

Wang Laboratories WangNet Broadband Local Area Network

■ PROFILE

Architecture • WangNet/FastLAN.

Type • broadband local area network (LAN) composed of 5 services: Interconnect Band with 3 classes of channels, 2 for 80 dedicated frequency channels, and 1 for 256 switched frequency channels; Wang Band with 1 channel for communication among Wang OIS, VS, and Alliance systems; Peripheral Band with 19 channels to extend distance between a CPU and its peripherals; Professional Computer (PC) Service with 4 channels for up to 255 Wang PCs each; and Utility Band with 7 channels for video transmissions, see Figure 1 • FastLAN is a modular WangNet LAN to interconnect from 4 to 640 transmit/receive ports; provides same services as WangNet; can operate standalone or can connect to WangNet operating as backbone network.

Transmission Speed • Interconnect Band has 16 dedicated frequency channels for communication at 64K bps, 64 dedicated frequency channels for communication at 9600 bps, and 256 switched channels for communication at 9600 bps; Wang Band operates at 10M bps over virtual circuits; Peripheral Band has 9 channels for communication at 427M bps; PC band has 4 channels that operate at 2.5M bps; and Utility Band has 7 channels, each channel can handle 1 composite audio/video device.

Cable Length • WangNet hardline cable limited to 4 cable miles; 2 miles actually, because cable is folded back on itself to form separate transmit and receive cables; Wang uses no frequency translation at head end, thus receive frequency is identical to transmit frequency, see Figure 2 • FastLAN limited to 220-foot Teflon cable or 280-foot PRC cable; FastLAN can also connect to WangNet hardline cable; see Figure 3.

Applications • primarily office automation applications that include text, data, electronic mail, facsimile, and video communication • operates as multiplexer for connecting up to 32

IBM 3270s to IBM 3274 controller.

Configuration • includes transmit/receive cable with fittings and connectors, head end composed of 2 amplifiers and power supply, Cable Interface Units for systems connected to Wang Band, interface boards for peripherals and communication controller for master on each channel on Peripheral Band, and Fixed Frequency and Frequency Agile Modems for Interconnect Band • up to 16K devices can connect to Wang Band and up to 32 serial devices can communicate with each CPU on each Peripheral Band channel; 1 video/audio device can connect to each of the 6 Utility Band channels.

Interface • Interconnect Band requires RS-232C/V.24 connector to fixed frequency modem (FFM) for 32 dedicated 9600-bps channels; RS-449/422/V.35 connector to FFM for 16 dedicated 64K-bps channels; and RS-232C/V.24 connector to frequency agile modem (FAM) for 256 switched channels • Wang Band requires Cable Interface Unit (CIU) • Peripheral Band requires interface imbedded in "W" models of Wang Ergo III workstation or a network multiplexer to connect up to 8 Wang peripherals, and a controlling master VS, OIS, or Alliance System • standard television modulator on video channels • PC Modem for PC Band.

Gateways • to be provided through a Wang VS, OIS, 2200, or Alliance Computer System on Wang Band • X.25 gateway on VS system • a Wang computer can interface to Wang Band, Peripheral Band, and Interconnect Band simultaneously, thus bridge product is not required to cross from one network to another.

Support of Foreign Devices • RS-232C devices to 9600-bps dedicated and switched channels and RS-449 devices to 64K-bps dedicated channels on Interconnect Band.

Communications Management • Technical Control and Management System (TCMS) provides network monitoring.

Protocols • CSMA/CD for access to Wang Band • implementation of lower 5 layers of Open Systems Interconnection (OSI) model recommendation to International Standards Organization (ISO) in CIU nodes on Wang Band (Link, Transport, Network, Session and Presentation layer protocols) • Interconnect Band is protocol transparent • Peripheral Band implements Wang I/O protocol • PC Band uses token-passing protocol for network access.

Distributed Functions • control distributed among CIU nodes on Wang Band • system peripherals can be located anywhere on WangNet cable, but they belong exclusively to system operating as master controller of Peripheral Band channel • distributed application functions depend on devices connected to WangNet and are not part of WangNet.

Support Software • in CIU node for Wang Band • in operating system on master controller system for Peripheral Band • in DataSwitch for switched channels on Interconnect Band • TCMS for network control.

First Delivery • January 1983.

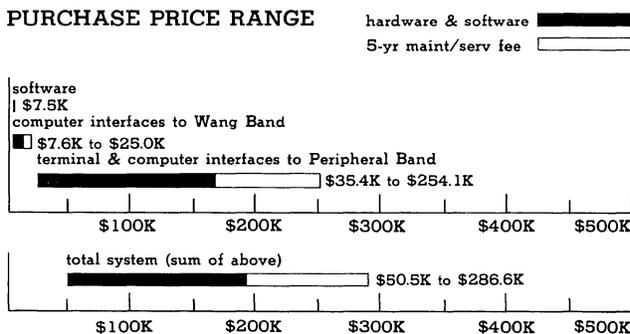
Systems Delivered • 180 currently installed.

Comparable Systems • none • Wang provides more services than broadband competitors; Wang implements 5 services.

Vendor • Wang Laboratories, Inc; One Industrial Avenue, Lowell, MA 01851 • 617-459-5000.

Distribution • through over 140 sales offices in the United States and through international sales offices and sales representatives abroad.

PURCHASE PRICE RANGE



WANGNET PURCHASE PRICING bar graph shows price range from a small configuration with 2 Wang computers and 100 terminals to a large configuration with 4 Wang computers and 500 terminals; pricing does not include cables, fittings, user outlets, and other components in backbone networks; also pricing does not include computers or terminals • **SMALL CONFIGURATION** includes CIU for OIS master and CIU for VS system on Wang Band with 4 Polling Master Boards (1 for OIS master and 3 for VS system), for connection of computer to Peripheral Band and Net Mux connections for 100 workstations to Peripheral Band • **LARGE CONFIGURATION** includes 4 CIUs for VS systems on Wang Band with 16 Polling Master Boards to connect VS systems to Peripheral Band and Net Mux connections for up to 500 workstations to Peripheral Band • all software, except Technical Control and Management System (TCMS) is bundled with hardware • PC Band connections are \$800 each; PCs cannot connect to Wang Band.

