HARDWARE

- **Industry-standard LAN connection**
- **Operates at 10 million bits per second**
- **Internal transceiver for operation with 'thin' Ethernet cable**
- **Supports external transceiver for use with standard Ethernet cable**
- **Compatible with IEEE 802.3 standard**
- **On-board ROM permits system bootstrap operations over Ethernet**
- **Supported by Ethernet server and CT-NET™ software**
- **Permits operation of distributed application software over Ethernet links**

CONVERGENT TECHNOLOGIES

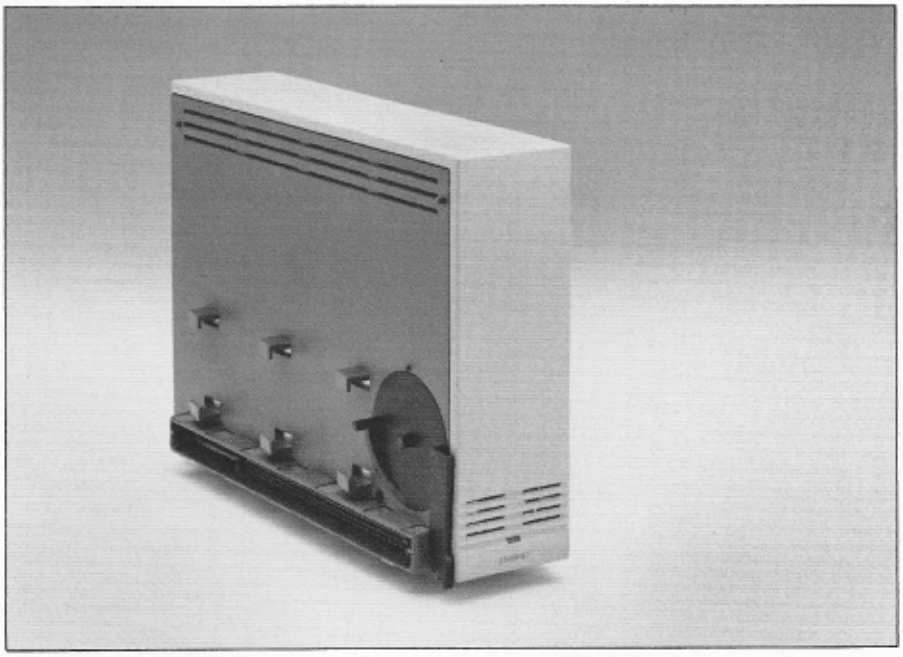
Ethernet Module

The Convergent™ XE-001 Ethernet Module allows NGEN® workstations to be attached to an Ethernet network. It fully conforms to the IEEE 802.3 standard definition for Ethernet devices, and operates at 10 million bits per second, using the CSMA/CD (Carrier Sense Multiple Access/Collision Detection) protocol. It can be used with standard Ethernet transceivers and cables, and also includes an internal VLSI transceiver for use with the lower cost 'Thin Ethernet' (or 'Cheapernet') cabling system. The Ethernet Module is typically used on an NGEN master workstation, in order to connect a cluster of workstations to other clusters via CT-Net™. It is packaged in its own NGEN enclosure, and uses the standard X-Bus™ latching mechanism for attachment to the other system modules. One Ethernet module may be used with each NGEN workstation.

ETHERNET OVERVIEW

Architecture

Ethernet is an industry standard Local Area Network medium, supported by many vendors. It allows up to 1024 devices to be connected to a common coaxial cable. Data is transmitted over the cable at 10 million bits per second, using baseband transmission with a carrier sense, multiple access/collision detection (CSMA/CD) protocol. Before a station on the network transmits data, it waits until all previous transmissions are completed, and the network appears idle. Should two stations attempt to transmit data simultaneously, each detects that a 'collision' has occurred. If this happens, both stations terminate their transmissions, and retry the operations after randomly selected intervals.



Cabling Requirements

There exist two common cabling arrangements for Ethernet:

The original Ethernet Standard Cable, often referred to as 'thick' Ethernet, is designed specifically for Ethernet applications. Its electrical properties allow a single section of cable, or 'segment', to be up to 500 meters long. Additional segments may be attached to the first, by using repeaters. A network may contain up to three segments, and be up to 1500 meters in length. The NGEN Ethernet module atache to 'thick' Ethernet cable via a standard external transceiver, which plugs into a 15-pin D connector drop panel, then to the rear panel.

Many contemporary Ethernet adapters also support a lower cost cabling system, which utilizes standard RG58 A/U or C/U coaxial cable. This is often referred to as 'thin' Ethernet, or 'Cheapernet'. Since this cable is used in ordinary CATV applications, it is substantially less expensive; it can be purchased for one-fourth the cost of the 'thick' cable. The maximum length of a 'thin' Ethernet segment is 300 meters. Repeaters can be used, with a maximum of three segments, or 900 meters, per 'thin' Ethernet Module contains an internal VLSI transceiver for 'thin' Ethernet, and attaches to cable via a BNC connector on its rear panel.

