to netboot once. If both the Local Boot and Netboot attempts fail, the AN Diagnostic Monitor login prompt appears on the AN/ANH console. In this case, you or your network administrator must troubleshoot the problem.

4. **Make sure that the AN/ANH boots correctly.**

    When you boot the AN/ANH, its LEDs flash in a particular order. To interpret the LED sequence and troubleshoot any potential problems, refer to Chapter 4; then return to Step 5.

5. **At the login prompt, enter the following command to log in to the Technician Interface (Figure 3-15):**

    Manager

    The Technician Interface prompt ([1:1]$) appears after the Technician Interface mounts the local file system, as shown in Figure 3-15. The prompt indicates the current working directory.

```
Bay Networks, Inc. and its Licensors.
Copyright 1992, 1993, 1994, 1995, 1996, 1997, 1998.
All rights reserved.
Login: Manager

Mounting new volume...
Device label:
Directory: 1:
New Present Working Directory: 1:

        Welcome to the Backbone Technician Interface



[1:1]$
```

AN0024A

Figure 3-15.   Logging In to the Technician Interface

> ➡ **Note:** To check the contents of the router's local file system on the installed
> flash memory card, enter **dir**. The AN/ANH router software image *an.exe* and
> the *config* file should appear among the files listed.

6. **Enter the following command to begin the Quick-Start procedure for configuring an initial IP interface:**

   run install.bat

7. **Using your completed Quick-Start worksheets from Appendix B, enter the appropriate network information as the prompts appear.**

   The AN/ANH uses this information to configure its interface to the network.

   Refer to Appendix B, "Using Local Boot (the Quick-Start Procedure)," for sample Quick-Start screen output and for information about using Quick-Start commands.

   After the AN/ANH creates and tests the configuration, your screen displays a message saying that the Quick-Start installation is complete. The AN/ANH dynamically starts using the configuration information you entered.

8. **When the Technician Interface prompt returns, enter the following command to exit the Technician Interface:**

logout

After configuring the AN/ANH network interface, you can replace the console connection with a modem connection to enable remote dial-in access. For instructions on connecting a modem, see Chapter 1 (AN or 12-port ANH) or Chapter 2 (8-port ANH).

Chapter 4
Operating the AN and ANH

This chapter describes the routine tasks of operating an AN or ANH router and contains the following topics:

Ensuring a Successful Installation

After connecting the AN/ANH to the network, you can ensure a successful installation by checking the diagnostic LEDs on the front panel. Figure 4-1 shows the front-panel LEDs on an AN. Figure 4-2 shows the front-panel LEDs on an 8-port ANH.
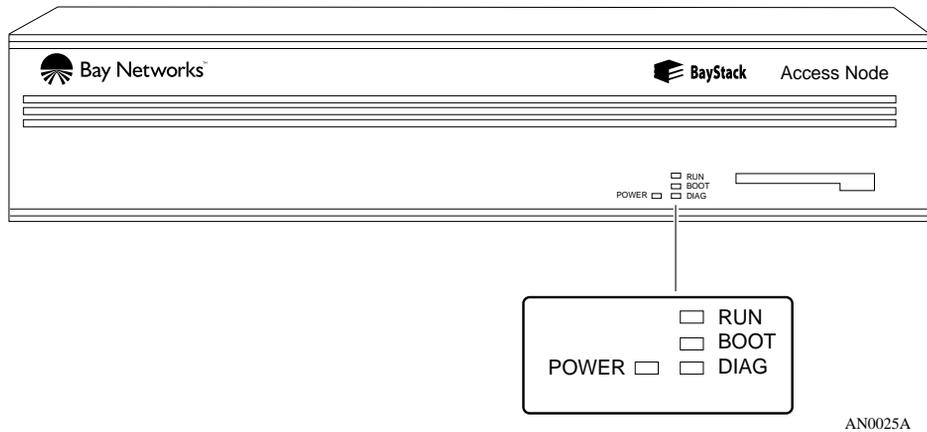
Figure 4-1.   AN Front-Panel LEDs
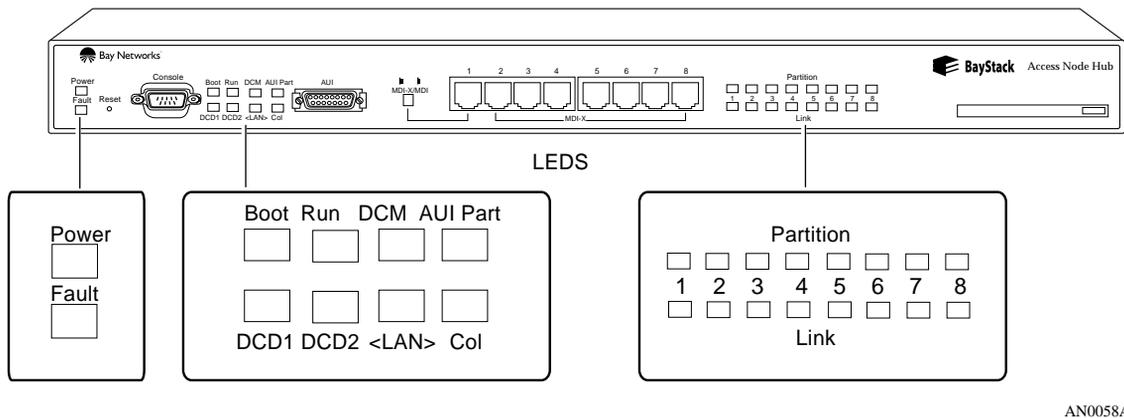
Figure 4-2.   8-Port ANH Front-Panel LEDs

When you turn on the router, the following LED sequence should occur:

1.   The Power LED lights and remains on.

2.   Run, Boot, and Diag (or Fault for 8-port ANH) LEDs light for approximately 1 second, then turn off, indicating that the router is functioning.

3. The Run LED flashes for 1 to 3 minutes, indicating that the diagnostic tests are running. (It flashes quickly during the initial 17-second memory test, then slows down during the interface tests.)

4. The Boot LED lights for 1 to 3 minutes, indicating that the diagnostic tests were successful and the router is booting.

5. The Run LED lights and the Boot LED turns off, indicating that the router is operational.

If the LEDs on the router light in this sequence, your installation is successful. Contact your network administrator to verify that the router is now connected to the network.

If the LEDs do not light in this sequence, your network administrator can refer to *Configuring BayStack Remote Access* to help troubleshoot the problem. If you need additional assistance, contact your local Bay Networks Technical Solutions Center.

AN and 12-Port ANH LED Descriptions

The LEDs on the AN front and back panels provide information about how the AN is operating. The following sections describe the AN front- and back-panel LEDs. For information about the 8-port ANH LEDs, see the section "8-Port ANH LED Descriptions" later in this chapter.

Front-Panel LEDs

Table 4-1 describes the AN and 12-port ANH front-panel LEDs. These LEDs indicate the status of the router itself.

All front-panel LEDs light briefly when you plug the AN into the power outlet and turn on the power switch (if so equipped); the AN is receiving power.

Table 4-1.   AN Front-Panel LEDs

LED	Meaning
POWER	Lights and remains on when the AN is plugged in.
RUN	Lights briefly when the AN is plugged in. Flashes for 1 to 3 minutes, indicating that diagnostic tests are running. When it lights again and remains lit, the AN is operational.
BOOT	Lights briefly when the AN is plugged in. Lights for 1 to 3 minutes, indicating that diagnostic tests were successful and the AN is booting.
DIAG	Lights briefly when the AN is plugged in. Lights again and remains lit when diagnostic failure occurs.

Back-Panel LEDs

The LEDs on the back panel differ depending on the AN or 12-port ANH model. Table 4-2 describes all available AN back-panel LEDs. These LEDs indicate the status of the network connections.

Table 4-2.   AN Back-Panel LEDs

LED	Meaning
Ethernet/Second Ethernet Interface (XCVR or UTP)	
TX (Transmit)	Lights when the AN is transmitting data over the network.
RX (Receive)	Lights when the AN is receiving data from the network.
CL (Collision)	Lights when the AN detects a collision on the network.
Ethernet Repeater Ports (1-12)	
MDI (media-dependent interface)	When lit, indicates the port 12 crossover switch is in the straight-through position. The LED remains off when the port 12 crossover switch is in the crossover position.
LINK	Lights when the repeater port registers a connection.
PART (Partition)	Lights when the repeater port experiences a partition (that is, a loss of signal or a disruption in transmission).
Synchronous Interfaces (COM1 and COM2)	
RLSD1 (Received Line Signal Detection 1)	Lights when Received Line Signal Detection is active on COM1.
RLSD2 (Received Line Signal Detection 2)	Lights when Received Line Signal Detection is active on COM2.
ISDN/BRI Interfaces	
ISDN BRI	Lights when S/T interface is active; turns off when interface is inactive.
56/64K DSU/CSU Interface	
Tx (Transmit)	Lights when the interface transmits data over the network.
Rx (Receive)	Lights when the interface receives data from the network.
CD (Carrier Detect)	Lights when the interface detects a connection to another device.
Test	Lights when the interface is in test or loopback mode.
FT1/T1 DSU/CSU Interface	
Red Alm	Lights when the T1 port is in a red-alarm state.
Yel Alm	Lights when the DSU/CSU has received a yellow alarm from the T1 network.

(continued)

Table 4-2. **AN Back-Panel LEDs** *(continued)*

LED	Meaning
Loop	Lights when the T1 interface is placed in loopback mode.
Sync	Lights when the T1 port is synchronized with the T1 network.
Token Ring Interface (MAU)	
RCVR (Receiver)	Lights when the AN receives data from the network.
NSRT (Insert)	Lights when you insert the AN into the token ring network.
WFAIL (Wire Failure)	Lights when the token ring hardware detects a wire failure condition.

8-Port ANH LED Descriptions

LEDs on the ANH front and back panels provide information about how the ANH is operating.

Front-Panel LEDs

Figure 4-2 illustrates the three sets of status LEDs on the 8-port ANH front panel. Table 4-3 describes the function of each of these ANH front-panel LEDs.

→ **Note:** All front-panel LEDs light briefly when you turn on the ANH; this indicates that the ANH is receiving power.

