Frame Relay Glossary

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Introduction

This document defines common Frame Relay terms.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software or hardware versions.

Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

Glossary

access line A communications line (for example, a circuit) interconnecting a Frame−Relay−compatible device (DTE) to a Frame Relay switch (DCE). See also trunk line below.

access rate (AR) The data rate of the user access channel. The speed of the access channel determines how rapidly (the maximum rate) that the end user can inject data into a Frame Relay network.

American National Standards Institute (ANSI) A private, non−profit organization that administers and coordinates the U.S. voluntary standardization and conformity assessment system by devising and proposing recommendations for international communications standards. See also International Telecommunication Union Telecommunication Standardization Sector (ITU−T, formerly Consultative Committee for International Telegraph and Telephone [CCITT]) below.

backward explicit congestion notification (BECN) A bit sent in reverse direction to the data flow. It is set by a Frame Relay network to notify an interface device (DTE) that congestion avoidance procedures should be initiated by the sending device.

bandwidth The range of frequencies, expressed in kilobits per second (kbps), that can pass over a given data transmission channel within a Frame Relay network. The bandwidth determines the rate at which information

can be sent through a channel: the greater the bandwidth, the more information that can be sent in a given amount of time.

bridge A device that supports LAN−to−LAN communications. Bridges may be equipped to provide Frame Relay support to the LAN devices that they serve. A Frame−Relay−capable bridge encapsulates LAN frames in Frame Relay frames and feeds those Frame Relay frames to a Frame Relay switch for transmission across the network. A Frame−Relay−capable bridge also receives Frame Relay frames from the network, strips the Frame Relay frame off each LAN frame, and passes the LAN frame on to the end device. Bridges are generally used to connect LAN segments to other LAN segments or to a WAN. They route traffic on the Layer 2 (L2) LAN protocol (for example, the MAC address), which occupies the lower sublayer of the LAN Open System Interconnection (OSI) data−link layer. See also router below.

burstiness In the context of a Frame Relay network, data that uses bandwidth only sporadically; that is, information that does not use the total bandwidth of a circuit 100 percent of the time. During pauses, channels are idle and no traffic flows across them in either direction. Interactive and LAN−to−LAN data is bursty in nature because it is sent intermittently. Between data transmissions, the channel experiences idle time waiting for the DTEs to respond to the transmitted data user s input and waiting for the user to send more data.

channel Generally, channel refers to the user access channel across which Frame Relay data travels. Within a given T1 or E1 physical line, a channel can be one of the following, depending upon how the line is configured:

- **unchannelized** The entire T1 or E1 line is considered a channel, where the following is true:
    - The T1 line operates at speeds of 1.536 Mbps and is a single channel consisting of 24 T1 time slots.
    - The E1 line operates at speeds of 1.984 Mbps and is a single channel consisting of 30 or 31 E1 time slots, depending upon the application.
- **channelized** The channel is any one of *n* time slots within a given line, where the following is true:
    - The T1 line consists of any one, or more, channels. Each channel is any one of 24 time slots. The T1 line operates at speeds in multiples of 56 or 64 Kbps to 1.536 Mbps, with aggregate speed not exceeding 1.536Mbps.
    - The E1 line consists of one or more channels. Each channel is any one of 30 or 31 time slots. The E1 operates at speeds in multiples of 64 Kbps to 1.984 Mbps, with aggregate speed not exceeding 1.984 Mbps.
- **fractional** The T1 or E1 channel is one of the following groupings of consecutively or non−consecutively assigned time slots:
    - *n* T1 time slots (*n* × 56 or 64Kbps, where *n* is equal to 1 to 23 T1 time slots per T1 channel).
    - *n* E1 time slots (*n* × 64Kbps, where *n* is equal to 1 to 30 time slots per E1 channel).

channel service unit (CSU) An ancillary device needed to adapt the V.35 interface on a Frame Relay DTE to the T1 (or E1) interface on a Frame Relay switch. The T1 (or E1) signal format on the Frame Relay switch is not compatible with the V.35 interface on the DTE; therefore, a CSU or similar device, placed between the DTE and the Frame Relay switch, is needed to perform the required conversion.

committed burst size (Bc) The maximum amount of data (in bits) that the network agrees to transfer, under normal conditions, during a time interval Tc. See also excess burst size (Be) below.

Consultative Committee for International Telegraph and Telephone (CCITT) See International Telecommunication Union Telecommunication Standardization Sector (ITU−T) below.

committed information rate (CIR) The rate at which a Frame Relay network agrees to transfer information under normal conditions, averaged over time interval Tc. CIR, measured in bits per second (bps), is one of the key negotiated tariff metrics.

committed rate measurement interval (Tc) The time interval during which the user can send only Bc−committed amount of data and Be−excess amount of data. In general, the duration of Tc is proportional to the burstiness of the traffic. Tc is computed (from the subscription parameters of CIR and Bc) with the formula Tc = Bc ÷ CIR. Tc is not a periodic time interval. Instead, it is used only to measure incoming data, during which it acts like a sliding window. Incoming data triggers the Tc interval, which continues until it completes its commuted duration. See also committed information rate (CIR) and committed burst size (Bc) above.

