

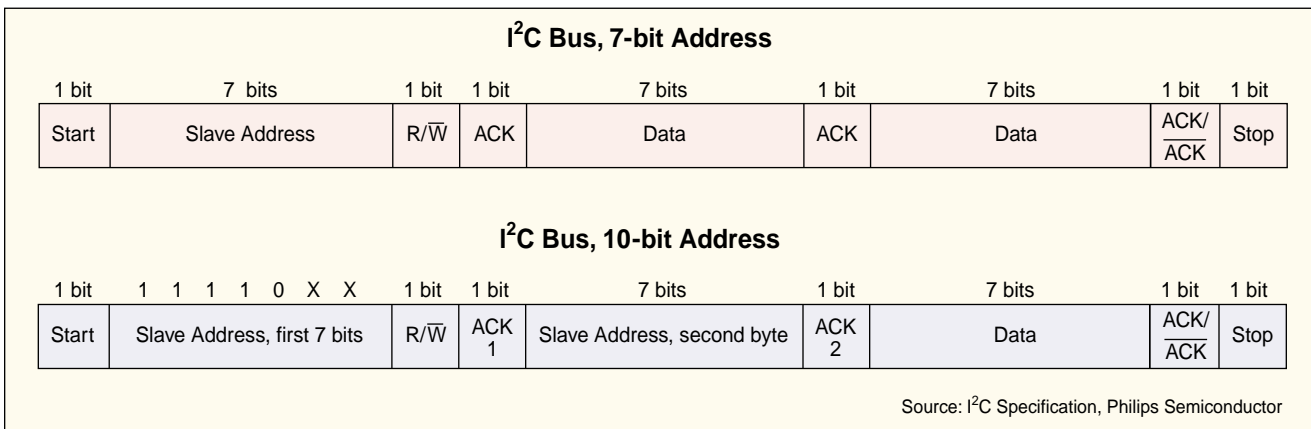
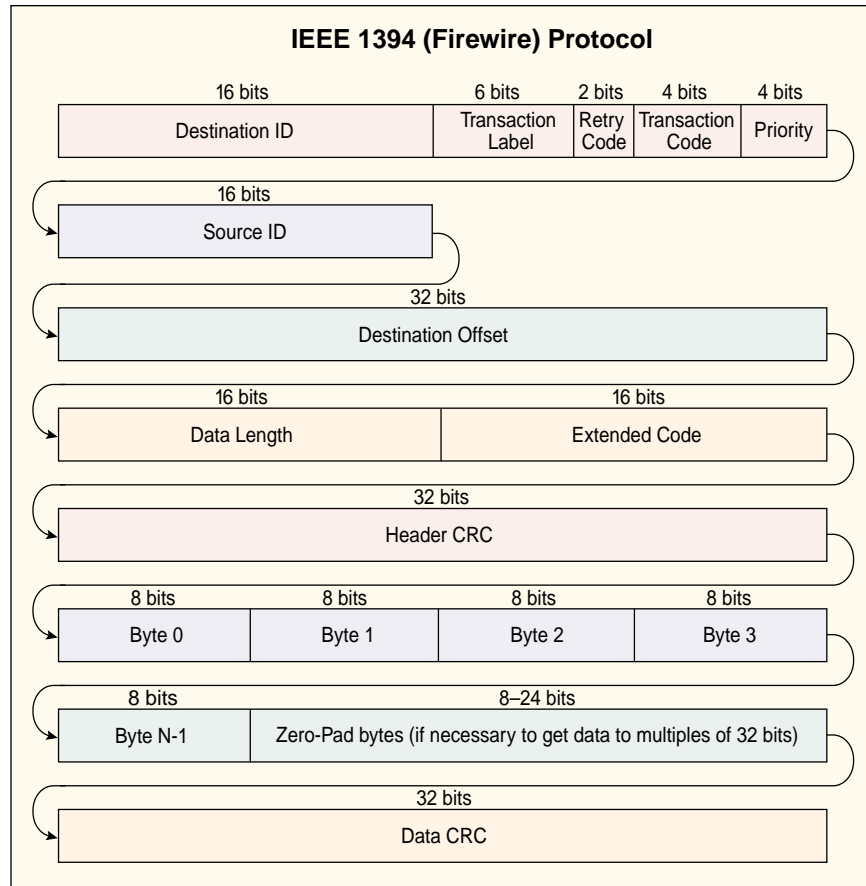
Datacom and Telecom Protocol Structures

