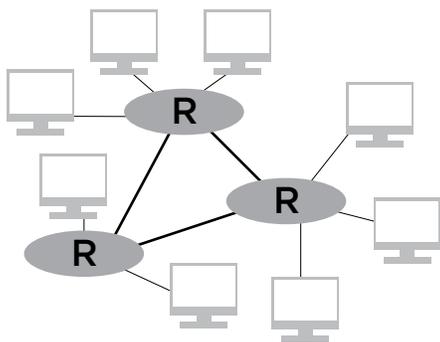


Overview

In order for computers to communicate across the Internet, they need a standard set of rules—or **protocols**—to dictate how the communication should happen, and how data gets from one place on the Internet to another. Without protocols, or standard ways of communicating information, computers would not have a way to transfer information across the Internet in a way that guarantees that the receiver will get the information, or that the receiving computer knows what to do with the information. Two important protocols are the Transmission Control Protocol—also known as TCP—and the Internet Protocol—or IP—which are often collectively known as TCP/IP.

Key Terms

- protocol
- IP
- router
- IP Address
- packet
- TCP
- port



Internet Protocol

Recall that the Internet Protocol (**IP**) sets the rules for how information is transferred from one computer to another. The Internet Protocol is structured as a web of connected **routers** (labeled as “R” in the diagram to the left), which are just devices that help to send information from one computer to another. Data will often need to pass through multiple routers to get from the sender’s computer to the destination. Each router is programmed with a set of instructions (stored in a “routing table”), that determine which direction to send data in order to reach the final destination.

IP Addresses

Just as homes need addresses so that mail can be delivered from one house to another, computers need addresses as well so that routers know where information is being sent from, and where information is supposed to be sent to. These addresses are known as **IP Addresses**, and they take the form **#.#.#.#**, where each # stands for a number in the range 0 to 255. When a user types a web address into their web browser, a Domain Name System (DNS) server translates a web address (like google.com) to an IP address (like 172.217.0.46).

Transmission Control Protocol

Instead of sending all of the data one computer wants to send to another computer as one big **packet**, information on the Internet is sent in smaller data **packets**. The Transmission Control Protocol (**TCP**) is responsible for breaking up data into ordered packets. Since there’s no guarantee that packets will arrive at the destination at the same time, or even in the same order, TCP labels each packet with the order it should go in. This way, the receiving computer can re-assemble the packets together in the right order.

In addition to assigning a packet number, TCP also assigns data a **port** number, to indicate what type of internet service the data should be used for. For instance, SMTP (email) uses port 25, while HTTP (normal web browsing) uses port 80.

In summary, to get data across the Internet: the data is first broken into smaller packets, TCP labels each packet with a port and packet number, IP tells the packet its destination, and the data is transmitted via routers which eventually direct the packet to its destination.

