Supplement: Ethernet Frames

by: Professor David Bray

Recall: Ethernet II Frame

- 6-byte Destination MAC
- 6-byte Source MAC
- 2-byte Ethertype (e.g. 0x0800 means IPv4)
  - greater than 1500
  - see http://standards-oui.ieee.org/ethertype/eth.txt or
    https://www.iana.org/assignments/ieee-802-numbers/ieee-802-numbers.xhtml
    http://www.cavebear.com/archive/cavebear/Ethernet/index.html
- Variable length Data (0-1500 bytes)
  - padded with zeros to achieve minimum frame size of 46 bytes (as necessary)
- 4-byte FCS

Recall: 802.3 / 802.2 LLC

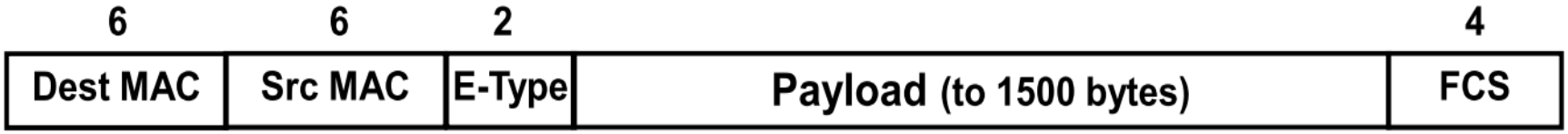
- 6-byte Destination MAC
- 6-byte Source MAC
- 2-byte length (2 to 1500 – value excludes padding)
- 802.2 Logical Link Control Frame:
  - 1 byte Destination Service Access Point
  - 1 byte Source Service Access Point
- Variable length Control & Data (0-1498 bytes)
  - zero-padded to min of 46 bytes as needed
- 4-byte FCS

SubNet Access Protocol (SNAP) Frame

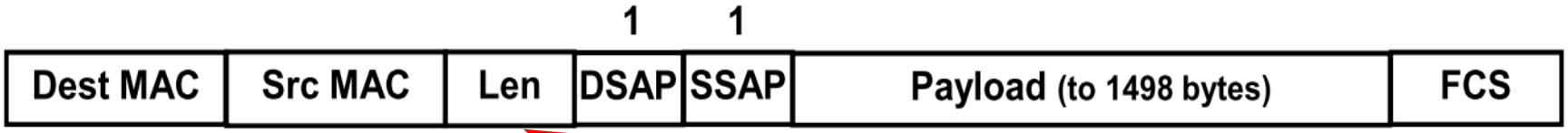
- Because the original LLC frame only allowed one byte for SAP values, it was anticipated that there would be a need to extend the number of access point values. The 802.2 LLC frame was therefore enhanced by:
- SubNet Access Protocol (SNAP) Frame
  - DSAP = 0xAA
  - SSAP = 0xAA
  - Control = 0x03
  - 3-byte Vendor OUI (as with MAC addresses)
  - 2-byte Type (also called Protocol ID)
  - variable length data (0 to 1492 bytes)

Summary of Frame Formats

- **Ethernet II (DIX)**

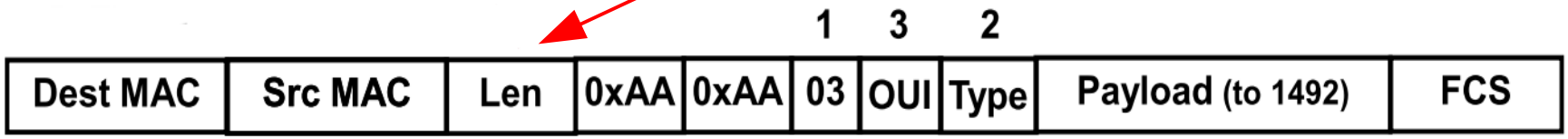


- **802.3 / 802.2 LLC**



- **802.3 / 802.2 SNAP**

value is from 0 to 1500 (excludes any padding)



Cisco-proprietary protocols are often encapsulated in “SNAP” frames, with OUI = 0x00000c (registered to Cisco) - see next slide.

Cisco Protocols Using SNAP Frames

- Cisco's proprietary trunking protocol ISL (Inter-Switch Link) uses a form of SNAP framing.
- Some other Cisco protocols that target on-link neighbours (sent to a multicast address) using a SNAP frame with OUI 0x00000c plus a 2-byte Type (Protocol ID):
  - **CDP**: PID=0x2000 (Cisco Discovery Protocol)
  - **VTP**: PID=0x2003 (VLAN Trunking Protocol)
  - **DTP**: PID=0x2004 (Dynamic Trunking Protocol)
  - **PAgP**: PID=0x0104 (Port Aggregation Protocol)
  - **RLQ-REQ**: PID=0x0108 (Root Link Query Request)
  - **RLQ-ACK**: PID=0x0109 (Root Link Query Acknowledge)
  - **PVST+**: PID=0x010b (Per VLAN STP and RSTP)
  - **UDLD**: PID=0x0111 (Uni-Directional Link Detection)