All forms of digital communication require some structure, for a receiver has to know how to decode incoming messages. Communications systems from the Universal Serial Bus (USB) on your PC to the Internet contain protocols that send data in groups. These groups are called packets, frames, or cells. Each contains a header that tells the receiver how to decode the incoming data. Headers also tell networks where to route each group so the data reaches its proper destination. The following pages contain the structure for several communications protocols.

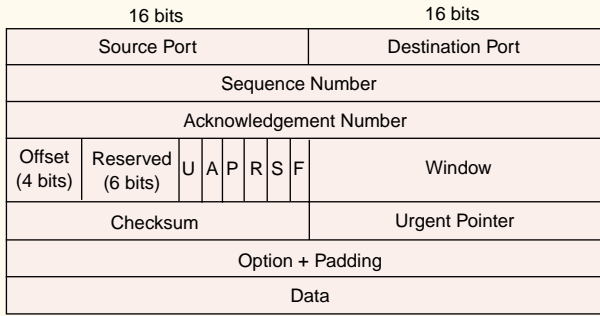
We've included the following:

- IEEE 1394
- I²C bus
- TCP/IP (used on the Internet)
- Asynchronous Transfer Mode (ATM)
- Universal Serial Bus (USB)
- Ethernet
- ISDN
- MPEG-2 Transport Stream
- Frame Relay

We will post these charts on our Web site; if you want to suggest other protocols for us to add, please e-mail us at tmw@cahners.com.



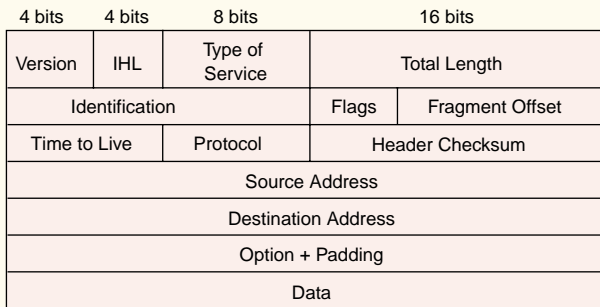
TCP Header Structure



Control Bits—6 bits. The control bits may be:

- U (URG) Urgent pointer field significant
- A (ACK) Acknowledgement field significant
- P (PSH) Push function
- R (RST) Reset the connection
- S (SYN) Synchronize sequence numbers
- F (FIN) No more data from s

IP Header Structure

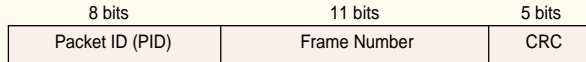


Key
IHL: IP Header Length

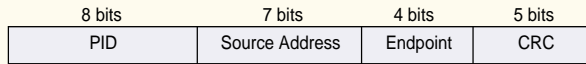
Source: www.protocols.com

Universal Serial Bus (USB)

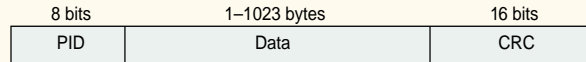
Start of Frame Packet (sent every 1 ms by host computer)



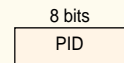
Token Packet—establishes the type and direction of an upcoming transmission



Data Packet—carries the information you want to send to another USB device

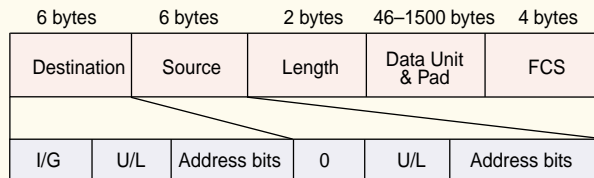


Handshake Packet—follows a data packet, traveling from recipient to sender



Source: *USB Complete*, by Jan Axelson, Lakeview Research, Madison, WI, 1999.

