

INFO 310

Fall 2016

Week 5 – Lecture 1

HOUSEKEEPING

- Attendance
- Quiz I Return

Intro to Networking

- Ethernet
- Network Adapters
- MAC Address (Media Access Control Number)
 - Unique identifier assigned to network interface
 - 48bit HEX, eg AA:BB:CC:DD:EE:FF, 00:11:AA:33:44:FF
 - First 24bit are the Manufacturer ID number
 - Usually set in network interface firmware, but can be changed through OS software.
 - Must be unique per network or collisions occur

Internet Protocol Version 4 (IPv4) Protocol Suite

Frequently used (non-exhaustive)

- ARP (Address Resolution Protocol)
- TCP (Transmission Control Protocol)
- UDP (User Datagram Protocol)
- ICMP (Internet Control Message Protocol)
- DHCP (Dynamic Host Configuration Protocol)
- DNS (Domain Name System)

IP (v4) Address

- Internet Protocol Version 4 Address
- 32 bit number, written in “dotted quad” notation:
 - Eg. 128.208.112.1
- Each spot contains 8 bit, also referred to as octet
- 8 bit: $2^8 = 256$, but 0 counts, so max value per octet is 255
- RFC 1918 “private” (non-routable) address space:
192.168.0.0/16, 10.0.0.0/8, 172.16.0.0/12
- Just for reference: IPv6 address = 128bit

IP v4 Allocation

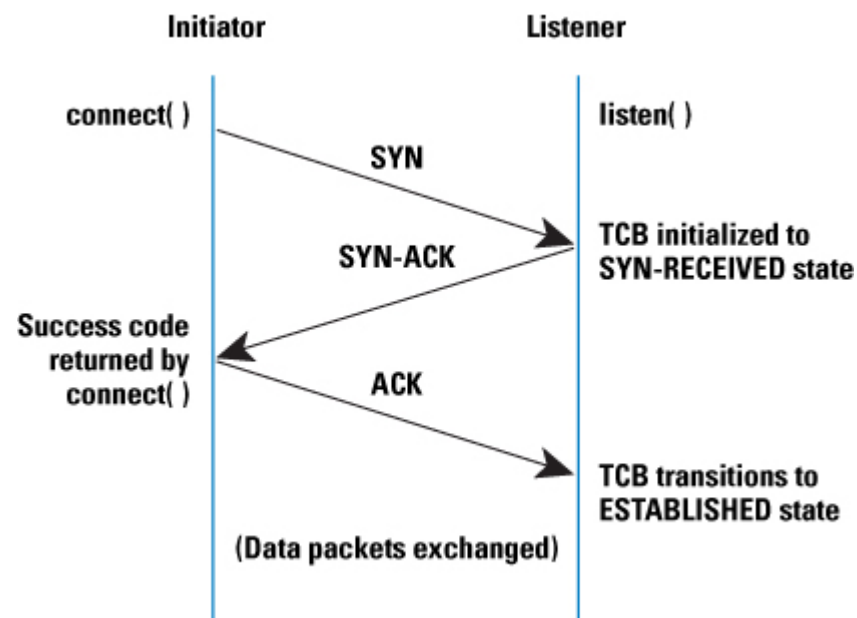
- ASN: Autonomous System Number
 - UW = ASN 73
- IANA: Internet Assigned Numbers Authority
 - Handles assignment of IP space
- UW owns these net blocks (and then some):
 - 128.95.0.0/16
 - 128.208.0.0/16
 - 140.142.0.0/16

How two hosts communicate

- ARP is used to find other “local” hosts even prior to IP address being assigned
- If IP address is assigned, ARP resolves IP <-> MAC binding
- If both hosts have IP addresses that are “local” to each other (on same subnet), then TCP/IP and other IP protocols can be used
- The subnet mask defines which hosts are “local” to each other (eg. 255.255.255.0)
- A gateway (router interface) is needed to communicate to hosts outside of the local network

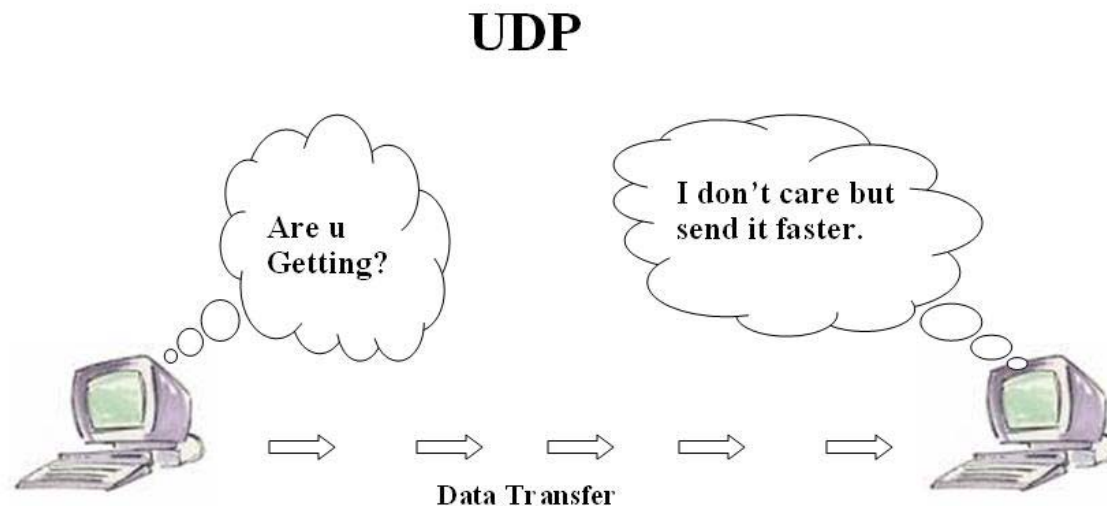
TCP 3-way Handshake

- A TCP connection requires a 3-way handshake between hosts: SYN, SYN-ACK, ACK



UDP: No handshake necessary

- Unlike TCP, UDP is a “connectionless” protocol
- Very efficient at delivering lots of data FAST
- But no flow control, no accounting for lost packages



NAT – Network Address Translation

The majority of NATs map multiple private hosts to one publicly exposed IP address. In a typical configuration, a local network uses one of the designated "private" IP address subnets (RFC 1918).

A router on that network has a private address in that address space. The router is also connected to the Internet with a "public" address assigned by an Internet service provider.

As traffic passes from the local network to the Internet, the source address in each packet is translated on the fly from a private address to the public address. The router tracks basic data about each active connection (particularly the destination address and port).

When a reply returns to the router, it uses the connection tracking data it stored during the outbound phase to determine the private address on the internal network to which to forward the reply.



WIKIPEDIA
The Free Encyclopedia

NEXT TIME...

IP Ports, OSI Model

<https://www.xkcd.com/1417/>



I HAVE THIS PROBLEM WHERE ALL SETS OF SEVEN THINGS ARE INDISTINGUISHABLE TO ME.

Read: Anderson, pages 633-640, 21.1-21.2.2.3

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LAB I

- Introduction
- Learning Objective
 - Instructions
 - Deliverable