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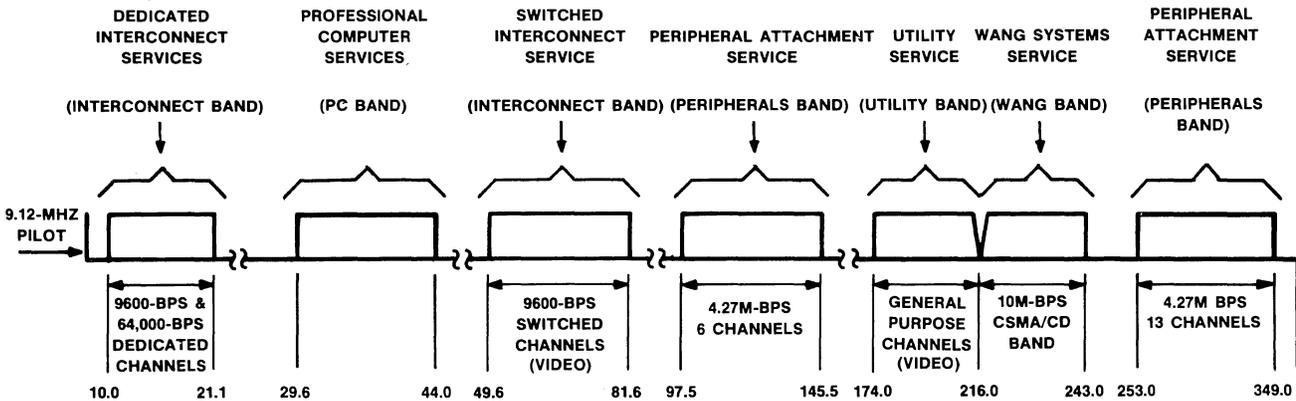


Figure 1 • WangNet services bandwidth allocation.

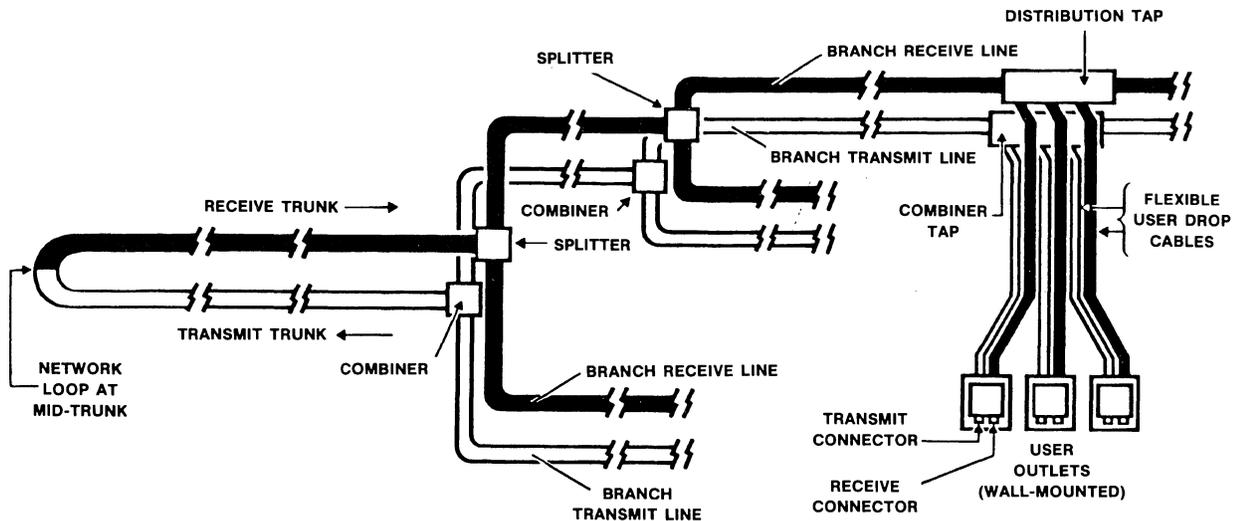


Figure 2 • WangNet user outlet attachment.

■ ANALYSIS

WangNet as announced June 23, 1981, included the Wang, Interconnect, and Utility Bands. The Peripheral Band was added in 1982. The Wang Band service is similar to Ethernet and other comparable systems. Wang offers no products for the Utility Band but reserves it for user-developed teleconferencing, security monitoring, and CATV types of applications. No other vendor offers services quite comparable to the Peripheral Band. Datapoint allows systems to share laser printers, disks, and facsimile transmission systems residing on ARC, but the Peripheral Band simply operates as an extension of a system's I/O lines. Peripherals are dedicated to a system and are indirectly shared. The WangNet Interconnect Band provides services similar to those offered by other vendors on its dedicated channels, which appear as data communication lines to the interconnected devices. The 256-channel Interconnect Band that utilizes frequency agile modems and Wang's DataSwitch provides full-duplex, transparent, multipoint, or point-to-point communication using circuit switching techniques.

Wang designed its system differently than other broadband LAN vendors. Wang does not use a frequency translator at the head

end. Devices receive and transmit on the same frequency, thus Wang essentially doubles the capacity of its cable using half of the available capacity for each channel, by comparison to other vendors. The head end contains amplifiers and a power supply, but no frequency translator.

Wang has been slow in introducing products for WangNet, but enough products to build WangNets have been available since 1983. Gateways to X.25 are available for VS systems. A network control center for Wang Band is also now available.

Wang Laboratories, in the first 20 years after its inception in 1951, was a small struggling company that sold calculators. Gross revenues in 1971 were \$36.7 million. The Wang 2200 with a firmware Basic compiler was introduced in the early 1970s. It became the company's first system to attain significant success. It became popular with OEMs who developed software packages for it to implement specific applications, such as automobile agency financial accounting or real estate office transactions. The Wang 2200 was inexpensive and easy to use; also, it could support a number of workstations for small business applications.