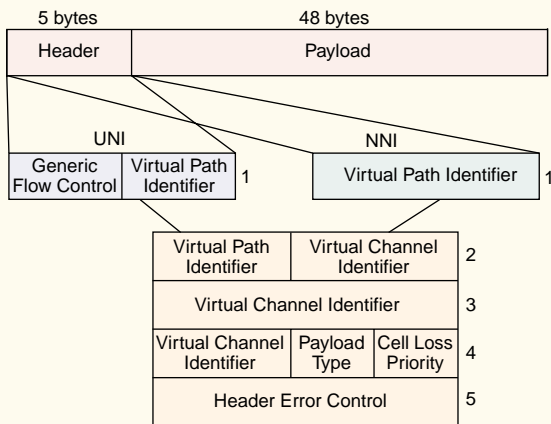
Ethernet Header Structure



Key
FCS: Frame Check Sequence
I/G: Individual/Group Address
U/L: Universal/Local Address

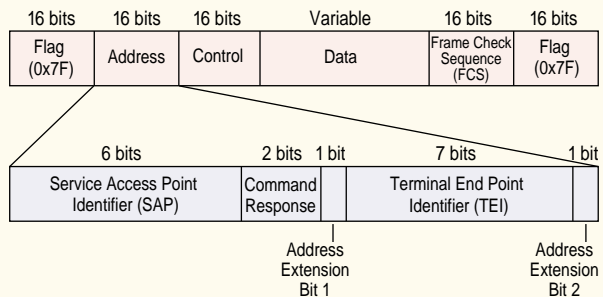
Source: www.protocols.com/pbook/ian.htm

ATM Cell Structure



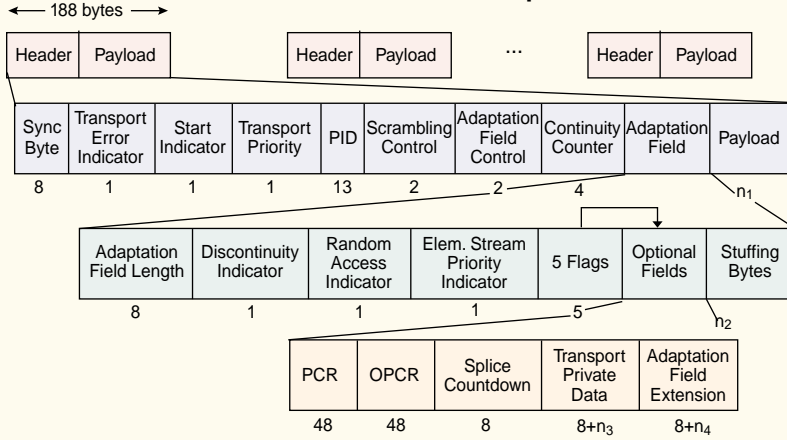
Key
UNI: User-to-Network Interface
NNI: Network-to-Network Interface

ISDN Link Access Protocol-D (LAPD)



Source: www.protocols.com

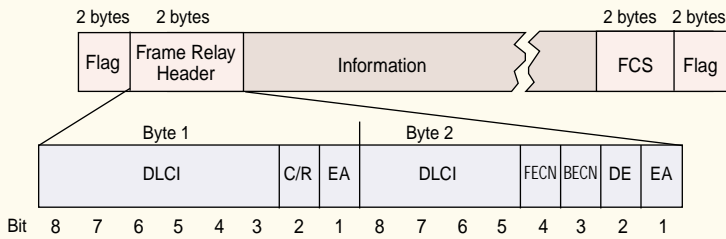
MPEG-2 Transport Stream Packet



Key
 PID: Protocol Identifier
 Governing Connection Types
 PCR: Program Clock Reference
 OPCR: Original Program Clock Reference

Source: Tektronix

Frame Relay Header



Key
 BECN: Backward Explicit Congestion Notification
 C/R: Command/Response Field Bit
 (application specific—not modified by network)
 DE: Discard Eligibility Indicator
 DLCI: Data Link Connection Identifier
 EA: Extension Bit
 (allows indication of 3- or 4- byte header)
 FCS: Frame Check Sequence
 FECN: Forward Explicit Congestion Notification
 Source: www.frforum.com/basicguide/basics.pdf