It is possible to mix 'thick' and 'thin' Ethernet cable in a single network, using special BNC to N-series adapters. The maximum length for an Ethernet network containing both types of cable is 1000 meters.

The lower cost associated with 'thin' Ethernet cable, combined with the ability to attach the workstation directly to this cable without needing an expensive external transceiver, makes the use of 'thin' Ethernet very attractive in environments which do not require the greater length permitted by 'thick' Ethernet cables.

ETHERNET MODULE ARCHITECTURE

The NGEN Ethernet Module is implemented as a single printed circuit assembly inside a 2½-inch NGEN module. Data is moved to and from the workstation's memory on a DMA basis, for low overhead; the module acts as an X-Bus Mode 3 Master for DMA operations. It uses a Seeq 8001 VLSI Ethernet Controller and a Seeq 8023 Encoder/Decoder to implement Ethernet's CSMA/CD protocol in hardware. It also contains an internal AMD Ethernet Transceiver chip, which is used for the interface to 'thin' Ethernet. Several custom gate arrays are used to implement system functions. An 8 KB boot ROM on the board allows a diskless workstation to be bootstrapped into operation over the Ethernet network.

SOFTWARE

Convergent supplies an Ethernet server that permits low-level access to Ethernet from CTOS™, DISTRIX™, and MS™-DOS environments on an NGEN workstation.

The optional CT-Net software package can be used in conjunction with the Ethernet module. CT-Net is based on the ISO/OSI (International Standards Organization Open Systems Interconnection) architecture. It permits workstations to share resources such as files, printers, and communications gateways to mainframes and public networks. CT-Net, Ethernet, and the RS-422-based Convergent Cluster can all be used together. This combination allows multiple workstations (NGEN, CWS™, AWS™, and IWS™) to share access to an Ethernet network via a single NGEN master station equipped with an Ethernet module, and thus lowers the effective cost of connecting several workstations to the network. Up to 255 master stations can be linked using CT-Net.

The optional CT-Mail™ electronic messaging package can be used in conjunction with CT-Net and Ethernet. CT-Mail allows the creation and transmission of messages between users of Convergent workstations within a Convergent cluster. Messages can include text, data, graphics and digitized voice information. When clusters are linked via CT-Net and Ethernet, message transmission building or campus setting is greatly facilitated.

SPECIFICATIONS

Module Power Requirements

Module	Power Code
XE-001	2

Transmission Standard
IEEE 802.3

Access Method
(CSMA/CD)

Clocking Rate
10 Mbps

Ethernet Standard Cable Requirements
Transceiver Cable: Ethernet connector Cinch Type D 53018 or equivalent
Transceiver Connector: Cinch type DA 51220-1 or equivalent
External Transceiver
Ethernet Coax Cable
Tap Kit (may be purchased from standard cable suppliers) for installation
Ethernet Repeater: one for every additional 500 meters of cable
Ethernet Cable Terminator

Thin-Net Cable Requirements
BNC "T" Connectors (1 per module, 2 minimum)
RG-58A/U Coax Cable with BNC Connectors
2 Thin-Net Cable Terminators

Network Connection
BNC connector for 'thin' Ethernet 15-pin D connector for external transceiver

Coaxial Cable Requirements
Standard Ethernet Cable via external transceiver
RG58A/U, RG58C/U via internal transceiver

Isolation Voltage
500V RMS (using internal transceiver)

Storage Capacity
8 KB ROM

PHYSICAL

Height:	8 inches (203.2 mm)
Width:	2.52 inches (64 mm)
Length:	12 inches (304.8 mm)
Weight:	9.87 lbs (4.5 kg)

ENVIRONMENTAL AND SAFETY
Meets UL 478 (EDP) and 114 (Office Equipment)
Meets CSA 154 (EDP) and 143 (Office Equipment)
Meets VDE 0806 (Office Equipment)
Meets BSI 5850 (Office Equipment)

Emissions
Meets VDE 0871 Level A (Emissions)
Meets FCC Part 15, Sub-part J for Class A Emissions

ESD

5,000 Volts:	No observable effect
12,500 Volts:	Errors corrected via Software Intervention
17,500 Volts:	Errors corrected via Operator Intervention
25,000 Volts:	No permanent damage

Altitude

Operating:	15,000 feet ASL
Non-Operating:	25,000 feet ASL

Acoustic Noise Level
NR 36 dBA

Temperature/Humidity

Operating:	0° to 60°C 5% to 95%
Non-Operating:	-40° to 75°C 90% at 65°C for 12 hours

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