Table 4-3.   8-Port ANH Front-Panel LEDs

LED	Color	Meaning
Power	Green	Lights after power is delivered to internal circuitry and remains on while the ANH is turned on.
Fault	Amber	Lights briefly when the ANH is turned on. Remains on if a diagnostic failure occurs. If the Run LED is also on, indicates that the ANH is running its self-test.
Boot	Green	Lights for 1 to 3 minutes while the ANH is booting to indicate that diagnostic tests were successful.
Run	Green	Flashes for 1 to 3 minutes while diagnostic tests are running; this indicates that the ANH has not yet started to execute the run-time image software code. The light remains on to indicate that the ANH has begun to execute the software image. If the Fault LED is also on, it indicates that the ANH is running its self-test.
DCM	Green	Lights to indicate an RMON data collection module (DCM) is installed.
AUI Part (Partition)	Amber	Lights to indicate that the AUI port has been partitioned from the repeater due to a disruption in transmission. Autopartitioning occurs after an excessive number of consecutive collisions or an excessively long single-collision signal.
DCD1 (Data Carrier Detect 1)	Green	Lights to indicate that the first synchronous port (COM1) is active.
DCD2 (Data Carrier Detect 2)	Green	Lights to indicate that the second synchronous port (COM2) is active.
<LAN>	Green	Lights after each data transmission to indicate data present in the repeater. The signal is longer than the duration of data, allowing the eye to perceive the occurrence of very short transmissions. The LED may appear to flicker during numerous transmissions.
Col (Collision)	Amber	Lights to indicate a collision in the AUI repeater.

(continued)

Table 4-3. **8-Port ANH Front-Panel LEDs** *(continued)*

LED	Color	Meaning
Partition (8 LEDs)	Amber	Lights when a specific repeater port (1-8) has been partitioned due to a disruption in transmission. Autopartitioning occurs after an excessive number of consecutive collisions or an excessively long single-collision signal. All 8 LEDs flash when you reset the ANH.
Link (8 LEDs)	Green	Lights to indicate that a repeater port registers a connection; that is, the port is currently connected to another powered 10BASE-T port. All 8 LEDs flash when you reset the ANH.

Back-Panel LEDs

Figure 4-3 illustrates the 8-port ANH back-panel LEDs for the ISDN, second Ethernet, 56/64K DSU/CSU, and FT1/T1 DSU/CSU options. These LEDs are visible after you install the associated module.
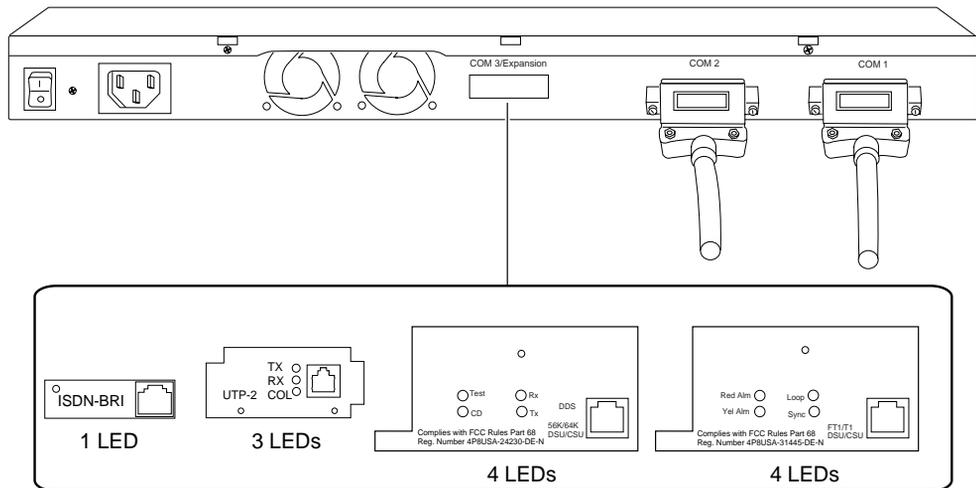
AN0059A

Figure 4-3. **8-Port ANH Back-Panel LEDs**

Table 4-4 describes the back-panel LEDs.

Table 4-4. **8-Port ANH Back-Panel LEDs**

LED	Color	Meaning
Ethernet UTP-2 Interface		
TX (Transmit)	Green	Lights when the ANH is transmitting data over the network.
RX (Receive)	Green	Lights when the ANH is receiving data from the network.
COL (Collision)	Amber	Lights when the ANH detects a collision on the network.
ISDN/BRI Interfaces		
ISDN BRI	Green	Lights when S/T interface is active; turns off when interface is inactive.
56/64K DSU/CSU Interface		
Tx (Transmit)	Green	Lights when the interface transmits data over the network.
Rx (Receive)	Green	Lights when the interface receives data from the network.
CD (Carrier Detect)	Green	Lights when the interface detects a connection to another device.
Test	Red	Lights when the interface is in test or loopback mode.
FT1/T1 DSU/CSU Interface		
Red Alm	Red	Lights when the T1 port is in a red-alarm state.
Yel Alm	Amber	Lights when the DSU/CSU has received a yellow alarm from the T1 network.
Loop	Amber	Lights when the T1 interface is placed in loopback mode.
Sync	Green	Lights when the T1 port is synchronized with the T1 network.

Turning the AN and 12-Port ANH On and Off

The power switch for the AN or 12-port ANH is located on the back panel of the router (Figure 4-4). To turn on the router, press the power switch to the On position (1). To turn off the router, press the power switch to the Off position (0).
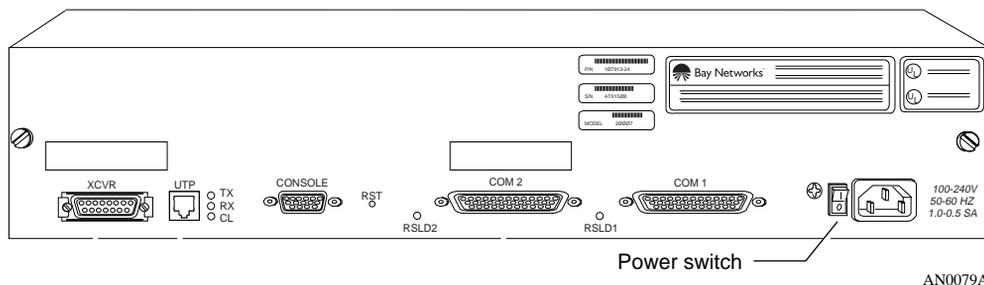
Figure 4-4. **AN Power Switch**

Turning the 8-Port ANH On and Off

The 8-port ANH power switch is located on the back panel of the router (Figure 4-5). To turn on the ANH, press the power switch to the On position (1). To turn off the ANH, press the power switch to the Off position (0).
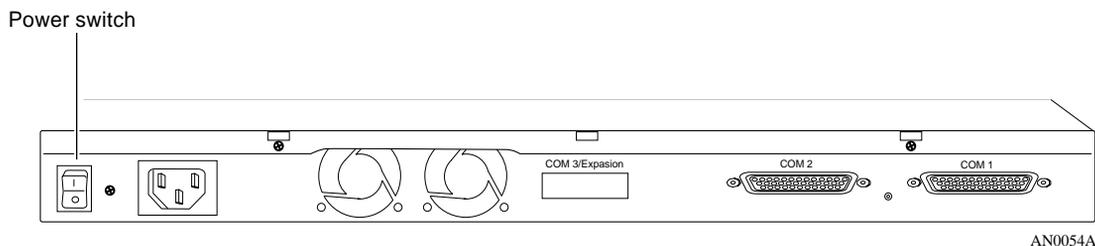
Figure 4-5. **8-Port ANH Power Switch**

Resetting the AN or ANH

To reboot the AN/ANH hardware without cycling power, use the Reset button as follows:

- To *warm-boot* the AN/ANH (no diagnostic tests run), press the Reset button for less than 3 seconds.

- To *cold-boot* the AN/ANH (diagnostic tests run), press the Reset button for more than 3 seconds.

To activate the Reset button, insert a small pointed object (for example, a paper clip) to press in the button.

On the 8-port ANH, the Reset button is inside the ANH front panel .
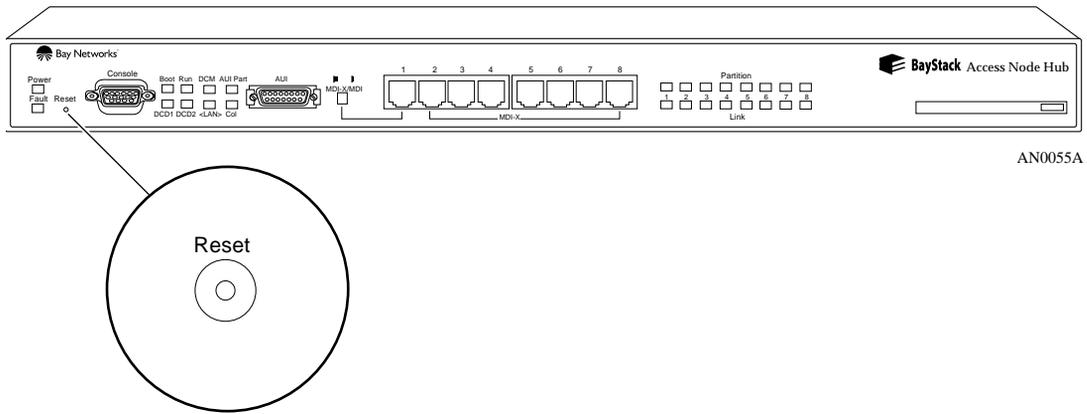
Figure 4-6.   ANH Reset Button

➤ **Note:** The Link and Partition LEDs for repeater ports 1-8 flash when you reset the ANH, whether or not a port has attached cables.

On the AN and 12-port ANH, the Reset button is located on the back panel of the router and is labeled "RST" (Figure 4-7).
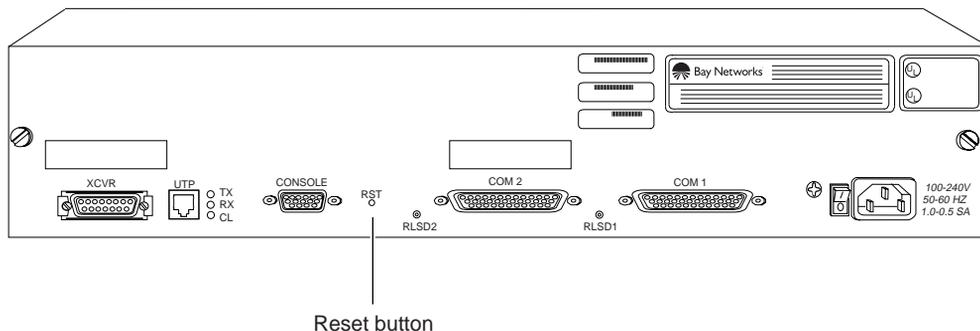
Reset button

AN0014A

Figure 4-7.   AN Reset Button

Removing a Flash Memory Card

To remove a flash memory card from an AN that has a memory card protector installed:

1. **Press the power switch to the Off position and unplug the power cable.**

2. **Remove the AN enclosure, as described in "Removing the AN Enclosure" in Chapter 1.**

3. **Press the Eject button (Figure 4-9) next to the card receptacle on the AN component tray (Figure 4-8).**
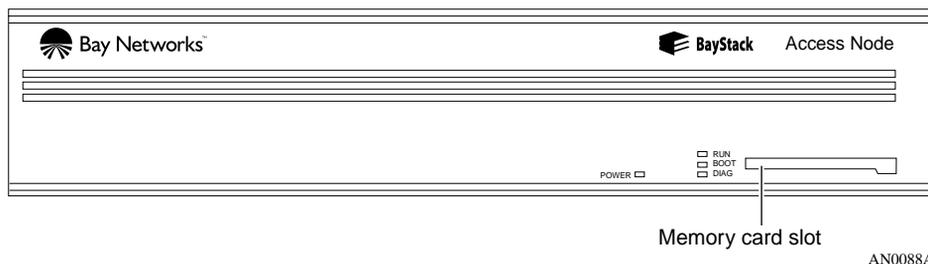
Memory card slot

AN0088A

Figure 4-8.   Flash Memory Card Receptacle on AN Component Tray

4. **To insert another card into the receptacle, refer to "Installing the Flash Memory Card" in Chapter 1.**

5. **Replace the AN enclosure, as described in "Replacing the AN Enclosure" in Chapter 1.**

To remove a memory card from an ANH or from an AN that does not have a memory card protector installed:

1. **Press the Eject button next to the card receptacle on the front panel.**

    Figure 4-9 shows the eject button on an AN. Figure 4-10 shows the Eject button on an ANH.

