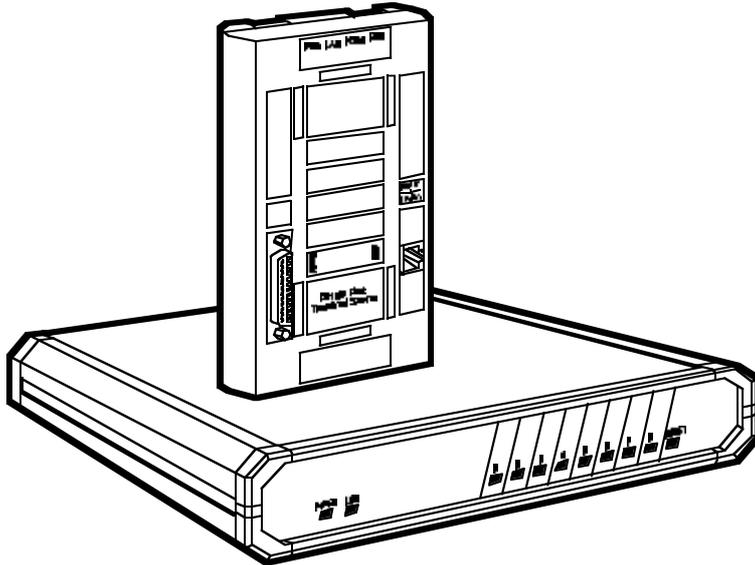




# BLACK BOX<sup>®</sup>

## NETWORK SERVICES

### *Economical Terminal Servers*



*Connect your async devices to an Ethernet using your choice of protocols—TCP/IP or LAT.*

*Economical Terminal Servers connect your ASCII devices to an Ethernet network. Choose the single-port model to connect one device using TCP/IP; choose a multiple-port model to connect four to eight devices using TCP/IP or LAT protocol.*

#### **Key Features**

*Supports command-line editing, recall, and completion.*

*Software upgrades are a breeze—they're immediately downloaded when the power comes on.*

*Small and quiet—fits where you need it and operates without a fan.*

*Runs multiple LAT and Telnet sessions simultaneously.*

*Provides a direct connection to the network for your devices.*

#### **Overview**

**T**erminal Servers are used to connect your PCs, ASCII terminals, printers, and modems to an Ethernet LAN. They give your users asynchronous connections whenever you need them—in the office, lab, computer, or branch offices. Wiring is neat and simple. Your terminals and printers merely need a physical connection to the Server, which connects via a single wire to the Ethernet backbone.

Terminal Servers will establish sessions between your terminals and printers, and any of the hosts connected to the Ethernet supporting the LAT or TCP/IP protocol suites.

Workstations and PCs supporting TCP/IP over serial lines can connect to the Terminal Server's serial ports

using the PPP or SLIP protocol. This type of connection provides a high-speed, low-cost full IP network link for many uses such as Telnet, file-transfer, and client-server distributed applications.

Terminal Servers will

increase your productivity by letting users access any of the hosts on the LAN from a single terminal. Users can initiate multiple concurrent sessions and switch between them with a single keystroke.

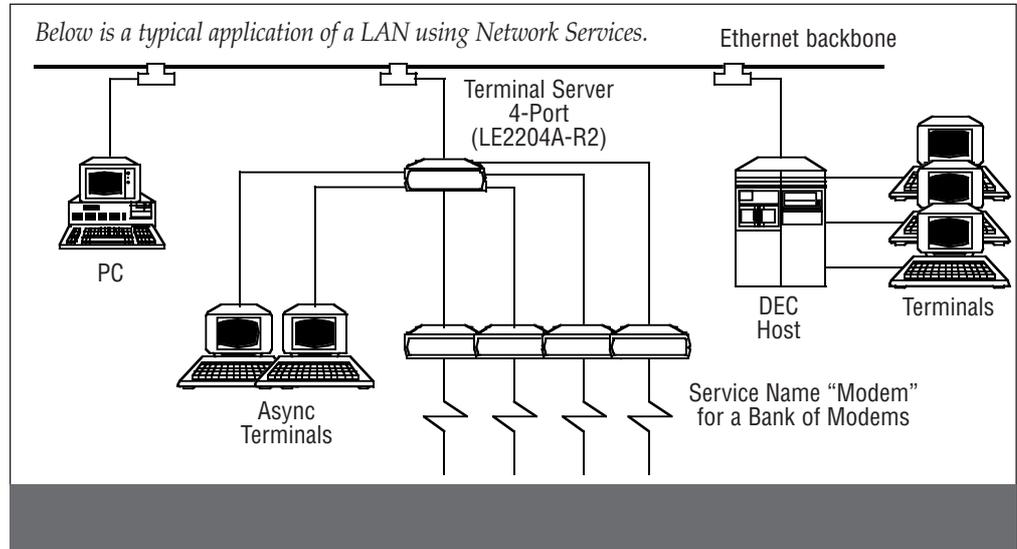
Choose from Thick, Thin, or UTP Ethernet connections.

