

The Beginning

Before the Internet, there was ARPANET



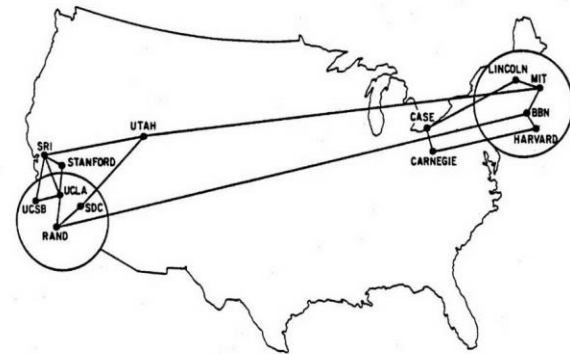
The ARPANET in December 1969

Prior to the creation of what is now known as the Internet, there was an academic research project funded by DARPA, the **Defense Advanced Research Projects Agency**. It was called **ARPANET** and it was initially used to simply connect the University of Utah with a few research centers in California. ARPANET used a novel approach to communication called 'packet-switching' which essentially breaks data into small 'packets' that can be more efficiently transmitted using electronic means. The goal of ARPANET was not just to increase communication; it was designed to make more efficient use of computing

resources. Another key goal was to facilitate the sharing of academic research in a more efficient manner. For example, computer scientists planned to use the system to share expensive resources with an array of other academic organizations.

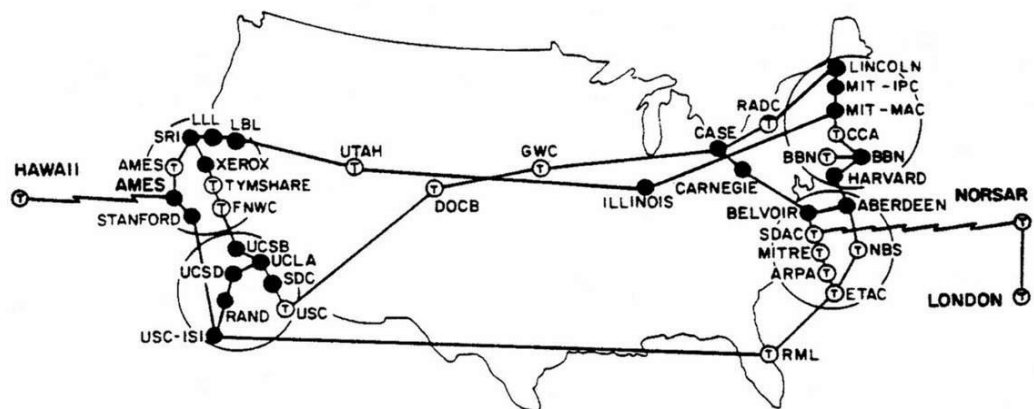
ARPANET Expands in 1970

At the close of 1970, ARPANET had expanded to 13 nodes including Harvard and MIT. Each node had a router that was called the **'Interface Message Processor.'** They each cost about \$82,200 which comes out to be roughly half a million dollars in current money.



ARPANET Expands Globally:

After a few years, ARPANET expanded into other countries. By using a satellite link connecting Hawaii, Norway, and London to nodes in the U.S., the network built a truly global reach. In 1973, there were a total of about 40 nodes and new applications for ARPANET had started to develop. For example, Email was invented in 1971 by an engineer named Ray

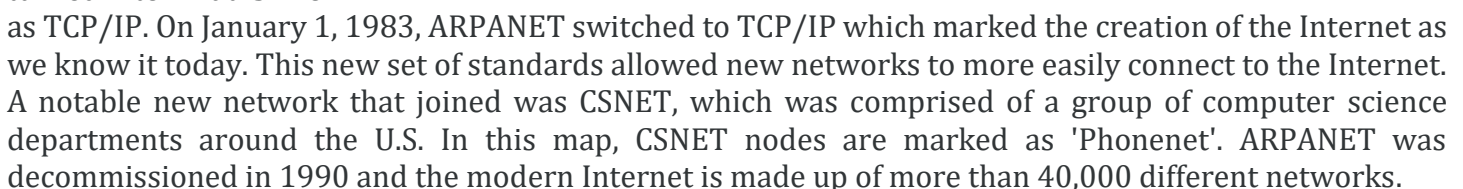


Tomlinson, the man who also invented the use of the '@' symbol in email. Another key application that was developed is the **File Transfer Protocol**, a method that let ARPANET users send files to each other.