Caution: Do not remove the flash memory card while the router is operating. Removing the memory card interferes with current networking operations.
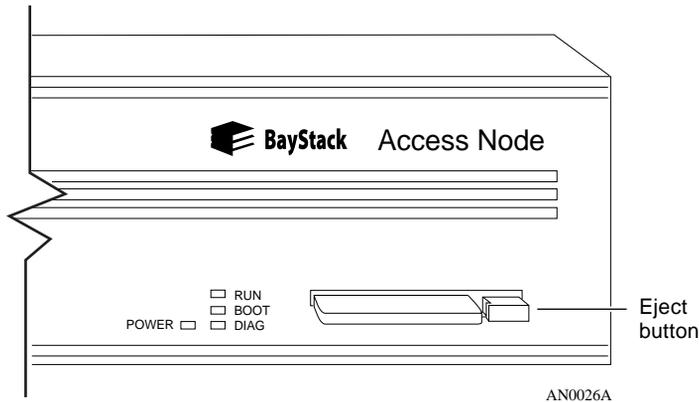
Figure 4-9.   AN Flash Memory Card Eject Button
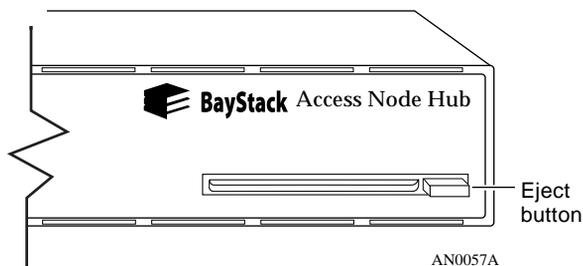
Figure 4-10.   ANH Flash Memory Card Eject Button

2.   To insert another card into the receptacle, refer to "Installing the Flash Memory Card" in Chapter 3.

When you remove a formatted memory card, the NVFS automatically removes access to the card. When you insert and format a card or insert an already formatted card, the NVFS automatically provides access.

Protecting Flash Memory Card Files

Bay Networks ships each flash memory card with its read-write protect switch in the unprotected position (Figure 4-11). After successfully loading the configuration file and saving your configuration, you may want to write-protect the memory card for backup purposes.

➡️ **Note:** You typically do not operate the AN/ANH with a write-protected memory card. Bay Networks recommends making a copy of your configuration on another memory card, write-protecting that card, and storing it in a safe place.

To change flash memory card protection:

1.   Remove the memory card as described in "Removing a Flash Memory Card" earlier in this chapter.

2.   Adjust the read-write protect switch, located on the edge of the memory card opposite the Insert arrow (Figure 4-11).
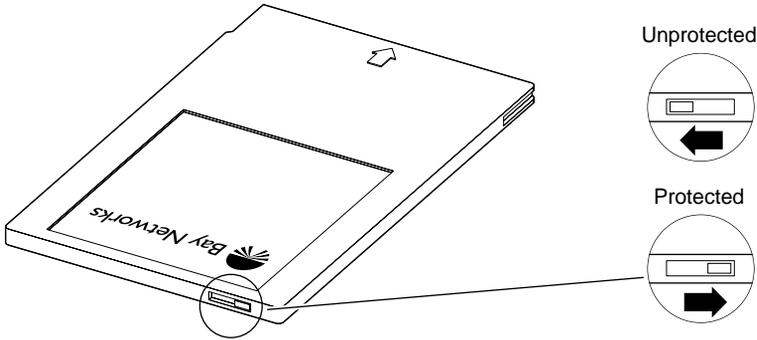
6948

Figure 4-11.   Memory Card Read/Write Protect Switch

3.   Reinsert the memory card into the card receptacle.

Appendix A
Configuring the AN or ANH
for Netboot and Directed Netboot

This appendix describes how to configure an AN or ANH router for Netboot and Directed Netboot and contains the following topics:

The **ifconfig** and **bconfig** commands configure the AN or ANH for Netboot and Directed Netboot:

• Use the **ifconfig** command to configure the AN/ANH router's initial IP interface to the network. You need this information to complete the procedure in "Continuing with Netboot" in Chapter 3.

• Use the **bconfig** command to specify the location and name of the AN/ANH software image and configuration file. You need this information to complete the procedure in "Continuing with Directed Netboot" in Chapter 3.

Contact your network administrator for additional assistance in determining the appropriate **ifconfig** and **bconfig** commands you need for the AN or ANH at your site. (Your network administrator has information about these commands in *Configuring BayStack Remote Access.*)

Using the ifconfig Command

You use the **ifconfig** command to do the following:

- Configure the router's initial IP interface to the network. (The initial IP interface must be a synchronous interface if you are using the EZ-Install option.)

- Configure other synchronous interfaces for the Netboot procedure.

- Configure Ethernet interfaces for the Netboot procedure.

- Enable or disable netbooting on an interface.

The following sections describe each use of the **ifconfig** command.

Configuring an IP Interface for Netbooting

To netboot the AN/ANH, you must first configure the router's initial IP interface to the network. You can use a synchronous IP interface or a 56/64K DSU/CSU interface. The following command description uses a synchronous interface:

ifconfig [*<synchronous options>*] *<interface>* *<IP address>* *<subnet mask>* [*<next hop address>*]

The *synchronous options* variable indicates some combination of the following settings:

[**-d │ -fr** [**-annexd │ -annexa │ -lmi**] **│ -int_clk**]

→ **Note:** Use a space to separate command options.

After creating the initial interface, you can use the same command format to configure other synchronous interfaces on the AN/ANH for netbooting.

Table A-1 describes the **ifconfig** command arguments for configuring a synchronous interface.

Table A-1. ifconfig Command Arguments for a Synchronous Interface

Argument	Description
Default Setting	
-d	Resets the AN/ANH IP interface settings to the default values. This argument tries four WAN protocols in the following order until it successfully establishes a connection to the network: 1. Bay Networks HDLC encapsulation (Bay Networks Standard Point-to-Point) with external clocking 2. Frame Relay Annex D 3. Frame Relay LMI 4. Frame Relay Annex A
Frame Relay Settings	
-fr	Configures the AN/ANH synchronous port as a frame relay connection. With this argument, use one of the following options to specify a DLCMI setting: **-annexd**, **-annexa**, or **-lmi**.
-annexd **-annexa** **-lmi**	When one of these options is used with the **-fr** argument, it specifies a DLCMI setting. Use the same setting as the network to which the router's frame relay interface is connected. The default setting for frame relay is **-annexd**.
Internal Clocking Setting	
-int_clk	Sets the AN/ANH synchronous port to internal clocking at 1.25 MB/s. If you do not specify the **-int_clk** option, the AN/ANH defaults to external clocking.
IP Connector Setting	
<interface>	Specifies the IP connector you are configuring. Use **com1, com2,** or **com3** (for synchronous media).
IP Address Settings	
<IP address>	Specifies the IP address of the interface you set with the *<interface>* variable. Provide this address in dotted-decimal notation.
<subnet mask>	Specifies the IP subnet mask of the interface you selected with the *<interface>* setting. Provide this address in dotted-decimal notation.
<next hop address>	Specifies the IP address of the next-hop router. Provide this address in dotted-decimal notation. Specify this address only if there are intermediate routers between the AN or ANH and the BootP server.

Configuring an Ethernet Interface for Netbooting

To configure an Ethernet interface for netbooting, use the following command:

ifconfig [**-d**] *<interface>* [*<IP address> <subnet mask>*] [*<next hop address>*]

Table A-2 describes the **ifconfig** command arguments for configuring an Ethernet interface.

Table A-2.   ifconfig Command Arguments for an Ethernet Interface

Argument	Description
Default Setting	
-d	Resets the AN/ANH IP interface settings to the default values. Resetting an Ethernet interface makes it inactive in the Netbooting process. (The output of the **getcfg** command shows the default as "None.")
IP Connector Setting	
<interface>	Specifies the IP connector you are configuring. Use **xcvr1** or **xcvr2** (for Ethernet media).
IP Address Settings	
<IP address>	Specifies the IP address of the interface you set with *<interface>*. Provide this address in dotted-decimal notation.
<subnet mask>	Specifies the IP subnet mask of the interface you set with *<interface>*. Provide this address in dotted-decimal notation.
<next hop address>	Specifies the IP address of the next-hop router. Provide this address in dotted-decimal notation. Specify this address only if there are intermediate routers between the AN or ANH and the BootP server.

Enabling and Disabling Interfaces with ifconfig

To enable or disable an interface for the Netboot procedure, use the following commands:

ifconfig -disable *<interface>*
ifconfig -enable *<interface>*

Table A-3 describes the **ifconfig** command arguments for enabling and disabling interfaces for netbooting.

Table A-3.   ifconfig Command Arguments to Enable and Disable Netbooting

Argument	Description
-disable	Disables netbooting on the specified interface. With no interface specified, disables netbooting on all router interfaces.
-enable	Enables netbooting on the specified interface. With no interface specified, enables netbooting on all router interfaces.
<interface>	Specifies the Ethernet or synchronous connector you are enabling or disabling for netbooting. Use one of the following formats: For synchronous media com1*<port #>* com2*<port #>* com3*<port #>* For Ethernet media **xcvr***<port #>*

Using the bconfig Command

To use Directed Netboot, you must use the **bconfig** command to specify the following:

- The IP address of the server where the router's software image and configuration file reside

- The full path names of the software image and configuration file

You must use two **bconfig** commands: one to specify the location of the software image, and one to specify the location of the configuration file.

