

Learning Guide

Learning Guide: Understanding the Internet

Foundations of the Internet

Understanding the Internet

The internet is a worldwide system that connects many separate computer networks, devices and services. It enables people to communicate, find information, learn, work, make payments and use services across towns, countries and continents. This guide explains the main parts of the internet and how information travels between them.

The Internet as a Network of Networks

A network is a group of connected devices that can communicate and share resources. It may be as small as two computers in an office or as large as a school, business or telecommunications network. The internet connects many different networks, including home, school, business, mobile and data-centre networks.

The internet is therefore not one single computer, building or company. It is a collection of cooperating networks that use shared communication rules. For example, a learner in Kisumu may use a phone connected to a mobile network, while another person may use a computer connected through home fibre. Both connections can reach services on the wider internet.

The internet and the World Wide Web are related but not identical. The internet is the underlying system of connected networks, devices, cables, wireless links and communication rules. The World Wide Web is a service that uses the internet to provide websites and web pages through browsers. Email, online banking, messaging, video calls and file transfers are other internet services.

- Local networks connect devices in a limited area.
- Internet service providers connect users to larger networks.
- The internet links many networks using shared standards.

The Main Parts That Connect You to the Internet

A local network connects devices in a home, school, office or library. Devices may use network cables or wireless signals. In a school, computers, teachers' laptops and a wireless access point might share a printer and connect to the school's internet service.

An internet service provider, or ISP, connects customers to larger networks and the wider internet. A household may use fibre, while a learner in a rural area may use mobile data. The connection method can differ, but both can provide access to internet services when suitable coverage, equipment and service are available.

A router directs data between networks. A home router may connect phones and computers to an ISP, while larger routers help telecommunications companies move data between cities, countries and continents. Transmission links carry the data between these networks. They may include fibre-optic cables, copper cables, radio links and satellite connections.

Fibre-optic cables carry information as pulses of light and are commonly used for high-capacity communication. Undersea fibre-optic cables carry much international internet traffic, while land-based cables, mobile networks and other links connect users to the wider system.

A Basic Connection Path



How Information Travels

When information is sent over the internet, it is divided into small units called packets. Each packet contains part of the message and information that helps networks deliver it to the correct destination. Packets belonging to one message may travel along different routes.

At the destination, the receiving system puts the packets back together so that the user sees the original message, photograph, audio or video. This process is normally very quick, although weak signals, congestion, distance or service problems can cause delays.

For example, when Amina in Kisumu sends a photograph to her cousin in Eldoret, her phone connects to a local wireless or mobile network. The photograph is divided into packets, which pass through an ISP and several routers. The receiving service or device obtains the packets, reassembles them and displays the photograph.

Devices also need addresses so that data can reach the right destination. An IP address identifies a device or network location. Because numerical addresses are difficult to remember, the Domain Name System, or DNS, helps translate familiar website names into the IP addresses associated with them.

- Information is divided into packets.
- Routers forward packets between networks.
- Packets may use different routes.
- The destination reassembles the information.

Clients, Servers and Communication Rules

A server is a computer or system that provides data or services to other devices. A client is a device or application that requests and uses those services. When you open a news website, your browser acts as the client by requesting content from a web server. The server then sends the requested content back to the browser.

Servers may be nearby or located in a data centre in another country. The distance and route can vary depending on the service and current network conditions. The same basic relationship applies when a device requests a web page, sends a message or uses another online service.

Connected devices need common rules, called protocols, so that they can address, send, receive and check information. Internet Protocol helps move packets between networks. Transmission Control Protocol can help check delivery and arrange packets in the correct order when required. Hypertext Transfer Protocol helps browsers and web servers exchange web content.

Secure communication protocols help protect information as it travels between a device and an online service. These shared rules allow equipment made by different companies and used in different countries to communicate.

What Happens When You Visit a Website?

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- Browser requests the website name**
 - DNS finds the associated IP address**
 - Request travels through local network, ISP and other networks**
 - Server sends content back in packets**
 - Browser reassembles and displays the page**

Benefits, Limitations and Responsible Use

The internet supports communication across towns, countries and continents. It can carry text, voice, video, images, documents and interactive services.

Learners can access educational material, businesses can communicate with suppliers and customers, and people can use services such as digital payments, online markets, health information and government platforms.

Access is not guaranteed everywhere. It depends on electricity, network coverage, suitable devices, affordability and technical infrastructure. A connection may also be affected by congestion, damaged cables, weak mobile signals, server failures or incorrect device settings. A slow connection does not always mean that the entire internet is slow; the problem may be limited to one device, network or service.

Responsible use includes protecting passwords, using different strong passwords for important accounts and enabling additional security where available. Before sharing personal information or making a payment, check whether the website or message is trustworthy. Be cautious with unexpected attachments, urgent requests and offers that seem too good to be true.

Online behaviour should also respect other people and creators. Avoid threats, harassment and harmful content. Think carefully before sharing photographs, location details, school information or other personal data. Respect copyright, acknowledge creators and keep devices, browsers and applications updated. Internet access should be inclusive, with consideration for barriers related to language, disability, cost or connectivity.

- Check a service before sharing personal or financial information.
- Use secure connections when accessing accounts on public networks.
- Keep devices and applications updated.
- Communicate respectfully and protect other people's privacy.

Practice / Reflection

1. Choose one familiar internet activity, such as sending a WhatsApp message, joining a video lesson, checking a weather report or making an online payment. Describe the device you use, how it connects to a local network, the ISP or mobile network involved, the online service or server you are reaching, and the information being sent or received.
2. Explain why this activity might become slow or fail. Then describe its path using these terms: device, local network, router, ISP, other networks and server.

Key Takeaways

- The internet is a worldwide network of interconnected networks, not one single computer or organisation.
- Devices connect through local networks, routers, ISPs and transmission links.
- Information is divided into packets that travel across networks and are reassembled at the destination.
- Clients request services, while servers provide data or online services.
- IP addresses, DNS and communication protocols help devices find and understand one another.
- The internet supports global communication and access to services, but access can be limited by infrastructure, cost, coverage and technical problems.
- Safe and responsible internet use includes protecting accounts, checking information, respecting others and considering privacy.