cyclic redundancy check (CRC) A computational means to ensure the accuracy of frames transmitted between devices in a Frame Relay network. The mathematical function is computed, before the frame is transmitted, at the originating device. Its numerical value is computed based on the content of the frame. This value is compared with a re−computed value of the function at the destination device. There is no limit to the size of the frame to which the CRC can be applied; when the frame length increases, however, so does the probability that an undetected error may occur. Frame Relay uses CRC−16, a 16−bit Frame Check Sequence (FCS) that will detect all types of bit errors for frames less than 4096 bytes in length. As the frames get larger, rare erroroneous bit patterns can occur that the CRC−16 will not detect. See also frame check sequence (FCS) below.

data communications equipment (DCE) Defined by both the Frame Relay and the X.25 committees, DCE applies to switching equipment and is distinguished from devices that attach to the network (DTE). See also end device below.

data−link connection identifier (DLCI) A unique number assigned to a permanent virtual circuit (PVC) end point in a Frame Relay network. Identifies a particular PVC endpoint within a user s access channel in a Frame Relay network and has local significance only to that channel.

discard eligibility (DE) A user−set bit indicating that a frame may be discarded in preference to other frames if congestion occurs, to maintain the committed quality of service within the network. The network side can also set the DE bit and, on congestion, will first drop frames that have this DE bit set. Frames with the DE bit set are considered Be−excess data. See also excess burst size (Be) below.

E1 Transmission rate of 2.048 Mbps on E1 communications lines. An E1 facility carriers a 2.048 Mbps digital signal. See also T1 below and Channel above.

egress Frame Relay frames which leave a Frame Relay network heading toward the destination device. Contrast with ingress below.

end device The ultimate source or destination of data flowing through a Frame Relay network, sometimes referred to as Data Terminal Equipment (DTE). As a source device, it sends data to an interface device for encapsulation in a Frame Relay frame. As a destination device, it receives de−encapsulated data from the interface device (in other words, the Frame Relay frame is stripped off, leaving only the user s data). An end device can be an application program or some operator−controlled device (for example, a workstation). In a LAN environment, the end device can be a file server or a host. See also data communications equipment (DCE) above.

encapsulation A process by which an interface device places the protocol−specific frames of an end device inside a Frame Relay frame. The network accepts only those frames formatted specifically for Frame Relay; hence, devices acting as interfaces to a Frame Relay network must perform encapsulation. See also interface device or Frame−Relay−capable interface device below.

excess burst size (Be) The maximum amount of uncommitted data (in bits) in excess of Bc that a Frame Relay network can attempt to deliver during a time interval Tc. Generally, Be data is delivered with a lower probability than Bc, and the network treats it as discard eligible. See also committed burst size (Bc) above.

file server In the context of Frame Relay network supporting LAN−to−LAN communications, a device connecting a series of workstations within a given LAN. The device performs error recovery and flow control functions, as well as end−to−end acknowledgment of data during data transfer, thereby significantly reducing overhead within the Frame Relay network.

forward explicit congestion notification (FECN) A bit sent in the same direction as the data flow. It is set by a Frame Relay network to notify an interface device (DTE) that congestion avoidance procedures should be initiated by the receiving device. See also backward explicit congestion notification (BECN) above.

frame check sequence (FCS) A 16−bit field for the CRC used in High−Level Data Link Control (HDLC) and Frame Relay frames. The FCS is used to detect bit errors that may occur during transmission of the frame. The bits between the opening flag and the FCS are checked. See also cyclic redundancy check (CRC) above.

Frame−Relay−capable interface device A communications device that performs encapsulation. Frame−Relay−capable routers and bridges are examples of interface devices used to interface the customer s equipment to a Frame Relay network. See also interface device below and encapsulation above.

Frame Relay frame A variable−length unit of data, in Frame Relay format, that is transmitted through a Frame Relay network as pure data. Contrast with packet below. See also Q.922 Annex A (Q.992A) below.

Frame Relay network A telecommunications network based on Frame Relay technology. Data is multiplexed. Contrast with packet−switching network below.

high−level data link control (HDLC) A generic link−level communications protocol developed by the International Organization for Standardization (ISO). HDLC manages synchronous, code−transparent, serial information transfer over a link connection. See also Synchronous Data Link Control (SDLC) below.

hop A single trunk line between two switches in a Frame Relay network. An established PVC consists of a certain number of hops, spanning the distance from the ingress access interface to the egress access interface within the network.

host computer A communications device that enables users to run applications to perform such functions as text editing, program execution, access to databases, and so on.

ingress Frame Relay frames heading from an access device toward the Frame Relay network. Contrast with egress above.

interface device A device that provides the interface between the end device (or devices) and a Frame Relay network by encapsulating the user s native protocol in Frame Relay frames and sending the frames across the Frame Relay backbone. See also encapsulation and Frame−Relay−capable interface device above.

International Telecommunication Union Telecommunication Standardization Sector (ITU−T) A standards organization that devises and proposes recommendations for international communications. Formerly known as Comite Consultatif International Telegraphique et Telephonique (CCITT). See also American National Standards Institute (ANSI) above.