Use one of the following formats for the **bconfig** command:

bconfig [**image** │ **config**] [**local** │ **network** [<*TFTP host*> <*TFTP pathname*>]]
bconfig **-d** [**image** │ **config**]

Table A-4 describes the **bconfig** command arguments.

Table A-4. **bconfig Command Arguments**

Argument	Description
image	Specifies the location of the AN/ANH software image.
config	Specifies the location of the AN/ANH configuration file.
local	Indicates that the specified file (image or configuration) resides in the router's local file system.
network	Indicates that the specified file resides on a network server.
<*TFTP host*>	Specifies the IP address of the host where the image or configuration file resides. If both the software image and configuration file reside on the network, the files must reside on the same host. In other words, you must specify the same IP address for the TFTP host for both files.

(continued)

Table A-4. **bconfig Command Arguments** *(continued)*

Argument	Description
<TFTP pathname>	Specifies the complete path name of the software image or configuration file on the host.
-d	Reverts to the default values for the software image or configuration file location and nullifies any previously specified IP address and path name for the file, thus disabling Directed Netboot. The command **bconfig -d image** tells the router to look for the image file locally and nullifies the IP address and path name for the file. The command **bconfig -d config** tells the router to obtain the configuration file over the network and nullifies the IP address and path name for the file. Without the IP address and path names, the router uses Netboot rather than Directed Netboot. However, if you want to obtain one file locally while using Directed Netboot for the other file, you can use the **bconfig** command as shown in the following examples: **bconfig image local** **bconfig config network 21.3.5.62 /usr/anstartup/config** Or, **bconfig image network 21.3.5.62 /usr/mykernel.exe** **bconfig config local**

Appendix B
Using Local Boot (the Quick-Start Procedure)

You can local-boot the AN or ANH using the Local Boot method and the
Quick-Start procedure as explained in the following sections. You need this
information to complete the procedure in"Continuing with Local Boot."

Topic	Page
Filling Out the Quick-Start Worksheets	B-2
Using the Quick-Start Commands	B-13
Running the Quick-Start Script	B-14

The Quick-Start procedure creates the initial configuration that starts a new AN or
ANH router running on the network. Using this procedure, you can connect to the
management workstation, where additional configuration tools such as Site
Manager can be used.

To begin the Quick-Start procedure, run the *install.bat* script and enter
information at the prompts. The AN or ANH automatically selects options for
some prompts, and you can accept default values for many of the other prompts.

To assist you in answering the Quick-Start prompts, this appendix includes some
sample worksheets. These sample worksheets contain options that appear at each
prompt and space for you to record the options you plan to select.

Refer to *Quick-Starting Routers* for additional information about the Quick-Start
procedure.

➡ **Note:** Contact your network administrator for assistance in selecting
worksheet options.

Filling Out the Quick-Start Worksheets

The *install.bat* script provides many options for configuring an initial IP interface to the network. The script is self-explanatory, so not all of the possible options are described here. This appendix provides sample Quick-Start worksheets that enable you to prepare your responses to the *install.bat* script before running it.

The sample Global Information Worksheet lists *only* the options for configuring a synchronous interface for the initial wide area network (WAN). If you configure a LAN interface as your initial IP connection, your worksheets will differ -- review the options provided with each *install.bat* prompt and make your decisions accordingly.

Bay Networks recommends that you fill out the worksheets as follows:

1. **Fill out the Global Information worksheet completely.**

2. **After you record your protocol selections on the Global Information worksheet, fill out *one* Router Protocol worksheet.**

   This worksheet lists options for RIP, OSPF, and Static router configurations. For example, if you select RIP as your routing protocol, you need only fill out the RIP worksheet.

3. **Fill out *one* Wide Area Protocol worksheet.**

   This worksheet lists options for Bay Networks Proprietary PPP, frame relay, Standard PPP, and SMDS configurations. For example, if you select frame relay as your wide area protocol, you need only fill out the frame relay worksheet.

4. **Run *install.bat* as described in*"Running the Quick-Start Script*."**

   Alternatively, a remote operator can run the installation script using a management console modem connection.

Once the router has an initial connection to the network, refer to *Configuring and Managing Routers with Site Manager* to configure the router using Site Manager.

Global Information Worksheet

This section contains the prompts and possible options relating to all AN/ANH synchronous configurations. Write your choices in the "Your Response" column.

Global Information Worksheet

Step	Requested Information	Options	Your Response
1	Specify the slot number where the Link Module resides.	Because the AN/ANH is not a link module, the router bypasses this step and automatically accepts a default slot of "1."	None
2	Specify the Link Module and network interface information for the initial IP connection to Site Manager.	The AN/ANH automatically provides a representative letter code depending on the type of AN/ANH you have. The network interface options are: 1. Ethernet 2. Token Ring 3. Synchronous Select the number associated with the synchronous interface.	
	Enter connector number [1]:	1. COM1 2. COM2 3. COM3	
	Enter clock source number [2]:	1. Internal 2. External	
	Enter circuit name [S#]:	The script provides a default circuit name for the COM interface you selected (for example, S11 for COM1 and S12 for COM2).	Press the Return key.

(continued)

Global Information Worksheet *(continued)*

Step	Requested Information	Options	Your Response
3	Enter IP address in dotted decimal notation:	Enter the IP address for the COM interface.	
	Enter IP subnetwork mask in dotted decimal notation:	Enter the subnet mask for the COM interface IP address.	
	Is the router connected to the same local area network as the Site Manager workstation? (y/n) [n]:	y(es) n(o)	Press the Return key.
	Enter routing protocol number [1]:	1. RIP 2. OSPF 3. Static Route to Site Manager	(Complete the worksheet for the protocol you select.)
	Enter wide area protocol number [1]:	1. Bay Networks Point-to-Point Protocol (Proprietary) 2. Frame Relay 3. Point-to-Point Protocol (PPP) Standard 4. Switched Multimegabit Data Service (SMDS)	(Complete the worksheet for the protocol you select.)
	Do you wish to set SNMP community management? (y/n) [n]:	y(es) n(o) Setting up SNMP community management is optional.	
4	Enter (TFTP) volume number [1]:	The script automatically selects 1 as the TFTP default volume.	None
5	Do you want to enable FTP? (y/n) [n]:	y(es) n(o) Enabling FTP is optional.	
	Enter (FTP) volume number [1]:	The script automatically selects 1 as the FTP default volume.	

(continued)

Global Information Worksheet *(continued)*

Step	Requested Information	Options	Your Response
6	Do you want to enable TI TELNET? (y/n) [n]:	y(es) n(o) Enabling Telnet is optional.	
7	Do you wish to save this configuration to a file? (y/n) [y]	y(es) n(o)	Press the Return key.
	Enter file name [*startup.cfg*]:	We recommend using the default file name.	Press the Return key.

Router Protocol Worksheets

This section contains requested information and possible options for the routing protocol choices on the Global Information worksheet.

RIP Worksheet

Requested Information	Options	Your Response
Should RIP listen to the default route? (y/n) [n]:	y(es) n(o) **Note:** RIP listens to a specific network or subnet route where Site Manager is located. Answering y(es) to this prompt forces RIP to also listen to the default route (0.0.0.0). This is useful when no specific route is available in the RIP updates that the router receives.	

OSPF Worksheet

Requested Information	Options	Your Response
Enter the OSPF router ID in dotted decimal notation:	Enter an IP address to uniquely identify the router in the OSPF domain. The script provides the IP address of the COM port. We suggest using the default IP address provided.	
Enter the OSPF area ID in dotted decimal notation [0.0.0.0]:	Enter the area ID. This ID must match the area ID of the router's neighbor. **Note:** The backbone area ID is always 0.0.0.0.	
Enable Simple Password authentication? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the script requests a password.	Password: _____
Enter OSPF MTU size selection [1]:	1. Default 2. Ethernet size (Bay Networks Series 5 compatible) 3. User defined MTU	
Enter OSPF interface type selection [1]:	1. Broadcast 2. NBMA 3. Point-to-Point 4. Point-to-Multipoint 5. Point-to-Multipoint (STD) **Note:** When using a wide area protocol other than Bay Networks Proprietary PPP, we suggest selecting NBMA.	

(continued)

OSPF Worksheet *(continued)*

Requested Information	Options	Your Response
Enter decimal value in seconds for Hello Interval [10]: **Note:** This value must match all other interfaces in the OSPF area for connection to take place.	The script suggests the following intervals: Broadcast -- 10 s Point-to-Point -- 15 s NBMA -- 20 s Point-to-Multipoint --10 s	
Enter decimal value in seconds for Router Dead Interval [40]: **Note:** This value must match all other interfaces in the OSPF area for connection to take place.	The script suggests the following intervals: Broadcast -- 40 s Point-to-Point -- 60 s NBMA -- 80 s Point-to-Multipoint (STD) -- 40 s	
Enter decimal value for Router Priority [1]: (For Broadcast, NBMA, or Point-to-Multipoint)	Enter a router priority value. The lower the value (above 0), the higher the priority. **Note:** If you set the router priority to 0, the router is not eligible to become the designated router on this network.	
Enter decimal value in seconds for Poll Interval [120]: (For NBMA only)	Enter the maximum number of seconds allowed between the Hello packets that the router sends to an inactive NBMA neighbor. The script suggests a 120-second interval.	
Enter IP address of neighbor in dotted decimal notation or enter **q** to quit: (For NBMA only)	Enter addresses for all NBMA neighbors you want the router to communicate with. When you finish, enter **q** and press the Return key to quit entering addresses.	
Enter IP address of neighbor in dotted decimal notation: (For PPP only)	Enter addresses for the PPP neighbor you want the router to communicate with.	

Static Route to Site Manager Worksheet

Requested Information	Options	Your Information
Destination Network [0.0.0.0]:	Enter the gateway address of the destination network. An address of 0.0.0.0 specifies the default route.	
Destination Network Mask [0.0.0.0]:	Enter the subnet mask of the destination network. A mask of 0.0.0.0 specifies the default route.	
Next-Hop Address:	Enter a next-hop address. All static routes require a next-hop address in the same subnet as the initial IP interface.	

Wide Area Protocol Worksheets

This section contains requested information and possible options for the wide area protocol choices on the Global Information worksheet.

