Verilink NCM 2000
User Manual

September 1999

P/N 880-502623-001-E1

Copyright Notice

This document does not create any express or implied warranty about Verilink or about its products or services. Verilink's sole warranty is contained in its product warranty. The end-user documentation is shipped with Verilink's products and constitutes the sole specifications referred to in the product warranty. Verilink has made reasonable efforts to verify that the information contained herein is accurate, but Verilink assumes no responsibility for its use or for any infringement of patents or other rights of third parties that may result. The customer is solely responsible for verifying the suitability of Verilink's products for its use. Specifications are subject to change without notice.

Trademarks

Verilink is a registered trademark of Verilink Corporation. Access System 2000, WANscope, VeriStats, and FrameStart are trademarks of Verilink Corporation.

Any named products herein are trademarks of their respective companies.

FCC Requirements

This equipment has been tested and found to comply within the limits for a Class A digital device pursuant to Part 15 of the Federal Communications Commission (FCC) rules. These limits are designed to provide protection against harmful interference in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, can cause harmful interference to radio communications.

There is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception—which can be determined by turning the equipment off and on—try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with Part 68 of the FCC Rules. On the rear, side or bottom of the unit is a label that contains the FCC registration number and other information. If requested, provide this information to the telephone company.

- All direct connections to the network lines must be made using standard plugs and jacks (compliant with Part 68). The following tables list the applicable registration jack universal order codes (USOCs), facility interface codes (FICs), and service order codes (SOCs). These are required to order service from the telco.

For T1 interfaces:

Port ID	REN / SOC	FIC	USOC
1.544 Mbit/s SF 1.544 Mbit/s SF, B8ZS 1.544 Mbit/s ANSI ESF 1.544 Mbit/s ANSI ESF, B8ZS	6.0N	04DU9 -BN 04DU9 -DN 04DU9 -1KN 04DU9 -1SN	RJ-48C jack

For DDS interfaces:

Port ID	REN / SOC	FIC	USOC
56 kbit/s 64 kbit/s	6.0N	04DU5 -56 04DU5 - 64	RJ-48S jack

- If the unit appears to be malfunctioning, inform the telco and disconnect it from the network lines until the source of trouble is determined to be your equipment or the telephone line . If your equipment needs repair, it should not be reconnected until it is repaired.
- The unit has been designed to prevent harm to the network. If the telephone company finds that the equipment is exceeding tolerable parameters, it can temporarily disconnect service. In this case, the telephone company will provide you advance notice if possible.

- If the telephone company alters its equipment in a manner that can affect the use of this device, it must give you warning so that you have the opportunity to maintain uninterrupted service. You will be advised of your right to file a complaint with the FCC.
- No customer is authorized to repair this equipment, regardless of warranty status. All repairs must be performed by Verilink or an authorized agent. It is the responsibility of users requiring service to report the need for service to Verilink or to one of our authorized agents.

Lithium Battery

The lithium battery referred to in the following notices is contained inside the clock chip.

English

DANGER!

The battery can explode if incorrectly replaced! Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

DANGER!

To avoid electrical shock in case of failure, the power supply must be installed by a professional installer. The terminal labeled with the ground symbol (⏚) on the power supply must be connected to a permanent earth ground.

CAUTION!

Interconnecting circuits must comply with the requirements of EN60950:1992/A4:1997 Section 6.2 for telecommunications network voltages (TNV) circuits.

Français

ATTENTION!

Une explosion peut se produire si la batterie est remplacée d' une façon incorrecte! Remplacez-la seulement avec le même modêle de batterie ou un modèle équivalent selon les recommendations de manufacture. Disposez de les batteries usées selon les instructions de manufacture.

ATTENTION!

Pour éviter choc électrique en cas de insuccès, la provision de pouvoir doit êtré installé par un installeur professionnel. Le terminal de la provision de pouvoir, marqué du symbol de terre, (⏚) doit connecté à un circuit de terre permanent.

PRUDENT!

Les circuits doivent êtré interconnectés de manière à ce que l' équipement continue a êtré en agrément avec "EN60950:1992/A4:1997, Section 6.2, pour les circuits de voltage de liaisons d' échanges (réseau) par les télécommunications (TNV)," après les connections de circuits.

Española

ATTENCION!

La bateria puede explotar si se reemplaza incorrectamente. Reemplace la bateria con el mismo tipo de bateria ó una equivalente recomendada por el manufacturero. Disponga de las baterias de acuerdo con las instrucciones del manufacturero.

ATTENCION!

Para evitar contacto con circuitos que electrocutan, la fuente de alimentación debe ser instalada por un técnico profesional. La terminal de la fuente de alimentación marcada con el símbolo de tierra (⏚) debe ser conectada a un circuito de vuelta por tierra permanente.

PELIGRO!

Circuitos que se interconectan a la red de telecomunicaciones deben hacerse de tal manera que cumplan con los requisitos estipulados en las especificaciones "EN60950:1992/A4:1997, Sección 6.2, para los voltages de circuitos interconnectados a la Red de Telecomunicaciones (TNV)," despues de terminar las connecciones entre los circuitos.

Deutsch

VORSICHT!

Explosionsgefahr bei unsachgemäßem Ersetzen der Batterie! Batterie gleichen Typs und gleicher Qualität benutzen, wie vom Hersteller empfohlen. Entsorgung der Batterie nach Anweisung des Herstellers!

VORSICHT, GEFAHR!

Um keinen Schlag zu erhalten beim Versagen der electrischen Anlage, muss der Stromanschluss von einem Elektriker vorgenommen werden. Der elektrische Pol, versehen mit dem Erdsymbol (⏚) muss am Stromanschluss permanent geerdet sein.

VORSICHT!

Schaltungen, die in den Geräten zusammengeschaltet sind, müssen weiterhin den Vorschriften EN60950:1992/A4:1997, Absatz 6.2 für Telecommunications Netz Spannung (TNV) Schaltkreize entsprechen.

Canadian Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques (de la class A) prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

The Industry Canada label indentifies CS-03 certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. Industry Canada 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. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility 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.

Safety Precautions

This equipment is intended to be installed only in a Restricted Access Location that meets the following criteria:

- Access can only be gained by service personnel or users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that must be taken.
- Access can only be gained through the use of a lock and key or other means of security, and is controlled by the authority responsible for the location.

When handling this equipment, follow these basic safety precautions to reduce the risk of electric shock and injury:

- Follow all warnings and instructions marked on the product and in the manual.
- Unplug the hardware from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a cloth slightly dampened with water.
- Do not place this product on an unstable cart, stand, or table. It may fall, causing serious damage to the product.
- Slots and openings in the shelves are provided for ventilation to protect them from overheating. These openings must not be blocked or covered. Never place this product near a radiator or heat register.

- This product should be operated only from the type of power source indicated on the marking label and manual. If you are unsure of the type of power supply you are using, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will interfere with the free movement of people.
- Do not overload wall outlets and extension cords, as this can result in fire or electric shock.
- Never push objects of any kind into the shelves. They may touch dangerous voltage points or short out parts that could result in fire or electric shock. Never spill liquid of any kind on this equipment.
- Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    - When the power supply cord or plug is damaged or frayed.
    - If liquid has been spilled into the product.
    - If the product has been exposed to rain or water.
    - If the product has been dropped or if the cabinet has been damaged.

Product Warranty

Verilink's product warranty covers repair or replacement of all equipment under normal use for a five-year period from date of shipment. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer. Our in-house Repair Center services returns within ten working days.

Customer Service

Verilink offers the following services:

- System Engineers at regional sales offices for network design and planning assistance (800) 837-4546
- Technical Assistance Center for free 24x7 telephone support during installation, maintenance, and troubleshooting (800) 285-2755 and support@verilink.com
- To return a product, it must be assigned a Return Materials Authorization (RMA) number before sending it to Verilink for repair (800) 926-0085, ext. 2282
- Maintenance contracts and leasing plans (800) 837-4546
- Technical Training on network concepts and Verilink products (800) 282-2755 and training@verilink.com
- Web site (www.verilink.com)

Publications Staff

This manual was written and illustrated by Marie Metivier and Steve Rider. Contributing writers include: Theresa Lau and Barbara Termaat.

Table of Contents

NCM 2000

Chapter 1

NCM Overview

This document describes the Access System 2000 (AS2000) Node Controller Module, NCM 2000, Verilink's SNMP solution to managing digital wide area networks.

Applications

This document provides information specific to the NCM 2000:

- Introduction, features, and general information
- Hardware and system overview
- Using the NCM Craft interface

For information about specific applications that can be managed by the NCM, see the appropriate application manual.

The NCM 2000 is a networked intelligent module that is devoted exclusively to management tasks. It has no data-carrying tasks other than its use of inband management via the data lines. The NCM is IP-addressable and can be fully integrated with an AS2000 network.

The NCM contains an embedded Craft interface (ASCII terminal interface) that allows a system administrator to control, configure, administer, and monitor application modules in the local node and in remote NCM-managed nodes of an AS2000 network.

The NCM also has an embedded SNMP agent that acts as a host for the optional Node Manager or any other SNMP-based network manager. (The Verilink Node Manager product is an optional Graphical User Interface-based manager application that runs under Windows 95/NT.) SNMP, Telnet and FTP protocols are supported through Ethernet and SLIP connections.

Network Node Management

A major feature of the NCM is that a local NCM Craft interface session can access up to 30 other nodes in an AS2000 network. Then you can manage elements in those nodes as if each were in your local node, through sessions that the Craft interface establishes to NCM modules in the network. These sessions communicate via inband management channels connecting a network of AS2000 nodes. Inband management channels are provided by dedicated DS0 lines within the T1 or T3 lines connecting the nodes.

NOTE: *Do not mix NCM and SCC Node Controllers in the same node. There can be only one type of node controller in a node. Any existing NCC controller card in a node will defer to the NCM when it is added and will become another T1 application module.*

Features Summary

The NCM 2000 is purely a management module. It does not operate as a CSU or DSU. However, it may control clocking functions. NCM tasks and features include:

- Fault management
- Configuration of all application modules in a network of AS2000 nodes
- Circuit manager and bandwidth management—real-time circuit building/routing support including drop-and-insert and bypass
- Alarm management with up to four trap hosts
- Performance monitoring and management
- Diagnostics and troubleshooting
- Security management using four levels of password access protection
- Management of legacy and newer ACP bus applications
- Provides both internal and external clock support

Features Detail

Major features of the NCM 2000 include:

Automatic Discovery and Restoral

When initially plugged into its node, the NCM automatically "discovers" the elements in the node. In restoral mode, a new application module that replaces a previously configured like module in the same shelf/slot position (or a module that has been cleared of its configuration) is automatically reconfigured by the NCM from the NCM database. This restoral includes circuits that made use of the module that was replaced or cleared.

In restoral mode, an unconfigured module is downloaded with a complete configuration from the NCM node master database. The node master NCM shares its database with all other shelf master NCMs in the node.

NOTE: *Because the database resides in the NCM module, an NCM moved to a different node without having its database first cleared, will reconfigure the new node. Take care not to cause unintended configuration effects when swapping or moving NCMs.*

Management Redundancy

Two NCM modules may be placed in a node in order for one to serve as a redundant backup for the other. The in-service NCM will synchronize the database of all card configurations and circuits in the standby NCM. If the primary NCM fails or is removed, the standby NCM will take over management of the node using the same MAC and IP addresses.

The primary NCM is the one with the greater running time and/or in the lower numbered shelf and slot. NCMs must be able to communicate with each other. If a standby NCM is in a different shelf than the primary NCM, the shelves must be connected using ACP-type daisy-chain cables. See Figure 1-6 in the section "Daisy-Chaining AS2000 Shelves".

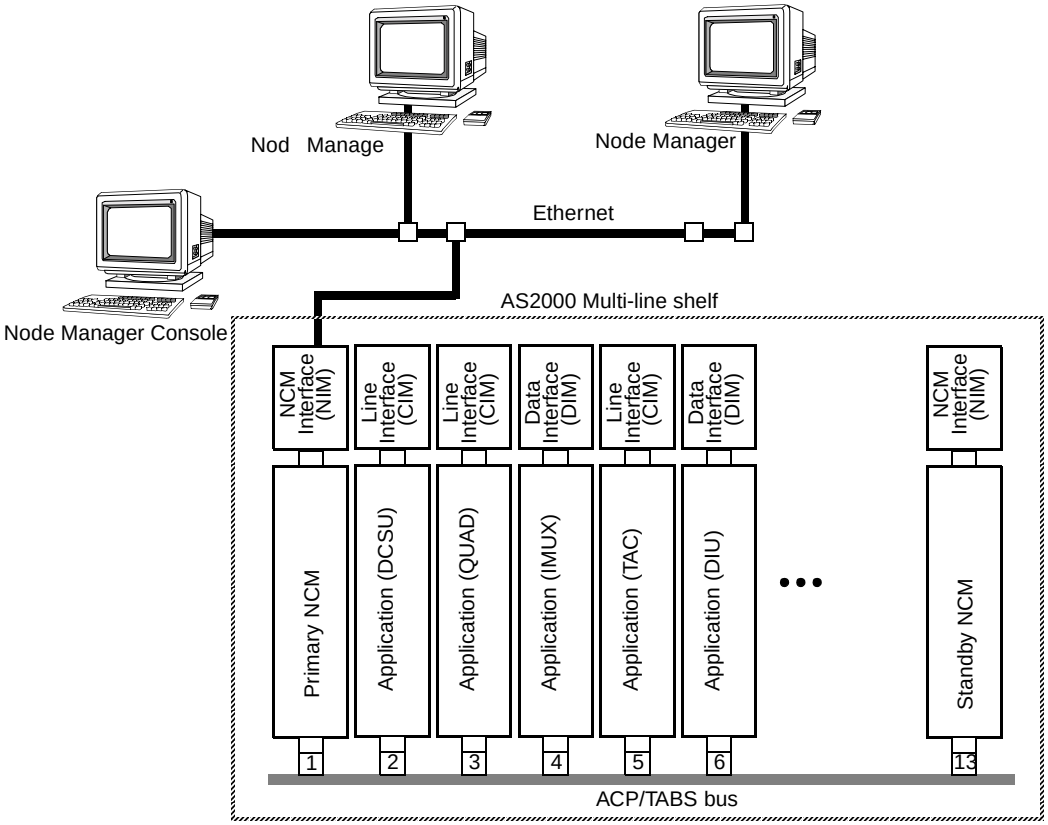
Figure 1-1 shows an application using two NCMs in a node and three Node Manager software installations, all connected to an Ethernet LAN.

NCM as a Gateway

The primary NCM is responsible for managing all the slots within the node. All communication between the NCM and the slots uses the ACP or TABS bus. Additionally, the primary NCM acts as a gateway for management traffic passing between the slots and the optional Node Manager software package. Node Manager is a Windows-based, SNMP-compatible network management program that features a Graphical User Interface (GUI).

The primary and secondary NCMs communicate with each other. If the primary NCM detects that there is no secondary NCM, the primary NCM sets an alarm and then continues normal operations. If the secondary NCM detects that there is no primary NCM, it becomes the primary NCM. Every 15 minutes, the primary NCM updates the database in the secondary NCM.

Figure 1-1 Mixed Shelf with Mirrored Node Managers and NCMs



Circuit Manager Database

The Circuit Manager uses a database which is stored in the NCM card. This database contains the configuration and circuit information for the entire node. It is sometimes referred to as the Central Circuit Manager.

Shelf Compatibility

The NCM is compatible with the AS2000 plug-in modular shelf system. The NCM can replace an NCC or SCC module as the node controller module. It can manage all modules controllable by the NCC or SCC in legacy AS2000 applications.

NOTE: *If an NCM is placed in a Dual-line shelf, it should be in slot two of the shelf.*

NOTE: *The DIU 2140, DIU 2130/NMS 56K and DIU 2131 modules may be configured with the NCM, but SNMP error messages are not supported. The SCC 2120 and TAC 2120 Automatic Protection Switch modules are not supported by the NCM, instead the NCM offers backup functionality through the Circuit Manager function.*

For information on daisy-chain connections of multiple shelves, see the section "Daisy-Chaining AS2000 Shelves".

Advanced Programmable Architecture

The NCM supports the downloading of firmware upgrades to the applications modules. Using the NCM, flash files can be sent across the network from NCM node to NCM node.

The NCM can broadcast new firmware revisions to multiple application modules in a shelf simultaneously.

