### **Networking and the Internet**

### **Duration: 2 Weeks**

### **Summary**

This lesson covers most of the Internet Big Idea. It describes network protocols including Data Link (ethernet and wifi), Network (IP protocol, IP addresses, DHCP, Domain Name Service), Transmission (brief description of TCP), and Application (HTTP, SMTP, and others).

The reading and first lectures describe the OSI protocol stack and the prominent protocols at most of the layers.

The assignment has the student work with network protocols and services. It has them find the network parameters (IP address, DNS server IP address, gateway IP address, etc.) for a computer. It has them trace network activity as it hops along its Internet route. It has them trace the geographic location of the origin of an email by looking at its SMTP header. It introduces them to web pages and web servers by making a Google Site web page and explaining how it is hosted on a web server.

### **Learning Objectives**

* Explain characteristics of the Internet and the systems built on it. [AP CSP P5, LO 6.2.1]
* Explain the abstractions in the Internet and how the Internet functions. [AP CSP P3, LO 6.1.1]
* Define what a *network protocol* is.
* Explain how open models like the OSI model, and protocols, enable widespread use of the Internet.
* Explain that routing on the Internet (hops) is hierarchical and redundant.
* Define what an *IP address* is.
* Explain that an IP is hierarchical and what *sub-netting* is.
* Define *Domain Name Service*.
* Explain how domain names are hierarchical and what a *sub-domain* is.
* Describe the functions of various network devices (e.g. router).
* Identify and describe the parts of a URL.
* Perform a WHOIS lookup to determine information about a registered domain.
* Find the network settings on a personal computer.
* Trace an email using its originating IP address.
* Use a trace route tool to trace the route that data takes in a simple Internet interaction.
* Explain how the size and speed of network systems affect their use.
* Define *network bandwidth* and *network latency*.
* Describe the *World Wide Web* including the basics of the *HTTP* protocol.
* Describe how *email* works including the basics of the *SMTP* protocol.
* Explain how the characteristics of the Internet influence the systems built on it. [AP CSP P4, LO 6.2.2]

### **Course Material**

* Watch: [The Internet - Wires, Cables and Wifi](https://www.youtube.com/watch?v=iV-YqG70wbQ) [6:40]
* Watch: [The Internet- IP addresses and DNS](https://www.youtube.com/watch?v=MwxMsaFFycg) [6:45]
* Watch: [The Internet - Packets and Routers](https://www.youtube.com/watch?v=aD_yi5VjF78) [6:25]
* Watch: [The Internet - HTTP and HTML](https://www.youtube.com/watch?v=1K64fWX5z4U) [7:06]
* Watch: [Web Pages, Web Servers, Google Sites](https://www.youtube.com/watch?v=FhPMiX-CvAk&feature=youtu.be) [22:32]
* Read: [Computer Networks](http://computing-concepts.cs.uri.edu/index.php/Computer_Networks)
* Watch: [How to do Computing Networks Assignment](https://www.youtube.com/watch?v=qhVLqwYTBJA) [21:54]

### **In Class**

Optional: [Network Protocols Unplugged](http://csunplugged.org/network-protocols/)

### **Assessments**

* Conceptual Quiz:
  + [Computer Networks](https://docs.google.com/document/d/1VbB0SFUv-KmvMCR4yfRy636HZpLlvg8kuGuYkufd6lc/edit?usp=sharing) (requires access)
* Practical Assignment:
  + [Computer Networks](https://drive.google.com/open?id=1ziXLV6ywp_kkY6e3ONaqe6cHXTqvDAOYLjUGeVXF7yk) | [Grading Rubric](https://drive.google.com/open?id=1tJabEKHw7zz5FkWYCnj2yr3m7WStqiV7SREQLVr99AQ) | [Answer Key](https://docs.google.com/document/d/1A0s6VKShyfOk2uT7EkkyPjN80rUTOXUpLUeLc2TTTzU/edit?usp=sharing)