One of the major applications of ARPANET got its start in 1980. It was called Usenet and was essentially an online discussion area where all members of ARPANET could communicate. Ideas, recipes, jokes, and opinions were all shared on a regular basis. This all happened decades before the creation of Twitter and Facebook. At this point, ARPANET consisted of roughly 100 nodes, mostly used by academic organizations that depended on federal funding.

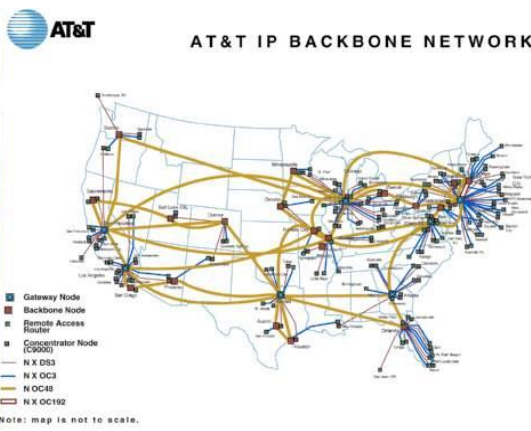
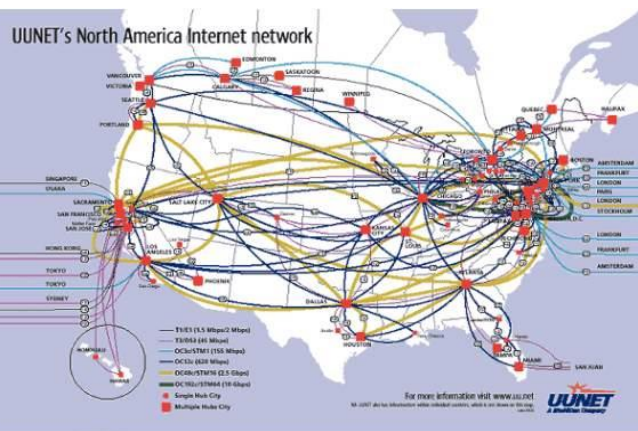
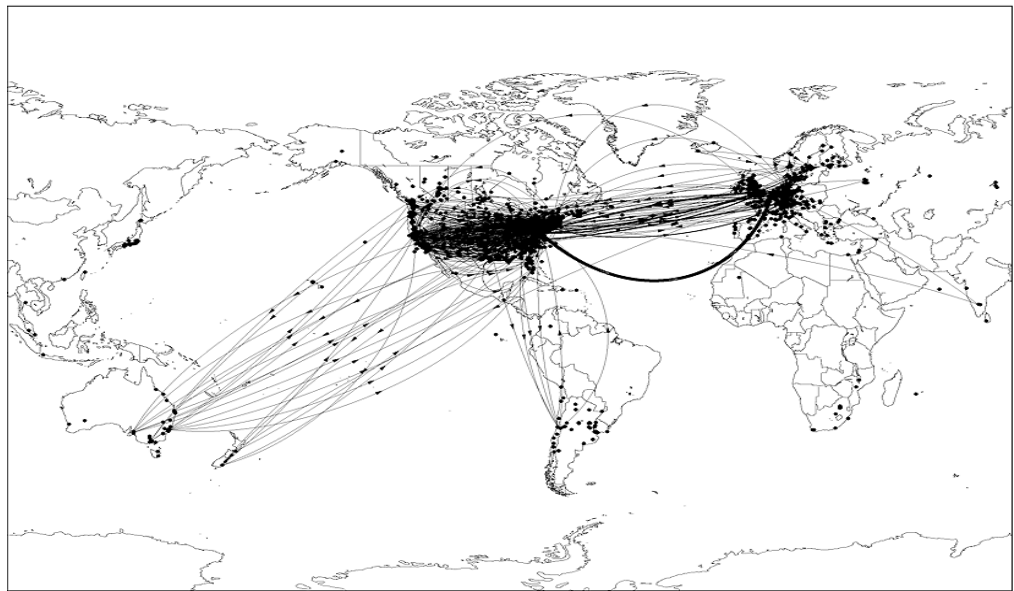


organizations rather than having a single overseer. In order to make this happen, these various networks would have to operate using a set of agreed-upon standards. This setup was then referred to as the Internet. In order to ensure the future of the Internet, the military asked computer scientists Robert Kahn and Vint Cerf to create new networking standards. This work turned into what is known