Wang's growth from 1971 to 1973 was relatively modest, but from 1973 to the present, the growth rate has been sustained at 50

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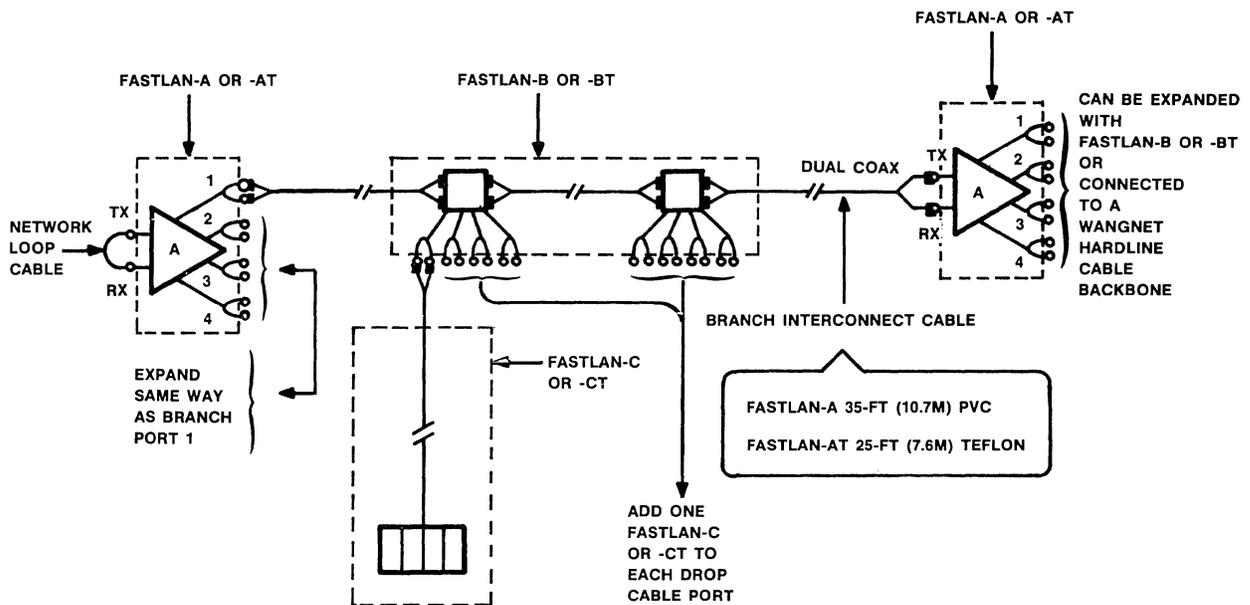


Figure 3 • FastLAN configuration possibilities.

percent per year. Gross revenues for fiscal year ending June 30, 1982 were \$1.2 billion making Wang one of the computer industry's leading corporations. Gross revenues as of June 30, 1983 exceeded \$1.5 billion for a growth of 32%. The goal set for 1984 is for 30 percent growth in revenues.

Wang's growth has followed the company's increasing dedication to the office automation marketplace, one of the fastest growing applications for computers. In 1980, Wang announced its strategy for developing office automation products that would encompass 6 technologies, including data processing, word processing, image processing, audio processing, networking and human factors. According to Wang, networking is the key technology for making office automation a reality.

Prior to the introduction of WangNet, which ties all of Wang's products together, Wang used the WISE (Wang Inter-System Exchange) to interconnect its data processing and word processing systems. WISE is a bus system with a hardware/software controller to interconnect 4 systems, which can be located 2,000 feet from the WISE unit. Workstations can be located 2,000 feet from the master computer systems. Thus, using WISE, computer systems can be located up to 4,000 feet apart, and workstations up to 8,000 feet apart. Multiple WISE systems can be used to interconnect more systems.

Remote Wang Systems Networking is not really part of WangNet. It allows a VS system acting as a host to link to remote OIS, Wang 2200, and other VS systems over point-to-point or multipoint communication lines at 2400/9600 bps. The VS system supports interactive processing and file exchanges with the remote system. A VS host can support up to 6 remote systems with up to 20 workstations per system.

□ Strengths

WangNet is a well-conceived system providing support for Wang's office automation products as well as for other vendor's products through its Interconnect Band. The Interconnect Band is transparent and appears as a data communication link to the interconnected devices. Therefore, any device can communicate with any other devices as long as the 2 devices are transmission compatible. The Interconnect Band does not provide data rate matching or code conversion.

Wang has not followed the conventional wisdom in its network design, but developed its own system using standard CATV

components. Using the same frequency for transmit and receive doubles the usable capacity of the CATV Band over mid-split, subsplit, and dual cable topologies. Wang essentially uses a cable folded back on itself with no split at the head end. WangNet uses only 266 MHz of the 390-MHz CATV bandwidth, 124 MHz remains available for future expansion.

The Wang Band interconnects OIS, VS, and Alliance systems. These systems can also connect to a channel on the Peripheral Band to allow communication with workstations connected to different computer systems. Wang has made some very large sales of WangNets, so it will continue to be developed as an important product.

□ Limitations

Workstations cannot connect directly to the Wang Band. They can connect to a VS, OIS, or Alliance system through a channel on the Peripheral Band. The path to connect to a different host system on Wang Band is always indirect through another system.

WangNet is designed to connect Wang products together. It is not designed to allow Wang products to interface to foreign systems.

The Wang Professional Computers can connect only to the PC Band, thus they can communicate only with each other. They cannot communicate with other Wang Computers connected to other bands on WangNet such as Wang Band. Furthermore, the connection is expensive although it does include the software as well as hardware.

■ NETWORK SUMMARY

WangNet is a broadband local area network (LAN) composed of standard CATV components and Wang-designed components. WangNet provides 5 services, 1 per band, and uses only 266 MHz of the 390-MHz CATV bandwidth that ranges from 10 MHz to 400 MHz. The remaining unused CATV bandwidth of 124 MHz is available for future development of additional services.

All services reside on the same cable. FDM (frequency division multiplexing) divides the total bandwidth into channels for the supported services. TDM (time division multiplexing) supports multiple devices on a channel. Channel access to Wang Band is through the CSMA/CD protocol. Access to the Peripheral Bands is established by polling. The Utility Band is provided for audio and video devices, only one device can connect to a channel. Interconnect Band is protocol transparent.

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WangNet uses a main trunk cable folded back on itself at the head end, the transmit/receive crossover point that Wang calls the Network Loop. The transmit and receive trunks are mirror images of each other. Data flow is unidirectional, down the transmit trunk through the Network Loop and back to the attached devices through the receive trunk. All devices connect to both trunks through dual coaxial cables.

Signal splitters divide the trunks into identical branches; receive-cable components are physically adjacent and parallel to transmit-cable components. User outlets connect to branches through dual drop cables; one cable is attached to the transmit line and the other to the receive line.