System Hardware

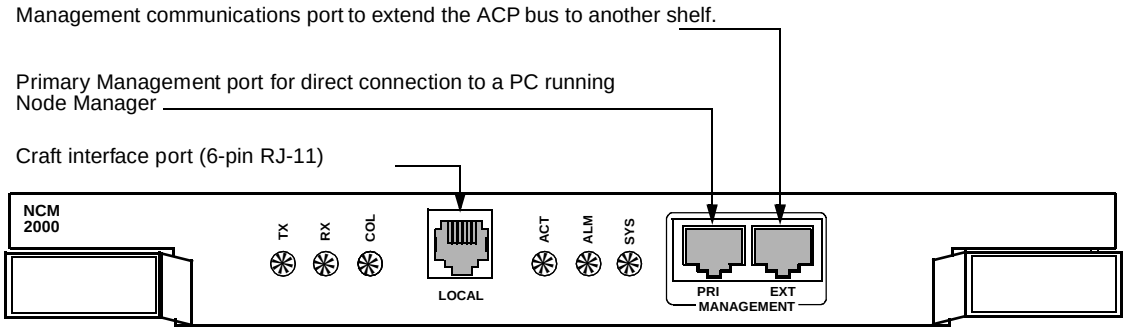
The NCM 2000 assembly consists of a front module and a connector interface module (NIM 2000), occupying a single shelf/slot position. The NIM is installed first from the rear of the shelf. The NCM front module is then installed from the front into the backplane. The NIM is always installed first and removed last. The NCM front module is always installed last and removed first.

For more information on Access System 2000 hardware see the *AS2000: The Basics* manual.

NCM Front Module

The NCM front panel provides LED indicators and management ports. It is equipped with dual ejector levers to aid installation and removal of the module. Figure 1-2 illustrates the front panel view of the module.

Figure 1-2 NCM Front Panel



Front Panel LEDs

The NCM front panel provides six tri-color status LEDs:

Table 1-1 NCM 2000 Front Panel LEDs

LED	Name	States
TX	Transmit	Flashes green whenever this NCM transmits a packet to the Ethernet.
RX	Receive	Flashes green whenever this NCM receives a packet from the Ethernet.
COL	Collision	Flashes amber whenever there is an Ethernet collision.
ACT	Active	Steady green if the NCM is the active NCM, flashing green to off if the NCM is the standby NCM.
ALM	Alarm	Steady red if there is a Major or Critical alarm on any of the modules in the node. Glows steady amber if a power supply is missing. Green means no alarm. It is off on a standby NCM.
SYS	System	Steady green, indicating the module is powered up normally, having passed the power-up self-test.

Management Ports

The NCM 2000 has three front panel management ports.

Table 1-2 NCM 2000 Front Panel Connectors

Port	Connector	Interface	Use
LOCAL	RJ-11	RS-232	ASCII terminal operations
PRI	RJ-45	RS-232	ACP bus connection to Node Manager, or SLIP port if SLIP is being used
EXT	RJ-45	RS-232	Daisy-chain to next ACP shelf

NOTE: *For operator convenience, the PRI and EXT ports are redundant with the same connectors on the connector interface module (NIM 2000), which is accessible at the rear of the shelf.*

NIM 2000 Network Interface Module

The NIM 2000 (Network Interface Module 2000) is mounted on the rear of the shelf, behind the NCM. The NIM 2000 ports are listed in Table 1-3 below:

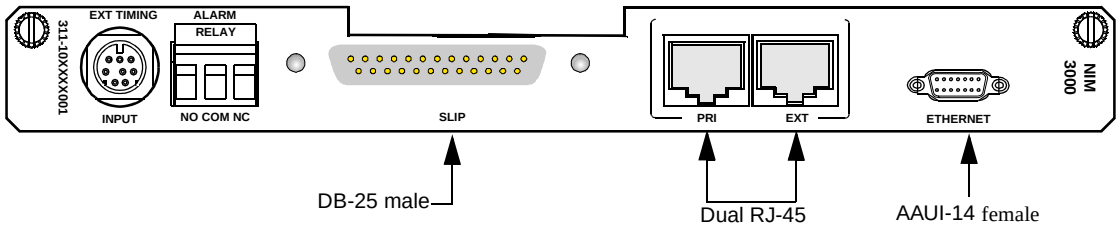
Table 1-3 NIM 2000 Connectors

Port Label on NIM 2000	Interface	Connector	Protocol Support
Ext Timing Input	Balanced RS-422	8-pin DIN	1.544 MHz clock input to NCM
Alarm Relay	Relay closure or open	Form C Relay	Make/Break to external alarm equip
SLIP	RS-232	DB-25	TCP/IP/Telnet/SNMP/FTP over asynchronous SLIP @ 9600 bit/s
Management PRI	RS-232	RJ-45	ACP management over RS-232
Management EXT	RS-232	RJ-45	ACP management over RS-232
Ethernet	10 Mbit/s Ethernet	AAUI	TCP/IP/Telnet/SNMP/FTP via external Ethernet transceiver (supplied)

Alarm Relay

The NIM rear panel provides external timing input and alarm relay outputs. The Form C alarm relay provides normally open (NO), normally closed (NC), and common (CO) contacts. The relay is triggered by alarms that may occur within the node, including the failure of one NCM in a node with redundant NCMs.

Figure 1-3 NIM 2000 Rear Connector Module, Rear Panel



NOTE: *For convenience, the PRI and EXT ports on the NIM rear panel are redundant to the same connectors on the front panel of the NCM.*

Craft Interface

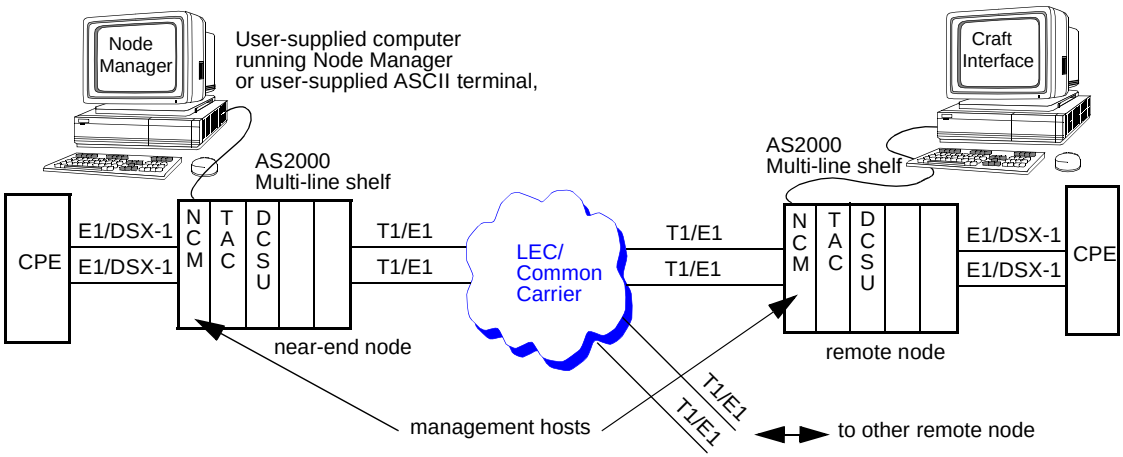
The NCM Craft interface is a menu-driven user interface. It can be accessed locally, or remotely via Telnet over SLIP or Ethernet.

An NCM installed in each node unifies a network via inband management. A local NCM can support a terminal session extended to the remote NCM. The remote NCM in turn, can communicate with the firmware of the applications modules in its node.

Each local NCM can manage a node of up to four shelves containing up to 51 modules.

Figure 1-4 shows an example T1/E1 Dual CSU application.

Figure 1-4 Node Controller Module in a Multiple Application Network



Craft Interface Ports

The Craft interface supports up to simultaneous sessions:

- One direct local connection
- Up to three Telnet sessions over Ethernet or SLIP. It is recommended that only one Telnet session be used during periods of heavy alarm activity.

Ethernet connectivity conforms to DIX and IEEE standards and is supported through the AAUI connector port on the rear panel and a provided transceiver with both 10BaseT and 10Base2 ports.

SNMP Support

The NCM supports SNMP-based clients such as Verilink's Node Manager and HP OpenView™, a Manager of Managers (MoMs), over Ethernet or SLIP.

Adherence to ITU/ANSI/IETF specifications is required to ensure compatibility and interoperability with complimentary SNMP products. For more information on SNMP and Verilink products see the *SNMP Management Manual.*

The NCM supports AS2000 node configuration by allowing appropriate values to be assigned to and collected from the configuration management objects defined in the supported MIBs. Management application protocols such as Node Manager make use of the MIBs.

The NCM 2000 does not support MIB II.

RFVerilink Enterprise MIBs

MIBs are supplied as part of the software distributions for the respective products.

- Verilink Enterprise CSU MIB (for TAC modules)
- Verilink Enterprise DSU MIB (for DIU, DDS, and DBU modules)
- Verilink Enterprise QUAD/IMUX MIB
- Verilink Enterprise AS2000 generic MIB
  For Dual CSU and Dual IDCSU modules
- Verilink Enterprise DS3 generic MIB
- Verilink Enterprise ISDN PRI MIB

Verilink Vendor Number

A vendor number is a number that the SNMP Manager of Managers (MoM) can use to isolate information about any vendor's equipment for viewing. For example, you might want to look at all the traps sent by Verilink equipment.

Verilink's vendor number is 1.3.6.1.4.1.321.1.1.

Verilink's vendor number for the NCM card is 1.3.6.1.4.1.321.11

TABS-based and ACP-based Application Modules

The NCM uses both TABS (Telemetry Asynchronous Block Serial protocol) and ACP (Advanced Communications Protocol) to control application modules. TABS-based modules include the AS2000 legacy modules such as TAC and DIU cards. The NCM acts as a Node Controller for up to four Multi-line shelves containing up to 51 application modules.

Enhanced Feature Sets

The NCM enhances and expands the functionality of several ACP modules:

- HDM 2180 and HDM 2182 DS3 DSU modules have increased support for far end statistics and configuration when an NCM manages the node.
- DPRI 2922 Dual Port Primary Rate ISDN modules are able to do ISDN dialing with an NCM present. Without the NCM, the DPRI 2922 functions only as a T1 DSU, without dialing or dial backup functions.
- The QPRI 2921 Quad Primary Rate Interface ISDN module functions as an ISDN device only with an NCM. Otherwise, it functions as a Dual CSU module like the DCSU 2911.

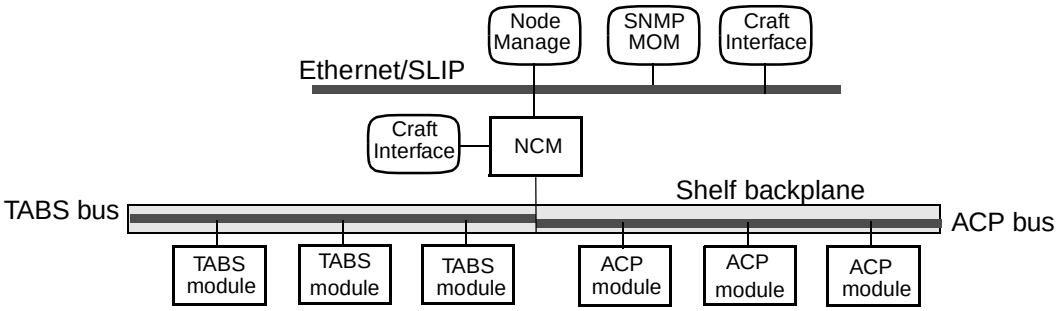
- The DIDCSU 2912 module can function as a standalone dual port CSU/DSU. With an NCM as the node controller, the DIDCSU supports the mapping of timeslots across the shelf backplane from one application module to another.

Mixing TABS and ACP Modules

All AS2000 application modules use either the TABS bus or the newer ACP bus to communicate with the controller. The NCM can support up to 51 elements (besides the NCM) in up to four shelves. TABS-based and ACP-based shelves can be mixed in any combination. Table 2-1 lists TABS and ACP type modules. Daisy-chain connections of multiple shelves is covered in the section, "Daisy-Chaining AS2000 Shelves".

Figure 1-5 shows how the NCM integrates TABS bus and ACP bus modules. These are virtual buses, both having their respective signals on the AS2000 shelf backplane.

Figure 1-5 The NCM as Gateway between the ACP and TABS Buses and Node Manager



Daisy-Chaining AS2000 Shelves

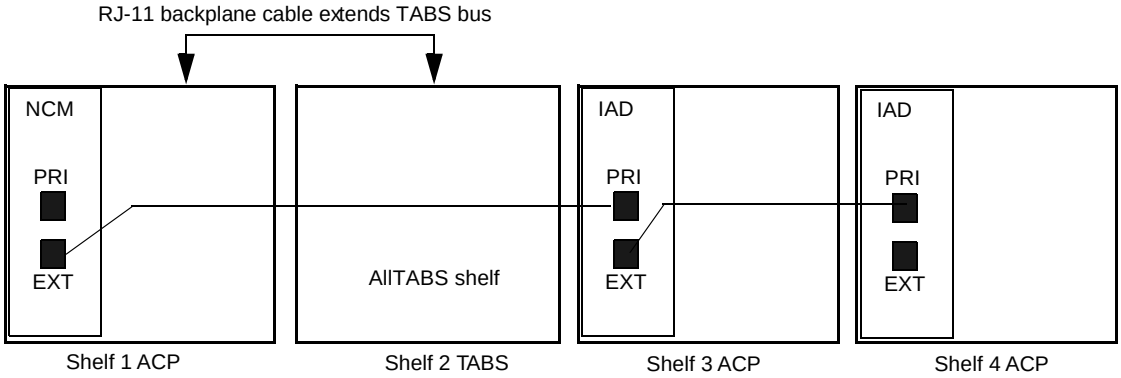
This section describes methods for connecting multiple shelves within a node. Up to four shelves may be controlled by one NCM card. Different cables and procedures are used according to which type of cards are in the shelves. For a listing of which cards use the TABS bus and which use the ACP bus see Table 2-1.

NOTE: *The Node Address referred to in this section is not an Ethernet IP address. Although it uses the same four octet format as an IP address, the Node Address is used only by Verilink hardware. The Node Address appears in the command line prompt in the Craft interface. The Ethernet IP address is set in the Network Configuration submenu of the Node Administration menu.*

Connectors Used

The EXT management port of the NCM is used to extend the ACP bus to multiple shelves. Backplane cable connections are used to extend the TABS bus. The example shown in Figure 1-6 consists of four shelves.

Figure 1-6 Cable Diagram for Daisy-chaining Shelves



The NCM in shelf 1 connects to shelf 3 (in this case) through the EXT connector on the NCM and the PRI connector on the ACP type card in shelf 3.

Shelf 2 contains all TABS modules. It is extended from Shelf 1 using the backplane RJ-11 connectors, as in a legacy AS2000 system.

Shelves 3 and 4 have DIDCSU application modules which use the ACP bus.

Cables for Connecting Shelves

The cables used to daisy-chain shelves extend only NCM management functions, not user data. Table 1-4 lists the types of cables used.

NOTE: *If a shelf contains both TABS and ACP type modules, use only ACP type cables to extend the NCM management to that shelf.*

Table 1-4 Management Extension Cables

Cable Description	Bus Extended	Cable Part Number	Cable Length	Connectors
Control bus expansion cable	TABS	458-501762-002	20”	RJ-11 - RJ-11
Control bus expansion cable	TABS	458-501762-004	40”	RJ-11 - RJ-11
Management bus extension cable	ACP	458-502313-001	12”	RJ-45 - RJ-45
Management bus extension cable	ACP	458-502313-008	8’	RJ-45 - RJ-45

ACP and mixed ACP/TABS Nodes

Use this procedure for a node which has all ACP cards or a node with a mix of card types including at least one ACP type card in each shelf.

1. Set the shelf address switch on the first shelf to one, on the second shelf to two, up to the limit of a fourth shelf. Although the NCM may be in any shelf, it will boot up faster if it is in slot one of shelf zero.

2. Connect the shelves using cable(s) listed above. Use the EXT connector on the front of the NCM and the PRI connector in any ACP type card in the next shelf. Do not use the PRI connector on the NCM to daisy-chain shelves.

3. Enter the Craft interface of the NCM and set the Node Address according to the directions given in Table 3-2. The first octet of the node address must not be greater than 127. Verify the front connectors of the NCM are active in the Administration menu by using the C command.

4. Set the correct shelf type for *each shelf* in the NCM Administration menu by using the H command. This will determine the bus used for ACP communications. See *"Shelf Type Sets ACP Bus"* in Chapter 3.

5. Observe the shelves which have ACP type cards but do not have an NCM. For each such shelf, one (or possibly more) of the modules will have a blinking SYS led. This indicates the module is the controller for that shelf (or that zone in an MLS shelf). Unplug the Craft cable from the NCM and move it to the LOCAL port of each such card, access the Administration menu for that card and set the Node Address to match the NCM. Also verify that the ACP bus used in *each card* in the shelf is consistent with the shelf type selected in step four. Changes to Node Address do not require a reset of the card, changes to ACP bus do require a reset of the card.

NOTE: *HDM 2180 and HDM 2182 DS3 DSU modules do not offer an ACP bus option. Instead these modules search for an NCM at power-up and use the same bus as the NCM. If a new HDM fails to appear in the shelf/slot map of the NCM, simply reset the HDM card.*

---

6. Move the Craft cable back to the NCM and log-in, all cards in all connected shelves should now be visible in the NCM shelf/slot map. If some cards do not appear:

   a. For a shelf in which none of the cards appear, verify the cable used and the node address setting.

   a. For a shelf in which some cards appear and some do not appear, verify the ACP bus selection in the missing cards by connecting directly to the LOCAL port.