Bay Networks Proprietary PPP Worksheet

Requested Information	Options	Your Information
Enter BofL (Breath of Life) timer value (1-60) [5]:	Enter the maximum amount of time that can elapse between the successful transmission of BofL messages.	
Enter Local Address selection [3]:	1. DCE 2. DTE 3. EXPLICIT **Note:** Reverse the local and remote address values when configuring the device at the other end of the circuit. (Exception: When connecting to a Bay Networks Series 5 router that uses DCE/DTE addressing, use the same local address value.)	
Enter Remote Address selection [3]:	1. DCE 2. DTE 3. EXPLICIT **Note:** Reverse the local and remote address values when configuring the device at the other end of the circuit. (Exception: When connecting to a Series 5 router that uses DCE/DTE addressing, use the same local address value.)	

Frame Relay Worksheet

Requested Information	Options	Your Information
Enter Management type [3]:	1. DLCMI None 2. Rev 1 LMI 3. ANSI T1 617D 4. CCITT Annex A 5. LMI Switch 6. Annex D Switch 7. Annex A Switch	
Enter addressing type [4]:	1. ADDR Q.921 2. ADDR Q.922 (MARCH '90) 3. ADDR Q.922 (NOVEMBER '90) 4. ADDR Q.922	
Enter address field length [2]:	2. Two Bytes 3. Three Bytes 4. Four Bytes	
Enter DLCI number [30]: (For DLCMI None, LMI Switch, Annex D Switch, and Annex A Switch only)	Enter the permanent virtual circuit (PVC) number. **Note:** The valid range for the DLCI number is from 16 to 1007.	

PPP Standard Worksheet

Requested Information	Options	Your Information
Enter Remote IP address in dotted decimal notation:	Enter the IP address of the peer connection.	
Do you wish to turn on the PPP echo function? (y/n) [n]:	y(es) n(o)	

(continued)

PPP Standard Worksheet *(continued)*

Requested Information	Options	Your Information
Enable PAP (Password Authentication Protocol)? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the script requests a PAP ID and password for this interface. If you answer n(o), the script asks whether you want to enable CHAP.	
Enable CHAP (Challenge Handshake Authentication Protocol)? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the script requests a CHAP secret for this interface.	
Does the Remote Peer have PAP authentication enabled? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the script requests the PAP ID and password for the remote interface.	
Enable the LQR (Link Quality Reporting) Protocol? (y/n) [n]:	y(es) n(o) **Note:** See *Configuring PPP Services* for information about the Link Quality Reporting (LQR) Protocol and LQR packets.	
Enable use of the Remote Peer router's LQR Timer? (y/n) [y]: (For LQR only)	y(es) n(o) **Note:** Enter y(es) if the remote peer router maintains its own LQR timer for this interface. Enter n(o) if the AN/ANH is responsible for maintaining the timer for this interface.	

(continued)

PPP Standard Worksheet *(continued)*

Requested Information	Options	Your Information
Number of seconds (1-120) [3]: (For LQR only)	Enter the maximum number of seconds between the transmission of LQR packets.	
Enter [inbound] success rate percentage (1-100) [90]:	Enter the minimum acceptable success rate (percentage) of packets transmitted by the peer router and received on this interface over the last five LQR reporting periods.	
Enter [outbound] success rate percentage (1-100) [90]:	Enter the minimum acceptable success rate (percentage) of packets transmitted by this interface and received by the peer router over the last five LQR reporting periods.	

SMDS Worksheet

Requested Information	Options	Your Information
Enter 10-digit individual address:	Enter the individual address assigned to you by your SMDS service provider.	
Enter 10-digit group address:	Enter the group address assigned to you by your SMDS service provider.	
Enter 10-digit arp address:	Enter the Address Resolution Protocol (ARP) address assigned to you by your SMDS service provider.	

Using the Quick-Start Commands

Before you start the installation script, refer to the commands in Table B-1.

Table B-1.   Quick-Start Commands

To Do the Following	Action	Result
Accept a default value.	Press **Return.**	This action accepts the default value that the script displays in brackets, for example, [S11].
Repeat a step to make a correction.	Press **Control-C.** Press **n.**	The script displays this prompt: `Terminate script y/n?` Enter **n** to return to the beginning of the step so you can reenter the information.
Stop the Quick-Start installation script.	Press **Control-C.** Press **y.**	The script displays this prompt: `Terminate script y/n?` Enter **y**. The Quick-Start script terminates and you are returned to the Technician Interface prompt. To restart the Quick-Start procedure, you must reboot the router by typing **boot** and pressing the Return key.

Running the Quick-Start Script

After you enter **run install.bat**, the AN/ANH progresses through the Quick-Start script as follows:

1. The AN/ANH begins prompting you for the initial Global Worksheet information.

2. After you select a router protocol option, the AN/ANH prompts for specific protocol information.

3. After finishing the router protocol configuration, the AN/ANH requests a wide area protocol selection.

4. After you select a wide area protocol, the AN/ANH prompts for specific protocol information.

5. After finishing the wide area protocol configuration, the AN/ANH prompts for the rest of the Global Worksheet information.

When the configuration is complete, the AN/ANH runs through a test procedure for the IP interface. When the test is complete, the following prompt appears:

```
Enter IP address of Site Manager workstation:
```

Obtain this information from your network administrator.

Appendix C
Technical Specifications

This appendix provides technical specifications and a product overview of the AN, 12-port ANH, and 8-port ANH routers. For AN and 12-port ANH specifications, go to the next section. For 8-port ANH specifications, go to the section "8-Port ANH Technical Specifications."

AN and 12-Port ANH Technical Specifications

This section lists:

- Physical, electrical, and environmental specifications
- Hardware communication options

Physical Specifications

The dimensions and weight of the AN are as follows:

- Height: 3.3 in. (8.4 cm)
- Width: 17.25 in. (43.8 cm)
- Depth: 9.5 in. (24.1 cm)
- Weight: 12 lb (5.4 kg)

Your installation site must provide sufficient free space around the AN to ensure proper ventilation and access for servicing. The space requirements for installing the AN at your site are as follows:

- Width: 19.5 in. (50 cm)
- Minimum depth: 15.5 in. (39.3 cm)
- Depth for servicing: 24.5 in. (62.2 cm)

If you are installing your AN in an equipment rack, make sure that the rack meets the following specifications:

- Heavy-duty steel construction
- Electronic Industries Association (EIA) standard hole-spacing
- Width of 19 in. (48.26 cm)
- Depth of 24 in. (60.96 cm)

Electrical Specifications

Your installation site must meet the following power requirements:

- Proximity to power outlet: within 6 ft (1.8 m) of the AN
- Voltage: 100 to 240 VAC
- Amperage: 0.5 to 1.0 A

Table C-1 lists the power outlet requirements.

Table C-1.   AN Power Outlet Requirements

Country	Outlet	Voltage
United States/ Canada	National Electrical Manufacturers Association (NEMA) 5-15P standard outlet.	100-120 V
Any other country	Your AN distributor informs you of the outlet you need.	200-240 V

Environmental Specifications

The environmental requirements for the AN are as follows:

- Altitude: 0 to 8,000 ft (0 to 2,438.4 m)
- Humidity: 10% to 90%, noncondensing
- Temperature: 32° to 104°F (0° to 40°C) stable

U.S. Safety Agency Approvals

- UL listed (UL 1950).
- Certified to CSA 22.2 #950.
- TUV licensed (EN 60 950).
- The power supply is UL 1012, CSA 22.2 number 234, and IEC 950 EN 60950 (TUV) compliant.

Hardware Communication Options

The AN is available in the following basic configurations:

- One Ethernet AUI and two synchronous interfaces
- One token ring media access unit (MAU) and two synchronous interfaces
- One Ethernet, one token ring, and two synchronous interfaces

As optional upgrades, the AN also supports:

- Third synchronous interface
- ISDN BRI for direct connection (without terminal adapter) to the ISDN network
- 56/64K DSU/CSU interface
- FT1/T1 DSU/CSU interface for direct connection to a T1 line
- Second Ethernet interface (*not* supported in token ring ANs)
- N11 Ethernet data collection module (DCM) for gathering RMON statistics (*not* supported in token ring ANs)

→ **Note:** To use an N11 DCM, the AN requires Router Software Version 9.0 or later and Site Manager Software Version 3.0 or later.

Table C-2 describes each interface.

Table C-2.   AN and 12-Port ANH Network Interfaces

Network Interface	Description
Ethernet and second Ethernet	Supports the Ethernet and IEEE 802.3 standards that provide LAN connectivity. The Ethernet interfaces on an AN include a 10BASE-T (UTP) and an 802.3 AUI (XCVR) port; however, you can use only one port at a time. **Note:** The 12-Port ANH comes with 12 Ethernet 10BASE-T repeater ports. The UTP interface provides unshielded twisted pair support; the XCVR interface provides broadband, baseband, fiber, and shielded twisted pair support, depending on the transceiver and cables you use.
Synchronous	Provides WAN connectivity. AN models can have either two (COM1 and COM2) or three (COM1, COM2, and COM3) synchronous ports. (The third synchronous interface option is available on any AN model that this guide describes.) Each port can operate independently with RS-232, RS-422, RS-449, V.28, V.35, and X.21 cables. Synchronous capability allows internal or external clocking.
Token ring	Supports the token ring and IEEE 802.5 standards that provide LAN connectivity. The media access unit (MAU) interface supports the 802.5 media access control (MAC) token-passing protocol, the 802.2 Type 1 (connectionless) protocol, the 802.2 Type 2 (connection-oriented) protocol, and the 16 Mb/s Early Token Release (ETR) protocol via appropriate cabling.
ISDN BRI	Supports an S/T interface (an RJ-45 physical connector). The BRI provides two B channels and supports full D-channel signaling and call setup/teardown as defined in 1988 CCITT (now ITU-T) Q.921 and Q.931. For more information about ISDN, see *Configuring Dial Services*. **Note:** In the United States, an external NT-1 device is required to provide the U interface to the carrier network. The ISDN BRI option is available on any AN model. Note that only one synchronous port, COM2, operates in AN models that include ISDN BRI support.
56/64K DSU/CSU	Supports an optional DSU/CSU interface that connects to either a 56 Kb/s dataphone digital service (DDS) or 64 Kb/s Clear Channel dedicated services (using an RJ-45 physical connector).

(continued)

Table C-2. **AN and 12-Port ANH Network Interfaces** *(continued)*

Network Interface	Description
FT1/T1 DSU/CSU	Provides an interface to convert incoming packet data from an external T1 line (using an RJ-48C connector). Because the interface integrates the channel service unit (CSU) function on each T1 port, it allows direct connection to the T1 network. A T1 port can transmit or receive a total of 24 DS0 HDLC channels for each DS1 frame.
N11 DCM	Gathers RMON statistics. See *Configuring BayStack Remote Access* for information.

Note the following facts about the 12-port ANH:

- The 12-port ANH treats all 12 repeater ports as a single interface. The 12 ports reside on an internal Ethernet upgrade module.

