CSET 2200 Lecture 11

Questions

Summary of TCP

AKA - What you actually need to remember

- Stream Oriented
- Reliable
  - In order delivery
  - Error Handling
- Providers Virtual Circuits
- Multiplexed

Summary of TCP

- Three Way Handshake initiates
  - SYN
  - SYN/ACK
  - ACK
- Four Way connection teardown
  - FIN
  - ACK
  - FIN
  - ACK

Summary of TCP

- Each packet sent gets an ACK
- Up to window size can be sent without an ACK
- Newer TCP does Window Scaling to get bigger

Questions

Layer 4 - UDP/ICMP

- UDP - User Datagram Protocol
- ICMP - Internet Control Message Protocol

UDP

- User Datagram Protocol
- Connectionless
- Unordered
- No guaranteed delivery

UDP (contd)

- PDU is datagram
- Stateless
- Can support broadcast

UDP (contd)

- Used when overhead of TCP too high
- Delay sensitive such as video or voice
- Broadcast and unidirectional well suited for some applications

UDP Header

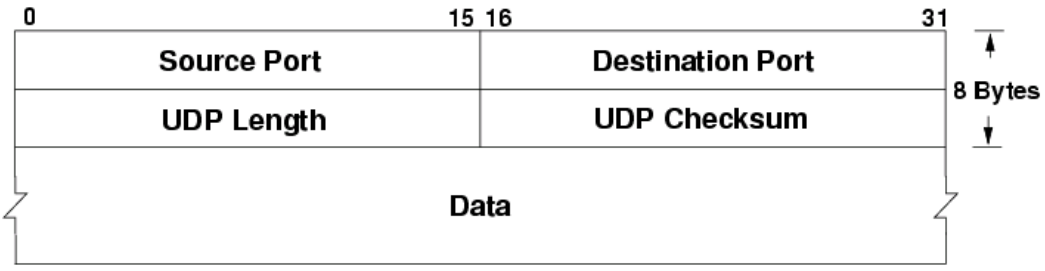

Figure 1: UDP Header

ICMP

- Internet Control Message Protocol
- "Control Messages" for IP
- Technicall Internet Layer
- Still Layer 4 in OSI model

ICMP (contd)

- Used by many internet utilities
  - ping
  - traceroute
- Also used to send errors
  - Destination Unreachable
- Many misc functions

ICMP Header

ICMP Header Format

Offsets	Octet	0								1								2								3							
Octet	Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	0	Type								Code								Checksum															
4	32	Rest of Header																															

Figure 2: ICMP Header

Type Field

- 0 = Echo Reply
- 3 = Destination Unreachable
- 5 = Redirect
- 8 = Echo Request
- 11 = Time Exceeded

Code

- Depends on Type
- Type 3 has many, 5 and 11 a few
- Type 3
  - 0 = Destination Network Unreachable
  - 1 = Destination Host Unreachable
  - 4 = Fragmentation Required - DF Set
  - 9 = Host Admin denied
  - 10 = Network Admin Denied
  - 13 = Communication Admin Denied

Ping

- Sending host sends echo request
- Receiving host replies with echo reply
- Payload data the same

Traceroute

- Host sends packet with ttl of 1
  - ICMP Echo request, UDP or TCP
- TTL expires, router or host replies with ICMP Type 11
- Increment TTL and send again until response received from target

Questions

End of Layer 4

Subneting

Next class

- Discussion of layers 5/6
- Start of discussions on some Layer 7 protocols