General Information on Northern Telecom's LANStar/PTE

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Northern Telecom's LANStar technology is based on the data handling capabilities of a central "frame" known as the packet transport equipment (PTE). The standard PTE resembles a full-height rack-mount frame in which earlier DEC minicomputers were mounted. It is divided into "shelves" and each shelf contains slots or tracks into which "modules" can be inserted.

Northern Telecom makes several different sorts of modules for this frame, most of which have nothing to do with LANs, but are related to voice processing, i.e., voice messaging, etc. One LANLink assembly, made up of two cards, is the basis for the local area networking capabilities of the PTE. Each assembly supports 16 nodes through the PTE. There are currently two versions of the PTE. The large one, known simply as the PTE, addresses 1,344 nodes. A smaller one, the PTE/S, can address 112 nodes. The smaller PTE can support ONLY the LAN modules, and not the other voice processing modules available for the large frame.

Communications between the PTE and the desktop workstation is via two twisted pairs (four wires). If the wiring must also support voice, a third twisted pair is required. Thus, buildings wired with at least three pair to each desktop are best suited for LANStar technology. Of course, there is a LANStar card in the desktop works MS-DOS based PCs (traditional slots, not MicroChannel). Data transfer between the workstation LAN card and the LANLink card in the PTE is at 2.56 Mpbs. There is absolutely no contention for this 2.56 Mbps bandwidth, as there is only one workstation attached to each PTE-LANLINK card. It appears from some of the materials available that this communications may be full duplex.

Back at the PTE, each PTE LANLINK card is plugged into a backplane bus. The PTE LANLINK cards communicate between themselves at 40Mbps, 8 bits wide. Obviously, as there could be 1,344 cards wanting to talk at 2.56 Mbps all at once, and 40 Mbps won't go around, there must be some "link access protocol managing access" to the 40 Mbps bus. This is where the telephone heritage of the PTE shows through. Rather than using CSMA/CA, CSMA/CD, or token passing, the PTE bus uses a form of time division multiplexing that Northern Telecom calls "Perfect Scheduling". The 40 Mbps bandwidth is divided into time slices during which certain sorts of tasks are allocated/guaranteed bandwidth. This time slicing is controlled externally to the data bus. There is virtually no bandwidth consumed by link access overhead, even under very heavy loads.

In some ways, this access scheme is similar to token passing, in that a given data transmission will have to wait its turn for bus access. But unlike token rings, a LANLink card failure cannot result in loss of the token. And no data bus time is consumed in simply passing the token around. The bandwidth is also sliced very fine: 8,000 slices per second, with 640 frames per slice (each frame carries 8 bits), so the wait should never be long.

As already stated, the PTE is wired as a star: a separate set of twisted pair goes from each workstation back to a corresponding LANLink card in the PTE. However, within the PTE the network takes on a more bus-link structure. Billed as one of LANStar's security features, packet address interpretation is all done inside the PTE bus, with each PTE LANLink recognizing its own address (note that the address, at least at this level, is the address of the PTE LANLink card, not the address of the LANStar card or the workstation itself) and capturing ONLY packets intended for it. Thus, anyone tapping into a leg of the star will see ONLY the data traffic for the workstation attached to that leg - not any of the traffic for any of the other legs. Broadcasts, of course, still go to all legs.

The PTE LANStar technology is also available to the MS-DOS world. The LANLink PC card goes in a standard MS-DOS slot, and connects to the same PTE equipment as is used with LANStar AppleTalk. In the Macintosh world, LANStar AppleTalk has (separately) been tested with MacServe, TOPS, and AppleShare. In the MS-DOS world, LANStar is in use with MS-Net and Banyan's Vines/286 servers.

It appears possible to attach both Macintoshes and MS-DOS PCs to a single PTE LAN. However, similar to running multiple protocols over Ethernet, the Macintoshes and their AppleShare will not see the PCs and their MSNet, etc. AppleShare PC, TOPS for PC, or Tangent Share do not solve this problem, because they all require an AppleTalk board for the MS-DOS PC -- not a PC LANLink card. Initial testing of this multiple protocol PTE LAN seems to run well. Apparently there is some performance degradation on the MS-DOS side, having to do with the number of broadcast packets used by AFP, vs. the number of broadcast packets expected by the Vines/286 server. The problem is not severe, as it was detected only through use of performance monitoring tools on the network.

Bridging between the different protocols seems to the best possibility for a mixed MS-DOS-Macintosh LANStar network. At least one of the MS-DOS PCs could run both TOPS and LANLINK and republish volumes as a gateway. Or, when the LANStar Bridge becomes available, PCs running an AFP based network could bridge onto a LANStar AppleTalk network to get to an AFP server. Long term, some further integration between MSNet based networks and AFP networks would be desirable.

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