The Wang user outlet is usually wall mounted and provides a connection to the WangNet for user devices. The outlet contains separate receive and transmit connectors that correspond to WangNet receive and transmit cables. The threads are reversed on the transmit and receive connectors to prevent reversing cables. This topology physically separates the transmit and receive signals. Thus a signal passed through the transmit connector on a user outlet propagates down the transmit tree to the Network Loop and back through the receive tree to the receive connector on every user outlet.

WangNet can be implemented with either an active or passive design. Both designs use the same CATV signal splitters and cable taps, but the active design adds in-line CATV-type amplifiers, powered by 30 VAC. Power supplies for the amplifiers are provided as needed. Typically, the passive-design head end includes 1 or 2 pilot frequency-standard generators and the Network Loop. The active-design head end also includes 2 amplifiers, an amplifier power supply, transmit and receive line ammeters, and various network test points.

WangNets are designed with provision for expansion. At least 1 point in each cable tap is reserved for expansion to accommodate an additional user outlet.

The length of a WangNet depends partly on the number of passive cable components and the number of amplifiers. In an active WangNet, up to 32 amplifiers can be cascaded end-to-end in any cable circuit. Each Diplexer also counts as an amplifier. Up to 568 amplifiers can reside on a WangNet: 283 in the transmit-line tree, 283 in the receive-line tree, and 2 in the head end.

FastLAN is a modular WangNet that can be established fast. It does not require an extensive study and estimation of future requirements or installation of a backbone cabling system. FastLAN consists of 3 modules that can be interconnected to provide a WangNet that can support up to 640 transmit-receive ports.

FastLAN-A is an amplifier module that can support up to 4 FastLAN-B network branch modules. Each FastLAN-B includes 2 coupler boxes and each coupler box can attach up to 4 FastLAN-C multiuser (4-port) outlet boxes for a total of 128 ports. A second LAN-A amplifier can be attached to each FastLAN-B module, and it can be expanded with FastLAN-B and -C modules to provide an additional 128 ports each for a total of 640 ports.

Alternatively, the loop on FastLAN-A amplifier can be removed and replaced with a dual coaxial cable to a connection on a WangNet hardline cable backbone network.

The end-to-end length of FastLAN varies depending on whether Teflon or PVC dual cable is used. Teflon cable segments on the FastLAN-B units are 25 feet, while PVC cable segments are 35 feet. The drop cable length to FastLAN-C outlets is 60 feet. Thus, maximum end-to-end length of a standalone FastLAN network is 400 feet for PVC cable and 340 feet for Teflon cable.

The Wang Band Service provides a general-purpose LAN on a single 10M-bps channel to interconnect Wang VS (virtual system) central processors, OIS (Office Information System) Master Units, and Alliance systems. Any system with attached workstations can use Wang Band to connect to another Wang system to access information, to perform application processing, to exchange electronic mail, or to transfer files or documents. The workstations can attach to a host system through a channel on the Peripheral Band.

All systems connect to Wang Band through a Cable Interface Unit (CIU). The CIU includes an RF (Radio Frequency) modem to connect to the WangNet user outlet on the cable through dual coaxial cable.

The CIU runs the Systems Service networking software and supports up to 24 virtual circuits; the gating factor is the operating system running on the attached VS CPU, OIS Master, or Alliance system. The CIU implements the lower 5 levels of the Open Systems Interconnection (OSI) model: data link, network, transport, session, and presentation levels. Information is transmitted over the cable in packets using HDLC protocol. The CIU also contains the hardware and software to handle the CSMA/CD contention protocol for cable access, see figure 4.

The Peripheral Band provides the Peripheral Attachment Service. It consists of 19 channels; each channel operates at 4.27M bps and can connect up to 32 serial devices to a VS CPU, OIS Master, or Alliance System. A Wang computer must contain a system-specific Peripherals Band Polling Card to communicate with devices on a Peripherals Band channel. The unit connects to the WangNet user outlet on the cable through dual coaxial cables. The Band Polling card is located on 1 board and allows the computer to operate as the master polling unit on a Peripheral Band channel.

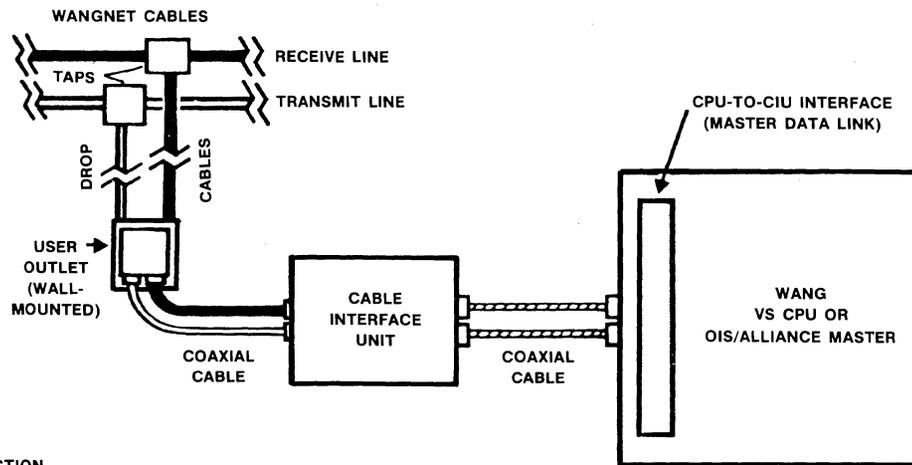


Figure 4 • WangNet cable interface unit and CPU-to-CIU interface.

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Peripherals can connect to the Peripheral Band through either a Wang Netmux or a WangNet connection option. The Wang Netmux contains an RF modem and can connect up to 8 standard Wang peripherals to a WangNet user outlet, thus to a Wang computer. Wang Ergo-IIIW workstations contain an RF modem to connect directly to a WangNet user outlet, see Figure 5.

Software support for a Peripheral Band channel resides in the operating system of the attached computer.

WangNet can contain more than 1 Peripheral Band of up to 19 channels. A Diplexer provides a connection between transmit and receive lines and establishes a separate Peripheral Band subnet. Only Peripheral Band channels are looped through the Diplexers; other service bands pass through the Diplexer without interference. WangNet can be segmented into several Peripheral Band subnets using Diplexers, however, each subnet is isolated from all the others. The total number of subnets that can be established within the WangNet is limited by the maximum number of Diplexers that WangNet can accommodate. Each Diplexer counts as an amplifier in the system, and a single cable circuit is restricted to 32 amplifiers. Multiple Peripheral Bands restrict the distance a peripheral device can be located away from its master computer; both must reside on channels within the loop formed by a Diplexer, see Figure 6.

