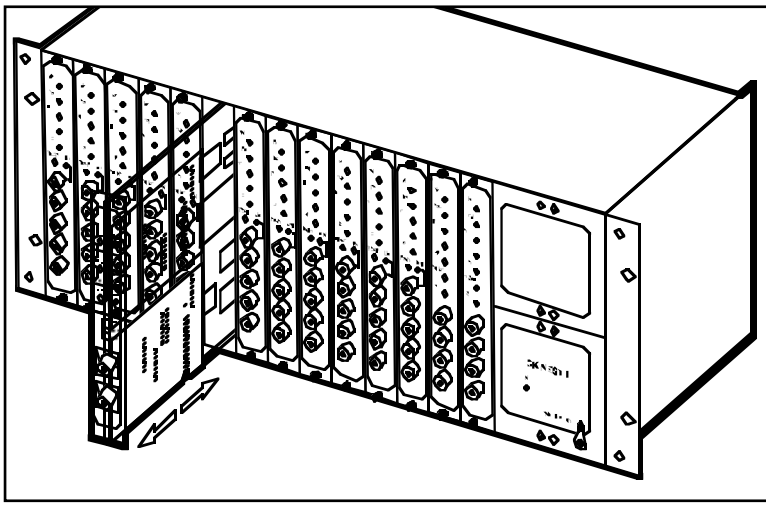
BLACK BOX®
NETWORK SERVICES

RACKNEST 2/14



Place any combination of up to 14 copper and fiber optic modules in this powerhouse rack!

Key Features

- ***Allows hot-swapping of cards and power supplies.***
- ***Houses fibre optic and copper-wire modems in a single nest.***
- ***High-density 19" modem rack.***
- ***Compact! Only 4U high.***
- ***Order second power supply for redundancy.***
- ***Works with balanced and unbalanced G.703 equipment.***
- ***11 cards to choose from.***
- ***Easy to install and operate. LEDs inform you of card status.***

Sometimes space is so limited that you can't even find room for your modems. So rack 'em! The BLACK BOX® RackNest 2/14 is your space-saving solution.

The RackNest 2/14 is a 19-inch, 4U-high rackmount modem card nest that can house up to 14 plug-in cards. The rack is a reliable concentration point for multiple baseband links supporting last-mile or campus applications.

Simply choose the speed, operation, and interface you need. For extra versatility, the cards are available in V.35, RS-232, RS-530, or X.21 interfaces. Install any combination of up to 14 copper and fibre optic cards.

The cards slide into edge connectors inside the rack and are secured by a nut. The rear panel consists of fourteen 5-screw, snap-type terminal blocks and fourteen DB25 connectors (one terminal block and one DB25 connector per card). The terminal blocks connect the transmit and receive lines. The transmit pair is connected to the terminals marked XMT, the receive pair is connected to the terminals marked RCV, and an optional ground connection is the fifth screw. The DB25 connectors are interface connectors, and they provide all interface signals for the digital interfaces. However, modem cards with an X.21 or V.35 interface require an external mechanical adapter.

Hot-swap cards at any time during operation—remove and reinsert them without interfering with other modem cards and their data transmission.

The RackNest 2/14 works with balanced or unbalanced G.703 equipment. Unbalanced interfaces use only one transmit, one receive, and one ground lead in contrast to balanced interfaces, which use a pair of transmit and receive leads.

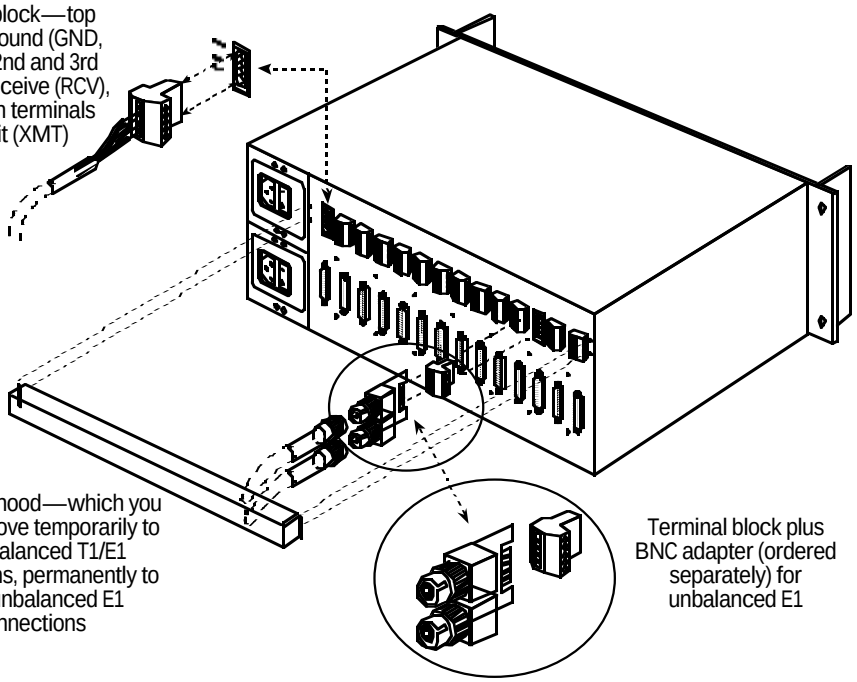
The RackNest 2/14 includes one 115-VAC or 230-VAC power supply. Plus, you can order a second, backup power supply.