In 1993, the Internet Goes Truly Global

The Internet was a global phenomenon by 1993. This map details the flow of information on Usenet, one of the applications commonly used on the Internet at the time. As mentioned earlier, Usenet was a tool that let users share information, jokes, opinions, and to hold online discussions.



In 1994, Privatization Begins

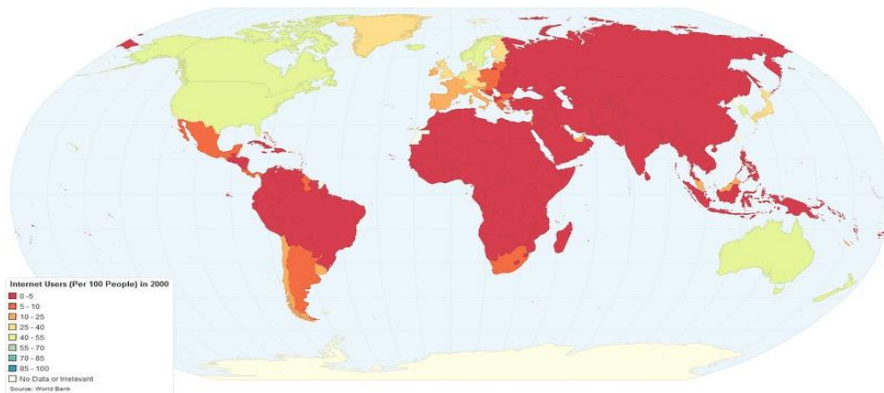
The privatization of the Internet began in 1994 when commercial organizations started providing the services of carrying long-distance traffic. This let the government-funded NSFNET to be decommissioned. To ensure that no single commercial organization controlled too much of the Internet, a competitive market structure was



established. As can be seen in the four maps, that market has evolved, but remains today. The maps show how each of the top four service providers built their network. These top providers were UUNet, AT&T, Sprint, and Level 3. There are currently more companies that provide this so-called 'Internet backbone.'

Lesson 3 of 6

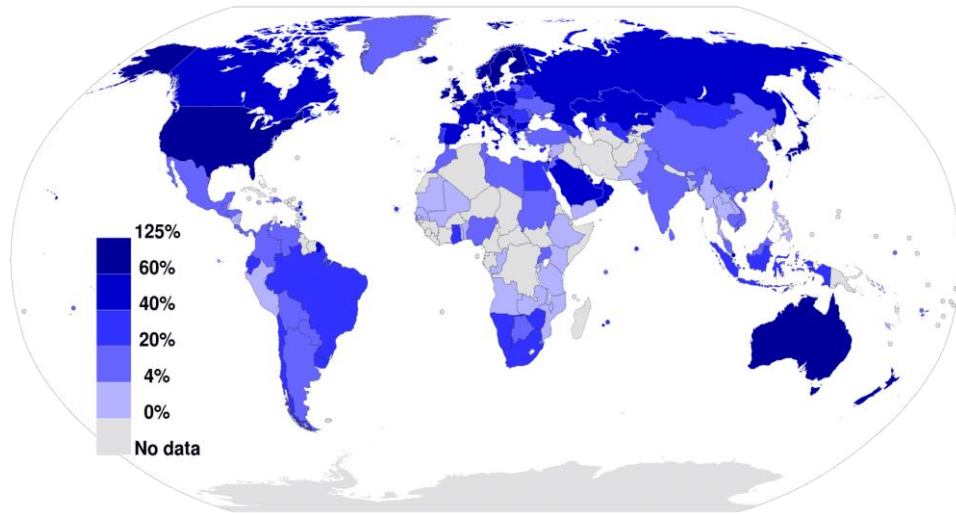
How the Internet Expanded into What It Is Today More than 2.5 Billion Users and Growing



Around the year 2000, nearly half of all Americans were online and using the Internet. This is in stark contrast to other countries where most people had not yet joined. At this point, there were less than 400 million Internet users around the world. Today, there are more than 2.5 billion users with hundreds of millions of new users joining every year. This map illustrates the growth of usage around the world.

