Suggested Answers to Week 1 Activities

Activities 1, 2 and 3

50.012 Networks, 2018

1. **Activity 1: Size and Growth of the Internet.**
   According to one source there are fifty billion nodes predicted to be on the Internet by the year 2020. See

   `https://www.electronicsweekly.com/news/business/information-technology/fifty-billion-internet-nodes-predicted-by-2020-2013-01/`

   It is estimated that the Internet is doubling approximately every 18 months. What is the estimated size of the Internet (in number of nodes) in the year 2029? Do you think this estimate is reasonable? Why or why not?

   Answer:
   Let N be the number of devices in 2020. In 18 months i.e. $1\frac{1}{2}$ years the number of devices connected to the Internet will double. Thus every 18 months the number doubles. There are six eighteen month periods betwen 2020 and 2029. Thus in this period the number of devices will become 2^6N = 64N devices. Thus total number of devices on the Internet is expected to be 64 x 50 billion = 3200 billion = 3.2 trillion by the year 2029.

   This number may be fewer than the actual number because of the proliferation of IoT.

2. **Activity 2: DNS Lookup.**
   Find out information about the company abracadabra.com using mxlookup, monitis or software on your computer such as dig / nslookup. Find out the following details:

   - IP address:

- Using the IP Address use mxlookup to do an Reverse DNS lookup – do you get the same domain name? Can you explain your answer?
- Which is their primary DNS server
- Which is their authoritative name server?
- Could you find more than one? How can you explain it?
- Find out the ASN of the AS that the domain belongs to
- Find out email gateway(s) if possible
- Find out security related information (keys, Hashing algorithms etc.)

Suggested Answer:

Please note that some of your answers may differ from the following.
Domain Name: abracadabra.com
IP Address: 159.65.37.60
Domain name after Reverse DNS lookup:
classic50.allwebnow.com (the company probably subscribes to protection from DDOS attacks from their ISP located at this host)
Primary DNS server: ns1.allwebnow.com (an SOA or Start of Authority record was found for ns1.allwebnow.com)
Authoritative Name Servers: ns1.allwebnow.com, ns2.allwebnow.com, ns3.allwebnow.com, ns4.allwebnow.com
More than one can be seen. All are authoritative.
ASN Number: AS14061
Country: US Registration Date: 2012-09-25 Registrar: arin Owner: DIGITALOCEAN-ASN - DigitalOcean, LLC, US.
This information was obtained from https://www.ultratools.com
email gateway is: webmail.abracadabra.com This information is not directly visible, however it does appear that an MX record exists on the DNS server. From other sources the mail server shows as being the same as the webserver.
Security related informaiton:
There are two entities that identfy themselves as being certification authorities, Let's Encrypt Authority with sha256RSA algorithm, and Digital Signature Trust Co. which issues both sha1RSA and sha256RSA certificates. Let's Encrypt advertises that it is a CA offering free SSL certificates.
Public key The way to get the Public key is to login to the secure

HTTP url: https://abracadabra.com, click on the lock in the top left hand corner and click on "view in browser", and then "public key algorithm".

3. **Activity 3: Subnet and Host addressing.**
   If I want just one device to be on the network, can I set the subnet mask to 255.255.255.255? For example, consider the following configuration: IP address 10.0.0.10 Subnet mask 255.255.255.255 Gateway 10.0.0.1

   10.0.0.10 will be the only device in the network talking to the 10.0.0.1 gateway? Is there a problem with this configuration? If no, explain. If yes, can you fix the problem.

   Answer:
   The subnet mask is incorrect. Since all bits are set to 1, no room is left for any host on the subnet. To fix the problem a least two bits should be reserved for the subnet. Thus the subnet mask should be set to 255.255.255.252. Then the host address can be set to 10.0.0.2 and the gateway can be set to 10.0.0.1 (or the other way around). Note that 10.0.0.0 is the subnet address and 10.0.0.255 is broadcast address, and these addresses are not assigned to hosts.