TABS-Only Node

For each shelf that contains *only* TABS based cards, use the MANAGEMENT BUS IN and OUT connectors on the rear of that shelf to connect it to *any* other shelf in the node. Use one of the RJ-11 type cables listed above. One end of the cable must be connected to an IN RJ-11 while the other end is connected to an OUT RJ-11 on the next shelf. No configuration changes are required in the TABS-based cards in order for the NCM to manage them.

When introducing an NCM to an existing node, any SCC controller card (SCC 2020, SCC 2130) must be removed.

Environmental Specifications

Table 1-5 Non-operating Environmental Specs

Specification	Value (or range)
Storage Temperature Range	-20 to +80°C
Max Rate of Temperature Change	8°C per hour
Humidity	0% to 95% relative humidity, non-condensing
Vibration in Transport	0.5G from 5 Hz, 3.0G from50 Hz to 500 Hz
Shock During Shipping	20 msec, 25G half sine shock pulse 80 G peak, half sine for 10 msec

Table 1-6 Operating Environmental Specs

Specification	Value (or range)
Temperature Range	0 to 50×C
Moisture	0% to 95% relative humidity, non-condensing
Airborne Contamination	0 to 75 micrograms per cubic meter
Noise	to 75 dBA
Power Consumption	10 Watts total front and back modules
Heat Dissipation	34 BTUh

Technical and Regulatory Compliance

This product complies with the following regulatory specifications as they apply to telecommunications equipment:

- FCC part 68
- CSA/DOC

- UL 1459 Revision 2

Related Verilink Documents

Refer to the following AS2000 manuals for more information:

- *Node Manager for Windows 95™ User Manual*
- *Verilink Access System 2000: The Basics*—Information on installing and replacing shelves, modules, and power supplies, and general information on the AS2000
- Application module manuals—such as T1/E1 CSU/DSU applications, DS3, and ISDN applications
- *SNMP Management Manual*

Chapter 2

Craft Interface

This chapter introduces the NCM 2000 Craft interface and describes in detail the **Main Menu** (the NCM Controller menu).

Accessing Remote Nodes

The NCM can shift its point of view to any NCM-supported element in the local node or in a remote NCM-controlled node in the same network (as indicated by the shifting brackets in the Shelf/Slot matrix display). This is done through inband management consisting of ACP messages using Facilities Data Link (FDL) or over a DS0 timeslot of a T1 or E1 line. Node selection is a function of the Administration Menu.

Use NCM Craft Interface

Most of the modules managed by the NCM have their own Craft interface. However, in an NCM-based node, the benefits available from the Circuit Manager and the NCM database require the use of the NCM Craft interface, instead of connecting directly to the Craft interface of each card. By using the NCM, the user allows it to build and maintain a database of all installed cards and every configured port and circuit.

Firmware Personalities

Since there are many application modules, application-specific Craft interfaces appear in the user manual for the corresponding application module, rather than in this manual. For example, certain ISDN parameters must be set on the ISDN DPRI 2922.

Each module (whether NCM or an application) has its own firmware and release version level. When navigating through an NCM 2000 network or node, the view of the Craft interface is subject to change according to the firmware of the module that is selected.

Starting a Session

To communicate with an NCM 2000 node from an ASCII terminal:

1. Use cable part number 458-501788-008 (provided) to connect your ASCII terminal (or PC) to the LOCAL port on the front panel of the NCM 2000.

   For cable pinout information, see the manual *AS2000: The Basics*.

2. Set your terminal parameters to the following values:
   - 19.2 kbit/s
   - 8 data bits
   - no parity
   - one stop-bit
   - no flow-control

NOTE: Ensure that both hardware flow control and X-On/X-Off flow control are disabled.

3. Press ENTER to get a prompt.

   The prompt displays:

   pSH+>

The P-shell is a level below the Craft interface program.

To start the Craft interface, type:

craft

You are prompted:

YOUR PASSWORD?

If you're accessing the node for the first time, press **ENTER** at the **PASSWORD?** prompt.

Until you change it, ENTER *is* the default password.

Using Telnet

Accessing the Craft interface via Telnet requires that you have previously configured the Ethernet IP address and related parameters. You must also know the IP address of the NCM you wish to connect to. The Craft interface must be used at least once to setup the IP address of the NCM before Telnet can be used.

In a shell, terminal, browser or Telnet application window, use a command similar to the following:

C:\> telnet 192.94.46.54 (substitute the IP address of the desired NCM)

A message indicates you have connected to the NCM node:

Figure 2-1 Telnet Session Connecting to the NCM Node

```
Trying 192.94.46.54 ...
Connected to 192.94.46.54.
Escape character is '^]'.
pSOSystem (192.94.46.54)
Copyright (c) Integrated Systems, Inc., 1992.
Welcome to pSOSystem...
pSH+>
```

When you are in the Craft interface's P-shell, the prompt is displayed as:

pSH+>

Now type the command to start the Craft interface session:

pSH+> craft

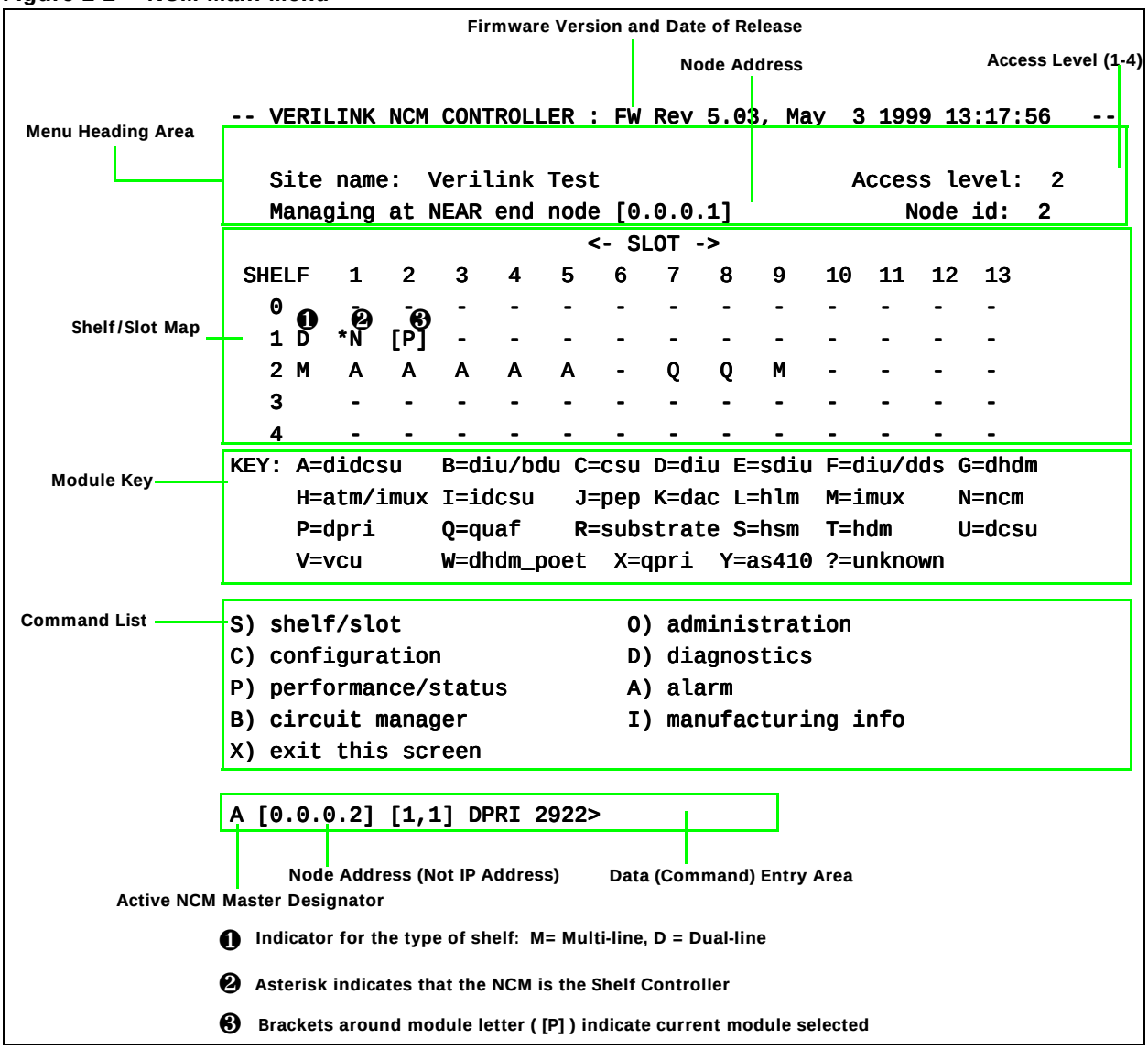
You are prompted:

YOUR PASSWORD?

If you're accessing the node for the first time, press ENTER at the **PASSWORD?** prompt. Until you change it, ENTER *is* the default password.

The NCM Controller **Main Menu** displays:

Figure 2-2 NCM Main Menu



The Main Menu

The NCM **Main Menu,** shown in Figure 2-2, provides:

- a shelf/slot display showing card and shelf types and card locations in each shelf
- a key decoding the alphabetic characters for the modules in the slots
- a command menu
- node information
- firmware revision number

The currently selected card is indicated in the command line prompt which returns after each command. The four part number shown on this line is NOT an Ethernet IP address. It is a Verilink specific node address used to identify this NCM.

Firmware Version

The firmware version release level appears on the top line. The NCM has a revision number series distinct from that of individual application modules.

NOTE: *The version levels shown in screen samples are placeholders only and do not reflect the version level(s) as they may appear in your system. Firmware revision levels vary according to several factors, including special firmware generated for specific customers, as well as more generic versions.*

Shelf Symbols

Directly to the right of the Shelf column:

The **M** next to Shelf 2 indicates it is a multi-line or quint-line shelf.

The **D** next to the Shelf 1 indicates it is a dual-line shelf.

Element Symbols

Each module (element) is represented in the matrix display by a character. The key to these symbols is included in the screen, beneath the Shelf/Slot matrix. See Table 2-1.

The shelf master is indicated by an asterisk (*****). When an NCM card is present, it should be the shelf master. In the absence of an NCM, some other card will become shelf master.

Selection Brackets

Brackets around an element in the shelf (for example: **[N]**) indicate that the element is currently selected. For example, the brackets around the letter N indicate the shelf and slot location of the primary NCM in the node is currently selected: **[*N]**.

A question mark **[?]** in place of an element symbol indicates the firmware of the NCM does not know about the module in the shelf/slot location.

A hyphen **[-]** in place of an element symbol indicates the shelf/slot location is empty.

Unknown

If the word “UNKNOWN" appears in place of the name of one of the elements in the KEY, it means one of the following conditions:

- the current firmware does not know about the element

- the slot is empty
- the module recently has been pulled out

Node Map

The node map graphically represents the type of shelf, the shelf/slot locations, and the type of element in each location. The Key legend interprets the letters representing the elements, as described in the following subsection.

Module Key

Application modules are represented in the matrix display by alphabetic characters. The key to these symbols is included in the **Main Menu**, beneath the shelf/slot matrix. The key elements in Figure 2-1 are described in Table 2-1.

Table 2-1 Module Key Legend

Key Symbol and Name	Generic Name	Model Number	Bus ACP	Bus TABS	Comment	NCM Required
A=DIDCSU	Dual Integrated E1 /T1 DSU/CSU	DIDCSU 2912	●		2 net ports, two data ports, maps DS0s across backplane bus if used with NCM; mini-DACS	Yes, only to map DS0s card to card
B=DIU/DBU	DIU with Dial Backup	DIU 2130/DBU		●	Modified DIU 2130, T1 Dial backup	No
C=CSU	TAC card	TAC 2010		●	T1 CSU, use w/ or w/o DIU card(s), uses backplane if using DIU	No
D=DIU	Data Interface Unit	DIU 2130		●	DSU used with TAC 2010 or DIDCSU across backplane	No
E=SDIU					Not available	N/A
F=DIU/DDS	DDS Data Interface Unit	DIU 2130 56K NMS		●	DIU 2130 modified for DDS remote circuits bundled into a T1	No
G=DHDM	Dual port DS3	HDM 2182	●		T3 net and two HSSI data ports	For far end functions
H=ATM/IMUX					Not available	
I=IDCSU	IDCSU; T1 Integrated DSU/CSU	TAC 2130; TAC 2130-S; TAC 2130-T		●	T1 CSU/DSU in one card; does not & will not use backplane to other cards	No
J=PEP	Protocol Engine Processor				Not available	
K=DAC	Digital Cross Connect				Not available	
L=HLM	High/Low Module	DIU 2131		●	DSU w/ one V.35 and one RS 232	No
M=IMUX	Inverse Multiplexer	IMUX 2160		●	IMUX 2160 uses QUAD 2164	2160 = No 2164 = Yes
N=NCM	Node Controller Module	NCM 2000	●	●	Management only—no data traffic	
P=DPRI	Dual Primary Rate Interface	DPRI 2922	●		ISDN DSU with backup capability; requires NCM	Yes, for ISDN or Backup
Q=QUAD	Quad Card	QUAD 2164	●		QUAD 2164 used with IMUX 2160, four E1/T1 CSUs each	No
R=SUBRATE	SRDM	DIU 2140		●	Five port RS232 subrate TDM. Used w/ TAC 2010	No
S=HSM	M13 DS3 Multiplexer	HSM 2113	●		Use w/ one or more IMUX 2164; changes backplane data rates	Yes, for all cases
T=HDM	Single port DS3	HDM 2180	●		T3 net and one HSSI data port	For far end functions

Key Symbol and Name	Generic Name	Model Number	Bus ACP	TABS	Comment	NCM Required
U=DCSU	Dual CSU	DCSU 2911	●		Four port T1 or E1 CSU in one card.	No
V=VCU	Voice Channel Unit				Not available	
W=DHDM_ POET	Dual Port DS3	HDM 2182	●		Two T3 ports	No
X=QPRI	Quad Primary Rate Interface	QPRI 2921	●		Four port ISDN aggregate; use with IMUX module	Yes, for ISDN

Command Examples

Some commands are shown with a lowercase character. The character, usually n or p, represents a variable. Enter a number in place of this lowercase placeholder. For example:

Dn) delete node

Where *n* is the number of the local or remote node.

Type:

"d1"

If you type "Dn", you will get an error message.

Command Line Prompt

The initial prompt defaults to the Node address of the local NCM. The command line prompt is interpreted as follows:

[0.0.0.1] [0,11] NCM 2000 >

Where:

[0.0.0.1] is the node address of the local node to which you are connected. This number is used by NCM modules and the Verilink Node Manager application to identify each NCM (and node). This value is completely unrelated to the Ethernet IP address of the NCM.

NOTE: *The first three digits of the node address must NOT be greater than 127. For example a node address of 128.7.5.251 will render certain critical NCM functions inoperative*

NOTE: *The node address 127.255.255.255 should not be assigned to any node. It is used internally by the system to broadcast to all nodes.*

NOTE: *In a network with multiple NCM sites, each NCM must have a unique address as shown in the command line prompt.*

[0,11] is the shelf number and slot number of the currently selected card

NCM 2000> is the command line prompt, showing the model name of the currently selected card

If you select a shelf/slot location that is empty or from which the element has been pulled out, this field reads: **UNKNOWN >**

Figure 2-3 NCM Main Menu for DIDCSU Element

```
-- VERILINK NCM CONTROLLER : FW Rev 5.03, May  3 1999 13:17:56   --

   Site name:  Test1                          Access level:  1
   Managing at NEAR end node [0.0.0.1]             Node id:  3141
                           <- SLOT ->
 SHELF   1   2   3   4   5   6   7   8   9   10  11  12  13
   0     -   -   -   -   -   -   -   -   -   -   -   -   -
   1 M   N  *N   -   -   Q   M   Q   Q   M   -   -   -   -
   2 M   A   A  [A]  A   A   A   A   A   A   A   A   -   -
   3     -   -   -   -   -   -   -   -   -   -   -   -   -
   4     -   -   -   -   -   -   -   -   -   -   -   -   -
KEY: A=didcsu   B=diu/bdu  C=csu  D=diu  E=sdiu  F=diu/dds G=dhdm
     H=atm/imux I=idcsu    J=pep  K=dac  L=hlm   M=imux    N=ncm
     P=dpri     Q=quaf     R=substrate   S=hsm   T=hdm     U=dcsu
     V=vcu      W=dhdm_poet X=qpri Y=as410  ?=unknown

S) shelf/slot                O) administration
C) configuration             D) diagnostics
P) performance/status        A) alarm
B) circuit manager           I) manufacturing info
X) exit this screen

A [0.0.0.1] [2,3] DIDCSU>
```

The command-line prompt reflects your selection in the shelf and slot field (Shelf 2 and Slot 3 in this case) and the card type (DIDCSU).

Main Menu Options

This section provides a brief description of selections on the **Main Menu**.