And all the hot-swapping's not just for modem cards—check out our RM110A-2PS model. It's the real powerhouse RackNest! The RM110A-2PS accommodates two 115-VAC Power Supplies. Each power supply supports 14 modem cards, regardless of their line type. And, like the cards themselves, the power supplies are hot-swappable during operation, so there's no effect on the modems and their data transmission.

Having the RM110A-2PS is like having insurance for your communications. In the event one power supply fails, the second kicks in—and the data continues to go through for all your cards.

The Rack Nest 2/14 is easy to install into a rack. To operate its one or two power supplies, simply plug one or both into the RackNest 2/14 and press the operating switch on the RackNest's rear panel. The On LED confirms the RackNest 2/14 is receiving power.

An example of card connections on the RackNest 2/14's rear panel.



The RackNest 2/14 can serve as host to 1 or 2 power supplies and up to 14 plug-in cards of any compatible type. These cards communicate with two sets of connectors on the rack's rear panel.

Shown at **left** is how you'd connect a T1/E1 Fibre Optic Line Driver (T1/E1 FOLD) Card. For each card, a snap-in 5-position terminal block handles balanced T1 or E1 communication and a DB25 female connector handles dry-contact alarms. (To support unbalanced E1, you would need a special adapter with BNC female connectors for each card. Call Tech Support for details.) The terminal block has two XMT terminals for the transmit pair of balanced T1/E1 wires and two RCV terminals for the receive pair of wires, plus a terminal for an optional ground connection.

Cards available for the RackNest 2/14:

NOTE: All cards must be used in pairs.

Async/Sync Card 19.2-kbps Line Driver Card (ME760C):

- Sends RS-232 data over 24 AWG wire up to 4 miles (6.4 km) at 19.2 kbps or up to 15 miles (24.1 km) at 1200 bps!
- Differential diphase modulation eliminates line distortion and provides clean transmissions.
- Runs sync or async, point-to-point or multipoint.
- Operates half-duplex over two wires or full- or half-duplex over four wires.
- V.54 diagnostics perform local and remote loopback tests.

Here's your long-distance solution for point-to-point or point-to-multipoint RS-232 applications—the 19.2-kbps RS-232 Line Driver (also called the LDM-MR19.2). It provides clean, clear data transmission up to 4 miles (6.4 km) at 19.2 kbps and an astounding 15 miles (24.1 km) at 1200 bps. And best of all, it achieves these substantial distances over ordinary unconditioned phone lines!

Because this line driver card can cover such long distances over standard twisted-pair wires, it's especially well-suited for campus-wide, building-to-building, or base-to-satellite RS-232 networks. It also works well in retail sales applications (with credit card verifiers, for instance) and shipping applications like cargo weigh stations on interstate highways.

To manage these distances and speeds, the line driver uses conditioned differential diphase modulation, a process that immunises the line against background noise and eliminates the signal distortion common over twisted-pair cable. Additionally, this line driver is joined to the line through dedicated isolation transformers that protect against damaging AC or DC overvoltages.

This line driver is versatile, too. It operates at both sync and async in half- and full-duplex mode. (Note that line transmission is always synchronous. The line driver, when set to async mode, converts async data to sync data in accordance with the ITU V.14 async-to-sync conversion standard.)

You can perform local analog loopback as well as local and remote digital loopback tests with the line driver's V.54 diagnostic capabilities.

In digital loopback mode, the modem can be tested from either end of the line. These tests are controlled either through pushbuttons or Pins 18 and 21. You can also insert a delay into the data stream so that loopback tests are not carried across your network.

You can choose from eight selectable data rates up to 19.2 kbps for both point-to-point and multipoint applications.

Async/Sync 2-Wire SHM Cards (ME375C-232 and -530):

- Send RS-232 data over 24 AWG wire up to 4 miles (6.4 km) at 19.2 kbps.
- Transmit async data up to 115.2 kbps and sync data up to 128 kbps using 2B1Q line coding.
- Adaptive equaliser provides noise immunity and high performance over low-quality lines.
- Full diagnostics include internal BERT and local and remote loopbacks.
- Transmit at over 3 miles (4.8 km)—even at maximum speeds!
- 2-wire, twisted-pair operation.
- Single async/sync channel.
- Full-duplex operation using echo cancellation.

