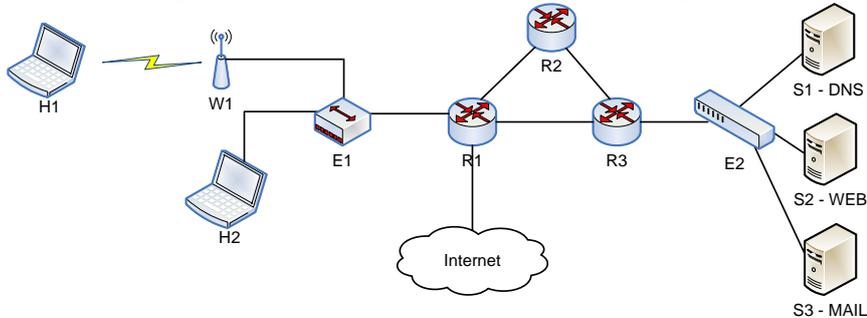




## EP1100 Datakommunikation och datornät

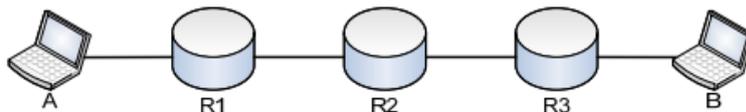
### 7. Previous Exam Problems (2)

**C1.** All nodes in the figure below are part of the KTH network which is an autonomous system. H1 and H2 are client end hosts. E1 is an Ethernet repeater and W1 is an 802.11 access point. R1, R2 and R3 are routers and they are connected by Ethernet links. E2 is an Ethernet bridge, S1 is a DNS-server, S2 is a web server and S3 is the KTH mail server. R1 is the gateway router that connects this autonomous system to the rest of the Internet.



- Imagine that H1 wants to send an e-mail to H2. List all application and transport layer protocols that are used both in sending and receiving the mail at H2.
- You are working on the laptop, connected wirelessly to the KTH network. You want to access a web page on the web server S2. Provide a list of the protocols that are (or might be) used across and in the internet when your computer fetches the contents of the page from the web server. Assign each protocol to its appropriate layer. Justify your answer.
- Assume that all caches in the network are empty, and you open a command line terminal on H2 and issue the command `ping www.webserver.com`. Explain the sequence of packets that would be exchanged on the link between H2 and R1 (the default gateway) until you receive an answer from the web server.

**C2.** A linear network consists of two end stations (hosts) and three routers. The bitrates of all links is 10 Mb/s and every router can buffer infinitely many packets. Assume that the propagation delay on each link is 0. At time  $t=0$  host A begins sending 10 packets to B of size 5000 bits each.



- When will all packets arrive at B if none of them are lost?
- Now assume that the bit-rate of link  $\langle R2, R3 \rangle$  is 1 Mb/s. When will all packets arrive at B if none of them are lost?

**C3.** You are working on a project to build an online game and you have several design considerations when it comes to the networking part. Which of the transport protocols, TCP or UDP, would you use if the application had to meet the following requirements? (briefly motivate your answers) (3p)

- Speed (responsiveness)
- Long messages
- Short-duration interactions
- Fairness between competing flows
- Reliability (for example, for in-game purchases)

**C4.** Consider the following network constituting three autonomous systems (AS1 ... AS3), four routers (R1 ... R4), and five networks (N1 ... N5). Name the routing protocol(s) that are installed on the routers and show the path table in router R2.