Link Access Procedure, Balanced (LAPB) The balanced−mode, enhanced version of HDLC used in X.25 packet−switching networks. Contrast with Link Access Procedure on the D−channel (LAPD) below.

Link Access Procedure on the D−channel (LAPD) A protocol that operates at the data−link layer (L2) of the OSI architecture. LAPD is used to convey information between Layer 3 (L3) entities across the Frame Relay network. The D−channel carries signaling information for circuit switching. Contrast with Link Access Procedure, Balanced (LAPB) above.

local area network (LAN) A privately owned network that offers high−speed communications channels to connect information processing equipment in a limited geographic area.

LAN protocols A range of LAN protocols supported by a Frame Relay network, including Transmission Control Protocol/Internet Protocol (TCP/IP), Apple Talk, Xerox Network System (XNS), Internetwork Packet Exchange (IPX), and Common Operating System used by DOS−based PCs.

LAN segment In the context of a Frame Relay network supporting LAN−to−LAN communications, a LAN linked to another LAN by a bridge. Bridges enable two LANs to function like a single, large LAN by passing data from one LAN segment to another. To communicate with each other, the bridged LAN segments must use the same native protocol. See also bridge above.

Local Management Interface (LMI) A set of enhancements to the basic Frame Relay specification. LMI includes support for a keepalive mechanism, which verifies that data is flowing, and for a status mechanism, which provides an on−going status report on the DLCIs known to the switch. There are three types of LMI: The Frame Relay Forum s LMI, ANSI T1.617 (Annex D), and CCITT Q922 (Annex A).

packet A group of fixed−length binary digits including the data and call control signals that are transmitted as a composite whole through an X.25 packet−switching network. The data, call control signals, and possible error control information are arranged in a predetermined format. Packets do not always travel the same pathway; rather, they are arranged in proper sequence at the destination side before forwarding the complete message to an addressee. Contrast with Frame Relay frame above.

packet−switching network A telecommunications network based on packet−switching technology, wherein a transmission channel is occupied only for the duration of the transmission of the packet. Contrast with Frame Relay network above.

parameter A numerical code that controls an aspect of terminal or network operation, such aspects as page size, data transmission speed, and timing options.

permanent virtual circuit (PVC) A Frame Relay logical link whose endpoints and class of service are defined by network management. Analogous to an X.25 permanent virtual circuit, a PVC consists of the originating Frame Relay network element address, originating data−link control identifier, terminating Frame Relay network element address, and termination data−link control identifier. Originating refers to the access interface from which the PVC is initiated. Terminating refers to the access interface at which the PVC stops. Many data network customers require a PVC between two points. DTE that needs continuous communication uses PVCs. See also data−link connection identifier (DLCI) above.

Q.922 Annex A (Q.992A) The international draft standard, based on the Q.922A frame format developed by the ITU−T, that defines the structure of Frame Relay frames. All Frame Relay frames entering a Frame Relay network automatically conform to this structure. Contrast with Link Access Procedure, Balanced (LAPB) above.

Q.922A frame A variable−length unit of data, formatted in Frame Relay (Q.922A) format, that is transmitted through a Frame Relay network as pure data (that is, it contains no flow control information). Contrast with packet above. See also Frame Relay frame above.

router A device that supports LAN−to−LAN communications. Routers may be equipped to provide Frame Relay support to the LAN devices they serve. A Frame−Relay−capable router encapsulates LAN frames in

Frame Relay frames and feeds those Frame Relay frames to a Frame Relay switch for transmission across the network. A Frame−Relay−capable router also receives Frame Relay frames from the network, strips the Frame Relay frame off each frame to product the original LAN frame, and passes the LAN frame on to the end device. Routers connect multiple LAN segments to each other or to a WAN. Routers route traffic on the L3 LAN protocol (for example, the IP address). See also bridge above.

statistical multiplexing A method of interleaving the data input of two or more devices on a single channel or access line for transmission through a Frame Relay network. Interleaving of data is accomplished using the DLCI.

switched virtual circuit (SVC) A virtual circuit that is dynamically established on demand and is torn down when transmission is complete. SVCs are used in situations where data transmission is sporadic. Called a switched virtual connection in ATM terminology.

Synchronous Data Link Control (SDLC) A link−level communications protocol used in an International Business Machines (IBM) Systems Network Architecture (SNA) network which manages synchronous, code−transparent, serial information transfer over a link connection. SDLC is a subset of the more generic HDLC protocol developed by the ISO.

T1 Transmission rate of 1.544 Mbps on T1 communications lines. A T1 facility carriers a 1.544 Mbps digital signal. Also referred to as digital signal level 1 (DS−1). See also E1 and channel above.

trunk line A communications line connecting two Frame Relay switches to each other.

Related Information

- **Guide to New Names and Colors for WAN Switching Products (registered customers only)**
- **Cisco WAN Switching Solutions Documentation**
- **Downloads − WAN Switching Software**
- **Technical Support − Cisco Systems**

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