Frame Relay Essay, Research Paper

Frame Relay and Leased Lines

In networking there are many options in having data transferred from one location to another. Two of which include frame relay and leased lines. Frame relay is a communication method that transfers data by dividing information into packets and sending them over a virtual network. Frame relay is a difficult process to understand and to accomplish. Leased lines, however, is the permanent connection between two stations. Leased lines are simpler to understand and do not take a lot of effort to achieve.

According to Computer Networks, frame relay came into existence to overcome the complex protocols caused by slow telephone lines, and expensive computers. Today, telephone lines are fast and inexpensive, which make a good market for frame relay (60). Frame relay is a service in which information can be transmitted in a fast and inexpensive way in either a Local Area Network (LAN) or Wide Area Network (WAN). However, the Frame Relay FAQ Website, refers to frame relay as “cost effective” because it is not necessarily cheap. The most is made out of the purchaser’s money.

Frame relay is often referred to as a “cloud” because information travels over many different paths; it is not a physical connection between two stations. It is uncertain how exactly the information will get from place to place at any given time. According to the LAN Times Encyclopedia of Networking, the Permanent Virtual Circuit (PVC) is a path in which the frame relay network connects two end points. These PVC’s are always active and are guaranteed to provide a certain level of service (384). Today, frame relay is a true “fast packet” switching network by using switched virtual circuits. Switched virtual circuits can provide “any-to-any connectivity” by allowing a customer to change the end points of the link to keep up with business changes. Switched virtual circuits also can provide “bandwidth-on-demand” meaning that when the line is at its peak carrying information more bandwidth can be made available. Also switched virtual circuits allow charges for connection to be made only for what the customer uses, unlike leased lines where you have to pay a flat rate (828-829).

In the May 1999 issue of “Computerworld”, a trading company decided to change its networking architecture. DCH (Da Chong Hong), in the past, used a multiple leased line architecture consisting of over 50 separate lines (See Figure 1). Figure 1 proves the fact that when transferring data between multiple sites, frame relay decreases the amount of lines that need to be leased. DCH knew it had to change its architecture to keep up with data rate technological advances. DCH decided to switch to a networking architecture that consisted of ATM and frame relay. This venture saved DCH over $129,000 per year. ATM is another form of a packet-switching data communication method.

One problem with transferring information over a frame relay network is the fact at times the network can become congested. The LAN Times Encyclopedia of Networking reports the fact that “when a frame relay network becomes congested, frames are arbitrarily discarded”. The end nodes are responsible for retransmitting the message frames or either they can be discarded permanently if the customer wants them to (387). Frame relay also offers a security features that help control access to the network: only private lines can access the network, passwords are required to access the network, and a time-out feature logs off inactive stations (388). These delaying tactics help insure the quality of transmission and help prevent hackers from accessing the network resources.

Frame relay use addresses to signify which site or node the message frame is being sent to. In the CCNA Exam Certification Guide, it establishes the fact that frame relay uses a header and a trailer to get the message over the network. The DLCI is the frame relay address; these addresses are used to address the virtual circuits in the network (See Figure 2). As displayed in the figure, if Router A wanted to send

information to Router B it would just need to be sent to the address DLCI 38.

Leased lines provide the permanent connection between nodes that communicate with each other. The LAN Times Encyclopedia of Networking establishes the fact that leased lines are guaranteed to operate at certain speeds and provide a quality service. “Leased lines are used to build private networks”, where a company connects sites by using their own switching equipment (518). Conditioning is also a service provided by carriers who supply leased lines, which include repairing or replacing damaged lines.

Two types of leased lines are available: analog and digital lines. Analog lines require modems to be at each end of the line. Digital lines, however, do not require any extra equipment. They have higher data transmission rates and signals are represented by 1’s or 0’s. Digital lines can beT1 or T3 lines. According to the Frame Relay Webopaedia Website, T1 lines can reach speeds up to 1.544 Mbps and T3 lines reach speeds up to 45 Mbps. The LAN Times Encyclopedia of Networking also states that when determining whether or not to use a leased line or not there are 4 points to take into consideration: the cost of leased lines increase with distance (may only work in certain geographical areas); may want to use leased line if two sites have four or more hours of traffic per day; leased lines are feasible if only connecting a few sites; leased lines can be used if a lot of voice and data traffic exists between two sites (920).

There are other means of leased lines. Leased lines do not always have to be T1 or T3 lines. A customer can lease fiber optic cable and coaxial cable. Fiber optic cables are very fast, provide security, and noise is minimal. Fiber optic cable can reach data speeds around 1 Gbps, but the bandwidth can be increased to provide speeds even higher. Coaxial cable run about 400 Mbps and is fairly inexpensive. Fiber is often compared to coaxial cable, however fiber has many advantages over coaxial cable. Fiber optic cable operates at more than twice the rate as coaxial cable. So, depending on whether speed is necessary or cost is an option there are other alternatives when leasing a line from a common carrier.

Usually leased lines are referred to as dedicated lines but they also can be nondedicated which means the customer only makes connections when needed. These can also be referred to as “fractional lines”. For example a fractional T1 line, allows a customer to use the T1 line only when needed. This saves money for companies who only need partial connection time. Another alternative to these methods if only a portion of the line needs to be used is just using a dialup line. In the LAN Times Encyclopedia of Networking, it states that a good example of using a dialup line is when the only thing being transferred is e-mail. The e-mail accumulates until it has enough to make a call (519).

An example where leased lines may be more beneficial than using frame relay could be an instance of a central company in Atlanta, GA needing to communicate with another site in Athens, GA (approximately 5 miles). This communication needs to be established throughout the day and it needs to be speeds at least 1.2 Mbps. The reason why a leased line would be most beneficial for this situation is the fact that the connection has to be established throughout the day, forcing a leased (dedicated) line to be used.

Frame relay and leased lines interconnect with each other to transmit data from one station to another. Leased lines provide some of the physical connections while using frame relay. Data in frame relay is transmitted through a “cloud” and data over a leased line is transmitted over a physical connection that actually connects the computers. According to a picture found in the July issue of “PC Magazine”, LAN’s are connected by using a leased line connection between routers. The router then uses a frame relay connection to access the frame relay service, and then it is able to send information to the other LAN (176). In the CCNA Exam Certification Guide, it states that the main difference between frame relay and leased lines is the fact that frame relay is a “multi-access network”, meaning that more than two devices can be attached to the medium (390). It also states that leased lines are the access link between the router and the Frame Relay switch (391).

In the LAN Times Encyclopedia of Networking, it states that in order to obtain frame relay or leased line services a user must use a common carrier such as AT&T, MCI, Sprint, and the Regional Bell Operating Companies (RBOCs). These companies provide the physical connections to the frame relay network, which are usually in the form of leased lines (384). When setting up a frame relay network it is necessary to choose which common carrier will be used. After choosing which carrier a service needs to be chosen that best suits the customers’ needs. The customer can choose between a variety of access speeds ranging between 56 Kbits to 1,544 Mbits. The customer then needs to plan on how to link from one site to the frame relay service provider by placing routers and other access devices at the site. These devices connect to the service provider’s frame relay port which connect to the PVC’s (386).

Frame relay and leased lines are good ways to have data transferred in a fast and predictable manner. Frame relay would be used in a situation where there are many sites and communication needs to be established throughout the day. A leased line is used to keep a communication link established between 2 locations and usually also is needed throughout the day. Each data communication need depends on the situation at hand and the communication circuit used would vary accordingly to that situation.

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