The Async/Sync 2-Wire SHM Cards run at amazing speeds: Async data goes 115.2 kbps while sync data travels up to 128 kbps. You get this astounding data rate even at these modems' maximum distance of 3.4 miles (5.5 km) over your existing, inexpensive, 2-wire, twisted-pair lines! Full-duplex over only two wires is possible because of the adaptive echo-canceling technique.

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Perform diagnostics on local analog loopback as well as local and remote digital loopback. You can test both modems and the line at either end when you're in the digital loopback mode. And you can control the loopbacks via a manual switch or through the DTE interface.

The Async/Sync 2-Wire SHM Cards incorporate interface circuits for the terminal or computer, an adaptive echo-canceler, an automatic adaptive equalizer, a modulator, and a demodulator. The adaptive equaliser provides noise immunity and high performance over low-quality lines.

The SHM cards also can be used to operate full-duplex over one pair of dedicated telephone lines. Full-duplex operation uses echo cancellation. You set one modem to be a master and the other to be a slave.

The cards are coupled to the line through an isolation transformer, which protects against AC or DC overvoltages. The protection circuitry enables the units to survive even if DC is accidentally connected to the line.

For more information, request **FaxBack # 14072**.

Sync SHM Cards (ME270C-35-R2 and -530-R2 & ME275C-35-R2 and --X21-R2):

- Super-high speeds for your point-to-point applications—up to 2.048 Mbps.
- Transmit data at T1 speeds, without installing T1 lines.
- Transmission range up to 1.1 miles (1.8 km).
- Choice of cards for extending balanced or unbalanced G.703 interface on line side.
- Full-duplex transmission over 4 wires.
- Selectable Forward Error correction for rates up to 1.024 Mbps.

It's tough to keep your file transfers, bridging, and heavy data traffic moving at a steady pace. If you want your data to go fast, one of these Sync SHM Cards gets things moving!

The cards move data up to 2.048 Mbps, increasing your network speed in some cases by as much as 33%. They'll help eliminate traffic jams, increase file-transfer times, and enable your network bridges to work at their true full speed. Your mainframes will trade data faster than ever. And your network users will spend less time waiting for big files to download. These cards are also ideal for CAD users with large graphics files—transmitting faster than a T1 line.

The cards operate full-duplex over unconditioned lines at 13 user-selectable data rates up to 2.048 Mbps. You can also select the transmission baud rate on the link.

Transmit and receive timing can be provided internally or derived externally from the data terminal or receive signal. The cards also have FIFOs for jitter attenuation or phase difference correction either from the incoming analog signal on the line side or from the external clock on the DTE side.

V.54 diagnostic capabilities enable you to perform local analog loopback as well as local and remote digital loopback. The SHM cards also include an internal pseudo-random pattern generator along with a basic error rate tester (BERT) to ensure complete end-to-end integrity. If a bit error is detected, an LED alerts you.

Built-in isolation transformers and protection circuitry protects the cards and any attached DTE from line hazards such as AC or DC overvoltages.

For additional information, request **FaxBack # 10171**.

768-kbps Cards (ME280C-35 and -530):

- Selectable data rates up to 768 kbps.
- Range up to 3.5 miles (5.6 km) at 64 kbps over 24 AWG wire.
- Efficient transmission and reception of serial data over twisted-pair cable.
- Carrier control.
- Choose between two interfaces: V.35 and RS-530.
- Detect bit errors in the connection.

These cards (also known as SHM-768K models) operate synchronously, full-duplex over 4-wire unconditioned lines. They have a range of 4.1 miles (6.6 km) and operate at 7 selectable rates up to 768 kbps. You choose the data rate.

These modem cards use conditioned diphase modulation to provide immunity from background noise, eliminate normal line distortion, and enable efficient transmission and reception of serial data over twisted-pair cable. Transmit timing is provided internally, or derived externally from the data terminal or from the receive signal. Receive timing is regenerated from the received data.

In addition, the cards feature V.54 diagnostic capabilities for performing local analog loopback and remote digital loopback. The loopbacks are controlled via the DTE interface.

A pseudo-random test pattern (511 bits) tests the line's end-to-end connectivity, and an LED flashes for each bit error detected.

The SHM-768Ks are coupled to the line through isolation transformers which, in conjunction with protective circuitry, protect against AC or DC overvoltages. The protective circuitry enables operation even when DC is connected to the line.

Async/Sync 144-kbps SHM Cards (ME445C-35 and -530):

- Selectable speeds range up to 144 kbps.
- Built-in BERT supports V.54 loop diagnostics.
- Includes conditioned diphase modulation.
- Runs full- or half-duplex over unconditioned lines.
- Efficient transmission and reception of serial data over a twisted-pair cable.
- Two types of interfaces available: V.35 and RS-530.

