

Computer Networks and Distributed Systems

Reference Solutions to Questionnaire no. 1 on the Foundation chapter

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The following questions are meant for you to review the concepts and structures we introduced in the first lecture and lab. I recommend that you have at hand the textbook and the relevant presentation and lab script so you can readily consult the materials as you work each question.

1. Name the types of networking equipment you can recall from the lecture and the lab session of this week.
We briefly introduced Hosts, NIC's (Network Interface Cards), Switches and IP Routers

2. Regarding the concept of value of a network (Metcalf's Law), what role do you think scalability plays in this context?

Metcalf's law states that the value of a network that has N hosts increases with N^2 . This law, however, assumes that the one-to-one communication capability is preserved as we increase N , which is not true for all the technologies (See fig. 1, also included in the presentation of the first lecture).

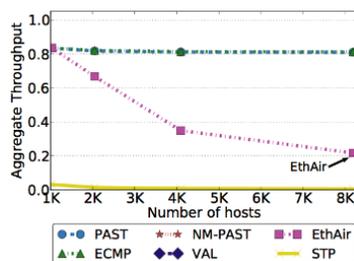


Fig. 1: Not all network technologies scale equally

When a technology is not capable of providing its function when the number of users (In our case, the number of hosts, represented by N) grows beyond some value N_0 , we state it doesn't scale beyond N_0 . All in all, Metcalf's law doesn't consider whether the network technology under study scales well or not.

3. The network architectures relevant to this course (CN), are they organized into layers or otherwise?
The two network architectures considered in this course are organized into 4 layers (TCP/IP) and 7 layers (OSI). We introduced them in the last lecture and will continue their study on our next lecture.
4. Consult the textbook to determine what the network layer does
Let's consider the Internet Architecture. The network layer in this architecture is the second layer. In page 34 of the Computer Networks textbook by Peterson & Davie, you may read:

The second layer consists of a single protocol – the Internet Protocol (IP). This is the protocol that supports the interconnection of multiple networking technologies into a single, logical internetwork.

5. Which of the Internet applications mentioned in the lecture (Slide no. 4) do you think is the most challenging

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for the network?

In my opinion, it's Video Conferencing the application that poses that highest requirements over the network.

6. In which units is the bandwidth of your internet access specified: bits, bytes, bits per sec or bytes per sec?
The point-to-point bandwidth of your internet access connection is usually specified in Mbps, ie., Mega bits per second or $\frac{Mbits}{sec} = \frac{10^6 bits}{sec}$
7. Calculate the maximum potential connectivity of a network comprised of 10 IP routers.
The maximum potential bidirectional connectivity reachable with 10 routers is equal to $10 \cdot (10-1) = 90$
8. The current scale of Internet is about 2500M of hosts. According to slide no. 11 in the presentation used in the lecture, which protocol is responsible for this huge scale?
The IP protocol
9. How many networks result when a number of switches are connected?
Assuming conventional switches in their most basic form, any correct interconnection of switches will yield a single local network.
10. What's the network equipment used for interconnecting networks?
The most important equipment for interconnecting networks is the IP Router.