The Interconnect Band implements 3 services: a 64K-bps Dedicated Interconnect Service, a 9600-bps Dedicated Interconnect Service, and a 9600-bps Switched Interconnect Service.

The Dedicated Interconnect Band provides 16 channels for the 64K-bps service and 64 channels for the 9600-bps service. The Switched Interconnect Band provides 256 channels for the 9600-bps service.

The Dedicated Interconnect Service channels connect to a WangNet User Outlet through a dual coaxial cable attached to a Fixed Frequency Modem (FFM). Each channel supports half-/full-duplex, point-to-point, or multipoint links between compatible data terminal equipment (DTE). The DTE equipment can be Wang or non-Wang devices as long as they conform to the appropriate interface standard: EIA RS-449 or CCITT V.35 for the 64K-bps service and EIA RS-232C or CCITT V.24 for the

9600-bps service. Wang terminals normally attach directly to Wang hosts/masters. The FFM for the 64K-bps service can be set at 0 to 64K-bps. The FFM for the 9600-bps service can be set at 0 to 9600 bps, see Figure 7.

Switched Interconnect Service channels connect to WangNet through dual coaxial cables attached to a Frequency Agile Modem (FAM). It allows dial-up communication between Wang or non-Wang DTE devices conforming to RS-232C or V.24 standards. Each channel supports a half-/full-duplex, point-to-point link. The FAMs can be set for synchronous/asynchronous operation. The FAM support DTE automatic dialing and automatic answer features.

The Switched Interconnect Service requires a WangNet DataSwitch to control the 256 connection pairs that can be supported simultaneously between 512 DTE devices. Addresses of the attached FAMs are specified to the switch at initialization time. The DataSwitch broadcasts a polling sequence over supervisory channels and services connection requests. Aggregate throughput of the DataSwitch is 4.9M bps, see Figure 8.

The Utility Band accommodates user-defined video communication services, such as teleconferencing, security monitoring, or electronic bulletin board. Wang does not sell video equipment, but devices used on the utility channels must be acceptable to Wang for connection to WangNet. The band can also be used for nonvideo devices supplied by the user. Such devices must also be acceptable to Wang for connection to WangNet.

Wang now offers the CMUX-3270 to connect up to 32 IBM 3270 terminals to an IBM 3274 controller over WangNet. Although the IBM 3270 devices use WangNet, they cannot communicate with Wang devices.

The first network control facility for WangNet is now available. The current Technical Control and Management System (TCMS) monitors and manages the devices on Wang Band, Interconnect Band, and Peripherals Band. Future modules added to the system will provide monitoring and control facilities for the other WangNet bands.

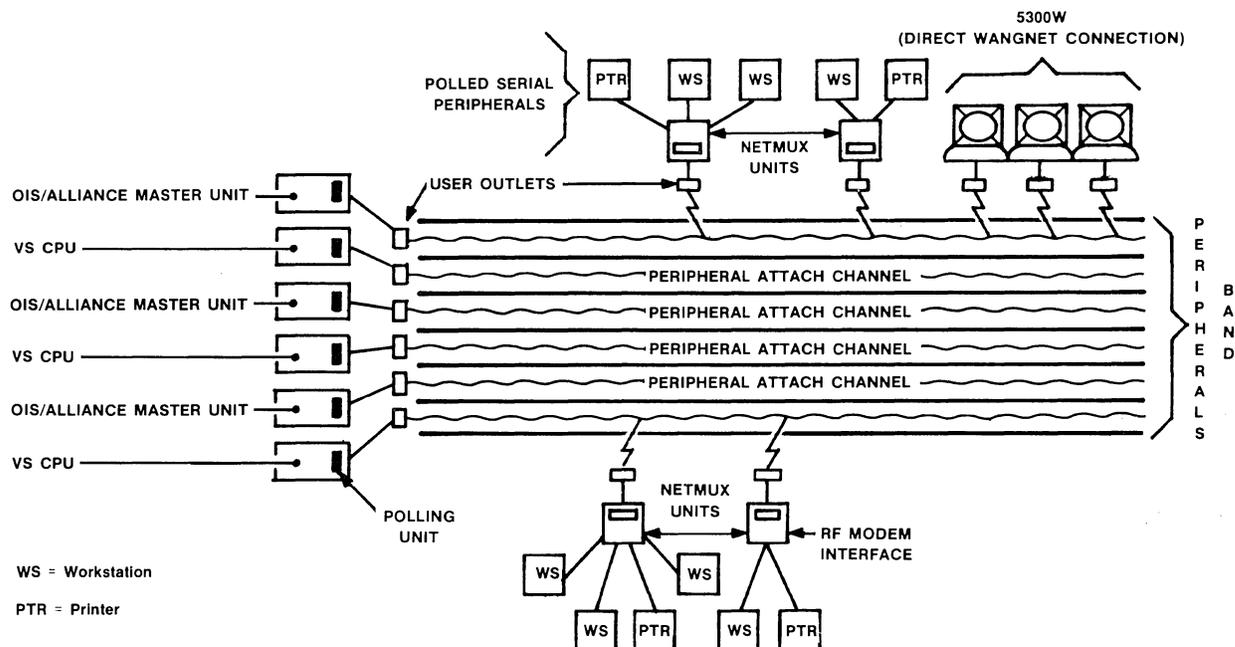


Figure 5 • peripheral attachment service.