- The 12-port ANH polls the internal module (on which the 12 Ethernet repeater ports reside) for operational status. The router does not poll individual Ethernet repeater ports for connection (link) status, therefore, it is aware of the connection between the base module and the upgrade module, but not of any connection between the module and the Ethernet network.

  If the upgrade module interface state reports an operational status, the AN may continue to transmit information through the upgrade module, even though a physical Ethernet connection does not exist.

8-Port ANH Technical Specifications

This section lists:

- Physical, electrical, and environmental specifications
- Hardware communication options

Physical Specifications

The dimensions and weight of the ANH are as follows:

- Height: 1.75 in. (4.5 cm)
- Width: 17.25 in. (43.8 cm)
- Depth: 11.25 in. (28.6 cm)
- Weight: approximately 7.5 lbs (3.2 kg)

Your installation site must provide sufficient free space around the ANH to ensure proper ventilation and access for servicing. The space requirements for installing the ANH at your site are as follows:

- Width: 19.25 in. (48.89 cm)
- Minimum depth: 17.25 in. (43.8 cm)
- Depth for servicing: 24.5 in. (62.2 cm)

Electrical Specifications

Your installation site must meet the following power requirements:

- Proximity to power outlet: within 6 ft (1.8 m) of the ANH
- Voltage: 100 to 240 VAC
- Amperage: 0.5 to 1.0 A

The 8-port ANH consumes 30 watts (W) maximum power.

Environmental Specifications

Table C-3 lists the environmental requirements for the 8-port ANH.

Table C-3.   Required Climatic Conditions

Condition	Operating	Storage
Temperature	41°-104°F (5°-40°C)	-58°-113°F (-50°-45°C)
Relative humidity	5-85%, noncondensing	95% maximum, noncondensing
Maximum altitude	10,000 ft (3,000 m)	10,000 ft (3,000 m)

These requirements meet IEC 721-3 Class 3K3 climatic conditions while under operation and IEC 721-3 Class 1K3 climatic conditions while under storage.

U.S. Safety Agency Approvals

- UL listed (UL 1950).
- Certified to CSA 22.2 #950.
- TUV licensed (EN 60 950).
- The power supply is UL 1012, CSA 22.2 number 234, and IEC 950 EN 60950 (TUV) compliant.

Hardware Summary

Every 8-port ANH includes the following:

- Nine Ethernet LAN repeater ports (one AUI and eight UTP)
- Two synchronous WAN ports
- One local console service port

→ **Note:** The Ethernet repeater ports operate as a single interface. Software configuration parameters (for example, the port IP address) apply to all ports.

As optional upgrades, the ANH also supports:

- ISDN BRI for direct connection to the ISDN network
- Third synchronous port (COM3)
- 56/64K DSU/CSU interface
- FT1/T1 DSU/CSU interface for direct connection to a T1 line
- Second Ethernet nonrepeating 10BASE-T port (UTP-2)
- N11 Ethernet data collection module (DCM) for gathering RMON statistics

→ **Note:** To use an N11 DCM, the ANH requires Router Software Version 9.0 or later and Site Manager Software Version 3.0 or later.

Table C-4 summarizes the network interfaces; the next section "Network Interface Pin Assignments" describes each interface in more detail and provides cable and connector specifications. For information about the front-panel and back-panel cable connections, see Chapter 2.

Table C-4. **8-Port ANH Network Interfaces**

Network Interface	Description
Ethernet	Supports eight 10BASE-T UTP repeater ports and one 802.3 AUI port; however, you can use only one port at a time. These interfaces comprise a single managed segment, supporting the Ethernet and IEEE 802.3 standards that provide LAN connectivity. Some 8-port ANH models also include an Ethernet UTP port on the back panel. This second Ethernet interface is not a repeater port.
Synchronous	Provides WAN connectivity. ANH models can have either two (COM1 and COM2) or three (COM1, COM2, and COM3) synchronous ports. Each port can operate independently with RS-232, RS-422, V.28, V.35, and X.21 cables. Synchronous capability allows internal or external clocking.
ISDN BRI	Supports an S/T interface (an RJ-45 physical connector). The BRI provides two B channels, and supports full D-channel signaling and call setup/teardown as defined in 1988 CCITT (now ITU-T) Q.921 and Q.931. For more information about ISDN, see *Configuring Dial Services*. In the United States, an external NT-1 device is required to provide the U-interface to the carrier network.
56/64K DSU/CSU	Supports an optional DSU/CSU interface that connects to either a 56 Kb/s dataphone digital service (DDS) or 64 Kb/s Clear Channel dedicated services (using an RJ-45 physical connector).
FT1/T1 DSU/CSU	Provides an interface to convert incoming packet data from an external T1 line (using an RJ-48C connector). Because the interface integrates the channel service unit (CSU) function on each T1 port, it allows direct connection to the T1 network. A T1 port can transmit or receive a total of 24 DS0 HDLC channels for each DS1 frame.
N11 DCM	Gathers RMON statistics. See *Configuring BayStack Remote Access* for information.

Network Interface Pin Assignments

The illustrations in this section describe the AN and 12-port ANH router. The same pin assignments apply to 8-port ANH routers if you invert the position of the connector in the figure.

Attachment Unit Interface (AUI) Port

The AUI transceiver (XCVR) port provides broadband, baseband, fiber, and shielded twisted pair support, depending on the transceiver and cables you use. The AUI interface connects internally to the Ethernet repeater.

The AN/ANH contains a standard 802.3 AUI DB-15 receptacle connector with a slide lock for connection to the AUI. You can use the Order No. 7115 Ethernet cable, described in the *Cable Guide*, for connections to this port.

➡️ **Note:** The AN/ANH AUI port is designed only for connection to a transceiver. Connecting the AN/ANH AUI port directly to the AUI port on an Ethernet station (without a transceiver) violates IEEE 802.3 standards.

Table C-5 lists the pin assignments for the standard 15-pin AUI receptacle on the AN/ANH and identifies its pin locations.

Table C-5.   AUI Port Pin Assignments
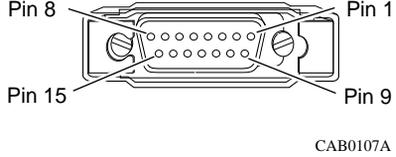
Pin Assignment	Pin No.	Signal Name
	1	Ground
	2	CI-A
	3	DO-A
	4	Ground
	5	DI-A
	6	+12 VDC Return
	7	(not connected)
	8	(not connected)
	9	CI-B
	10	DO-B
	11	Ground
	12	DI-B
	13	+12 VDC
	14	Ground
	15	Ground

Pin 8   Pin 1

Pin 15   Pin 9

CAB0107A

10BASE-T Repeater Ports

The eight Ethernet 10BASE-T repeater port RJ-45 connectors provide UTP support on the 8-port ANH and on the AN. On the 12-port ANH, there are twelve repeater port RJ-45 connectors.

The AN/ANH transmits the same information over each repeater port; it allows simultaneous connection to any of the 10BASE-T ports or the AUI port.

Each of the shielded RJ-45 jacks is a 10BASE-T port using the standard MDI-X pin assignment. Each port detects the polarity of the circuit connected to Receive Data (RD) pins 1 and 2 and adjusts polarity as necessary to correctly complete this circuit.

UTP repeater ports 2 through 8 ship with an internal crossover (MDI-X) connection. This means that you can use a straight-through cable when connecting to other network resources (for example, workstations or other nonrepeating devices).

Table C-6 lists the RJ-45 pin assignments for the front-panel Ethernet 10BASE-T ports and identifies the pin locations.

Table C-6.   RJ-45 Pin Assignments

Pin Assignment	Pin No.	MDI-X Signal (Function)	MDI Signal (Function)
	1	RD + (Receive from UTP wire)	TD + (Transmit to UTP wire)
12345678	2	RD - (Receive from UTP wire)	TD - (Transmit to UTP wire)
	3	TD + (Transmit to UTP wire)	RD + (Receive from UTP wire)
	4	Not used	Not used
	5	Not used	Not used
	6	TD - (Transmit to UTP wire)	RD - (Receive from UTP wire)
	7	Not used	Not used
	8	Not used	Not used
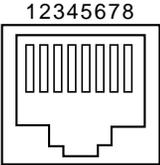
Synchronous Interface Options

All AN/ANH routers support two synchronous interfaces, labeled COM1 and COM2. There is a third synchronous port in which you can install either a third synchronous interface or a WAN adapter module, such as an ISDN BRI or an FT1/T1 DSU/CSU.

The synchronous interfaces provide multiprotocol WAN connection through DB-44 receptacle connectors. Each synchronous interface can operate independently with RS-232, RS-422, V.28, V.35, and X.21 electrical interfaces at transmission rates from 1200 bits/s to 2.048 Mb/s. When used with standard keyed cables, the ports automatically configure to the desired electrical interface.

You can use the following cables, described in the *Cable Guide*:

V.35 connections	Order No. 7220
X.21 connections	Order No. 7224
V.28 connections	Order No. 7837

RS-422 connections	Order No. 7318
RS-232 connections	Order No. 7826

lists the signal and pin assignments for these connectors.

Table C-7. Synchronous Port Pin Assignments

Pin Assignment	Pin No.	Signal Name	Pin No.	Signal Name
	1	FGND	23	DCD-
	2	SD+	24	ST-
	3	RD+	25	RT-
	4	RTS+	26	TT-
Pin 15 Pin 1	5	CTS+	27	NC
Pin 30 Pin 16	6	DSR+	28	RTIN#B
Pin 44 Pin 31	7	SGND	29	CTSIN#
CAB0109A	8	DTR+	30	ST#
	9	DCD+	31	VST-
	10	ST+	32	VST+
	11	RT+	33	VRT-
	12	TT+	34	VRT+
	13	RTIN#	35	VRD-
	14	CTS#	36	VSD-
	15	RTS#	37	VRD+
	16	SD-	38	VSD+
	17	RD-	39	VTT-
	18	RTS-	40	VTT+
	19	CTS-	41	UNBE
	20	DSR-	42	V35D
	21	NC	43	GND
	22	DTR-	44	SNDC
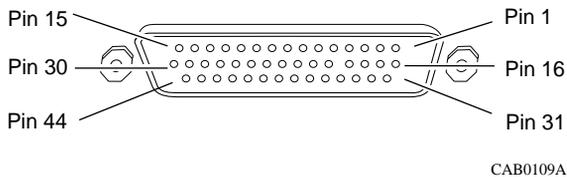
ISDN BRI Interface

The AN/ANH supports the BRI standard for ISDN using an optional ISDN/BRI module. The integrated ISDN BRI functions allow you to connect directly to the ISDN network, as opposed to connecting via a terminal adapter. This solution reduces equipment costs and simplifies connection to an ISDN switch.