Selecting an Element

To select an element in the node to manage, select the command option for choosing the shelf and slot:

S) shelf/slot

as shown in the following example command line:

[0.0.0.1] [1,1] NCM 2000 > s

The next prompt shows you the format for your input:

Enter 'shelf,slot' pair or 'slot' in current shelf(e.g. 3,4 or 5): >

Enter the shelf and slot location of the element to manage. In this example, suppose you wish to configure a port on the DIDCSU located in shelf 2, slot 3. This element is represented by an **A**, which the **Key** below the Shelf/Slot display identifies as a **DIDCSU**. You would type in response to the prompt:

2,3

When the **Main Menu** is redisplayed the bracket-indicator **[ ]** has moved to enclose the A.

NOTE: *When navigating to a slot in the same shelf, save time by entering the slot number only, instead of shelf and slot numbers.*

Administration

The **O** command displays the **Node Administration Menu**. This menu is covered in detail in the next chapter, "Administration Menu".

Configuration

The Configuration command, **C**, brings up the **Configuration Menu** for the currently selected card.

NCM

If the NCM is the currently selected card, the configuration command returns this menu:

Figure 2-4 NCM 2000 Configuration Menu

```
-- NCM 2000 CONFIGURATION MENU --


-- NCM CONFIGURATION MENU --

I) QUAD/IMUX far node communication: enabled
X) exit this screen


A [0.0.0.1] [1,1] NCM 2000 >
```

If this node contains any Quad/IMUX applications, the NCM can use some of the bandwidth reserved by each Quad 2164 card network port to establish a path to a remote NCM.

If **Far Node Communication** is enabled, this NCM will communicate with a far end NCM without requiring any DS0 timeslots. If **Far Node Communication** is disabled no connection to the remote NCM is made.

If no Quad/IMUX applications are installed, this option has no function.

NOTE: *If a download is in progress, this inband should be disabled to improve the reliability of the local download.*

Other Cards

A principle use of the NCM is to configure (option) the other application modules in a node. If the currently selected card is other than an NCM card, the **Configuration Menu** for that card will appear.

In Figure 2-5, the sample is the **HDM 2182 Port Configuration Menu**. (For more information on the latter menu, see the *HDM 2182 User Manual*.) Each application module has its own specific configuration parameters for the module and for the data and network ports it supports.

Figure 2-5 HDM 2182 Configuration Menu

```
-- HDM 2182 Port Configuration Menu --

-  Line Code                  B3ZS
-  AIS C-Bit                  0

T) Timing                     Recover Clock
B)  Line Build Out               Normal Cable <= 250 ft
H)  Line Type                 C-Bit Parity
R)  Performance Control       On
E)  Equipment ID
L)  Location ID
F)  Frame ID
U)  Unit ID
A)  Facility ID
P)  Port ID
C)  Circuit ID
G)  Test Sig ID
I)    Inband Control          Enable
N)  FE Inband Mgmt            Enable
X)  Exit this screen
```

Diagnostics

Diagnostics are not required for the NCM itself, since it does not handle user data, it controls diagnostics on other cards which do handle user data.

You can perform diagnostics for other modules from the NCM Craft interface. To use diagnostics you must first select a module by using the **S) shelf/slot command.**

The following is an example of an IMUX module diagnostics menu.

Figure 2-6 IMUX 2160 Diagnostics Menu

```
-- IMUX 2160 DIAGNOSTICS MENU --

Data Port Type:      HSSI
DTR:                 YES
Loop type A:         NO
Loop type B:         NO
AIS Pattern:         DISABLE
Test Pattern:        DISABLE
Loopback:            NONE
                    1  2  3  4  5  6  7  8
Lines Equipped:           X  X  X  X  X  X
Lines Active:             X  X  X  X  X  X
Frame Status:             X  X  X  X  X  X
CTS Status:               X  X  X  X  X  X
CRC Status:
Far CRC Status:
E) Equipment Loopback          P) Payload Loopback
A) AIS Pattern                 X) main menu
[0.0.0.90] [1,13] IMUX 2160 >
```

Performance and Status

Performance and status functions are used to evaluate the operation of application modules and the network facilities they use. Modules which connect to network facilities such as E1, T1 or T3 circuits will usually have statistics on circuit performance for the preceeding 24 hours.

Performance and status for the NCM are not applicable, since the NCM card does not connect to any customer equipment or circuits.

The performance information stored in each application module module may be viewed by first selecting the module using the shelf/slot command and then selecting **P) performance/status**.

[0.0.0.1] [1,13] IMUX 2160 > p

The **Performance/Status Menu** for an IMUX 2160 card is shown below.

Figure 2-7 Example of IMUX 2160 Performance/Status Menu

```
--  IMUX 2160 PERFORMANCE/STATUS MENU --
Data Port Type:      HSSI
DTR:                 YES
Loop type A:         NO
Loop type B:         NO
AIS Pattern:         DISABLE
Test Pattern:        DISABLE
Loopback:            NONE
                    1  2  3  4  5  6  7  8
Lines Equipped:           X  X  X  X  X  X
Lines Active:             X  X  X  X  X  X
Frame Status:             X  X  X  X  X  X
CTS Status:               X  X  X  X  X  X
CRC Status:
Far CRC Status:

Press enter to continue

[0.0.0.1] [1,13] IMUX 2160 >
```

Alarms

A primary function of the NCM is the handling of alarm messages from the application modules. Alarms are sent to the optional Verilink Node Manager application if it is used. Alarms will be sent to an SNMP manager if the TCP/IP options under the Network Configuration submenu of the **Administration Menu** are properly configured. See "The Network Configuration Menu" in Chapter 3.

NOTE: *The ACP-type application modules have been designed to send messages to an NCM 2000 node controller. Legacy TABS type cards were designed before the NCM and may occasionally report alarms to the NCM but fail to report later when these alarms have cleared. Users should be aware that under some circumstances the NCM alarm indication may fall out of sync with certain TABS-based cards.*

In addition to reporting alarms to an SNMP Trap Host or Verilink Node Manager, the NCM is also able to display alarm messages in real time on the Craft interface terminal. This is configured through the **Alarms Option Menu**.

The Alarm command displays the **Alarm Options Menu** for the currently selected module. If the NCM is currently selected the following menu appears.

Figure 2-8 Alarm Options Menu

```
-- NCM 2000 CONFIGURATION MENU (ALARM OPTIONS)--

     --  Alarm Conditions  --

                          <- SLOT ->
 SHELF   1   2   3   4   5   6   7   8   9   10  11  12  13
   0     -   -   -   -   -   -   -   -   -   -   -   -   -
   1 M   C   C   -   -   A   A   C   C   C   -   -   -   -
   2     -   -   -   -   -   -   -   -   -   -   -   -   -
   3     -   -   -   -   -   -   -   -   -   -   -   -   -
   4     -   -   -   -   -   -   -   -   -   -   -   -   -

  Legend:  A = In Alarm, B = Alarming Blocked, C = Alarms Clear

M) alarm monitoring:     NO
I) relay inhibit
A) display alarm buffer
C) clear alarm buffer
X) exit menu

A [12.13.14.15] [1,2] NCM 2000 >
```

A shelf/slot matrix display of alarm status appears. Each location is mapped to a slot of a shelf. The meanings of the symbols shown are listed in Table 2-2. The command options available on the **Alarms Menu** are described in Table 2-3.

Table 2-2 Alarm Menu Key

Symbol	Meaning
-	NCM sees no card in this slot.
A	Card has some alarm condition at this time, use A) display alarm buffer to view current alarm details.
B	The Relay Inhibit option has been configured not to show alarms for a period of time, and this screen has been displayed during this inhibited (blocked) period. Useful if a circuit tends to have frequent but minor alarms of short duration and the user wants to avoid relay trips caused by these conditions.
C	Card has no alarms at this time, any previous alarms have cleared.

The following command options are available on the **NCM Alarm Options Menu**:

Table 2-3 Alarm Options Menu Commands

Command	Function
M	Alarm Monitoring. Toggles on/off the display of alarm messages in the Craft interface screen. If ON, messages appear on the Craft interface terminal as alarms occur and again as they clear.
I	Relay Inhibit. Allows the user to enable, disable, or temporarily block the action of the alarm relays. Values range from 0 to 256. Selecting zero enables immediate alarm relay activation. Values from one to 255 block alarm relay operation for an equal number of minutes. Selecting 256 disables the alarm relays. This might be used in a large network to avoid tripping alarm relays when a specific circuit is scheduled for an outage, or to block alarm relay operation on pending or non-critical facilities.
A	Display Alarm Buffer. Presents a history of alarm messages to the Craft interface. See the example in Table 2-9.
C	Clear Alarm Buffer. Removes all alarm messages from the display buffer referenced above. User is not asked to confirm this selection.
X	Exit. Exits to the NCM **Main Menu**.

The following is an NCM Alarm Display:

Figure 2-9 NCM Alarm Display

```
A [12.13.14.15] [1,2] NCM 2000 > a
* 12.13.14.15      NCM 2000     [01,01] Info alarm          Software
   Standby NCM                                          98-02-26  17:58:52


* 12.13.14.15      NCM 2000     [01,01] Info alarm          Equipment
   Near-End Plug Present Alarm                          98-02-26  17:57:23


* 12.13.14.15      NCM 2000     [01,02] Info alarm          Software
   Active NCM                                           98-02-26  16:03:53


* 12.13.14.15      NCM 2000     [01,02] Major alarm         Power
   Near-End Power Supply Alarm                          98-02-26  16:03:53



Press enter to continue
```

The display indicates date and time for each alarm. The shelf and slot of the module reporting the alarm is shown in brackets **[01,02]**.

Whenever the NCM detects a card for the first time, an alarm is reported, **Near-End Plug Present Alarm.** This does not indicate a problem.

If a module other than the NCM is the currently selected module, an **Alarm Options Menu** for that module will appear when **Alarm** is selected from the **Main Menu**.

Circuit Manager

Circuit Manager is used to create, edit and maintain connections from one application module port to another application module port. Without an NCM, individual application modules are only able to make connections between ports on the same card.

The NCM adds the ability to build circuits from a port on one application module to a port on another card.

Circuit Manager is covered in detail in Chapter 4, "Circuit Manager".

Manufacturing Info

This submenu displays hardware revision level, date of manufacture, serial number and part number information for the currently selected card. The front application module appears under the heading "Main Card" and the Connector Interface Module in the rear is reported under the CIM column.

This information may be very useful if you need to contact Verilink for assistance.

This screen is read-only to users of the equipment. The information is set in the card at time of manufacture and updated as need be when a card is factory upgraded.

NOTE: *This information is not available for TABS modules in the node.*

The following is an example of the information displayed.

Figure 2-10 Manufacturing Information Report

```
MANUFACTURING INFORMATION
                          Main Card              CIM
Revision              RM) A                  RC) A
Date                  DM) 9/17/96            DC) 11/11/96
Serial number         SM) 00534795           SC) 00643461
Manuf. Part No.       MM) 319101697001       MC) 311101761001
Cage Code             CM)                    CC)
Type                  TM) NCM                TC) NIM 2000

Press enter to continue
```

Pressing ENTER returns you to the **Main Menu**.

Card Specific Menus

When the NCM is used to select certain application modules, new commands and functions appear which are specific to those cards:

- When managing an HDM 2180 or HDM 2182 module the prompt **F) Display Far End DS3 Port Identification** appears**.** This informational display will indicate:
  - Equipment ID
  - Location ID
  - Frame ID
  - Unit ID
  - Facility ID
  - Port ID
  - Generator ID
- The HDM 2180 and HDM 2182 modules also present **R) Remote Setup** which allows the user to configure certain far-end parameters before inband management is enabled in the DS3 DSU. Before leaving this screen the fifth option **Update NCM Table** should be used if any changes have been made. The parameters which can be changed in the far-end DS3 product are:
  - Site name
  - Node address
  - Node ID
  - Inband state
  - Update NCM table (saves this info to node list)

Chapter 3

Administration Menu

This chapter describes the functions available from the NCM Controller **Administration Menu**.

For a convenient summary of the command options, see Table 3-2.

Functions that generate major submenus are:

- Setting the shelf type
- Using passwords
- Network configuration parameters
- Configuring modems

Downloading and broadcasting firmware upgrades is covered in Chapter 5, "Downloading and Broadcasting Firmware".

Selecting the Administration Menu

Access the **NCM Controller Administration Menu** from the NCM **Main Menu**.

If the command line prompt does not already indicate that the NCM 2000 is the currently selected card, navigate to the NCM by using the **S) Shelf/Slot** command.

Select command option: **O) administration**:

[12.13.14.15] [1,1] NCM 2000 > o

The NCM Controller Administration Menu appears:

Figure 3-1 provides a sample NCM **Administration Menu**.

Table 3-2 describes the command options that are available from the NCM **Administration Menu**.

Table 3-1 Administration Menu

```
-- NCM CONTROLLER ADMINISTRATION MENU --
Date/Time/Zone:        12-10-97  01:51:28
Node Address:          [0.0.0.7]
Node ID:                7
Site Name:             San Jose
System Uptime:         0:14:49
 --- Node Administration ---
H) set shelf type      Z) set time zone
T) set time            D) set date
B) download firmware   Y) switch over once
W) write file to flash O) switch over permanent
C) set front/rear access                 Q) query firmware
U) clear card configuration           R) reset card
A) set node address    E) change node id
I) change site name    P) change password
N) network parameters  S) Node Selection
M) modem parameters
F) Flash Copy (B => A)
X) exit this screen
A [12.13.14.15] [1,1] NCM 2000 >
```

Table 3-2 Administration Menu Commands

Menu Option	Description	Instructions
A) set node address	Changes local node address. This is not the Ethernet IP address. This is the number on the prompt line [0.0.0.1], value for each NCM *must* be unique.	*Never* set first octet greater than 127. Will cause momentary reset of NCM as it updates database records. Used by Verilink Node Manager application.
B) download firmware	Firmware download to selected modules (other than the NCM itself).	See Chapter 5, "Downloading and Broadcasting Firmware".
C) set front/rear access	Set management port access.	Front OR back, not both at same time.
D) set date	Set date for all modules in node.	Use the format: mm/dd/yy for month, day, and year.
E) change node id	Changes local node ID, this value is used by Node Manager software.	Enter any value in the range of 1-65535. This is an arbitrary number.
F) Flash copy B => A	Copy firmware from flash bank B to flash bank A. *Test firmware first*.	See Chapter 5, "Downloading and Broadcasting Firmware".
H) set shelf type	Define or change shelf types of each shelf in local node. Sets ACP bus used.	See the subsection "Shelf Type Sets ACP Bus".
I) change site name	Changes local node site name as it appears on second line of Main Menu.	Enter up to 19 alpha-numeric characters.
M) modem parameters	NCM SLIP modem interface menu.	See the section "Configuring Modem Parameters".
N) network parameters	Ethernet/SLIP, SNMP, Trap Host, and TCP/IP addresses and options.	See the section "The Network Configuration Menu".
O) switch over permanent	Sets which flash bank to boot from at power up (setting saved on reset).	See Chapter 5, "Downloading and Broadcasting Firmware".
P) change password	Changes local node password.	See the section "Using Passwords".
Q) query firmware	Displays status of firmware revisions in flashbanks of selected module.	Results displayed after about 60 seconds.
R) reset card	Used to restart selected module. *Does NOT reload from flashbank*. Do not use reset to test firmware upgrades.	Reinitializes RAM based code. Will cause switch to a standby NCM, if present.
S) Node Selection	Select a node in your network.	See the section "Selecting a Node".
T) set time	Sets time for all modules in the node.	Use format hh:mm:ss to set time. Select time zone before setting time.
U) clear card configuration	Clears all configuration from currently selected card, resets it to factory defaults.	May change ACP bus used by the card being cleared, requiring direct connection to Craft port of that card.
W) write file to flash	Stores previously downloaded firmware in flash bank on this NCM card.	See Chapter 5, "Downloading and Broadcasting Firmware".
X) exit this screen	Exit to NCM Main Menu.	
Y) switch over once	Executes selected firmware image ONCE, the switchover is not permanent. Use to test firmware upgrades.	See Chapter 5, "Downloading and Broadcasting Firmware".
Z) set time zone	Set time zone for all modules in node.	Select time zone from list presented, or use custom for GMT offset in hours +/-.

Selecting a Node

To access the node selection submenu, use the **S** command option on the **Administration Menu**:

S) Node Selection

Node Management Menu

The Node Management Menu is presented:

Figure 3-1 Node Management Menu

```
-- NCM NODE MANAGEMENT MENU --
A) add node                    Dn) delete node
L) List nodes                  Sn) select/manage node
X) exit this screen
Note: Selection of a node to manage will cause the terminal
      to move to the main menu displaying the requested
node.
```

Use the **L** command for a list of nodes. The nodes are listed under the headings “local” and “remote”.

In order for nodes to be listed, they must be entered using:

A) add node

on the NCM **Node Management Menu**, or result from node list configuration options available on the HDM 2180 or HDM 2182 modules. Nodes are numbered from 0 in the order in which they are entered.