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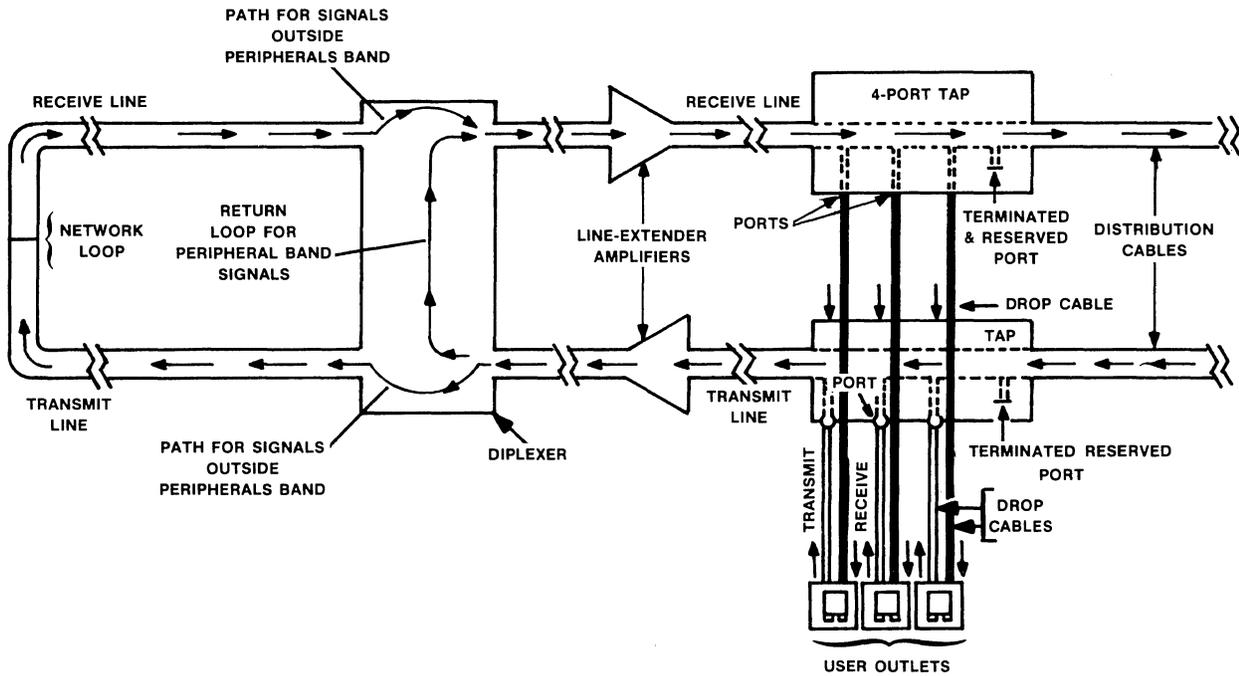


Figure 6 • WangNet Diplexer.

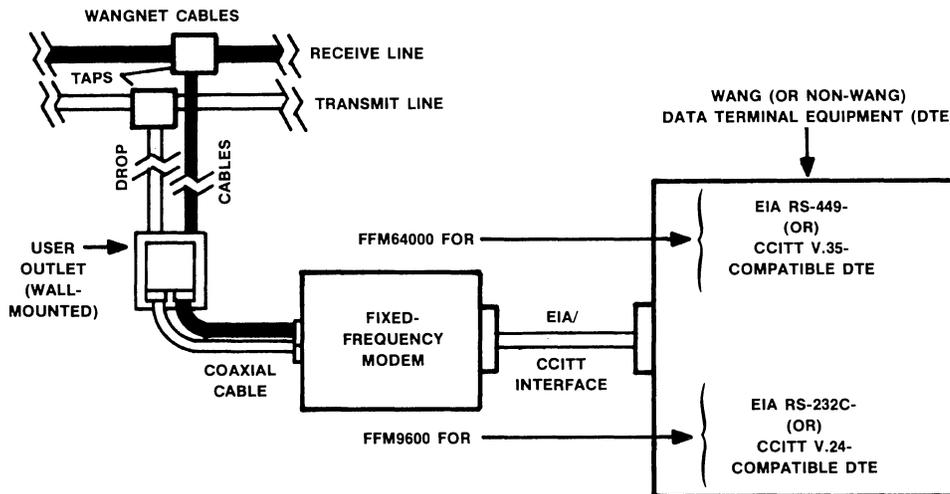


Figure 7 • WangNet FFM interconnections.

■ SOFTWARE

The software required to run WangNet is distributed among the various connected devices.

The control software for Wang Band services resides in the Cable Interface Unit (CIU). It implements the CSMA/CD contention scheme for cable access and the 5 lower layers of the OSI model: physical link, data link, network, transport, and session. The CIU can handle 24 virtual circuits simultaneously. The upper

presentation and application OSI layers reside in the VS, OSI, or Alliance system.

The software to control the Peripheral Band resides in the operating system of the VS CPU or OIS or Alliance Master that operates as the master controller to WangNet attached workstations.

Software support for the Dedicated Interconnect Band channels resides in the DTE units. The channels appear as a data communication link and the only requirement is that the DTE

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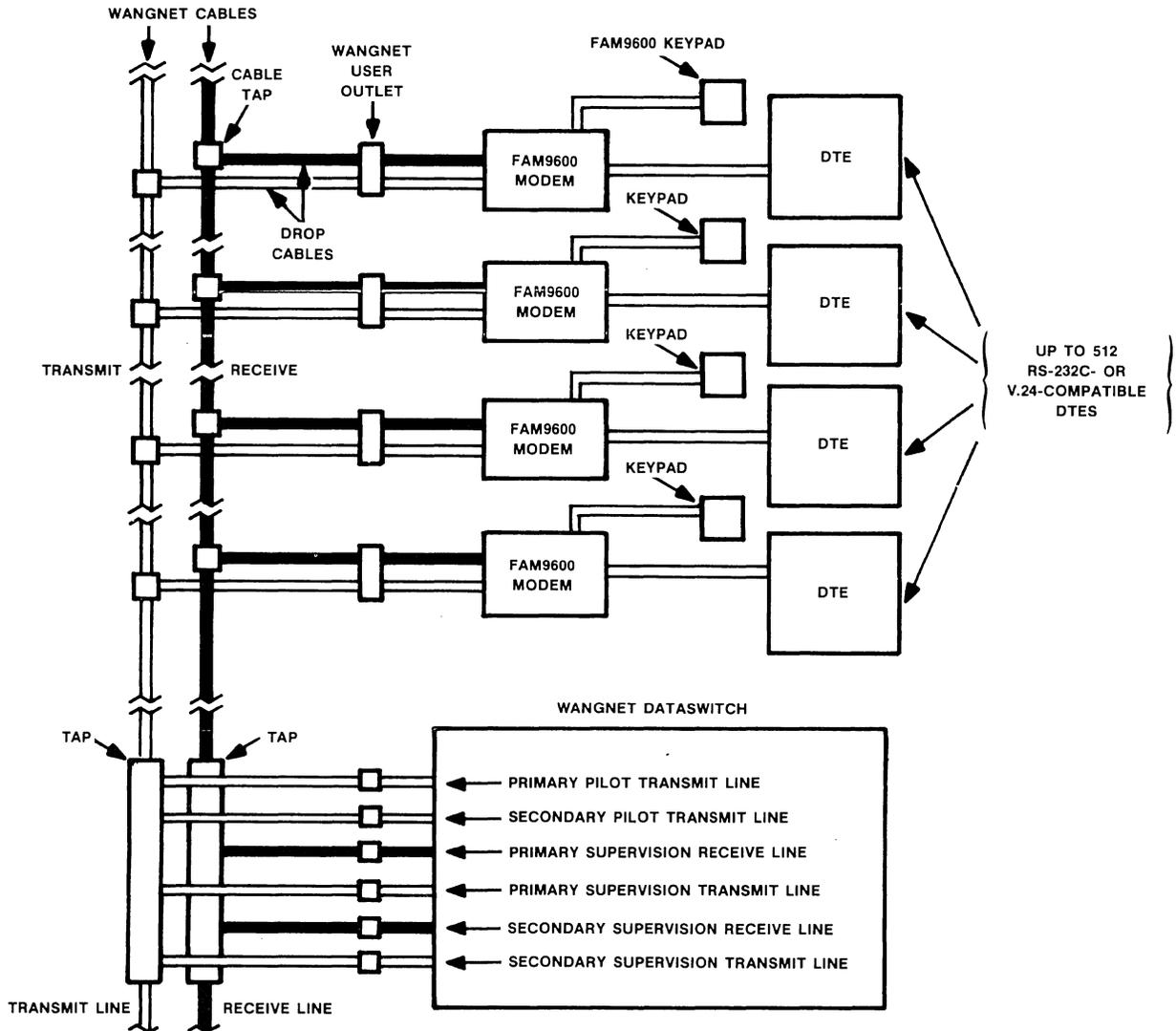


