Hardware Addressing and Frame Type Identification

Chapter 9

Addresses
- Remember that all computers receive the same messages on a shared medium.
- How does the intended recipient know the message is for it?
- Addresses are used.

Network Interface Cards
- Note that the initial processing of an incoming frame is performed in hardware.
- Then if the destination address is a match, the frame is passed on to the memory and CPU for further processing.

Type of Addresses
- Static - The hardware address is burned into the NIC Card permanently.
- Configurable - The user (software) can change the hardware address.
- Dynamic - The hardware address is assigned each time the computer is turned on. This is done automatically, usually with a randomly chosen address that no other computer on the LAN is using.

Broadcasting
- Usually one address is chosen for a broadcast address.
  - The Ethernet broadcast address is FF FF FF FF FF FF
- All NICs on the shared medium receive the broadcast message and pass it on for processing.
- Using the broadcast address it is possible to send a single message to all computers at the same time.

Multicasting
- With Broadcast addresses, all stations pass the frame to Memory and the CPU for processing.
- In many cases some, but not all of the stations need the information. Forcing all stations to process the message is inefficient if not wasteful of computer resources.
- How do you solve this problem?
- Multicast addresses.
Broadcast Example
• Note that all destination machines receive and process the message.

Multicast Example
• Notice that only some of the destination machines receive and process the message.

Identifying Contents of a Frame
• Explicit
  – Type is identified in a field
  – Example is Ethernet II Frame Type Field.
• Implicit
  – Need to agree on type, or use part of the data field
  – Example is Ethernet 802.2 & 802.3 which uses fields inside the data area.

Frame Format
• This is an Ethernet II Frame.
• Note that the Header and Payload are passed to the computer.
• The Preamble and CRC are used by the NIC and not passed to the computer.

A Frame in Hex
• 00a0 4b01 bf58 0050 045b 9e85 0800 4500 0054 05c7 0000 4001 f182 e0a8 0105 e0a8 010a 0800 3778 f603 0000 5542 4839 4005 0200 0809 0a0b 0e0f 1011 1213 1415 1617 1819 1a1b 1c1d 1e1f 2021 2223 2425 2627 2829 2a2b 2c2d 2e2f 3031 3233 3435 3637
• Frame Components
  – Destination address in blue
  – Source address in red
  – Frame type in green

IEEE Assigned Addresses
• Broadcast  FF FF FF FF FF FF
• CISCO  00 00 0C XX XX XX
• Novell  00 00 0B XX XX XX
• Wellfleet  00 00 A2 XX XX XX
• 3COM  02 60 8C XX XX XX
Frame Types

- 0000 to 05DC  IEEE 802.3 SNAP (length)
- 0800  IP Version 4
- 0805  X.25 level 3
- 0806  ARP
- 8035  Reverse ARP
- 8137 to 8138  Novell

Non Self Identifying Frames

- Agree on a single Format
  - seldom used
- Use Data Field
  - IEEE 802.3/802.2 LLC/SNAP

IEEE 802.3/802.2 LLC SNAP

- LLC is DSAP SSAP and Control.
- SNAP is Organizationally Unique ID & Type Value.

Protocol Analyzers

- Ethereal is an example protocol analyzer.
  - Uses Ethernet NIC card interface (promiscuous mode, not private)
  - Uses Linux/PC for processor.
- Another example is the HP Internet Advisor.
  - Has OC-12, OC-3, DS3, T1, 10/100 Ethernet and Gigabit Ethernet Interfaces.
  - Decodes ATM, Frame Relay, IP over SONET, Ethernet, and many Others.