Access to a node is not allowed when the far-end inband channel is supported by the HDM 2182 and the far-end inband management option is disabled. The far end management option is the capability of a node to “block” the access from a far-end node.

When a remote node is selected, a prompt confirms your selection:

Selected remote node: [0.0.0.5] shelf = 0, slot = 11

Figure 3-2 Node Management Menu

```
 -- NCM NODE MANAGEMENT MENU --
A) add node                    Dn) delete node
L) List nodes                  Sn) select/manage node
X) exit this screen
Note: Selection of a node to manage will cause the terminal
      to move to the main menu displaying the requested node.
A [0.0.0.7] [1,1] NCM 2000 >
```

When logically positioned at a remote node and a command of **x) exit this menu** is entered from the Main Menu, control returns to the Main Menu of the local node.

DS3 Far-end Node Records

The DS3 applications, HDM 2180 and HDM 2182 can use a portion of the DS3 framing overhead to allow a session to a far end NCM. Through this method they can create a record of a far end node in the NCM database of remote nodes. See "Card Specific Menus" in Chapter 2.

Set Shelf Type

Use this command to enter or change the shelf type of any shelf in the node. This determines which midplane bus in the shelf the NCM will use to control the other modules. If one of the selections in the first group is made (1-4), the NCM will use Bus A. If the selection is in the range (50-52) then Bus C will be used.

Each shelf in the node has a switch used to set the shelf number, each shelf must have a unique shelf number. For more information on shelf switch settings see the manual *AS2000: The Basics*.

All of the ACP-based modules in the shelf must be set to use the same bus as the NCM uses. If any installed modules do not appear in the shelf/slot map, connect to each such card directly using the modules LOCAL port. Using the **Administration Menu** in that module, set it to the same ACP bus as the NCM.

This selection is also used by the Central Circuit Manager for circuit building purposes. It must accurately reflect each shelf in the node.

Figure 3-3 Shelf Type Menu

```
Current Shelf Configuration:
shelf # 0 unset Shelf Type
shelf # 1 2200 Shelf
shelf # 2 2000 Shelf
shelf # 3 unset Shelf Type
shelf # 4 unset Shelf Type

Shelf Type Selections:
0) unset Shelf Type
1) Dual Line Shelf                2) 2000 Shelf
3) 2200 Shelf                     4) 2900 Shelf

For QUAD_IMUX Applications Use:
50) 2000 QUAD/IMUX Shelf         51) 2200 QUAD/IMUX Shelf
52) 2900 QUAD/IMUX Shelf

Enter shelf (0 - 4): 0
Enter shelf type number: 2
setting shelf  0 to 2000 Shelf Type
```

Shelf Type Sets ACP Bus

Enter the number of the shelf you wish to define. Although the menu allows five possible values for the shelf number, a node may contain only four shelves.

Enter the shelf type from the "Shelf Type Selections".

If the shelf type selected has a value between 1 and 4 (inclusive), then the NCM will use Bus A for ACP management.

If a shelf type in the range of 50 to 52 is selected, the NCM will use Bus C for ACP Management. In an MLS 2200 or MLS 2200*i* shelf, the A bus is divided into multiple segments, while the C bus runs the entire length of the shelf. To enable an NCM to manage all of the slots in an MLS 2200 or MLS 2200*i* shelf, select a value in the 50 to 52 range.

Each ACP-based application module must be set to use the same ACP bus as the NCM. If installed modules fail to appear in the NCM shelf/slot map, connect directly to the local port of each such card and set it to use the ACP bus selected here for the NCM.

Changes to shelf type in the NCM card do not require a card reset. Changes to ACP bus selection in other modules requires a reset of those cards for the change to take effect.

Using Passwords

NCM password functions are controlled through the Password Menu.

To enter the **Password Menu**, from the **Administration Menu** (shown in Table 3-1), type "P"

The **Password Menu** is displayed:

Figure 3-4 NCM Password Menu

```
-- PASSWORD MENU --
S) Set System Superuser Password    A) Set Superuser Password
P) Set Privileged User Password     U) Set Unprivileged User Password
D) Set Default Passwords            W) Display 3 Levels of Password
X) exit menu
[0.0.0.1] [2,13] NCM 2000 >
```

Password Levels

Four password security access levels are available in the NCM module. They are:

- System superuser level (level 4—highest)
- Superuser level (level 3)
- Privileged level (level 2)

- Unprivileged level (level 1—lowest)

NCM access levels always allow comparable access to the application modules being managed. These different levels of security access (passwords) reflect different capabilities, described in Table 3-3.

Table 3-3 Access Levels:

Options	Access Level 1 Unprivileged	Access Level 2 Privileged	Access Level 3 Superuser	Access Level 4 System Superuser
Default Password	ENTER	ENTER	"sutest"	"systest"
Local node configuration settings	Read	Write	Write	Write
Diagnostic Tests	No access	Write	Write	Write
Loopbacks	No access	Write	Write	Write
Remote NCM configuration	No access	No access	Write	Write
Remote application module configuration	No access	No access	Read	Write
Set passwords for levels 1-3	No access	No access	Write	Write
Set passwords for levels 1-4, local and remote	No access	No access	No access	Write

Displaying Passwords

Log-in to the NCM using the current system superuser password. From the **Password Menu**, type the command option:

[0.0.0.1] [3,11] NCM 2000 > w

The following report is displayed:

Figure 3-5 Password Menu, Display 3 Levels of Password

```
-- PASSWORD MENU --
Superuser Password: 222
Privileged User Password: 333
Unprivileged User Password: 444
[0.0.0.1] [2,13] NCM 2000 >
```

System Superuser Password

The system superuser has the highest access level. In the Craft interface this is shown as Access Level 4 on the **Main Menu**. Only the system superuser may set the system superuser password.

Figure 3-6 Password Menu

```
-- PASSWORD MENU --
S) Set System Superuser Password   A) Set Superuser Password
P) Set Privileged User Password     U) Set Unprivileged User Password
D) Set Default Passwords           W) Display 3 Levels of Password
X) exit menu
[0.0.0.1] [2,13] NCM 2000 >
```

From the Password menu, select the **S) Set System Superuser Password** option:

[0.0.0.1] [3,11] NCM 2000 > s

You are prompted through the following sequence:

Figure 3-7 Password Menu, Setting the System Superuser Password

```
[0.0.0.1] [2,13] NCM 2000 >Old System Superuser password:
***
Enter New System Superuser Password (1-16 chars): ***
```

Note that you must know the current system superuser password in order to change it. The **Password Menu** reappears.

Figure 3-8 Password Menu, Setting the Superuser Password

```
-- PASSWORD MENU --
S) Set System Superuser Password    A) Set Superuser Password
P  Set Privileged User Password     U) Set Unprivileged User Password
D) Set Default Passwords            W) Display 3 Levels of Password
X) exit menu
[0.0.0.1] [2,13] NCM 2000 >
```

A similar procedure is used to set the password for the other access levels.

If the NCM is using its default set of passwords and no password was typed upon starting the Craft interface, then the session will be at the Privileged access level.

The Network Configuration Menu

The NCM can be connected to a local area network using the (provided) Ethernet transceiver. This provides support for Node Manager and Telnet sessions by allowing connections to the NCM over the LAN. SLIP provides another alternative via an asynchronous connection, often over a modem. The **Network Configuration Menu** is used to configure parameters that integrate the NCM into a TCP/IP network.

The network configuration parameters are standard Ethernet and SLIP parameters. The user should consult with the system administrators to obtain IP address information which is valid for the local TCP/IP network.

Since the Ethernet IP address and SLIP IP address will be at a factory default value in a new NCM module, it will always be necessary to use the Craft interface LOCAL port at least once to set the Ethernet and/or SLIP IP addresses. Thereafter, if desired, the Craft interface can be accessed via Telnet over Ethernet or SLIP.

From the NCM Controller Administration menu, type "n" to access the **Network Configuration Menu**:

NOTE: *Upon entering a number of the routines under the Network Configuration Menu, the user is advised that this will cause a reset of the NCM in five minutes. This is done because the TCP/IP stack runs at a level below the Craft interface. When changes are made to the SNMP or other TCP/IP related functions, the NCM must be reset before the changes take effect.*

Figure 3-9 Network Configuration Menu

```
-- NETWORK CONFIGURATION MENU --
Ethernet Type:                Ethernet 2
Enet IP Address/Subnet Mask:  [192.94.45.242] / [255.255.255.0]
Gateway Address:              [192.94.45.1]
Ethernet Trap Addresses:      [0.0.0.0]           [0.0.0.0]
                              [0.0.0.0]           [0.0.0.0]
Slip IP Address/Subnet Mask:  [192.94.46.100] / [255.255.255.0]
Slip Trap Addresses:          [0.0.0.0]           [0.0.0.0]
                              [0.0.0.0]           [0.0.0.0]
Read Community string:        public
Write Community string:       public

I) ethernet ip address        L) slip ip address
M) ethernet subnet mask       S) slip subnet mask
G) gateway ip address         R) SNMP read community string
T) ethernet type              W) SNMP write community string
P) ethernet trap addresses    E) slip trap addresses
X) exit menu
[0.0.0.5] [3,11] NCM 2000 >
```

Ethernet and SLIP Parameters

The parameter fields at the top of the **Network Configuration Menu** reflect the values you enter using the menu commands at the bottom of the menu.

I) ethernet ip address

Enter the Ethernet IP address of the primary NCM in the node, in the form: **[0.0.0.0]**. for example: **[192.94.45.242]**

Using Telnet with the IP address, you can initiate a Craft interface session over Ethernet.

NOTE: *If, after configuring IP addresses, an error message appears including the text "**sendto: new socket sendto fail:**", there is an error in the IP addresses used. The Ethernet IP address and the SLIP IP address must reflect different network segments as per the subnet mask in use. Correct the error and reset the NCM card to stop the error messages.*

M) ethernet subnet mask

The Ethernet subnet mask is based on the IP address according to the standard rules for IP address classes (A,B,C etc).

L) slip ip address

Serial Line Interface Protocol (SLIP) is a protocol over which a Telnet Craft interface session can be established, often through a modem. SLIP and Ethernet addresses *must* reflect different networks as per the subnet masks in use.

NOTE: *Do not enter a SLIP address unless SLIP will actually be used. When a SLIP address is entered the selected (front or rear) PRI connector on the NCM module becomes a SLIP port instead of a port which supports Verilink Node Manager software. If the SLIP address is left at 0.0.0.0 the PRI port uses ACP and may be used with Node Manager.*

S) slip subnet mask

The SLIP subnet mask is based on the SLIP address according to standard rules.

G) gateway ip address

The IP address of your network gateway device. This might be a router which the NCM will use to reach an SNMP manager. A gateway address is only required if the NCM module will be communicating with other devices not on the same LAN segment. Consult with your network administrator.

R) SNMP read community string

This parameter is used as rudimentary security for messages to or from an SNMP manager. This value should match the read community string being used by the SNMP manager. Enter an alpha-numeric string of up to 31 characters.

T) ethernet type

There are two supported types: Ethernet 2 (DIX), and 802.3. If your network uses TCP/IP, select DIX by entering “1”.

W) SNMP write community string

This parameter should match the write string being used by the SNMP manager. Enter an alpha-numeric string of up to 31 characters.

P) ethernet trap addresses

These are Ethernet addresses to which alarm messages will be sent. This might be a copy of the Verilink Node Manager application or some other SNMP network manager. You can specify up to four trap host addresses.

E) slip trap addresses

These are IP addresses to which alarm messages will be sent via the SLIP port. You can specify up to four addresses.

Configuring Modem Parameters

Modems used for SLIP connections can be configured and controlled using the **Modem Configuration Menu**.

In addition to preconfigured parameters for the modem, the **Modem Configuration Menu** provides a set of manual commands.

On the **Administration Menu** is the following selection:

M) modem parameters

Access the **Modem Configuration Menu** by typing “m”.

Figure 3-10 Modem Configuration Menu

```
-- MODEM CONFIGURATION MENU --
 Modem Status:   NOT CONNECTED
D) Answer:                      DISABLED
C) Answer command:              AT &C1&D2&K3 S0=1
T) Answer inactive timeout:     0 seconds
B) Dial-Out:                    DISABLED
U) Dial-Out command:            AT &C1&D2&K3 X4 S0=0 DT
N) Dial-Out number:
R) Dial-Out connect retries:    0
K) Dial-Out connect timeout:    60 seconds
I) Dial-Out inactive timeout:   0 seconds

S) Dial-Out         W) Set default commands
H) Hangup           A) Answer
X) exit menu
[0.0.0.5] [3,11] NCM 2000 >
```

where:

The Modem Status is either CONNECTED or NOT CONNECTED. Connected means that the modem is outputting the Data Carrier Detect (DCD) lead as a HIGH, indicating a connection has been made to another modem. If the NCM always shows connected for this value, it might indicate that the modem has been optioned to force DCD on at all times.

The upper part of the menu contains commands in the left column and their affected parameter fields in the right column.

Change the appropriate parameters as necessary by typing the command option character on the parameter line. You will be prompted for your entry.

Table 3-4 Modem Commands

Command	Usage
D	Answer. Toggles auto-answer mode On/Off. ENABLED = on, DISABLED = off
C	Answer Command. Initialization string sent to modem when auto-answer is enabled, verify commands in modem manual if auto-answer does not function.
T	Answer Inactive Timeout. Time in seconds NCM will wait for Data Carrier Detect (DCD) after going off-hook to answer an incoming call, value of zero disables this option and allows modem shift register 7 to handle timeout.
B	Dialout. Toggles dialing out to Trap Host On/Off. If ENABLED NCM will attempt to dial Trap Host(s) sequentially when it has alarms to report. If DISABLED NCM will never dial out.
U	Dial-Out Command. Command string sent before the phone number when NCM dials out. Typically includes S0=0 to turn off auto-answer for duration of the dial-out session as well as DT to use DTMF (touch tone) dialing.
N	Dial-Out number. The phone number to be dialed when the NCM dials out.

Command	Usage
R	Dial-Out connect retries. The number of attempts the NCM is to make each time it attempts to dial out to the trap host.
K	Dial-Out connect timeout. The length of time in seconds that the NCM will wait for DCD, a value of zero disables this option and allows modem shift register 7 to handle timeout.
I	Dial-Out inactive timeout. Length of time in seconds that the NCM will allow the connection to remain established when idle (no data). A value of zero disables this option.
S	Dial-Out. Commands the modem to dial the phone number shown NOW. Useful for testing the modem configuration.
W	Set default commands. Restores all of the user options on this submenu to factory defaults.
H	Hangup. Commands the modem to hangup and return to an on-hook condition. This might be used to end a modem test.
A	Answer. Commands the modem to answer now. Use to verify that the NCM and modem are communicating properly.
X	Exits the Modem Configuration Menu and returns to the Administration Menu above.

Exiting the Administration Menu

The command option:

X) exit this screen

returns you to the NCM **Main Menu**.

Chapter 4

Circuit Manager

This chapter describes how to build circuits using the NCM Craft interface. Topics covered are:

- Central Circuit Manager concept
- Limitations to the product
- Key definitions
- Adding and editing circuits
- Activating/deactivating a configured circuit
- Other general task functions available through the Circuit Manager menu, such as deleting and searching for circuits

NOTE: *Circuit building done by connecting directly to other modules is not documented in this chapter. When an NCM is present in a node, only the NCM Central Circuit Manager should be used to build circuits.*

Cautions

The following must be considered when you are using an NCM to build circuits:

- If you are integrating an NCM with a node that has application modules with pre-existing circuits, the circuits must be cleared before using the modules with the NCM or building new circuits with the NCM Circuit Manager.
- While the **Shelf Type** option under the **Administration Menu** determines which ACP bus the NCM will use, it also is used by the CCM to determine bus architecture. The Shelf Type selection must accurately reflect the actual shelf type for each shelf in the node. See the section "Set Shelf Type" in Chapter 3.
- If an NCM is moved from one node to another node, it will try to build the circuits it has stored in the new node. To avoid configuration errors, delete all circuits from an NCM card before moving it to a new node.
- Circuits can only be built within a shelf (no data bus extensions between shelves are possible).
- An ISDN port can be a destination port only, not a source port.
- Modules must be present in the shelf at the time their circuits are built.
- If a circuit terminates in a DIU 2130/DDS or a DIU 2130/DBU module (two modified versions of the TABS-based DIU 2130 DSU), it will not be restored when the DIU card is removed

from the shelf and then re-inserted. To avoid this limitation, do not unplug and reseat these cards after building their circuits.

Modules Supported for Building Circuits

Currently the Central Circuit Database supports the following modules: TAC 2010, DIU 2130, DIU 2131, DIU 2140, DIDCSU 2912, DCSU, DPRI 2922, HDM 2180, HDM 2182, QPRI 2921, QUAD 2164, IMUX 2160.