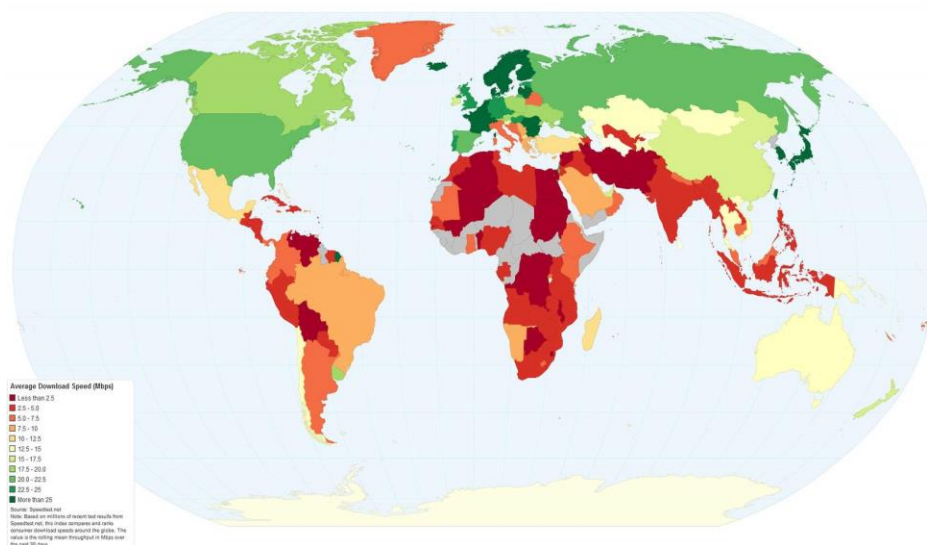
How Mobile Broadband Really Works

Many people now access the Internet using a mobile device. As you can see in this blue map, the amount of mobile penetration is strong in many countries. The darker the blue, the more mobile Internet access. Most developed countries have the most mobile usage. In terms of developing countries, many are deploying cell phone towers in order to increase connectivity without having to rely on fixed access points. For example, 2.7 percent of Egyptians have fixed broadband service while 10 times that have Internet access using a mobile device. An important note on the map: countries that are greyed out simply have no data. It does not mean they have no mobile connectivity



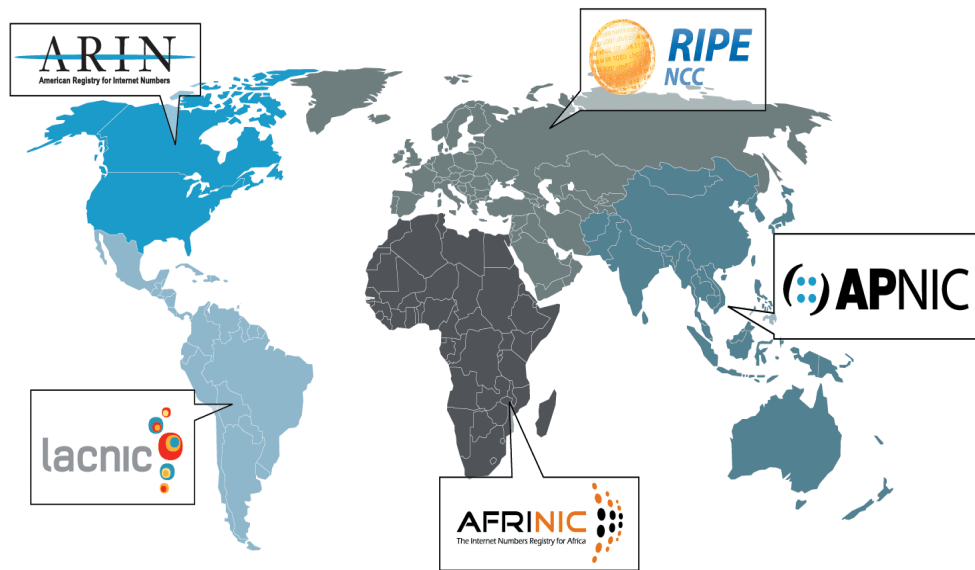
Where are Internet Connections the Fastest?

