Midterm Review 2

Focused only on transport layer (TCP and UDP)

Network Layer

Nothing else thats general or in application

TCP (IP)

* Just IP
* UDP doesn’t do much besides giving a “wrapper” for the protocol below it

What's better RDT or URT?

* It depends

**Chapter 3: Transport Layer**

• Communication between processes (transport layer) vs. between hosts (Network layer)

* Transport layer: end to end communication across different processes
* Network Layer: Routing of data packets between hosts

• TCP vs. UDP

* TCP: Very Relaible, sends all the necessary information
* UDP: Not reliable, only sends the very important bits of information.
  + Why use it:
  + Connection less
  + No connection established (can lead to RTT delay)
  + Simple
  + No congestion control, UDP can blast away

• “Multiplexing” and “demultiplexing” (specifically in the transport layer).

* Packaging packets from same IP address
* For demultiplexing
* Hosts receives IP datagrams
* Uses IP addresses and port numbers to direct data to appropriate socket

• Demultiplexing using more information under TCP than UDP.

* In UDP there is only the use of the destination port #
* In TCP, there is a 4tuple of the source and destination IP addresses and Port numbers

• The simple UDP checksum (its purpose).

* On payload
* Detect errors in transmitted segment

• State machines and their use to describe a protocol.

* State Machines prompt protocols based on the state of the machine and the transition

• Stop-and-wait vs. Pipelining

* Stop-and-wait: Send one and wait (acknowledgment)
* Pipelining: Sending everything

• Go-back-N (GBN) error recovery vs. Selective Repeat (SR).

* Go Back N: Goes back N number of bytes if there is an error detected. Used in streaming services
* SR: Used when there must be minimal error
* If there is a loss in packets, buffet the following packets till the lost packet is sent again
* Then it will send the rest (happens in the receiving side)

• The minimum number of sequence numbers required for GBN vs. SR.

• “Flow control” vs. “congestion control” (and how TCP ensures both)

* They are different
* Flow Control; Stream control to not congest the receiver
* Congestion Control: Being merciful to the receiver

• TCP’s "Slow Start"/AIMD and its relationship to "congestion control"

* It has a slow start grows exponentially when sending data when it feels its close it will additionally increase (AI in AIMD) and once congestion is detected it will Multiplicative decrease to half of its original flow and do small increments (additionally increase) to a good data flow

**Chapter 4: Network Layer - Data Plane**

• Communication between processes (transport layer) vs. between hosts (Network layer)

• Understanding the difference between “routing” and “forwarding”.

• Network layer service models and terms like: bandwidth, packet loss, packet ordering, packet delivery timing, and congestion feedback.

• Virtual-circuit (connection-oriented) vs packet switching (connectionless) service at the network layer.

• Forwarding tables of routers.

• The definition of a subnet, and how “longest prefix matching” works in routing tables (which you should remember use address ranges, not specific IP addresses).

• Explain the difference between the “control plane” and “data plane” in a router.

• The three types of switching fabrics in a router.

* Why: Routers day to day is forwarding stuff
* Picture router as box with input ports and output ports
* 1. Memory Copy based router
* 2. Buss model: A common rail where data is exchanged
  + cheap , reasonably fast
  + Not reliable in switching inputs and outputs
* 3. CrossBar: 2 dimensional. Can have multiple layer and be dense
  + Horizontal and vertical bars with paral
  + Expensive

• How packets may be queued at input, or output, ports in a router.

* Output data can queue even if input doesn’t

• Head-of-line (HOL) blocking (at the input port of a router).

* Happens when input queues get backed up because of the fabric being busy

• The role of (the need for) a Time To Live (TTL) field in IP header?

• The Header Checksum field of IP header (used to check the sanity of IP header, not the data field).

* Wrapped that goes around TCP and UDP packet
* Contains source and destination IP
* Expected to know
* Checksum is calculated for the header
* Service model of iP does not offer delivery of everything

• Subnet masks and Classless Inter-Domain Routing (CIDR) IP addresses.

• DHCP, and its basic functionality.

* Deals with IP address

• Network Address Translation (NAT), and how it works.

* Happens at the network layer
* Lie because we know the port numbers
* Needs to know Transport layer
* There's a reply needed: figure out where it needs to go back to

• Where to find the ICMP protocol (the layer that implements it, and its purpose).

**Chapter 5: Network Layer - Control Plane**

• The difference between centralized (global) and decentralized (distributed) routing algorithms.

* Centralized: (SDN) Routers are told there forwarding tables
* Link-state, and Distance vector: No central authority telling them what to do

• The difference between link-state and distance-vector routing algorithms.

* Link state: “who should I connect to?”

• The count-to-infinity problem (for distance vector routing).

DATA PLANE vs