Circuit Manager Functions

The Central Circuit Manager performs the following functions:

- Preserves and restores circuits after a node is powered down.
- Builds and manages circuits, and also detects and resolves any circuit resource conflicts.
- Performs special circuit backup applications such as the ISDN dial-backup application.
- Preserves the configuration and circuits associated with a module. For example, in case a module goes bad and is replaced by a new module with the same equipment ID (front panel model number), the new module will obtain the configuration previously set to the old module and inherit any associated circuits.
- Supports standby NCM backup with its database.
- Supports circuit building between Verilink legacy (TABS) modules and new-generation (ACP) modules.
- Records configurations of modules installed in a node in a data structure called the Central Circuit Database.
- Accepts user circuit-building input.
- Checks input information against static circuit-building rules.
- Applies dynamic circuit-building rules before activating a circuit.

Alarm Handling

The CCM "catches" every alarm received by the NCM module and processes these alarms. Those selected alarms can be grouped into certain categories. For example, the following alarms belong to the node information alarm category:

- module present alarm
- module absent alarm
- shelf present alarm

- standby NCM alarm

Loss of signal, loss of frame, and AIS belong to the circuit performance alarm category. For circuits of the Backup or Dial-Backup types, alarms relating to circuit performance may trigger a switch to the configured backup facility.

Module Configuration Updates

The Circuit Manager polls one module every six seconds to retrieve every module's configuration in the node, continuously updating the Central Circuit Database. A mirror image of this database is maintained in any standby NCM modules present in the node.

Circuit Manager Menu

From the NCM **Main Menu**, select the **Circuit Manager Menu** by typing "b".

Figure 4-1 Circuit Manager Menu

```
Circuit Manager -- [1,1] NCM 2000 Firmware 4.17 --
  Name        Type Mode  Prio     Src Port          Dest Port      Bus  Status
----------- ---- ----  ----  ---------------  ---------------  ---  ------
ckt1          perm 64k   low   [1, 8] TAC  NET  [1, 9] DIU  DAT2  B    Active
prim1         prim 64k   low    [1, 8] TAC  NET   [1, 9] DIU  DAT2  B    Inactive
 A) add circuit                I) activate circuit
 D) delete circuit             R) deactivate circuit
 P) prev page                  L) search circuit
 N) next Page                  E) edit circuit
 X) exit to craft main menu
[12.13.14.15] [1,1] NCM 2000 >
```

NOTE: *When Circuit Manager is accessed, all other users are prevented from using it. Anyone else who tries to enter the menu while it is being accessed gets the message: "Wait until later."*

The **Circuit Manager** menu shown in Figure 4-1 already contains two circuits shown in a table at the top of the menu. This means that someone has already created these circuits. One of the circuits is reported Active, the other is Inactive. The commands on the Circuit Manager Menu are described in Table 4-1.

Until circuits have been created, no circuits are listed in the table at the top of the menu. Instead, the following message is displayed in their place:

>>>>>> NO CIRCUIT FOUND IN DATABASE <<<<<

or

>>>>>> REACHED THE END OF THE LIST <<<<<

Table 4-1 Circuit Manager Menu Commands

Key	Description	Notes
A	Add Circuit. Displays Add Circuit submenu.	See the section "Adding Circuits" below.
I	Activate Circuit. Used to start a circuit. This step is not usually required for a circuit type of Permanent or Primary.	The circuit must exist first. Useful for testing switched, backup and dial-backup circuits.
D	Delete Circuit. Removes a circuit from the list maintained in the NCM database. A submenu appears: **Circ Deletion Menu -- [1,1] NCM 2000** **S) single circuit** **A) all circuits** **C) card circuits** **P) port circuits** **X) exit**	Before attempting to delete an active circuit, it must be deactivated. The user is able to delete a single circuit, a subsequent prompt will ask for the circuit name. The user may also delete all circuits, this would be wise if an NCM is to be moved to a new node. All the circuits with Source or Destination ports on a specific card may be deleted, or only those ports which terminate on a particular port of a specific card.
R	Deactivate Circuit. Used to stop a running circuit. The user is prompted for the name of the circuit to be deactivated.	Stops user data. Use before deleting or editing a circuit.
P	Previous Page. Display previous page of circuits in NCM database.	Used when the database contains more circuits than one screen can display.
L	Search Circuit: a submenu appears which allows the user to find a circuit based on a known Source or Destination port: **C) search by shelf,slot** **P) search by port.** **X) exit** Use X to exit when done searching.	To display all of the circuits with a Source Port or a Destination Port on a particular module use C. The user is asked for the desired shelf/slot. An entry in the format x,y is expected where x=shelf and y=slot. To narrow the search to a specific port of an application module use P. The user indicates a specific module first by its shelf/slot location and is then asked to select a port from a list of options.
N	Next Page. Display next page of configured circuits.	Used when the database contains more circuits than one screen can display.
E	Edit Circuit. Used to change one or more parameters of a circuit which already exists in the CCM database.	Before attempting to edit a circuit, it must be deactivated. See the section "Editing and Cloning New Circuits".
X	Exit.	Leaves the Circuit Manager and returns to the **Main Menu**.

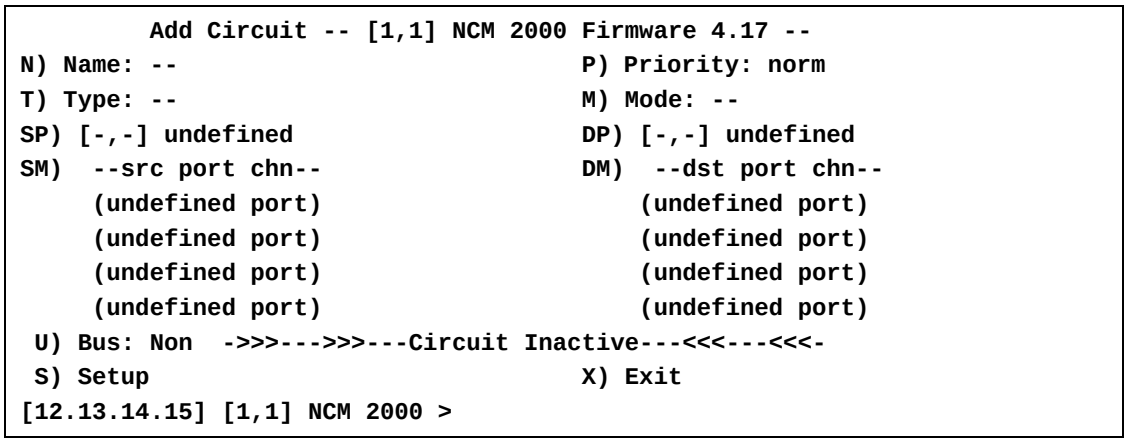
Adding Circuits

To add a new circuit, select option **A** from the **Circuit Manager** menu:

[12.13.14.15] [1,1] NCM 2000 > a

The Add Circuit menu is displayed, as shown in Figure 4-2:

Figure 4-2 Add Circuit Menu



When the menu is displayed, the default circuit priority (normal) is displayed. All other parameter fields are either empty (--) or undefined.

Commands and Parameters

The parameters on the **Add Circuit Menu** are listed in Table 4-2.

Certain additional commands appear on the **Add Circuit Menu** when a circuit type of Backup or Dial-Backup is chosen. These additional parameters are detailed in Table 4-2.

Table 4-2 Add Circuit Menu Commands

Key	Description	Range	Note
N	Name. User defined alpha-numeric label for circuit.	12 character maximum.	Used as an entry key for future edits of this circuit.
P	Priority. Sets order in which circuits are routed. Highest priority circuits are routed first.	Low, normal, high, critical. Default = normal.	Important when a network includes ISDN or other backup ability.
T	Type. Circuit type sets basic function of this circuit. Except where some method of alternative routing or a switched facility like ISDN is available, most circuits will be permanent type.	Permanent, switched, primary, dial backup, backup.	Selection of circuit type may cause additional option parameters to appear. See further details in the section "Circuit Types" below.
M	Mode. Bandwidth usage per timeslot, select 56K or 64K for most cases. Actual data rate becomes 56K or 64K multiplied by the number of DS0s selected, except subrate ports.	56K or 64K except for subrate DIU ports.	On DIU2131 port 2 rates available are: 2.4K through 64K: on DIU 2140 rates available are 2.4K through 19.2K.
SP	Source Port. Port from which circuit originates. A specific port on an application module currently installed in a slot of a shelf in the node.	Shelf number/slot number separated by a comma (1,7), then a port of the card per list presented.	Source port may be a network port or a data port. Circuits must have one network port.
DP	Destination port: Port at which circuit terminates. A specific port on an application module currently installed in a slot of a shelf in the node.	Shelf number/slot number separated by a comma (1,8) then a port of the card per list presented.	Destination port may be a network port or a data port. If a circuit uses ISDN, it must be the Destination port.
SM	Source Mapping. Timeslots to use at the Source Port. For T1/E1 ports these are level zero (DS0) timeslots at 56K or 64K each. For T3 ports these are level 1 (DS1) timeslots - at T1 rate each.	Enter the timeslots with comma separators or a range with a hyphen between first and last. For example: 1,2,3,4 or 1-4.	One timeslot only for circuits terminating in subrate DIU ports. 1-24 for T1 ports. 1-30 for E1 ports. 1-28 for T3 ports.
DM	Destination Mapping. Timeslots to use at the Destination Port. For T1/E1 ports these are level zero (DS0) timeslots at 56K or 64K each. For T3 ports these are level 1 (DS1) timeslots - at T1 rate each.	Enter the timeslots with comma separators or a range with a hyphen between first and last. For example: 1,2,3,4 or 1-4.	One timeslot only for circuits terminating in subrate DIU ports. 1-24 for T1 ports. 1-30 for E1 ports. 1-28 for T3 ports.
U	Bus. Selects which, if any, backplane bus will be used to transfer data from one application module to another for this circuit.	For circuits with source and destination ports in different modules, choose A,B,C or Auto. Auto allows the Circuit Manager to select the best bus to use.	For circuits with source and destination ports on the same module no bus is required. For more details on bus selection see the section "Backplane Bus".
S	Setup. Used to start a fully configured circuit. All parameters above should be entered first before setup is invoked.	When Setup command is issued, Circuit Manager will attempt to route and initialize the circuit.	After a brief pause, the menu is redisplayed with the status of the circuit shown on same line as bus selection.
X	Exit. Return to Circuit Manager Menu above.	If the Add Circuit Menu is exited before completing a circuit, when the Add Circuit Menu is re-entered, the incomplete circuit will be displayed.	Should a circuit fail to become active, check the configuration of the application module(s) and verify ports used are configured as active ports.

Circuit Types

When the circuit type is set to Permanent, Circuit Manager will attempt to route the circuit as described and it will not reroute the circuit based on current or future alarm conditions.

A Primary circuit is one which uses a Backup circuit in the event of a failure in the normal circuit path. Primary and Backup circuits may be built such that a single Backup circuit serves to protect a number of Primary circuits in an *n* x 1 configuration. In the event of multiple simultaneous Primary circuit failures, the circuit with the highest priority will be given Backup circuit bandwidth first. When configuring Primary and Backup circuits, configure the Primary circuit(s) first, as you will refer to them when creating the Backup circuit.

There are two types of backup circuits: ISDN dial-backup (d-bk) and non-ISDN backup (bkup).

Switched circuits and Dial-Backup circuits require a DPRI 2922 or QPRI 2921 ISDN application module for the destination port, as only these products handle establishing calls over digital switched facilities. For more information on backup and dial-backup circuits see the *DPRI 2922 User Manual* or the *QPRI 2921 User Manual.*

Additional menu items for Backup and Dial-Backup are shown in Figure 4-3 and detailed in Table 4-3.

Figure 4-3 Add Circuit Menu for Backup/Dial-Backup Circuits

```
Add Circuit -- [1,1] NCM 2000 Firmware 4.17 --

 N) Name: Backup #2                      P) Priority: high
 T) Type: bkup                           M) Mode: 64k

SP) [2, 1] DIDC net2                    DP) [2, 2] DIDC dat1
SM)  --src port chn--                   DM)  --dst port chn--
 01 02 03 04 05 06 07 08                01 02 03 04 05 06 07 08
 09 10 11 12 .. .. .. ..                09 10 11 12 .. .. .. ..
 .. .. .. .. .. .. .. ..                .. .. .. .. .. .. .. ..


 U) Bus: AUT    ->-->>->> Circuit Inactive <<-<<--<-



 A) primary circ: Primary #1               backup  circ:
SE) src err mask: ais,yel,los,lof,ses/uas,
DE) dst err mask: rts,                    O) dbkp timeout: 5days,23hrs,59min
 G) err clr mask: rts,dtr,

 S) Setup                               X) Exit

A [12.13.14.15] [1,1] NCM 2000 >
```

Table 4-3 Backup and Dial-Backup Options

Key	Description	Notes
A	Primary circuit. The name of the (previously configured) circuit to be protected.	Enter the name of the Primary circuit which this Backup or Dial-Backup circuit is to protect.
SE	Source Error Mask. Used to select which possible alarm conditions on the source port will be used to trigger a switch to backup or dial-backup. Some of these conditions indicate a major failure of a circuit. A network port, for example, is completely out of service when a Loss Of Signal or Loss Of Frame condition exists. Severely Errored Seconds on a network port is a different case as the facility may still be in service although it is seriously impaired. The user is able to select one, more than one, all or none of these possible triggers which will be used to determine when a backup/dial-backup switch will be made.	Enter the numbers shown for the conditions upon which a switch to backup/dial-backup is to be made. For a T1 port possible selections are: AIS, yellow alarm received, Loss Of Signal, Loss Of Frame or Severely Errored Seconds/Unavailable Seconds threshold exceeded. For a data port choices are presented for leads which might be asserted by the DTE: RTS or DTR. In the less common case of a data port configured for DTE mode, it will switch on CTS or DSR, if so configured. Multiple selections can be made by using a comma between the digits. For example, to switch on any of the possible T1 port error conditions enter "1,2,3,4,5".
DE	Destination Error Mask: as above, the user selects from a list of possible errors on the Destination Port which may trigger a backup/dial-backup switch.	Multiple selections can be made by using a comma between the digits. For example, to switch on any of the possible T1 port error conditions enter "1,2,3,4,5".
O	Dial Backup Timeout: the maximum length of time which a circuit will be kept on the backup or dial-backup path. Upon expiration of this time period the Circuit Manager will revert to the primary circuit.	A series of three prompts are presented. First the user sets a maximum number of days, then maximum hours, then maximum minutes up to a total of 5 days, 23 hours and 59 minutes.
G	Error Clear Mask: list of possible alarm conditions which must not exist before backup/dial-backup is terminated. User selects from a list.	These need not exactly match the choices made above for Source Error Mask or Destination Error Mask. Separate multiple entries with commas: 1,2,3,4.

TAC Module Differences

When a circuit uses a TAC 2010 T1 CSU module for the source port, the Source Port Channels option need not be entered. When the Destination Port Channels is entered, like values are used for the TAC 2010. A different menu appears as shown in Figure 4-4.

Figure 4-4 Add Circuit Menu for TAC 2010

```
         Add Circuit -- [1,1] NCM 2000 Firmware 4.17 --
N) Name: ckt1                          P) Priority: low
T) Type: perm                          M) Mode: 64k
SP) [1,8] TAC NET                      DP) [1,9] DIU DAT2
SM)  --src port chn--                  DM)  --dst port chn--
     ( not applied )                   01 02 03 04 05 06 07 08
     ( not applied )                   09 10 11 12 13 14 15 16
     ( not applied )                   17 18 19 20 21 22 23 24
     ( not applied )
 U) Bus: Non  ->>>--->>>---Circuit Inactive---<<<---<<<-
 S) Setup                              X) Exit
[12.13.14.15] [1,1] NCM 2000 >
```

Backplane Bus

Limited bus selection is provided to give the user more control, which may be useful under certain circumstances such as running certain combinations of modules. If a bus is selected that cannot be used because of the shelf/slot configuration, the Circuit Manager prompts the user with an appropriate message. Initially, the bus selection displayed in the Add Circuit menu/form is Non (None).

Table 4-4 Bus Selection Commands

Value	Description	Notes
A	The circuit will use Bus A between modules.	Bus A offers 16 Mbit/s bandwidth in an AS2000 shelf.
B	The circuit will use Bus B between modules.	Bus B offers a maximum of 2.048 Mbit/s bandwidth in an AS2000 shelf.
C	The circuit will use Bus C between modules.	Bus C offers a maximum of 2.048 Mbit/s bandwidth in an AS2000 shelf.
Auto	Circuit Manager will compute the best selection for which bus to use and assign the circuit automatically.	For most cases Auto will be the best selection. Circuit Manager uses the "Set Shelf Type" selection in the **Administration Menu** to calculate which bus to use.

When building circuits you may need to separately activate the circuit when you are ready to do so. You activate a configured circuit by selecting the command: **I) activate circuit** from the **Circuit Manager** menu.

However, when building a permanent circuit, the Circuit Manager automatically activates the circuit when you apply the Setup command.

[12.13.14.15] [1,1] NCM 2000 > s

The **Edit Circuit** menu returns displaying the banner that the circuit is running on bus B.