Figure 8 • Wangnet DataSwitch.

units at each end of the link be transmission compatible with one another.

Software support for the Switched Interconnect Band channels resides in DataSwitch, which includes a 2200SVP processor. The DataSwitch appears as a switched connection line to the attached DTE units. Thus, the only requirement is that the units at each end of a link be transmission compatible with one another.

The WangNet Technical Control and Management System (TCMS) is a software and hardware package that requires a VS system.

WangNet Technical Control & Management System (TCMS) • operates on a VS system; compiles information on location, status, and performance of components on Wang Band; measures traffic and quality of network service • consists of TCMS monitor and WangNet Information Management System; monitor compiles performance statistics and generates reports on channel-wide status, unit status, and circuit status; WangNet Information Management System is interactive, online DBMS that combines monitor data with management information to provide network

manager with formatted displays, reports, and archives • future releases will provide for managing interconnect, peripheral attachment, and utility bands:

\$7,500 lcn\$

■ **HARDWARE**

Terms & Support

Terms • Wang will provide a WangNet site survey for \$1,800; a site survey for an additional building in conjunction with an initial site survey is \$650; prices for WangNet cable design and cable certification are based on the labor hours for a particular site; standard labor price is \$95 per hour • Wang also supplies various sized cable kits for small WangNets • WangNet components are available for purchase as well as for rent under 1/2/3/5-year contracts.

LCNS: is one-time license fee; includes standard entitlement services. Prices effective as of October 1984.

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Support • provided through Wang's sales and service centers; monthly maintenance is for standard on-call service, 5 days per week, 9 hours per day.

Wang produces WangNet to meet user's specific requirements. The backbone network includes the cable, head-end, amplifiers, signal splitters, drop cables, Diplexers, and user outlets. Other hardware components include Cable Interface Units (CIUs), WangNet connection options, Netmux multiplexers, fixed frequency modems (FFMs), frequency agile modems (FAMs), a DataSwitch unit, and PC modems.

Cable Interface Unit (CIU) • connects a Wang VS CPU or OIS/Alliance Master Unit to Wang Band • implements CSMA/CD contention scheme for cable access and 5 lower-level protocols of OSI model • includes RF modem to interface transmit and receive lines of WangNet.

CIU-A • for OIS/Alliance Master Units:

\$247/\$168/\$152 mo	\$3,800 prch	\$41 maint
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CIU-B • for VS CPUs:

247/168/152	3,800	41
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CIU-C • for Alliance Master Units:

247/168/152	3,800	41
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WangNet Connection • no longer offered as option, Wang Ergo-IIIW model workstations now offered with interface to WangNet Peripheral Band; workstation includes RF modem for direct connection to WangNet.

WN2 • for Ergo-II workstation; no longer offered.

WN3 • for Ergo-III workstation; no longer offered.

5300W/PS Proportional Space Workstation Electronics • includes WangNet interface (Peripheral Band); with 64K-byte memory; OIS/Alliance workstations:

212/185/168	4,400	24
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5300W Alliance Workstation Electronics • includes WangNet interface (Peripheral Band); VS workstation:

198/154/140	3,650	20
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5300W/AUD Alliance Workstation Electronics • 64K-byte audio with WangNet interface (Peripheral Band):

240/185/168	4,400	37
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5300W/AUD-PS Alliance Workstation Electronics • 64K-byte audio, proportional space, with WangNet interface (Peripheral Band):

254/207/188	4,900	41
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PC-PM075 PC WangNet Service Option • includes WangNet Option Card and Professional Computer Interconnect Software; packet size is 1 to 508 bytes:

52/39/NA	800	8
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Polling Master Board • interfaces controlling Alliance, OIS, or VS Master to Peripheral Band; provides polling for up to 24/32 devices on a WangNet channel • includes RF modem • incorporated directly into the OIS, VS, or Alliance system.

