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| **Grade: 9 - 12** | | **Unit: Networking** | |
| **N1: Exploring IP Addresses using Network Traffic Packets** | | | |
| **Topic:**   * IP Addresses * Server-Client relationship | | **Materials:**   * Class set of computers, with:   + Internet connection   + Ability to run command line/ terminal   + [Wireshark/tshark](https://www.wireshark.org/download.html) installation   + Modern web browser | |

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| **Science & Engineering Practices (SEPs)** | **Disciplinary Core Ideas (DCIs)** | **Crosscutting Concepts (CCs)** |
| * **Not applicable** | * **Not applicable** | * **Not applicable** |

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| **APCSP Enduring Knowledge Standards:**   * EK6.1.1A The Internet connects devices and networks all over the world * EK6.1.1C Devices and networks that make up the Internet are connected and communicate using addresses and protocols. * EK6.1.1E Connecting new devices to the Internet is enabled by assignment of an Internet Protocol (IP) address. * EK6.1.1G The domain name system (DNS) translates domain names to IP addresses. * EK6.1.1H The number of devices that could use an IP address has grown so fast that a new protocol (IPv6) has been established to handle routing of many more devices. | | | |
| **Essential Question:**   * How does a computer identify where to send a message on a network? | | | |
| **Learning Target** | SWBAT contrast different IP protocols and recommend one for a particular network. | | |
| **Engage** | **(WEBSITES URLs HAVE EQUIVALENT NUMBERS)**   * Students setup on laptops in small groups & log on. * Instructions:   + Open a web browser (Google Chrome)   + Type the following URL and press enter:     - 172.217.12.142 (Google.com)     - 34.200.100.132 (ESPN)     - 52.6.111.61 (McDonalds)     - [104.193.88.123](http://104.193.88.123) (Baidu.cn)     - [130.211.198.204](http://130.211.198.204/) (Disney error)     - [31.13.71.37](http://31.13.71.37) (Facebook) | | |
| **Explore** | **(PING ACTIVITY)**   * Students are given basic instructions about how to “ping” a website. [PING ACTIVITY] * Student prompts:   + What is the average time it takes to ping Google.com?   + Try a different website that gives you a longer time.   + What do you think “ping” means? | | |
| **Explain** | * Elicit the following responses from students:   + “Ping” - send a message back and forth to someone (ie. ping-pong) * Watch [Code.org video about IP addresses](https://www.youtube.com/watch?v=5o8CwafCxnU&feature=youtu.be) * Draw on previous activity to come up with definitions for vocab:   + “server”   + “client”   + “IP Address”   + “latency” * How many different IP addresses exist? | | |
| **Extend** | **(IP ADDRESS VISUALIZATION TOOL)**   * Open the tool * Identify 3 websites * Generate 3 different traffic patterns * Determine which website goes with * Determine which IP address goes with what website using nslookup | | |
| **Evaluate** | * Discussion with Students:   + How many different IP addresses can you make with 4 bytes?   + How many different IP address can you make with 6 bytes?   + Which is better: IPv4 or IPv6? Why? * Exit Slip:   + Write 1 good reason to use IPv4.   + Write 1 good reason to use IPv6. | | |
| **Differentiation** | * Provide article “The Internet is Too Big” (2015) for students to read ahead of time to prepare them for the concepts   + <https://www.usatoday.com/story/tech/2015/07/03/internet-is-officially-too-big/29666003/> | | |