#### **Typical Applications**

*Set up a Local Area Network using DEC LAT protocol. Share services (such as a printer) among several connected devices (such as a group of PCs).*

*Set up a Wide Area Network using TCP/IP protocol. Access a remote server from a virtual terminal, which can be located thousands of miles away from the server.*

Create a LAN using DEC LAT protocol's network services. Or set up a WAN using a TCP/IP Telnet connection to access a remote host.



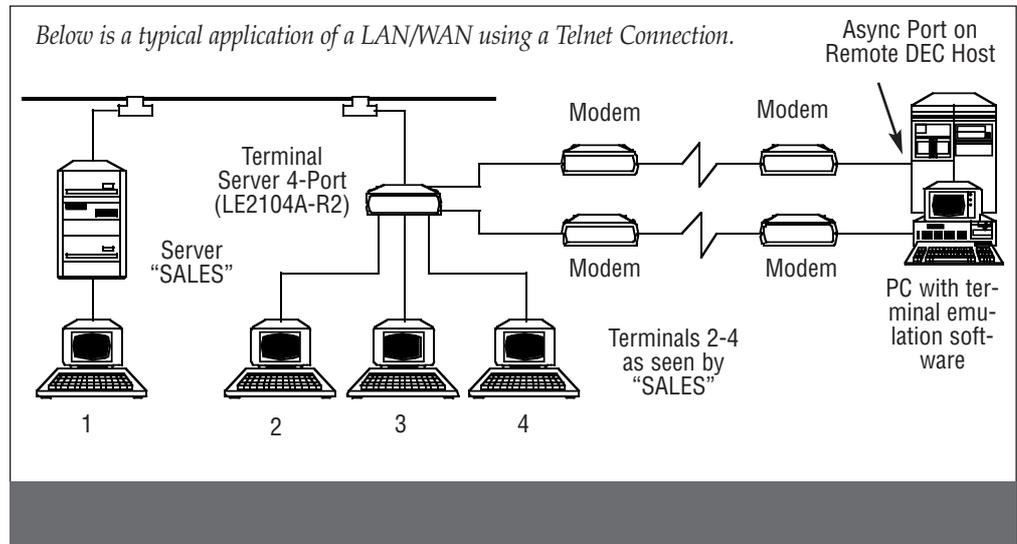
### Technically Speaking

The Terminal Servers are available in a variety of models and work with several protocols to fit your application. Additional features help you manage your network.

- The Single-Port Terminal Server lets you connect one device to an Ethernet running at up to 115.2 Kbps. One model has a connection for a 10BASE-T Ethernet device, while another model has connections for either a 10BASE-T or a ThinNet device. All models support TCP/IP.
- The multiple-port Terminal Servers can connect to standard, Thin, or 10BASE-T Ethernet networks. There are models for 4 or 8 serial device connections. Some models support TCP/IP and some models support both TCP/IP and LAT protocol.

**All models provide:**

- UNIX compatibility—Telnet is supported by almost all UNIX systems. The Terminal Servers support Domain Name Servers and a host table that contains IP addresses of frequently used hosts.



- Remote console support—Simple configuration of the single- or multiple-port Terminal Servers by UNIX managers is provided by Telnet.
- SNMP—The Simple Network Management Protocol provides an overall view of network load, error conditions, and problem sites.
- Security—Limit user access to services via group codes. Or configure the Terminal Server to log out a session automatically when a device is turned off or when a port is disconnected. Set time limits to user sessions. Give ports a limited view of the network, and prevent them from issuing privileged commands. Enable password protection for privileges, ports, services, and remote access. Users can lock and unlock ports via passwords.
- Power-on diagnostics pinpoint trouble with network and serial lines.
- You can use SLIP or PPP to access the Internet by terminals or PCs connected to the Terminal Server's serial port.
- Host-initiated transfers—Hosts can share modems and printers when a Terminal Server is configured to provide its attached devices as services to other nodes. Jobs can be queued concurrently to Terminal Servers' services by TCP/IP and LAT hosts.
- Remote console support—DEC NCP and TSM facilities can be used to configure multiple-port Terminal Servers from a remote location. UNIX managers can support remote consoles via Telnet.