22V57W VS-80 IOP • master data link to drive up to 32 terminals; provides 4 ports for 4 serial devices and 1 port to WangNet Peripheral Band:

193/181/164	4,100	50
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22V67 VS-90/100 IOP • master data link drives up to 32 terminals; provides 4 ports for serial devices and 1 port to WangNet Peripheral Band:

193/181/164	4,100	50
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22V67W-A Additional VS-90/100 IOP • second master data link drives up to 32 terminals on VS 90/100 system; provides 4 ports for serial devices and 1 port to WangNet Peripheral Band:

208/180/163	4,075	50
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6540-3W OIS 140 Model 3 Master • includes OIS 140 Model 3, 80.4M-byte disk, single diskette, and WangNet interface (Peripheral Band):

1,490/1,175/1,068	26,700	276
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6545W OIS 145A Master • includes OIS 145, 275M-byte disk, single diskette, and WangNet interface (Peripheral Band):

1,819/1,703/1,548	38,700	393
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6750-1W Alliance 250-1 Master • includes 128K-byte memory, 32 ports, new Alliance operating system software, 80.4M-byte fixed/removable disk, and WangNet interface (Peripheral Band):

1,819/1,484/1,348	33,700	368
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6750-2W Alliance 250-2 Master • includes 128K-byte memory, 32 ports, new Alliance operating system software, 275M-byte removable disk, and WangNet interface (Peripheral Band):

2,524/1,791/1,628	40,700	401
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Wang Netmux • connects up to 8 standard Wang serial devices to a Peripheral Band channel • includes RF modem:

104/71/64	1,600	10
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Diplexer • segments WangNet into 2 or more 6-channel Peripheral Band loops; 1 additional loop per Diplexer; maximum number of Diplexers per WangNet restricted to 32 minus number of amplifiers on a WangNet cable; installed as part of backbone network:

NA/NA/NA	1,291	39
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CMUX-3270 Cable Multiplexer • connects up to 32 IBM 3270 terminals to IBM 3274 controller over WangNet Peripheral Band; basic unit includes 8 ports:

220/149/135	3,375	33
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CMUX-3270/Device Support Module (DSM) • provides 8 additional ports for CMUX:

25/17/16	376	4
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Fixed Frequency Modem (FFM) • RF modem connects industry standard DTE devices to channels on the Interconnect Band • modem tunable to required frequency.

FFM 64000 • connects RS-449/V.35-compatible user devices to 64K-bps Dedicated Interconnect Band channel:

78/53/48	1,200	14
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FFM 9600 • connects RS-232C/V.24-compatible devices to a 9600-bps Dedicated Interconnect Band channel:

56/38/34	850	9
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PFG912 Pilot Frequency Generator • 9.12 MHz; required for WangNet cable kits with attached FFM 9600s:

51/35/31	775	5
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PFG48 Pilot Frequency Generator • 9.12 MHz; required for WangNet cable kits with attached FFM 64000s except those with DataSwitches:

52/36/32	800	5
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FAM 9600 Frequency-Agile Modem (FAM) • connects an RS-232C/V.24-compatible user device to a 9600-bps Switched Interconnect Band channel • required for each device connected to Switched Interconnect Band • maximum of 512 per WangNet:

82/55/50	1,250	14
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DataSwitch • controls polling and switching on Switched Interconnect Band; supports up to 256 connections simultaneously between 512 devices; runs control software and diagnostics for attached FAMs:

780/528/480	12,000	130
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FastLAN-A Amplifier Unit • with a 5-inch network loop cable and a 35-foot PVC Branch Interconnect Cable:

NA/NA/NA	995	20
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FastLAN-AT Amplifier Unit • same as FastLAN-A except with 25-foot Teflon in place of 35-foot PVC Branch Interconnect Cable:

NA/NA/NA	1,300	20
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MO: 1/3/5-year monthly rental charges including maintenance. PRCH: purchase price. MAINT: monthly maintenance charge for purchased units. NA: not available/applicable. Prices effective as of October 1984.

Wang Laboratories WangNet

Broadband Local Area Network

FastLAN-B Distribution Leg • includes a coupler Box 1, a coupler Box 2, a 35-foot PVC Network Branch Cable 1, and a 70-foot PVC Network Branch Cable 2:

NA/NA/NA	350	6
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FastLAN-BTD Distribution Cable • same as FastLAN-B except 25-foot Teflon instead of 35-foot PVC Network Branch Cable 1 and 55-foot Teflon instead of 70-foot PVC Network Branch Cable 2:

NA/NA/NA	800	6
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FastLAN-C Drop Cable • with multiuser (4-port) outlet and a 60-foot PVC drop cable:

NA/NA/NA	120	NA
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FastLAN-CT Drop Cable • same as FastLAN-C except with 60-foot Teflon instead of 60-foot PVC drop cable:

NA/NA/NA	180	NA
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FastLAN-ENC Office Enclosure • optional cabinet for FastLAN-A or -AT amplifier:

NA/NA/NA	640	NA
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120-2307 WangNet Interconnect Cable • 25-foot; to interface device to outlet:

NA/NA/NA	15	NA
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220-0294 WangNet Interconnect Cable • 10-foot; to interface device to outlet:

NA/NA/NA	10	NA
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■ SPECIFICATION

Wang proprietary. Wang Band follows the OSI model recommendation and implements the data link, network, transport, session, and presentation layers.

Packet Format

Wang Band uses HDLC protocol as specified in the OSI model recommendation.

Format • Wang Band divides data link packet into 3 parts: Header, Information Field, and Trailer • Header contains 1-byte Flag, 2-byte Destination address, 2-byte Source address, and 1-byte Control Field • Information Field includes variable-length

Packet Header, 3-byte Transport Layer Header, variable-length Presentation Service Header, and variable-length Application Data • Trailer contains 2-byte CRC-CCITT check data and 1-byte Flag.

Transmission Characteristics

WangNet uses Radio Frequency (RF) transmission.

Channel Encoding • Wang proprietary.

Data Rate • 10M bps for Wang Band; 4.27M bps for Peripheral Band; 64K bps and 9600 bps for Dedicated Interconnect Band; 9600 bps for Switched Interconnect Band; Utility Band not defined; 2.5M bps for PC Band.

Carrier • frequency varies from channel to channel depending on assigned frequency of RF modems.

Control Procedures

WangNet implements network control on each channel for all services. Because of the nature of the Switched Interconnect Band service, the DataSwitch controls all 256 channels. Currently, control is distributed on Wang Band. Control can be through TCMS, from a terminal/workstation connected to a dedicated system connected to Wang Band through a CIU. Control of the Peripheral Band is from the VS, OIS, or Alliance system operating as the master on a channel. Control of the Dedicated Interconnect Band channels is through the connected devices.

CSMA/CD access control for Wang Band is implemented in each CIU connected to the channel. The algorithms for its implementation are Wang proprietary. The PC Band uses token-passing protocol for network access.

Transmission Medium

Wang uses standard CATV cable.

Use

Wang developed WangNet to interconnect its broad line of Office Automation products.

• END