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**Week 2**

1. For the OSI seven-layer model, explain in your own words the function of each layer and list examples of protocols for each of the layers. This can be in list or chart form.

Mnemonic - **P**eople **D**on't **N**eed **T**hose **S**tupid **P**ackets **A**nyway

Julia Evans has a good comic that touches OSI on page 8.

<https://jvns.ca/linux-comics-zine.pdf> (Evans, n.d.)

Another great resource is from the tcpipguide website.

<http://www.tcpipguide.com/free/t_UnderstandingTheOSIReferenceModelAnAnalogy.htm> (Understanding The OSI Reference Model: An Analogy, n.d.)

|  |  |  |
| --- | --- | --- |
| Layer | Name | Desc |
| 1 | Physical | Bits moving from one place to another. Electrical Engineering |
| 2 | Data Link | Ethernet protocol. |
| 3 | Network | IP’s |
| 4 | Transport | TCP/UDP ports |
| 5 | Session | Defines the “conversation” between the end points once 1-4 are done. |
| 6 | Presentation | Translation into network format to application layer. Reading data in packet and routing it internally to application on the system |
| 7 | Application | Http, https, ssh, etc.. User interactions occur here. |

1. Run and explain the command(s) for determining the network information on your PC or other device. Include all critical network information for your PC or device, such as IP address, MAC address, subnet mask, DNS server, etc. Include screen captures to show your work.

IP/subnet mask needs to calculate using CIDR

32 – 24 = 8

2^8 = 256

Starting at 0 this means netmask is 255.255.255.0

A picture containing text

Description automatically generated

Or this way.

A screenshot of a cell phone

Description automatically generated

MAC

A picture containing indoor

Description automatically generated

DNS

A close up of a sign

Description automatically generated

1. Explain at least two similarities and two differences between IPv4 and IPv6.

(Comparison of IPv4 and IPv6, n.d.) (Comparison of IPv4 and IPv6, n.d.) <https://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzai2/rzai2compipv4ipv6.htm>

Similarities

Both support unicast and multicast.

Both have ping functionality

Both support QoS.

Differences

32bit address(IPv4) vs 128bit address(IPv6)

Loopback 127.\*.\*.\*(IPv4) vs 0000:0000:0000:0000:0000:0000:0000:0001 or ::1(IPv6)

1. Explain the purpose behind DNSSEC.  How does it use cryptography to secure network traffic?  How is it used by organizations to ensure network security?

DNS is the glue that takes human readable domain names and translates to IP addresses.

A close up of a screen

Description automatically generated

I can remember <http://www.walmart.com> but there is no way I could remember that specific IP address nor would it be beneficial for \*everyone\* to all go to one IP address. (CDN’s and redundancy issues.)

But this inherent trust means that if an attacker can fake a dns lookup they can effectively direct traffic to an IP they control or other actions like that. To provide that in steps public key encryption. Each DNS zone owner signs data in their zone to generate a digital signature. This flows down from the root server down to each zone that then creates a certificate. This creates a chain of trust. So the .ORG owner will sign the foo.org, which in turn will sign bar.foo.org. So when I query bar.foo.org, I walk the chain of trust back and am able to know that the nameserver is the authorized nameserver for giving this info as well as that the response didn’t get modified in transit. (I butchered this so here is a better explanation.) (DNSSEC – What Is It and Why Is It Important?, n.d.)

# Bibliography

*Comparison of IPv4 and IPv6*. (n.d.). Retrieved from IBM Knowledge Center: https://www.ibm.com/support/knowledgecenter/ssw\_ibm\_i\_73/rzai2/rzai2compipv4ipv6.htm

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