**Models supporting TCP/IP and LAT protocol provide:**

- DEC™ compatibility—The units are fully compatible with most DEC operating systems since they support LAT and NCP™.

## Tech Glossary

**Host:** A computer attached to a network. A "host" is generally an interactive computer that enables users to log in.

**Local Mode:** Mode in which the user issues commands directly to the Terminal Server.

**Node:** An intelligent device (for example, a host, an Ethernet workstation, or a Terminal Server) with a direct connection to the Ethernet network and an Ethernet address. Devices connected to a Terminal Server serial port are excluded from this category.

**Point-to-Point Protocol (PPP):** A suite of protocols that are used to encapsulate protocols other than just TCP/IP. Similar to SLIP, but is a more robust, full-featured protocol. PPP is extensible via automatic negotiation to allow interoperability between a wide range of products. During negotiation, each end of the link advertises which features it has implemented, and the peers agree on a common set of features to be used.

**Reverse Telnet:** When the Terminal Server provides a service to a LAT (VMS™) host, the connection is often referred to as Reverse LAT, in that "normal" LAT connections are logins from a Terminal Server to a host. Hosts request reverse LAT connection (a LAT "solicit" message) when wishing to access a service such as a printer or modem connected to the Terminal Server.

**Serial Line IP (SLIP):** A common, non-standard method of sending Internet Protocol (IP) over low-speed point-to-point links. SLIP provides a very simple framing scheme for sending IP packets over a serial line, and works on a simple, dedicated, character-oriented, asynchronous line like RS-232.

**Service:** A device that can establish a network connection, such as a host that terminals can connect to.

## Hot Topics

### All models of the Terminal Servers support Transmission Control Protocol/Internet Protocol (TCP/IP), described below.

Telnet is an industry-standard network terminal protocol. It allows a user anywhere on the network to access a foreign host and start a terminal session. The user need not worry about what kind of computer the foreign host is or what operating system it uses, and the remote host will know nothing about the user terminal type. This is essential for the wide-area networks that Telnet was designed for. Networks that support Telnet can stretch for thousands of miles and contain thousands of hosts. Telnet accomplishes this compatibility using virtual terminals. Any Telnet connection looks the same from both sides of the network.

The second diagram on page 2 illustrates a simple Telnet connection.

All terminals on the net-

work in this figure can access all hosts, but do not need to (nor can they) know exactly what type of hardware the host is. Theoretically, terminal 4 in the example could establish a Telnet session with host SALES, and would see the same type of session as would terminal 1, which is directly connected. SALES, the CPU, will treat terminal 4 as if it were also directly connected.

A Telnet connection begins with both sides of the connection assuming the other terminal is "dumb," that is, knows little about characters, fonts, cursor movement, etc. The two sides then negotiate options to determine the capabilities of their peer. For example, a terminal might support full cursor-control characters. Once the connection is established, the terminal and host may agree to support the extra characters. This all happens transparently to the user, who sees only a

login screen and none of the mechanics.

Unlike LAT network service (with its multicasts), TCP/IP implementations generally have no knowledge of remote hosts until a connection is attempted. There is no TCP/IP parallel to the SHOW SERVICES commands. Until the actual connection request is made, a host is not searched for.

Hosts using TCP/IP frequently see only a fraction of the hosts on the whole network. Usually, a TCP/IP network is broken down into "subnetworks," where a host is able to see only the hosts on its own subnet.

TCP/IP hosts generally have both an alphanumeric IP host name, such as SALES, and a numeric IP address (such as 192.114.22.97).

### Some of the multiport Terminal Servers support Local Area Transport (LAT) protocol, developed by Digital Equipment Corporation (DEC).

Digital Equipment Corporation's LAT (Local Area Transport) networking software is designed to make local area networks easy to access and manage. LAT software is built around the concept of services. A service may be provided by a dedicated device, such as a printer, or by a network host. A "node" is a device on the network that allows one or more services to be accessed, such as a computer you can log in to. A Terminal Server is also a node, since it can offer services and logins.