Also named LDM-MR144, these cards support transmission speeds of 144 kbps at up to 3 miles (4.8 km). They achieve even longer distances at slower speeds. Specifically, the cards operate at user-selectable data rates from 19.2 to 144 kbps. You can use the cards in either full- or half-duplex applications.

A built-in BERT tests both the line drivers and the line. An ERROR LED flashes when a bit error is detected.

With the cards, your data is safe, too, thanks to conditioned diphase modulation. This feature not only provides background noise immunity, but it gives you efficient data transmission and reception and eliminates normal line distortion.

As a bonus, the line driver cards include V.54 diagnostic capabilities for local analog loopback and local and remote digital loopback testing.

Transmit timing is provided internally, derived externally from the PC or terminal, or regenerated from the receive signal.

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T1/E1 Fibre Optic Line Drivers Cards (MT650C and MT651C):

- Drive data at full T1 or E1 speed over fiber.
- Maximum distances up to 3.1 miles (5 km) of multimode cable or 23.6 miles (38 km) of single-mode cable.
- Optical link is immune to EMI/RFI, surges, taps, and ground loops.
- ST® connectors.

Would you like to put your high-speed computer or other DTE device in a different room from your T1 or E1 CSU/DSU? In a different building? A different campus? Or would you just like to make a connection at T1 or E1 speeds without handing your entire budget to a telco for a subscription to T1 or E1 service?

Pairs of these T1/E1 Fibre Optic Line Drivers (T1/E1 FOLDs) can pass data to each other at full T1 or E1 speed across multimode or single-mode fibre optic cables. Not only does this solve device-placement problems, it does so with optical links that aren't susceptible to tapping, noise, and other hazards of electrical communication.

The MT650C transmits and receives data on the 1300-nm wavelength into as much as 23.6 miles (38 km) of single-mode cable. MT651C transmits and receive at 850 nm into as much as 3.1 miles (5 km) of multimode cable. Both models have common ST® type connectors.

For more information on the T1/E1 Fiber Optic Line Drivers (T1/E1 FOLDs), request **FaxBack #11835**.

You can set the FOLD to use a 100-Ω balanced T1 interface, a 120-Ω balanced E1 interface, or a 75-Ω unbalanced E1 interface. The balanced interfaces on the cards are expressed on the RackNest's 5-position terminal blocks. For the unbalanced interface, you'll need a special adapter (call us for ordering details).

Specifications

Number of Slots: 14 slots for cards

CE Approval: Yes

Connectors:
Line: (14) 5-screw, snap-type terminal blocks;
DTE: (14) DB25 F connectors

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

Humidity: 10 to 90%, noncondensing

Power: RM110A: 115-VAC (±10%), 47–63 Hz;
RM110A-2PS: (2) 115-VAC power supplies (one main and one redundant), 47–63 Hz;
RM110AE: 230 VAC (±10%), 47–63 Hz

Size: 7"H x 19"W x 10.4"D (17.8 x 48.3 x 26.4 cm)

Ordering Information

ITEM	CODE
First, choose a rack with your system's voltage…	
RackNest 2/14	
115-VAC	RM110A
230-VAC	RM110AE
RackNest 2/14 with Dual Power Supplies	
115-VAC	RM110A-2PS
Then order backup power supplies you may need…	
Power Supply	
115-VAC	PS1000A
230-VAC	PS1000AE
Next, order up to 14 cards to populate the rack…	
Async/Sync Card, 19.2 kbps	
RS-232	ME760C
Async/Sync 2-Wire SHM Cards	
RS-232	ME375C-232
RS-530	ME375C-530
Async/Sync 144-kbps SHM Cards (LDM-MR144)	
V.35	ME445C-35
RS-530	ME445C-530
Sync Cards	
Balanced G.703 Interface on Line Side, 2.048 Mbps	
V.35	ME270C-35-R2
RS-530	ME270C-530-R2
Unbalanced G.703 Interface on Line Side, 2.048 Mbps	
V.35	ME275C-35-R2
X.21	ME275C-X21-R2
768-kbps Cards	
V.35	ME280C-35
RS-530	ME280C-530
T1/E1 Fibre Optic Line Drivers (T1/E1 FOLDs), ST	
1300-nm Single-Mode	MT650C
850-nm Multimode	MT651C
To connect the V.35 or X.21 cards, you need…	
V.35 Adapter	FM150-R2
X.21 Adapter	FM151
NOTE: Each adapter supports two cards.	
For optimum performance, order…	
CAT5 Solid-Conductor Bulk Cable, 2-Pair, PVC, Custom Lengths	EYN717A
NOTE: Other lengths and plenum cable available. Call Tech Support.	
RS-232 Cable, 25-Conductor, 10-ft. (3-m)	ECM25C-0010
NOTE: Other lengths available. Specify gender when ordering.	