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Frame Relay: Overview, and Sending AppleTalk Packets

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Article Change History

11/03/92 - CORRECTED

- The vendor search string information

TOPIC -----

Can I send AppleTalk packets via frame relay technology from AT&T or WilTel?

DISCUSSION -----

Summary

Yes, you can send AppleTalk packets via frame relay, but you need to consider many factors that may adversely affect AppleTalk performance across frame relay.

First, there's no guaranteed maximum time delay between frames. This could significantly affect performance/usability of some AppleTalk-based services. AppleTalk services have many time-dependent functions that are hard-coded to a very low value and may fail in the presence of long frame delay times.

Second, frame relay has no recovery/re-transmission mechanisms to allow it to recover from lost frames. This forces the recovery mechanism to the higher level services (AppleTalk in this case), which may not be tuned for re-transmissions on such data links. The AppleTalk ATP TRel timer is a perfect example of this problem. If a TRel packet was lost while in transit across the frame relay network, you'd be forced to wait at least 30 seconds before the recovery process completed.

The third problem with frame relay and AppleTalk is related to the second problem, but with a slightly different slant. Frame relay supports the ability to drop packets in order to adjust the data stream for congestion reasons. For AppleTalk, this can lead to the same types of problems discussed in the last example.

Several router vendors (ACC, cisco, Coral, Network Equipment Technologies, Newbridge, Proteon, 3Com, and Wellfleet all currently offer AppleTalk routing services over frame relay.

We're not sure whether anyone has extensively tested AppleTalk over frame relay.

Frame Relay Compared to X.25

Frame relay is a packet-switching data link technology which can be thought of as a close cousin to present day X.25. Frame relay defines an interface, or access protocol, between two data communications devices. It operates at line speeds up to 2.048 Mbits/sec and can accommodate the bursty nature of LAN traffic without wasting link capacity or causing significant average delay.

Compared to the X.25 protocol, frame relay is a streamlined approach to wide-area packet switching and provides superior performance by eliminating the X.25's inherent overhead. Frame relay is also faster than X.25 because it uses the fidelity and reliability of modern digital facilities; the access speeds of frame relay can reach 2 megabytes per second, compared to 64,000 bytes per second for X.25.

Defined by ANSI, frame relay is a packet-mode service in which data is organized into individually addressed units. As a result, it retains the statistical multiplexing capabilities of X.25; multiple data streams can be multiplexed over a single serial line, allowing for port-sharing. However, frame relay eliminates most of the other X.25 functions. Frame acknowledgment, automatic retransmission in case of errors, and other X.25-like capabilities are handled by higher-layer protocols, such as TCP/IP and OSI Transport Class 4, in the source and destination devices. By essentially restricting its role to multiplexing and routing, frame relay is able to operate more efficiently -- and therefore more quickly -- than X.25.

Frame Relay Limitations

Because it is a stripped-down protocol, frame relay has certain limitations. It doesn't have error handling and flow control, so frame relay needs an error-free transmission path, such as a digital carrier circuit or fiber-optic span, and intelligent higher-layer protocols in the devices at each end of the connection. Although it recognizes transmission errors through a standard CRC, frame relay discards data with errors as well as excess packets that result from network congestion. Frame relay discards these frames without notifying the sender that they need to be retransmitted.

As with X.25, frame relay allows for frames of variable length, so the delay that network traffic encounters will vary. Because of this, frame relay isn't suitable for delay-sensitive traffic such as voice and compressed video.

Another important factor to consider is the service provider's committed

information rate (CIR), usually available for each virtual circuit established.

Frame-relay data communications networking services are appealing due to their relatively low cost, but their burst-mode transmission makes reliability a big issue. Users are greatly concerned about the performance and quality of their wide area network (WAN) and local area network (LAN) communications systems. In bursty transmissions, congestion is a crucial concern, for the networks have the potential to become over-burdened if many users on a public frame-relay network send a lot of data at the same time.

Early frame-relay users, many of them customers of WilTel Communications Systems, Inc. and other large carriers, currently operate without a lot of traffic management control on their systems. WilTel has approached the issue conservatively, engineering its network so that users can't transmit at speeds above a certain level unless their burst is momentary. This approach is considered inefficient by some, due to the slim chance that WilTel's customers would all transmit at once.

Frame Relay NuBus Card Information

Multiaccess Computing Corp. offers a 1.544-Mbps frame-relay NuBus card that can be upgraded to SMDS. This is for users who want fast wide-area networks now, but hesitate to upgrade to not-ready-for-prime-time Switched Multimegabit Data Service. The MCC-1000F card lets you connect to frame-relay services expected from the regional Bell operating companies, AT&T Co., MCI, Sprint USA, or other interexchange carriers.

Frame relay is a technology that links remote network sites by dedicated virtual circuits, allowing access to multiple sites through a single physical connection. To speed transmission, it assembles network packets in super packets called frames, and routes them across a telephone network to remote sites. The technology offers a high-speed, expandable WAN environment, because it's easy to add new sites by subscribing to the same frame-relay service.

Multiaccess will ship software with the MCC-1000F card that provides AppleTalk-to-frame relay translation. Network resources, such as printers and servers, connected to a Macintosh by frame relay will appear in the Chooser as though they were on a local network. The MCC-1000F also supports applications that use Apple's MacTCP TCP/IP communications stack to access network resources. The card includes an integrated CSU/DSU (Channel Service Unit/Data Service Unit), hardware that provides the physical interface to long-haul digital telephone lines.

To locate a vendor's address and phone numbers, use the vendor name as a search string.

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