Computer Networking Past Paper

0. Network and Architecture

Switching

- y2019p5q6 (a)
 - multiplexing in five layers
- y2016p5q6 (a)
- y2018p5q5 (a)
 - Packet switching and Circuit switching
- y2019p5q5 (a)
 - marshalling taking up transmission time vs propagation delay
 - TDM
- y2017p5q4 (b)
 - $\circ~$ queueing, \propto contention, B=2T imes C
 - $\circ~$ processing, unusual packets, pprox 0~
 - \circ transmission, the capacity of the link, size(pkg)/Exception
 - $\circ~$ propagation, \propto distance, WAN

Architecture

- y2017p5q4 (a)
 - hop-by-hop vs end-to-end, encryption

1. Physical Layer

- y2014p5q5 (b)
 - Queueing
- y2013p5q4 (a)
 - Coding
- y2019p5q5 (b,c)
 - Coding, multilevel encoding
 - Error Correction, redundancy and FEC
 - CDMA, chipping / gold code

2. Data Link Layer

- y2013p5q4 (b)
 - CSMA/CD, CSMA/CA
- y2021p5q6 (b)
 - CDMA, CSMA/CA, VLAN

- y2021p5q4
 - Topology, Forwarding table, Troubleshooting
- y2020p5q4
- y2023p5q3 (a)(i,ii)
 - Spanning Tree

3. Network Layer

- y2020p5q5
 - fault finding
- y2020p5q6
 - DHCP, ARP
- y2021p5q5
 - ICMP, topology, ping, trace-route, whole-system debugging
- y2018p5q5 (c)
 - subnet
- y2021p5q6 (a)
 - subnet and IPv6
- y2016p5q5 (a)
 - IPv6 address
 - IPv4 vs IPv6, DHCP vs SLAAC
- y2023p5q3 (b)
 - IP Troubleshooting
- y2017p5q5 (b ii,iii)
 - Fault finding, Classless Inter-Domain Routing, trace-route

Routers

- y2018p5q6 (a,b)
 - a switch vs router
 - distance-vector
- y2017p5q5 (a)
 - Router Control vs Data Panel (line-card)
- y2022p5q1
 - shortest path in a satellite network
- y2023p5q3 (a)(iii,iv)
- y2018p5q5 (b)
- y2014p5q4
 - Link-state vs Distance Vector protocol
- 4. Transport Layer

Reliable Data Transfer

- y2011p5q5
- y2014p5q6
 - ∘ FSM

UDP(QUIC), TCP

- y2022p5q3 (a,b), y2009p5q7 (a), y2017p5q6
 - Flow-control and Congestion-control
- y2019p5q4
 - TCP, ARQ; QUIC
- y2022p5q2
 - TCP; QUIC
- y2016p5q6 (b)
 - TCP retransmission timeout
 - Exponential Average (EWMA filter), Jacobson/Karels Algorithm
- y2018p5q6 (c-e)
 - TCP, Karn-Partridge algorithm
 - Max-min fairness, limitations(cheat)
- y2017p5q5 (b i)
 - Fault finding, TCP

Network buffers

- y2013p5q4 (c)
 - $\circ ~~B=2T imes C$, assumptions
 - Reference: Buffer Size Rule, Stanford, Note on Buffer size BDP

5. Application Layer

- y2014p5q5 (a)
- y2019p5q6 (b,c)
 - DNS
- y2016p5q4 (a)
 - HTTP, Connections, latency, RTT, bandwidth,
- y2013p5q5
 - Cache, CDN
- y2022p5q3 (c,d)
 - Cache
- y2016p5q4 (b)
 - conditional GET