Figure 4-5 Edit Circuit Menu

```
         Edit Circuit -- [1,1] NCM 2000 Firmware 4.17 --
N) Name: ckt1                          P) Priority: low
T) Type: perm                          M) Mode: 64k
SP) [1,8] TAC NET                      DP) [1,9] DIU DAT2
SM)  --src port chn--                  DM)  --dst port chn--
     ( not applied )                   01 02 03 04 05 06 07 08
     ( not applied )                   09 10 11 12 13 14 15 16
     ( not applied )                   17 18 19 20 21 22 23 24
     ( not applied )
 U) Bus: B  ->-->>->> Running on Bus B   <<-<<--<-
   S) Setup                              X) Exit
[12.13.14.15] [1,1] NCM 2000 >
```

Sample Circuit Listing

Figure 4-6 shows an example two-page display of the **Circuit Manager** menu containing different types of circuits.

Figure 4-6 Circuit Manager Menu

```
Circuit Manager -- [1,1] NCM 2000 Firmware 4.17 --
  Page : 1
  Total: 10 circuits
 Name        Type Mode  Prio     Src Port          Dest Port      Bus  Status
------------ ---- ----  ----  ---------------  ---------------  ---  ------
p8           prim 64k   low   [3, 5] DPRI DAT2  [3, 5] DPRI NET2  INT  Inacti
p9           d-bk 64k   norm  [3, 5] DPRI DAT2  [3,10] DPRI NET1  B    Inacti
p10          prim 64k   high  [3, 5] DPRI DAT1  [3, 5] DPRI NET1  INT  Inacti
p11          d-bk 64k   crit  [3, 5] DPRI DAT1  [3,10] DPRI NET1  AUT  Inacti
a1           prim 64k   low   [2,12] DIU  DAT1  [2, 5] DIDC NET1  B    Inacti
a2           prim 64k   high  [2,12] DIU  DAT2  [2, 1] DPRI NET2  C    Inacti
 A) add circuit                L) search circuit
 D) delete circuit             E) edit circuit
 P) prev page                  I) activate circuit
 N) next page                  R) deactivate circuit
 X) exit to craft main menu
[0.0.0.5] [3,11] NCM 2000 > n
Circuit Manager -- [1,1] NCM 2000 Firmware 4.17 --
  Page : 2
  Total: 10 circuits
 Name        Type Mode  Prio     Src Port          Dest Port      Bus  Status
------------ ---- ----  ----  ---------------  ---------------  ---  ------
c8           prim 64k   low   [3, 5] DPRI DAT2  [3, 5] DPRI NET2  INT  Inacti
c9           bkup 64k   norm  [3, 5] DPRI DAT2  [3,10] DPRI NET1  B    Inacti
c10          prim 64k   high  [3, 5] DPRI DAT1  [3, 5] DPRI NET1  INT  Inacti
c11          bkup 64k   crit  [3, 5] DPRI DAT1  [3,10] DPRI NET1  AUT  Inacti
 A) add circuit                L) search circuit
 D) delete circuit             E) edit circuit
 P) prev page                  I) activate circuit
 N) next page                  R) deactivate circuit
 X) exit to craft main menu
[12.13.14.15] [1,1] NCM 2000 >
```

Editing and Cloning New Circuits

This section describes how to edit an existing circuit. Time savings are possible when creating new circuits by cloning an existing circuit.

Begin to edit a circuit by typing "E" at the **Circuit Manager** menu:

[12.13.14.15] [1,1] NCM 2000 > e

You are prompted to enter the name of the circuit you wish to edit.

The **Edit Circuit** menu appears with the configuration of the specified circuit:

Figure 4-7 Edit Circuit Menu

```
         Edit Circuit -- [1,1] NCM 2000 Firmware 4.17 --
N) Name: ckt1                          P) Priority: low
T) Type: perm                          M) Mode: 64k
SP) [1,8] TAC NET                      DP) [1,9] DIU DAT2
SM)  --src port chn--                  DM)  --dst port chn--
     ( not applied )                   01 02 03 04 05 06 07 08
     ( not applied )                   09 10 11 12 13 14 15 16
     ( not applied )                   17 18 19 20 21 22 23 24
     ( not applied )
 U) Bus: B  ->-->>->> Running on Bus B   <<-<<--<-
 S) Setup                              X) Exit
[12.13.14.15] [1,1] NCM 2000 >
```

Changing Name Clones New Circuit

When a circuit name is modified, it is the same as adding a new unique circuit having the same configuration as the originally named circuit. This is the point at which a new circuit is cloned. The original circuit is not disturbed. This is handy when creating multiple circuits that are similar.

The process is similar to initially configuring a circuit. The user may change the name of a circuit by typing the command option "N" from the **Edit Circuit** menu for the circuit selected for editing.

[12.13.14.15] [1,1] NCM 2000 > n

A prompt appears:

Enter circuit name (12 char maximum) > prim1

The name of the selected circuit is changed in the redisplayed menu:

Figure 4-8 Edit Circuit Menu

```
         Edit Circuit -- [1,1] NCM 2000 Firmware 4.17 --
N) Name: prim1                          P) Priority: low
T) Type: perm                          M) Mode: 64k
SP) [1,8] TAC NET                      DP) [1,9] DIU DAT2
SM)  --src port chn--                  DM)  --dst port chn--
     ( not applied )                   01 02 03 04 05 06 07 08
     ( not applied )                   09 10 11 12 13 14 15 16
     ( not applied )                   17 18 19 20 21 22 23 24
     ( not applied )
 U) Bus: B  ->-->>->> Running on Bus B  <<-<<--<-
  S) Setup                              X) Exit
[12.13.14.15] [1,1] NCM 2000 >
```

Changing the Type of a Circuit

The process of editing an existing circuit to change its Type is similar to initially configuring its Type. Type "T" to enter a circuit type:

[12.13.14.15] [1,1] NCM 2000 > t

The circuit type options are shown:

Select circuit type: 1) perm 2) swit 3) prim 4) d-bk 5) bkup> 3

The **Add Circuit** menu redisplays with the type of the selected circuit changed:

Figure 4-9 Edit Circuit Menu

```
         Edit Circuit -- [1,1] NCM 2000 Firmware 4.17 --
N) Name: prim1                          P) Priority: low
T) Type: prim                           M) Mode: 64k
SP) [1,8] TAC NET                       DP) [1,9] DIU DAT2
SM)  --src port chn--                   DM)  --dst port chn--
     ( not applied )                    01 02 03 04 05 06 07 08
     ( not applied )                    09 10 11 12 13 14 15 16
     ( not applied )                    17 18 19 20 21 22 23 24
     ( not applied )
 U) Bus: B  ->-->>->> Running on Bus B  <<-<<--<-
 S) Setup                               X) Exit
[12.13.14.15] [1,1] NCM 2000 >
```

Setting up a Cloned Circuit

Once the new circuit has been cloned and edited to use different ports, set up the circuit using the Setup command option **S**:

[12.13.14.15] [1,1] NCM 2000 > s

A confirmation message is displayed:

Successful circuit build

Now exit from the **Edit Circuit** menu to return to the **Circuit Manager** menu:

[12.13.14.15] [1,1] NCM 2000 > x

Figure 4-10 Circuit Manager Top Menu Showing Second Circuit Added

```
Circuit Manager -- [1,1] NCM 2000 Firmware 4.17 --
  Name        Type Mode  Prio     Src Port          Dest Port      Bus  Status
------------ ---- ----  ----  ---------------  ---------------  ---  ------
ckt1         perm 64k   low   [1, 8] TAC  NET   [1, 9] DIU  DAT2  B    Active
prim1        prim 64k   low   [1, 7] TAC  NET   [1, 9] DIU  DAT1  B    Inacti
 A) add circuit                I) activate circuit
 D) delete circuit             R) deactivate circuit
 P) prev page                  L) search circuit
 N) next Page                  E) edit circuit
 X) exit to craft main menu
[12.13.14.15] [1,1] NCM 2000 >
```

The **Circuit Manager** menu now shows the two circuits, including the one just cloned.

Chapter 5

Downloading and Broadcasting Firmware

This chapter describes file transfers using FTP and downloading firmware upgrades to application modules.

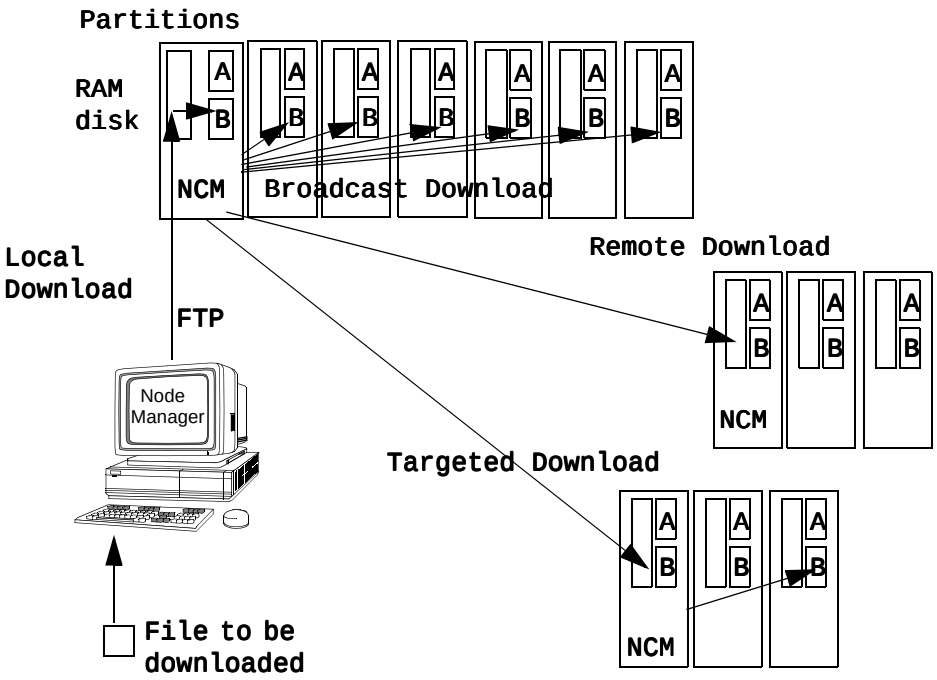
A major feature of the AS2000 architecture is the capability of changing the personalities of AS2000 application modules by downloading firmware upgrades to the module's flash RAM. This method may be used to upgrade an NCM card or the application modules which the NCM manages.

Four types of firmware downloads are supported by the NCM Craft interface:

- Local download: uses FTP to copy new firmware to the RAM disk on the NCM and then stores it to local flash to upgrade the NCM.
- Broadcast download: uses FTP to copy new firmware to the RAM disk on the NCM, then broadcasts the firmware to one or more other modules in the local node.
- Remote download: uses FTP to copy new firmware to the RAM disk on the NCM, then directs the firmware to a remote NCM. The firmware may then be targeted or broadcast to other modules in the same node as the remote NCM.
- Targeted Download: uses FTP to transfer files to RAM disk and then retransmission to a specific card.

The download process is illustrated in Figure 5-1.

Figure 5-1 Firmware Downloads



Using the Administration Menu in Downloads

Access the **NCM Controller Administration Menu** from the NCM **Main Menu**.

Select command option **O) administration**:

A [12.13.14.15] [1,1] NCM 2000 > o

The NCM Controller Administration menu appears:

Figure 5-2 Administration Menu

```
-- NCM CONTROLLER ADMINISTRATION MENU --
Date/Time/Zone:               01-28-97  01:39:18
Node Address:                 [12.13.14.15]
Node ID:                      0
Site Name:                    station_1
System Uptime:                0:30:29
 --- Node Administration ---
H) set shelf type             Z) set time zone
T) set time                   D) set date
B) download firmware          Y) switch over once
W) write file to flash        O) switch over permanent
C) set front/rear access      Q) query firmware
U) clear card configuration   R) reset card
A) set node address           E) change node id
I) change site name           P) change password
N) network parameters
M) modem parameters
X) exit this screen
[12.13.14.15] [1,1] NCM 2000 >
```

Different Command Options

The **Administration Menu** options are module-specific, and also specific to the local or the remote node. For example, the NCM menu shown above is specific to the local node. The NCM menu shown below is specific to the remote node.

Figure 5-3 Administration Menu for a Remote Node

```
-- NCM CONTROLLER ADMINISTRATION MENU --

Date/Time/Zone:               79-00-01  16:18:49 PST
Node Address:                 [0.0.0.2]
Node ID:                      122
Site Name:                    Far Remote Other
System Uptime:                0:17:08

 --- Node Administration ---

H) set shelf_type             O) switch over permanent
F) firmware from local NCM    Q) query firmware
B) download firmware          R) reset card
L) tabs download              Y) switch over once
N) network parameters         U) clear card configuration
I) change site name           P) change password
X) exit this screen

A [0.0.0.2] [1,1] NCM 2000 >
```

Firmware Options

Command option B is used to download firmware to modules in the node other than the NCM. At the remote node, there is an additional command option on the menu that reads:

F) firmware from local NCM

Command options on the NCM Controller **Administration Menu** related to firmware downloads and control of firmware are shown in Table 5-1 below:

Table 5-1 Firmware Related Commands

Command	Usage
B) download firmware	Sends file from NCM RAM to non-NCM cards in node (for updating cards other than NCM). See section below on "Broadcasting Firmware".
F) firmware from local NCM	Gets file from local NCM and brings it to this remote NCM (seen only in remote node).
O) switch over permanent	Reloads firmware from selected bank and also sets that bank as default power up boot partition. Test new code first before using this option.
Q) query firmware	Checks CRC values of code in flashbanks and reports OK or BAD as well as code revisions.
R) reset card	Restarts card without re-loading code from either flashbank.
W) write file to flash	Writes new file in NCM RAM to bank B of this NCM (for updating NCM only).
Y) switch over once	Reloads firmware from selected flashbank but does not change which bank is loaded at power-up.

Upgrading NCM Firmware

You Will Need

- A Verilink NCM 2000 Node Controller Card
- A file containing a new revision of NCM firmware.
- An Ethernet connection to the Ethernet transceiver supplied with the NCM card
- A Telnet application or a terminal connection to the NCM Local (Craft) port
- An FTP *Server* application

NOTE: *Most common FTP programs are CLIENTS, not SERVERS. Be sure you have an FTP server program. Such programs, distributed as shareware, may be found on World Wide Web download sites*

You Will Need to Know

- Basic TCP/IP terminology
- How to use FTP

- How to use the specific FTP server program you have selected
- The IP address of the FTP server
- The specific path and filename to the new NCM firmware file

Before Beginning This Upgrade

If applicable, install the FTP server program that you have selected.

Copy the file containing the new NCM firmware to a known location (path) on the computer running the FTP server application.

Preview

NCM cards may be upgraded by using the TCP/IP File Transfer Protocol (FTP) to bring a new executable into the card and then writing it to flash memory.

Different versions of code may exist in banks A and B. Upgrades are applied to bank B only.

Before attempting to FTP new code into the NCM verify that these two conditions are met:

- The NCM is connected to a LAN segment which also has a computer with an FTP server application, or that a gateway address in the NCM network configuration makes the FTP server reachable via a router.
- The NCM card has an Ethernet IP address and subnet mask which are valid for the LAN segment on which it resides.

NOTE: *If changes are made to the NCM Ethernet configuration menu the card must be reset for the changes to take effect.*

Upgrading NCM Flashbanks

This section details the procedure for upgrading a local NCM.The first portion of this procedure transfers the file into the NCM, these steps are also used if using the NCM to upgrade other cards.

Using FTP to Transfer the File

Copy the new firmware file to a known path on the FTP server machine. This file will often be named FLASH.QB. If it has a different name, rename it FLASH.QB.

Start the FTP server application.

On the NCM card, exit using "X" until the **pSH+>** prompt is reached. Verify that the FTP server is reachable by using the PING command

ping 192.94.45.242 (substitute the IP address of your FTP server)

When it is successful PING will return:

PING (192.94.45.242): 56 data bytes

192.94.45.242 is alive

If PING fails verify the TCP/IP related options. See "The Network Configuration Menu"paying special attention to the Ethernet IP address, Ethernet subnet mask and Ethernet type options. If the address of the FTP server reflects a different network segment than the NCM, also verify that the Gateway address reflects a valid router port.

Once PING is successful, connect to the FTP server:

ftp 192.94.45.242

and then log in to the FTP server using whatever method your FTP server package may require.

Navigate to the directory on the FTP server where you placed the new download file. Typically this is done using the **cd** command:

cd mydir

Issue the binary command to set the transfer type to binary:

binary

Transfer the file to the NCM card by using the Get command:

get flash.qb flash.qb

NOTE: *As with the copy command, the first instance of "flash.qb" in this command is the source, the file on the FTP server, and the second instance of "flash.qb" is the target or name under which it is to be saved in RAM on the NCM. Be sure that you do save the file as "flash.qb", regardless of its name on the FTP server.*

You should see screen output like:

200 PORT command successful.

150 Binary data connection for flash.qb (192.94.45.229,1026) (584121 bytes).

The file transfer is likely to take a few minutes, after which a message appears:

226 Transfer complete.

584121 bytes received in 36 seconds (15 Kbytes/s)

Writing the File to Flash Memory

Once the transfer is finished end your FTP session

quit

You will be returned to the **pSH+>** prompt.