The BRI implementation supports two dial service applications: dial-on-demand and dial backup. *Configuring Dial Services* describes these services and how to configure them for connection to an ISDN network.

Table C-8 lists the ISDN connector pinouts.

Table C-8.   **ISDN Connector Pinouts**
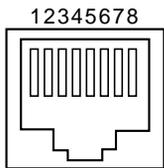
Pin Assignment	Pin No.	Signal
12345678	1	No connection
	2	No connection
	3	Transmit +
	4	Receive +
	5	Transmit -
	6	Receive -
	7	No connection
	8	No connection

56/64K DSU/CSU Interface

The AN/ANH supports direct synchronous access to either a 56 Kb/s dataphone digital service (DDS) or 64 Kb/s Clear Channel dedicated services using an optional 56/64K DSU/CSU adapter module.

Table C-9 lists the 56/64K DSU/CSU interface pin assignments.

Table C-9.   56/64K DSU/CSU Interface Pin Assignments
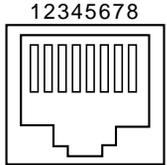
Pin Assignment	Pin No.	Signal
12345678	1	Transmit -
	2	Transmit +
	3	Not used
	4	Not used
	5	Not used
	6	Not used
	7	Receive +
	8	Receive -

FT1/T1 DSU/CSU Connections

The AN/ANH supports the conversion of data (HDLC protocol) from a T1 line using an optional FT1/T1 DSU/CSU adapter module. The integrated DSU/CSU functions allow you to connect directly to the T1 network, as opposed to connecting via an external adapter. This solution reduces equipment costs and simplifies connection to a T1 carrier.

The AN/ANH FT1/T1 DSU/CSU implementation supports dynamic reconfiguration, fractional T1 loopback, facility data link (FDL) functions, and an integrated bit error rate test (BERT) line tester. *Configuring WAN Line Services* describes these services and how to configure them for connection to a T1 network.

Table C-10 lists the FT1/T1 DSU/CSU RJ-48C connector pinouts.

Table C-10.   RJ-48C Connector Pinouts
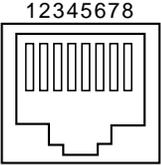
Pin Assignment	Pin No.	Signal
12345678	1	Receive -
	2	Receive +
	3	No connect
	4	Transmit -
	5	Transmit +
	6	No connect
	7	No connect
	8	No connect

Local Console Connections

The AN/ANH contains one service interface, labeled Console; its DB-9 plug connector provides an RS-232-D serial connection. You use this local console port to connect the router to:

• Any VT-100 compatible console device for direct console access

• Any Hayes compatible modem for remote dial-in access

The AN/ANH shipping package includes a console/modem kit (Order No. 110310) for connecting devices to the Console port.

Table C-11 lists signal and pin assignments for the Console port.

Table C-11.   Console Port DB-9 Pin Assignments

Pin Assignment	Pin No.	Signal Name	Direction
Pin 5 Pin 1 CONSOLE Pin 9 Pin 6 AN0132A	1	DCD (Data carrier detect)	In from terminal (DCE)
	2	TXD (Transmit data)	Out to DCE
	3	RXD (Receive data)	In from DCE
	4	DSR (Data set ready)	In from DCE
	5	GND (Ground)	N/A
	6	DTR (Data terminal ready)	Out to DCE
	7	CTS (Clear to send)	In from DCE
	8	RTS (Request to send)	Out to DCE
	9	Not used	N/A
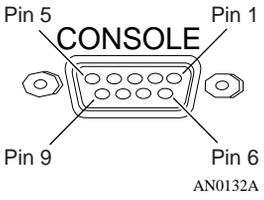
Appendix D
Requirements for European Operation

This appendix provides the following information required about the BayStack AN, 12-port ANH, and 8-port ANH routers:

- Safety information required for operation in Europe

- Cabling requirements for synchronous connections

- Using the ISDN BRI module (Order Nos. 24000, 50022, 24000-S) in Europe

The information is structured as follows:

ANH Safety Status

Tables D-1, D-2, and D-3 list the safety status of interconnection points on the ANH to the connection of other equipment.

Table D-1. **Safety Status (Order Nos. AE1001009, AE1001010, AE1001011, and AE1001012)**

Port Location	Port Description	Type of Circuit
COM1	V.28, X.21, V.35	TNV (Telecommunications Network Voltage) at SELV (Safety Extra-Low Voltage) levels
COM2	V.28, X.21, V.35	TNV at SELV levels
Console	V.28	SELV
AUI	Ethernet AUI	SELV
UTP 1-8	Ethernet 10BASE-T	SELV

Table D-2. **Safety Status (Order Nos. AE0004005, AE0011012, and AE0011020)**

Port Location	Port Description	Type of Circuit
COM3	V.28, X.21, V.35	TNV at SELV levels

Table D-3. **Safety Status (Order Nos. AE0004006, AE0011013, and AE0011019)**

Port Location	Port Description	Type of Circuit
ISDN	BRI ISDN	TNV at SELV levels
P6	Host port	SELV

Safety Status (AN Ethernet Models)

Table D-4 lists the safety status of interconnection points to the connection of other equipment.

Table D-4.   Safety Status (Order Nos. AE1001005, AE1001006, AE1001007, and AE1001008)

Port Location	Port Description	Type of Circuit
COM1	V.28, X.21, V.35	TNV at SELV levels
COM2	V.28, X.21, V.35	TNV at SELV levels
Console	V.28	SELV
XCVR	Ethernet AUI	SELV
UTP	Ethernet 10-BASE-T	SELV

Safety Status (AN Token Ring Models)

Table D-5 lists the safety status of interconnection points to the connection of other equipment.

Table D-5.   Safety Status (Order Nos. AE1101001, AE1101002, AE1101003, and AE1101004)

Port Location	Port Description	Type of Circuit
COM1	V.28, X.21, V.35	TNV at SELV levels
COM2	V.28, X.21, V.35	TNV at SELV levels
Console	V.28	SELV
MAU	Token ring	SELV

Safety Status (AN Combined Ethernet and Token Ring Models)

Table D-6 lists the safety status of interconnection points to the connection of other equipment.

Table D-6. Safety Status (Order Nos. AE1101005, AE1101006, AE1101007, and AE1101008)

Port Location	Port Description	Type of Circuit
COM1	V.28, X.21, V.35	TNV at SELV levels
COM2	V.28, X.21, V.35	TNV at SELV levels
Console	V.28	SELV
XCVR	Ethernet AUI	SELV
UTP	Ethernet 10-BASE-T	SELV
MAU	Token ring	SELV

Safety Status (AN 12-Port Ethernet Hub Models)

Table D-7 lists the safety status of interconnection points to the connection of other equipment.

Table D-7.   Safety Status (Order Nos. AE1101013, AE1101014, AE1101015, and AE1101016)

Port Location	Port Description	Type of Circuit
COM1	V.28, X.21, V.35	TNV at SELV levels
COM2	V.28, X.21, V.35	TNV at SELV levels
Console	V.28	SELV
UTP 1-12	Ethernet 10BASE-T	SELV

Safety Status (AN Third Synchronous Interface Module)

Order Nos. 24001, 50025, and 24001-S are upgrade options that provide a third synchronous interface. These options can be installed in any AN model.

Table D-8 lists the safety status of the interconnection point (COM3) provided by Order Nos. 24001, 50025, and 24001-S to the connection of other equipment.

Table D-8.   Safety Status (Order Nos. 24001, 50025, and 24001-S)

Port Location	Port Description	Type of Circuit
COM3	V.28, X.21, V.35	TNV at SELV levels

Synchronous Cabling Requirements

This section lists the synchronous interface cabling information required to meet:

- V.28 compliance
- V.35 compliance
- X.21 compliance

V.28 Compliance

V.28 compliance requires cable Order No. 7837. Refer to Figure D-1 and Table D-9 for cabling information.

15 ft
(4.57 m)

Pin 1 Pin 15
Pin 16 Pin 30
Pin 31 Pin 44

44-position D-sub plug with screw locks
(ground shield connected to backshell)

Pin 1 Pin 13
Pin 14 Pin 25

25-position D-sub plug with M-3 jack screws
(ground shield connected to backshell)
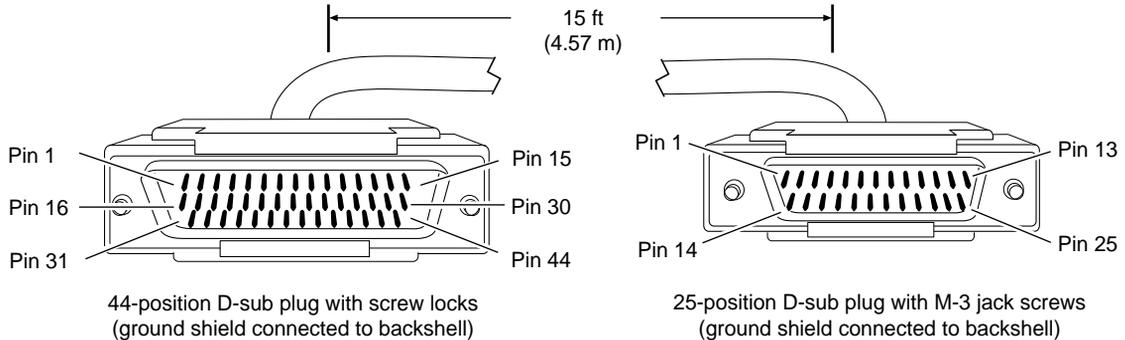
CAB0069B

Figure D-1.   Cable Order No. 7837 (V.28 Compliant)

Table D-9.   V.28 Interface (Cable Order No. 7837)

Bay Networks Termination		Remote Termination	
Pin	**Signal**	**Pin**	**Signal**
1	Frame Ground	1	Frame Ground
2	Send Data+	2	Send Data
3	Receive Data+	3	Receive Data
4	Request to Send+	4	Request to Send
5	Clear to Send+	5	Clear to Send
6	Data Set Ready+	6	Data Set Ready
8	Data Terminal Ready+	20	Data Terminal Ready
9	Data Carrier Detect+	8	Data Carrier Detect
10	Send Timing+	15	Send Timing
11	Receive Timing+	17	Receive Timing
12	Transmitter Signal Element Timing+	24	Transmitter Signal Element Timing
7	Signal Ground	7	Signal Ground
Local Wire Connections			
Pin 7 > 19 > 20 > 23			
Pin 13 > 28			
Pin 14 > 29			

