A **network is** officially defined as **a group or system of interconnected people or items**.

There are **two main purposes** of computer networks: **Communication** using computers and **sharing of resources**. An “internet” allows doing these two things across different computer networks.

**The Internet**

The Internet is essentially a network of computer networks.

So your personal computer is connected to other computers at your house or workplace to create a small computer network, which is in turn connected to other computer networks. And so the global Internet encompasses a complex web of interconnected computer networks.

The **World Wide Web** (**WWW**), commonly known as **the Web**, is an [information system](https://en.wikipedia.org/wiki/Information_system) where documents and other [web resources](https://en.wikipedia.org/wiki/Web_resource) are identified by [Uniform Resource Locators](https://en.wikipedia.org/wiki/URL) (URLs, such as *https://www.example.com/*), which may be interlinked by [hypertext](https://en.wikipedia.org/wiki/Hypertext), and are accessible over the [Internet](https://en.wikipedia.org/wiki/Internet).

The resources of the WWW are transferred via the [Hypertext Transfer Protocol](https://en.wikipedia.org/wiki/Hypertext_Transfer_Protocol) (HTTP) and may be accessed by users by a [software application](https://en.wikipedia.org/wiki/Software_application) called a [*web browser*](https://en.wikipedia.org/wiki/Web_browser) and are published by a software application called a [*web server*](https://en.wikipedia.org/wiki/Web_server)*.*

## What Is a Protocol? [#](https://www.educative.io/courses/grokking-computer-networking/myV8DgE0pZn#what-is-a-protocol)

A set of rules governing the exchange or transmission of data between devices.

For example, most conversations start with greetings and end with goodbyes. They probably go something like this:

Turns out that end systems also follow such **protocols to communicate with each other effectively** on the network.

The **Transmission Control Protocol (TCP)** is one such protocol. It was created to allow [end systems to communicate effectively](https://www.educative.io/collection/page/10370001/6105520698032128/5759874585591808). The distinguishing feature of TCP is that it ensures that data reaches the intended destination and is not corrupted along the way.

The **User Datagram Protocol (UDP)** is also one such key protocol. However, it **does not ensure** that data reaches the destination and that it remains incorrupt.

**HyperText Transfer Protocol (HTTP)** is a web protocol that defines the format of messages to be exchanged between web clients, e.g., web browsers and web servers and what action is to be taken in response to the message. The World Wide Web uses this as its underlying protocol.

## Packets

Computers send messages to each other that are made up of ones and zeros (bits). However, instead of sending messages of possibly trillions of bits all in one go, they’re broken down into smaller units called **packets** to make transmission more manageable.

## Addressing

So, applications communicate with each other by sending messages based on protocols. However, packets have to be addressed to a certain application on a certain end system. An address identifies a sending entity and a receiving entity.

### IP Addresses [**#**](https://www.educative.io/courses/grokking-computer-networking/myV8DgE0pZn#ip-addresses)

Every device that is connected to the Internet has an address called an ‘IP Address’ which is much like a mailing address.

* IP addresses are 32 bit numbers (in IP version 4).
* The human readable way for looking at these numbers is the **dotted decimal notation**, whereby the number is considered one octet of bits (8 bits) at a time. Those octets are read out in decimals, then separated by dots.
  + Hence, each number can be from 00 to 255255. For example, 1.2.3.4.
* Some IP addresses are reserved for specific functions. We’ll discuss them in more depth in later lessons.

### Ports [**#**](https://www.educative.io/courses/grokking-computer-networking/myV8DgE0pZn#ports)

Any host connected to the Internet could be running many network applications. In order to distinguish these applications, all bound to the same IP address, from one another, another form of addressing, known as **port numbers**, is used.

Each endpoint in a communication session is identified with a unique IP address and port combination. This combination is also known as a **socket**. So in essence, ports help to address the packet to **specific applications** on hosts.

* IP addresses identify end systems but ports identify an application on the end system.
* Every application has a 16-bit port number. So the port number could range from 0 to 2^{16}=65535.
* The ports 0-1023are reserved for specific applications and are called [**well-known ports**](https://en.wikipedia.org/wiki/List_of_TCP_and_UDP_port_numbers#Well-known_ports) **or system ports**.
  + For instance, port 80 is reserved for HTTP traffic.
* The ports 1024−49152 are known as **registered** ports and they are used by specific, potentially proprietary, applications that are known but not system defined.
  + SQL server for example, uses port 1433
  + It is generally considered best practice not to use these ports for any user defined applications although there is no technical restriction on using them.
* The ports 49152–65535 can be used by user applications or for other purposes (dynamic port allocation for instance, but more on that later).

## Network Edge [#](https://www.educative.io/courses/grokking-computer-networking/m229DgnRrPr#the-network-edge)

The **network edge** is simply the collection of end-systems that we use every day: smartphones, laptops, tablets, etc. However, note that **devices that relay messages (such as routers) are not part of the edge of the Internet**.

## Access Networks [#](https://www.educative.io/courses/grokking-computer-networking/7AZNYYr1YJr#access-networks)

Access networks, also known as **the last mile**, consist of the media through which end systems connect to the Internet. In other words, **access networks** are networks that physically **connect end systems to the first router** on a path which connects them to some other end systems.