4.NI.1 Networks and the Internet

The student will identify the interrelationship between computing devices and a computing network. (a) Define client and server. (b) Describe how packets are used to transmit information on a network. (c) Describe factors that may affect the speed of data transmission. (d) Differentiate between networking tasks that require Internet access and tasks that do not require Internet access. (e) Model how computing devices in a network transmit and receive information.



Understanding the Standard

A network is a group of computers that can communicate directly with each other. Networks allow devices to share resources like hardware, software, and data, saving time and money. In a network, an individual device, or client, makes a request for data from a server, which responds to the request and transmits the data to the client. The data is sent in discrete segments of data called packets. Networks need a physical pathway such as an ethernet cable or a wireless pathway such as wifi in order to send information (often both types of pathways are used). Being familiar with how data is transmitted over networks helps students to be able to troubleshoot problems and to navigate them safely.

Term	Definition
Network	A group of computers that can communicate directly with each other.
Internet	A network, or system, that connects millions of computers worldwide.
Transmit	Send information from one device to another.
Client	A computer that connects to and uses the resources of a remote computer or server. (from <u>ComputerHope</u>)
Server	A software or hardware device that accepts and responds to requests made over a network. (from <u>ComputerHope</u>)
Packets	A segment of data sent from one computer or device to another over a network. (from <u>ComputerHope</u>)

Prerequisite Knowledge

Students should have foundational knowledge of how a network functions and be able to identify various types of electronic communication.

Integration Opportunities

English 4.C.2a. 4.C.3a Have students create and present a visual display of a computing system, accurately using content-specific vocabulary, descriptive details, and appropriate facts.

History Skills VS.e,f, VS.13

Students will assess communication networks throughout Virginia history, comparing and contrasting physical and wireless networking evolution (e.g., telephones to cell phones). Students will investigate how these networks have created greater collaboration globally and increased trade relationships.

History VS.2 Students will investigate how networks are used for greater communication and collaboration in preserving the historical practices and ideas of Indigenous nations in Virginia today. Students will discuss how methods of communication could be tailored to specific audiences.

Summary of a Lesson

Create a class model of how information is transmitted over a network. Assign students the roles of "clients" (stay in one location), "servers" (stay in one location), and "connectors" (carry requests and responses as "packets" along designated pathways). Designate the pathways over which connectors may travel. Have clients write requests on slips of paper and segment them into packets, giving each packet to a different connector to deliver to an assigned server. Once a server has received all packets, they assemble and read the request, write a response, divide the response into packets, and send the packets back to the designated client. After modeling,

have students create diagrams to illustrate how a network functions. A more detailed activity is described in Code.org's lesson <u>The Internet</u>.