V.35 Compliance

V.35 compliance requires cable Order No. 7220. Refer to Figure D-2 and Table D-10 for cabling information.
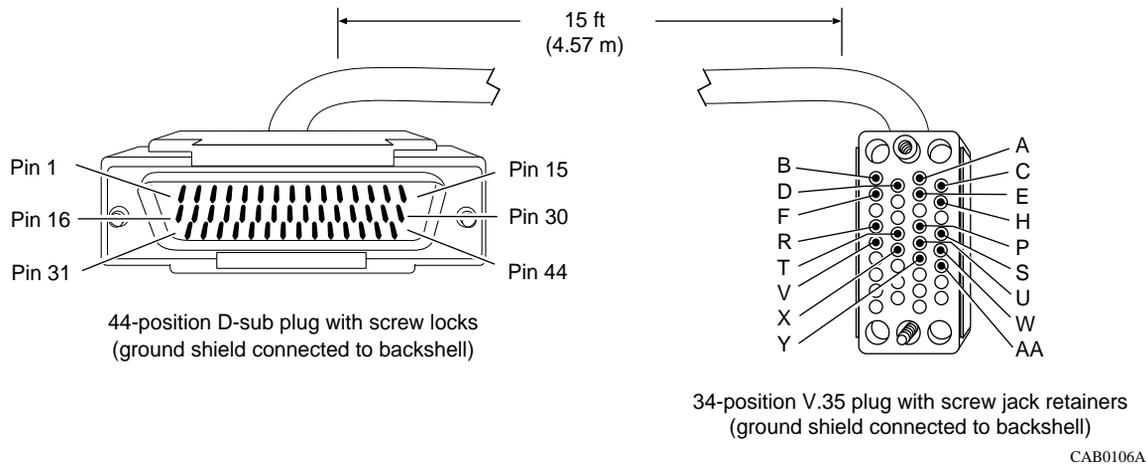
Figure D-2. Cable Order No. 7220 (V.35 Compliant)

Table D-10.   V.35 Interface (Cable Order No. 7220)

Bay Networks Termination		Remote Termination	
Pin	**Signal**	**Pin**	**Signal**
38	VSD+	P	Send Data A
36	VSD-	S	Send Data B
34	VRT+	V	Receive Timing A
33	VRT-	X	Receive Timing B
32	VST+	Y	Send Timing A
31	VST-	AA	Send Timing B
37	VRD+	R	Receive Data A
35	VRD-	T	Receive Data B
6	Data Set Ready+	E	Data Set Ready
8	Data Terminal Ready+	H	Data Terminal Ready
4	Request to Send+	C	Request to Send
5	Clear to Send+	D	Clear to Send
40	VTT+	U	Terminal Timing A
39	VTT-	W	Terminal Timing B
1	Frame Ground	A	Frame Ground
9	Data Carrier Detect+	F	Data Carrier Detect
19	Signal Ground	B	Signal Ground
Local Wire Connections			
Pin 19 > 20 > 23 > 7			
Pin 41 > 42 > 43			
Pin 13 > 28			
Pin 14 > 29			

X.21 Compliance

X.21 compliance requires cable Order No. 7224. Refer to Figure D-3 and Table D-11 for cabling information.

15 ft
(4.57 m)

Pin 1
Pin 16
Pin 31
Pin 15
Pin 30
Pin 44

44-position D-sub plug with screw locks
(ground shield connected to backshell)

Pin 1
Pin 9
Pin 8
Pin 15

15-position D-sub plug with M-3 jack screws
(ground shield connected to backshell)

CAB0104A
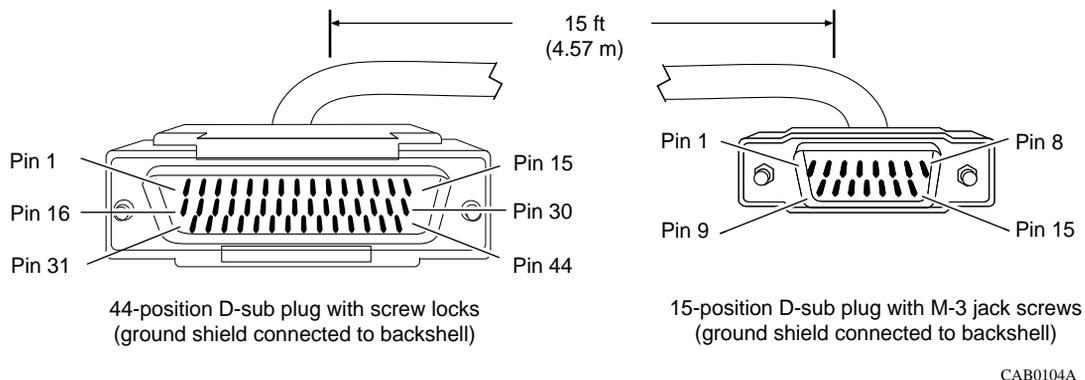
Figure D-3.   Cable Order No. 7224 (X.21 Compliant)

Table D-11.   X.21 Interface (Cable Order No. 7224)

Bay Networks Termination		Remote Termination	
Pin	**Signal**	**Pin**	**Signal**
2	Send Data+	2	TD A
16	Send Data-	9	TD B
4	Request to Send+	3	Control A
18	Request to Send-	10	Control B
3	Receive Data+	4	RD A
17	Receive Data-	11	RD B
9	Data Carrier Detect+	5	Indication A
23	Data Carrier Detect-	12	Indication B
10	Send Timing+	6	Timing A
24	Send Timing-	13	Timing B
7	Signal Ground	8	Signal Ground
1	Frame Ground	1	Frame Ground

(continued)

Table D-11.   X.21 Interface (Cable Order No. 7224) *(continued)*

Bay Networks Termination	Remote Termination
Local Wire Connections	
Pin 41 > 43	
Pin 28 > 30	
Pin 14 > 15	

ISDN BRI Requirements

The ISDN BRI module for the ANH (Order Nos. AE0004006, AE0011013, and AE0011019) and the ISDN BRI upgrade module for the AN (Order Nos. 24000, 24000-S, and 50022) are approved only for installation in a host, and with host attachments, that are either type-approved for such apparatus or, if supplied after 1 March 1989, are marked with or supplied with a statement that the host is supplied under the terms of General Approval Number NS/G/1234/J/100003.

Installation of the ISDN BRI module in any BayStack ANH chassis (Order Nos. AE1001009, AE1001010, AE1001011, and AE1001012) complies with all requirements listed in this section. Installation of the ISDN BRI upgrade module in any AN complies with all requirements listed in this section.

Power Requirements

The ISDN BRI obtains power from the host chassis and has the power requirements shown in .

Table D-12.   ISDN BRI Power Requirements

Voltage	Amperage
+5 V	1 A
+12 V	0.15 A
-12 V	0.15 A

The power drawn from the host chassis combined with the power required for any other modules and accessories must be within the power rating of the host chassis.

You must install the ISDN BRI upgrade module in an AN in such a way as to not impair the integrity of the network protection from hazardous voltages used or generated internally by the host chassis.

ISDN BRI Clearances and Creepage Distances

The clearances and creepage distances (shown as X and Y, respectively, in Figure D-4 and Table D-13) must be maintained between the module and:

- The host chassis in which it is installed
- Any adjacent modules installed in the host chassis

The exception to this rule is the edge connector, which resides in the host chassis backplane, where no minimum distance applies.

The creepage distances apply to the normal office environment. When the local environment within the host chassis is subject to conductive pollution or dry, nonconductive pollution that could become conductive due to condensation, the creepage distances shown in parentheses in Table D-13 apply.
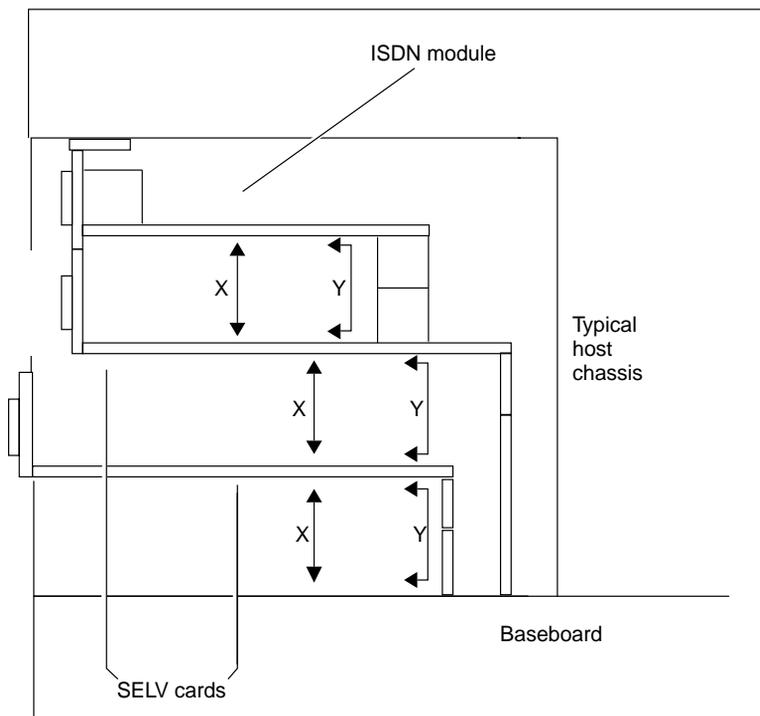
AN0034A

Figure D-4.   ISDN BRI Clearances and Creepage Distances

Table D-13.   ISDN BRI Clearances and Creepage Distances

Clearance (X)	Creepage (Y)	Voltage Used or Generated by Other Parts of the Host or Expansion Card
2.0 mm	2.4 (3.8) mm	Up to 50 V rms or VDC
2.6 mm	3.0 (4.8) mm	Up to 125 V rms or VDC
4.0 mm	5.0 (8.0) mm	Up to 250 V rms or VDC
4.0 mm	6.4 (10.0) mm	Up to 300 V rms or VDC

Determine the clearance and creepage distance between adjacent points as follows:

- The clearance distance (X) is the shortest distance between two points through the air.

- The creepage distance (Y) is the shortest distance between two points measured across a surface.

If you have any questions, consult a competent telecommunications safety engineer. Failure to install the ISDN BRI according to these instructions will invalidate the General Approval.

ISDN BRI Upgrade Module Safety Status

Table D-14 lists the safety status of interconnection points to the connection of other equipment.

Table D-14.   ISDN BRI Safety Status (Order Nos. 24000, 24000-S, 50022, AE0004006, AE0011013, and AE0011019)

Port Location	Port Description	Type of Circuit
ISDN	BRI ISDN	TNV at SELV levels
P6	Host port	SELV

ISDN BRI Connector Pinouts

Table D-15 lists the ISDN connector pinouts.

Table D-15.   ISDN Connector Pinouts

Pin No.	Signal
1	No connection
2	No connection
3	Tx +
4	Rx +
5	Tx -
6	Rx -
7	No connection
8	No connection

Index

Numbers