Many developed countries currently have the fastest Internet access. According to Speedtest.net, Hong Kong has the fastest with an average connection of 80Mbps. Other top countries include Japan, South Korea, Sweden, Romania, the Netherlands, and Switzerland. The United States is 30th with an average connection speed of about 24 Mbps. This data is based on visitors to Speedtest.net and is therefore potentially bias toward users in countries with higher connection speeds.



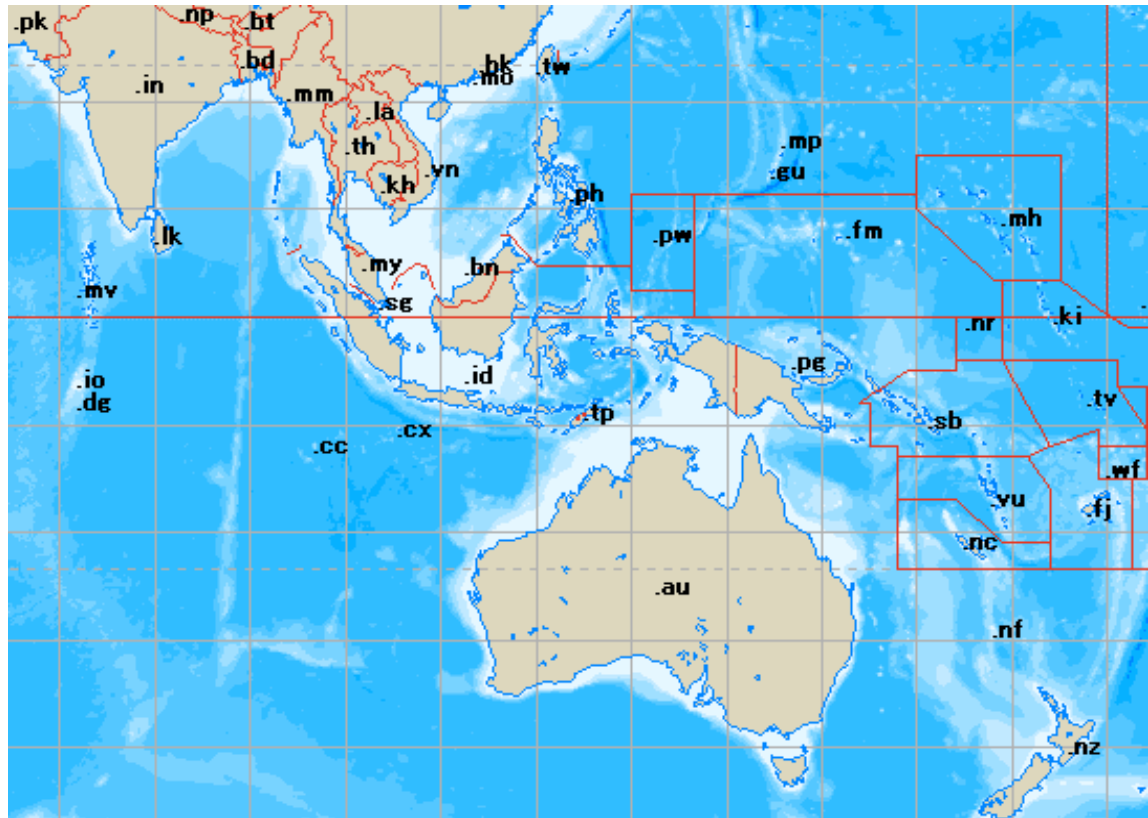
Who oversees (In charge for) IP Addresses?