Log in to the normal menu system

craft

At the shelf/slot map select:

O) administration

Figure 5-4 Administration Menu

```
-- NCM CONTROLLER ADMINISTRATION MENU --

Date/Time/Zone:               79-00-01  16:21:45 PST
Node Address:                 [12.13.14.15]
Node ID:                      102
Site Name:                    Test1 NCM Card
System Uptime:                0:19:50

 --- Node Administration ---

H) set shelf type             Z) set time zone
T) set time                   D) set date
B) download firmware          Y) switch over once
W) write file to flash        O) switch over permanent
C) set front/rear access      Q) query firmware
U) clear card configuration   R) reset card
A) set node address           E) change node id
I) change site name           P) change password
N) network parameters         S) node selection
M) modem parameters
F) flash copy (B => A)
X) exit this screen


A [12.13.14.15] [1,2] NCM 2000 >
```

Select **W) write file to flash** to save the new file and say Yes to writing to flash bank B. This process takes nearly five minutes. As the process completes see a message appears:

dnld_ramdisk: done

After another minute you will see the **Administration Menu** again. Select **Y) switch over once** to try your new code. When asked which bank to boot from, choose B.

Copying Bank B to Bank A

Verilink suggests that customers refrain from using the **Flash Copy** command unless specifically instructed to do so by a Tech Support representative or an upgrade procedure included with new firmware files. No harm is done if bank A and bank B contain different versions of firmware. A failed attempt to copy bank B to bank A could leave an NCM module unable to boot.

By keeping the original version of firmware intact in bank A, the user can easily recover if an upgraded firmware version is later found to have a problem.

Broadcasting Firmware

If the NCM is not to be updated, but rather modules which it controls are to be updated, the procedure outlined above may still be used to FTP new code into the NCM. Then, instead of writing the file to flash memory the file will be broadcast across the shelf.

Firmware is downloaded to the Bpartition. The Apartition can be upgraded only by a field upgrade of the RAM chip.

A message is contained in the header of the download file that identifies which type of module the file is intended to upgrade. Other modules that may be in the node ignore the download file.

A minimum of privileged user password status is required to exercise a broadcast.

To minimize errors and facilitate a quicker download, disconnect the Ethernet port prior to initiating the download.

Cautions

The **Download Firmware Menu** functions are subject to these considerations:

- TABS-based cards do not support the ACP Broadcast Results option or any of the other commands beginning with ACP.
- If a node contains a mix of TAC 2130 or TAC 2130-S cards as well as TAC 2130-T cards, do not use the TABS download option. TAC 2130 and TAC 2130-S cards use a different firmware file than TAC 2130-T cards. A TABS download in a mixed shelf will damage the cards for which the file is incorrect, requiring factory repair.
- NCM releases 4.14 and newer do not support the broadcast results function for DIDCSU or DCSU modules with firmware earlier than version 2.14.
- If the ACP Broadcast Results option is used before a broadcast has been done, the information shown will apply only to the status of code in the NCM module(s).
- During a download, ACP Broadcast Results cannot be used. Wait for the download to finish.
- The ACP Broadcast Results option shows the results of ACP broadcast downloads only. If a specific shelf/slot has been targeted by use of the Card Retransmit function, those results are not shown in the broadcast result screen.
- Each time Card Retransmit is used on a card, it will force a download to that card, even if a retransmit to that card has already been requested.
- When using the Card Retransmit option to resend to a number of cards, avoid entering a command string longer than 128 characters. Any input after the 128th character will be lost.

- When all cards targeted by the Card Retransmit option have been downloaded, a message "All Targeted Downloads Complete" will appear.
- The Card Retransmit option is not supported for the HDM 2180 or HDM 2182 modules. (Direct downloads may be done to these cards using options on the individual module **Administration Menu** using the local Craft interface).
- Targeted downloads take about four minutes each and are performed sequentially. If more than three cards are targeted the Craft interface may time out and logoff the user.

Securing the Download File

You must have already transferred the file to the RAM of the NCM which is going to broadcast to the node. See "Using FTP to Transfer the File" in this Chapter.

Next, call up the NCM **Main Menu** and select Administration:

[12.13.14.15] [1,1] NCM 2000 > o

The NCM **Controller Administration Menu** is displayed:

Select command option: **B) download firmware**

[12.13.14.15] [1,1] NCM 2000 > b

Figure 5-5 Download Firmware Menu

```
-- NCM 2000 DOWNLOAD FIRMWARE MENU --

N) ACP broadcast download     C) card re-transmit
B) ACP broadcast switchover   O) switchover to bank A/B
S) ACP broadcast results      T) tabs download

X) exit this menu
```

For an ACP type card, select **N** to broadcast the download image file:

[12.13.14.15] [1,1] NCM 2000 > n

Figure 5-6 NCM Download Broadcast Prompt

```
broadcast begin
broadcast_sector: equip id = 0x1
file size = 630875
Press enter to continue
```

After you press ENTER, the broadcast process takes place as in the following example. The interface dynamically indicates the percentage of the download that has completed. It polls all the modules in the node for potential anomalies during the download:

shelf 1 / slot 6 is being polled

00000006:1.A 5% complete

shelf 1 / slot 6 is being polled

...

00000006:1.A 95% complete

shelf 1 / slot 6 is being polled

00000006:1.A 100% complete

shelf 1 / slot 6 is being polled

file checksum = 57398768

broadcast done

[12.13.14.15] [1,1] NCM 2000 > Enter

NOTE: *The broadcast may take so long that the Craft interface will time out and log you out. The polling status messages will still appear. If that happens, re-enter the Craft interface and get back to the Download Firmware Menu as described above.*

When you press Enter, the NCM 2000 **Download Firmware Menu** reappears:

Figure 5-7 NCM Download Firmware Menu

```
-- NCM 2000 DOWNLOAD FIRMWARE MENU --

N) ACP broadcast download     C) card re-transmit
B) ACP broadcast switchover   O) switchover to bank A/B
S) ACP broadcast results      T) tabs download

X) exit this menu
```

Checking the Result/Retrying Broadcast

As a precaution, after a download, check the download status screen—**S) ACP Broadcast Results**— in the **Download Firmware Menu**. Rebroadcast to any modules that may have failed the download.

Select the command option for ACP Broadcast result:

[12.13.14.15] [1,1] NCM 2000 > s

You are prompted:

Press enter to continue Flash has a good image

total number of A card type in this node 4

The results for the DIDCSU Craft interface query is displayed:

Figure 5-8 NCM Broadcast Result

```
                              <- SLOT ->
 SHELF   1   2   3   4   5   6   7   8   9   10  11  12  13
   0     -   -   -   -   -   -   -   -   -   -   -   -   -
   1     -   -   Y   Y   Y   Y   -   -   -   -   -   -   -
    KEY:Y=GOOD, N=BAD
[12.13.14.15] [1,1] NCM 2000 >
```

Press ENTER to display the NCM 2000 **Download Firmware Menu**.

If an ACP card did not receive a good load the **Card Re-transmit** function may be used to specifically target that card.

Switching over to the New Firmware

Try the new firmware by using the **B) ACP broadcast switchover** option.

NOTE: *When switching over to the new firmware version, there is a slight chance of failure to switch in one or a few modules. The user should check that the switch-over is actually complete. If not, try again.*

After a download, the target module cannot be downloaded again until that module has been restarted (either in the A bank or in the B bank).

NOTE: *Do not attempt to do a switch over before the download has completed. The card may be left in an inoperative condition.*

Alternatively, the user may navigate to a specific card and reset it individually, or use the switchover to bank B option.

From the **Main Menu**, select the module you wish to restart (in this example, a DIDCSU module, which received the firmware download):

[12.13.14.15] [1,1] NCM 2000 > s

You are prompted:

Enter 'shelf,slot' pair or 'slot' in current shelf(e.g. 3,4 or 5): > 1,6

The NCM Controller **Main Menu** appears:

Select the option for node administration: **O**

[12.13.14.15] [1,6] DIDCSU 2912 > o

The DIDCSU Controller **Administration Menu** appears:

Figure 5-9 DIDCSU Controller Administration Menu

```
--  ACE CONTROLLER ADMINISTRATION MENU --
 Date/Time/Zone:     8-14-96  20:02:41
Node Address:       [12.13.14.15]
System uptime:      1:03:16
T) set time                   D) set date
Z) set time zone              A) set node address
R) reset card                 P) change password
Q) query firmware             I) change site name
O) switch over permanent      Y) switchover once
F) restore card defaults      X) main menu
[12.13.14.15] [1,6] DIDCSU >
```

From the DIDCSU Controller Administration Menu, select the command option for: **Y) switch over once**

[1,6] DIDCSU 2912 > y

At the prompt select the partition:

Select image to switch to? 1) A 2) B > 2

NOTE: *The firmware is always downloaded to the Bpartition.*

The card reboots from the selected partition.

Confirming the Firmware Upgrade

A way to confirm the success of a firmware download is to use the **Administration Menu** command option:

Q) query firmware

Figure 5-10 DIDCSU Administration Menu

```
--  ACE CONTROLLER ADMINISTRATION MENU --
 Date/Time/Zone:     8-14-96  20:02:41
Node Address:       [12.13.14.15]
System uptime:      1:03:16
T) set time                   D) set date
Z) set time zone              A) set node address
R) reset card                 P) change password
Q) query firmware             I) change site name
O) switch over permanent      Y) switchover once
F) restore card defaults      X) main menu
[12.13.14.15] [1,6] DIDCSU 2912 >
```

Type the command:

[12.13.14.15] [1,6] DIDCSU 2912 > q

The query firmware report is displayed:

Figure 5-11 Administration Menu Query Firmware Report

```
Executing from partition: B
Partition B ver 2.12  Status: Ok
Partition A ver 1.94  Status: Ok
Partition RAM ver 2.12  Status: Ok
Press enter to continue
[12.13.14.15] [1,6] DIDCSU 2912 >
```

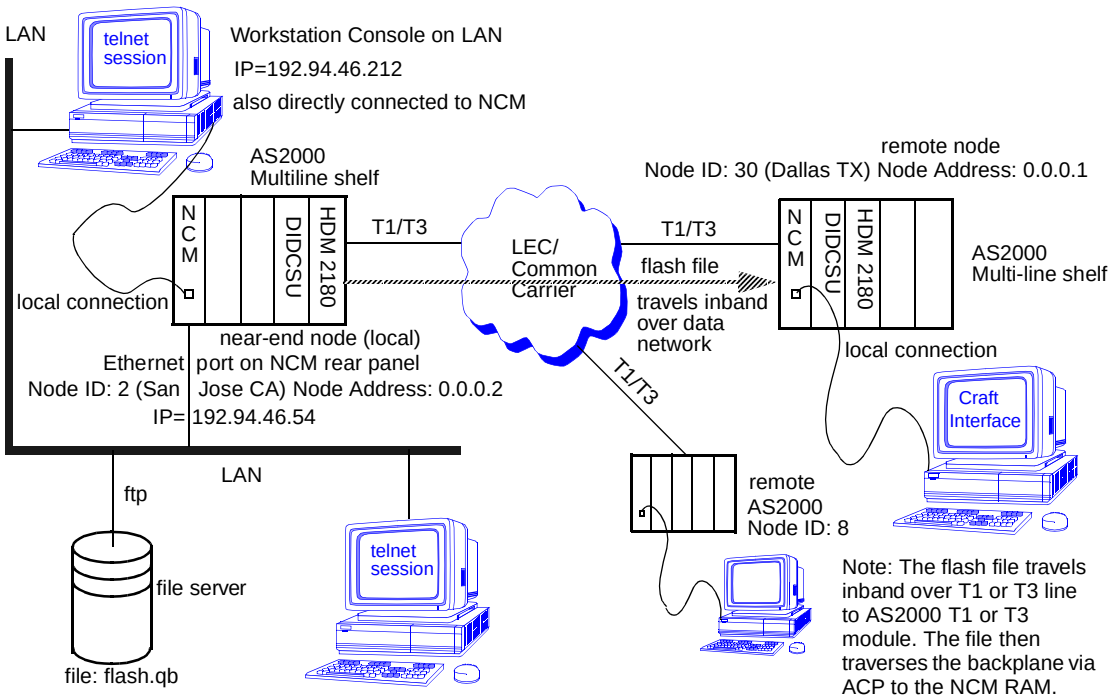
Moving Firmware Across a Network from NCM to NCM

The NCM File Transfer Facility enables you to download a flash file from the local node NCM RAM to a remote node NCM RAM. Use this procedure only after first using FTP to get the new firmware into the NCM, as outlined under "Upgrading NCM Firmware" above.

This section provides a sample session using Telnet to move an upgrade file from a workstation on the LAN to the local NCM. From there, the file is *pulled* from the remote node destined to receive the upgrade.

From the remote NCM, the file can be broadcast to modules in the remote node, using the procedure in the section below:

Figure 5-12 Downloading Firmware Across a Network



FTP the Flash File

In this example, a flash file containing the firmware upgrade has already been transferred to the RAM of the local NCM. See "Using FTP to Transfer the File" in this chapter.

The Craft interface session is started in the local node NCM, that is, with the terminal plugged into the Local port or communicating directly with the local NCM via Telnet.

Select a Remote Node

Select the Administration menu from the local NCM Main Menu.

O) administration

The Node Administration menu appears. Select

S) node selection

The Node Selection menu appears. Select the node you wish to upgrade.

[12.13.14.15] [1,1] NCM 2000 > s1

Confirmed:

Selected FAR end node: [12.13.14.17] shelf = 0, slot = 2

The NCM Node Controller shelf/slot display for the remote node appears:

Figure 5-13 NCM Main Menu

```
-- VERILINK NCM CONTROLLER : FW Rev 4.17, Dec 30 1997 16:55:20   --

   Site Name:  Test Remote                    Access Level:  4
   Managing at FAR end node [12.13.14.17]         Node ID:  4463

                           <- SLOT ->
 SHELF   1   2   3   4   5   6   7   8   9   10  11  12  13
   0 M   N [*N]  A   A   A   A   -   -   -   -   -   -   -
   1 M   A   A   A   A   A   A   Q   Q   M   -   C   D   R
   2     -   -   -   -   -   -   -   -   -   -   -   -   -
   3     -   -   -   -   -   -   -   -   -   -   -   -   -
   4     -   -   -   -   -   -   -   -   -   -   -   -   -
KEY: A=DIDCSU, B=DIU/DBU, C=CSU, D=DIU, E=SDIU, F=DIU/DDS, G=DHDM,
     H=ATM/IMUX, I=IDCSU, J=PEP, K=DAC, L=HLM, M=IMUX, N=NCM, P=DPRI,
     Q=QUAD, R=SUBRATE, S=HSM, T=HDM, U=DCSU, V=VCU, X=QPRI

S) shelf/slot                O) administration
C) configuration             D) diagnostics
P) performance/status        A) alarm
B) circuit manager           I) manufacturing info
X) exit this screen

A [12.13.14.17] [0,2] NCM 2000 >
```

Select **O) administration**.

The NCM Controller **Administration Menu** for the remote NCM appears:

Figure 5-14 Administration Menu

```
-- NCM CONTROLLER ADMINISTRATION MENU --

Date/Time/Zone:                79-00-01  16:18:49 PST
Node Address:                  [0.0.0.2]
Node ID:                       122
Site Name:                     Far Remote Other Si
System Uptime:                 0:17:08

 --- Node Administration ---

H) set shelf_type              O) switch over permanent
F) firmware from local NCM     Q) query firmware
B) download firmware           R) reset card
L) tabs download               Y) switch over once
N) network parameters          U) clear card configuration
I) change site name            P) change password
X) exit this screen

A [0.0.0.2] [1,1] NCM 2000 >
```

Select **F) firmware from local NCM**

[12.13.14.17] [0,2] NCM 2000 > f

You are prompted:

[12.13.14.17] [0,2] NCM 2000 > Press enter to continue

NOTE: *The flash file can take a long time to download because it is transmitted inband and must be packetized. You can monitor the remote node in another Craft interface session while the download is taking place.*

When the download completes, the **Administration Menu** for the remote NCM reappears:

Using the New File

Now the **B) download firmware** submenu may be used to broadcast the file to all of the cards in this node for which it is appropriate.

A header in the file identifies which modules it applies to, only those modules will accept the download.

See the preceeding section "Broadcasting Firmware" for more details.

Conflicting Download Sessions

If another Telnet session invokes the transfer of the same firmware, that session is blocked and the following message is displayed on its console.

Download in use... Wait until later

Index

W

September 1999

P/N 880-502623-001-E1

VERILINK CORPORATION
127 JETPLEX CIRCLE,
MADISON, ALABAMA 35758
TEL: (800) 837-4546