Services are named, and more than one service on a network can have the same name. For example, you could attach eight modems to a Terminal Server and set up the service "modem" to use

ports 1-8. A user who types CONNECT MODEM does not necessarily know which of the modems he or she would be connected to. The first diagram on page 2 shows an example of a network with services.

Multicasts are advertisements containing the name and list of services of various nodes. By monitoring multicast messages, all hosts on the network know what nodes and services are available, and can provide this information to their interactive users. The SHOW SERVICES and SHOW NODES commands display this information.

A rating for each service offered is contained in multicast messages. This rating is

an estimate of how busy that service is. Ratings range from 0 to 255; 0 means the service is unavailable, while 255 means the service is available and has no current users. Since ratings are used to determine to which service a user will be connected when a choice is available, service ratings may concern even casual users.

LAT also implements service groups. Each port on the Terminal Servers (or any Terminal Server) and service on the network can be thought of as belonging to one or more groups. When a user or device requests a service connection, the LAT host checks to see if the groups that the requester belongs to match up with those of the service request-

## Specifications

**Protocol**—LE2101A-R2, LE2101AE-R2, LE2104A-R2, LE2508A-R2: LAN: TCP/IP; LE2204A-R2, LE2608A-R2: LAN: TCP/IP, LAT; Serial ports: None, PPP, SLIP

**Indicators**—LE2101A-R2, LE2101AE-R2: 1) Power LED, (1) LAN, (1) Port, (1) ERR (Error); LE2104A-R2, LE2204A-R2, LE2508A-R2, LE2608A-R2: (1) Power LED, (1) LAN, and (1) Activity for each port

**Connectors**—LE2101A-R2, LE2101AE-T-R2: (1) DB25, (1) RJ-45, LE2101A-BT-R2, LE2101AE-BT-R2: (1) DB25, (1) RJ-45, (1) BNC; All multiport models: (1) IEC 320 power connector, (1) DB25 female (parallel); AUI multiport models: (1) DB15 female and (4) or (8) RJ-45 serial; BNC multiport models: (1) BNC and (4) or (8) RJ-45 serial; TP multiport models: (1) RJ-45 10BASE-T and (4) or (8) RJ-45 serial

**Speed**—Ethernet: 10 Mbps; Serial: Up to 115 Kbps

**Operating Temperature**—0° to 50° C (32° to 122° F)

**Humidity**—5% to 90% non-condensing

**Power**—LE2101A-R2: Input: 120 VAC/60 Hz, Output: 12 VDC, 800 mA, 9.6 VA; LE2101AE-R2: Input: 220 VAC/50 Hz, Output: 12 VDC, 800 mA, 9.6 VA; LE2104A-R2, LE2204A-R2, LE2508A-R2, LE2608A-R2: 100-230 VAC, autosensing

**Size**—LE2101A-R2, LE2101AE-R2: 3.8 x 11.4 x 19 cm (1.5"H x 4.5"W x 7.5"D); LE2104A-R2, LE2204A-R2, LE2508A-R2, LE2608A-R2: 4.3 x 21.6 x 29.7 cm (1.7"H x 8.5"W x 11.7"D)

**Weight**—LE2101A-R2, LE2101AE-R2: 0.5 kg (1 lb. ); LE2104A-R2, LE2204A-R2, LE2508A-R2, LE2608A-R2: 2.1 kg (4.7 lb.)

## The complete package

What you get when you order the Terminal Server.

All models:

- Terminal Server
- User's manual

Single-port models:

- Power supply

Multiple-port models:

- Power cord

# Ordering Information

This information will help you place your order quickly.

PRODUCT NAME	ORDER CODE
Economical Terminal Servers	
1-Port 10BASE-T.....	LE2101AE-T-R2
10BASE-T/BNC .....	LE2101AE-BT-R2
4-Port TCP-AUI.....	LE2104A-AUI-R2
TCP-BNC .....	LE2104A-BNC-R2
TCP-TP .....	LE2104A-TP-R2
TCP/LAT-AUI .....	LE2204A-AUI-R2
TCP/LAT-BNC .....	LE2204A-BNC-R2
LAT/TCP-UTP.....	LE2204A-TP-R2
8-Port TCP-AUI.....	LE2508A-AUI-R2
TCP-BNC .....	LE2508A-BNC-R2
TCP-TP .....	LE2508A-TP-R2
TCP/LAT-AUI .....	LE2608A-AUI-R2
TCP/LAT-BNC .....	LE2608A-BNC-R2
TCP/LAT-TP .....	LE2608A-TP-R2