Every device you use has what's called an Internet Protocol (IP) address. This is a unique identifier like a phone number or email address except it tells the Internet about your device. In order to organize and manage the IP addresses of all the devices connecting to the Internet, 5 separate zones were created. Originally, a standard called IPv4 was used and there were about 4 billion IP addresses available. Since the number of connected devices has been rapidly expanding since the inception of the Internet and ARPANET, a new standard needed to be implemented. This is called IPv6 and it is a long-term solution that allows for more than enough devices to connect to the Internet without a problem. This new standard is currently being adopted around the world and will continue to grow. However, most connections are still done using the IPv4 standard.



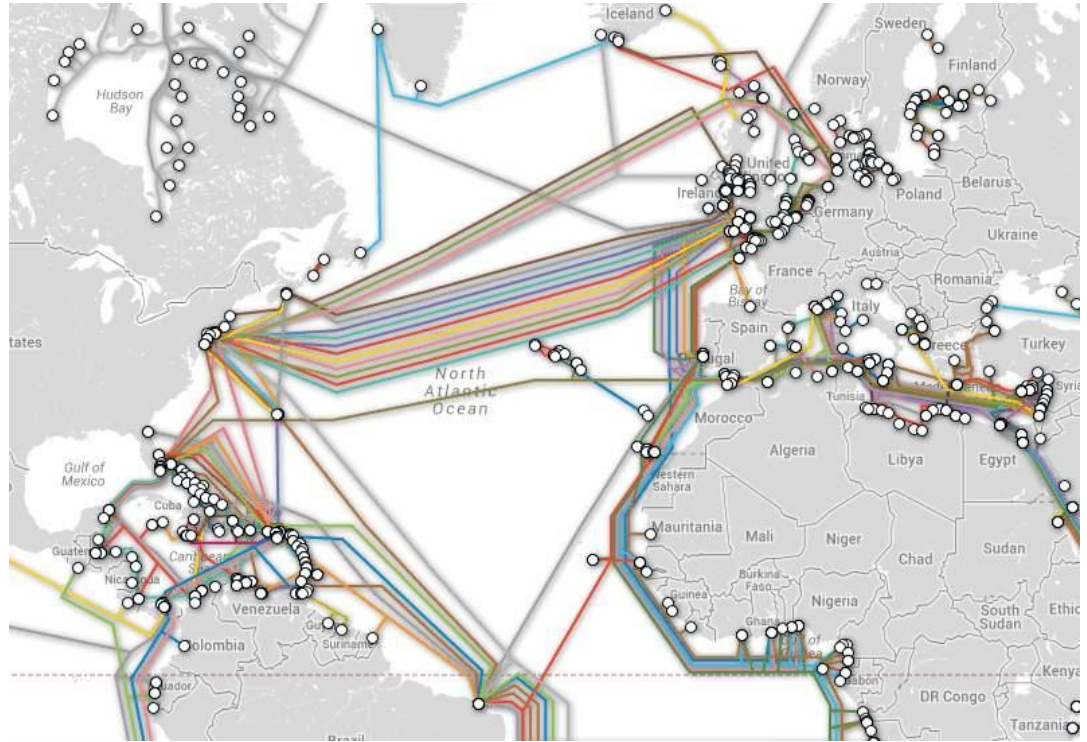
The Role Small Islands Play in Domain Names

Domains are key to anyone doing business on, or simply interacting with the Internet. Most businesses want a short and relevant domain name. This means that shorter top-level domains are in high demand. A **top-level domain** (TLDs) is the '.com' or '.org' you typically type into your web browser while using the Internet. Country code top-level domains (ccTLDs) are smaller domains assigned to specific countries such as .tv which is the domain of the island nation of Tuvalu. This domain is typically used by websites with a focus on media and television. This map shows the actual location of the places with ccTLDs.



Where Fiber Optic Cables Are Around the World

One of the most efficient ways to send data over long distances is through fiber optic cables. These are long and thin strands of glass that transmit information using pulses of light. In this map, you can see the location of fiber optic cables around the world. In terms of speed, fiber optic cables can send as much as 100 Gbps across a single fiber. That's roughly ten thousand times faster than most home connections. Since a cable can have hundreds of fibers, that means it could hold enough transmission capability for millions of users.



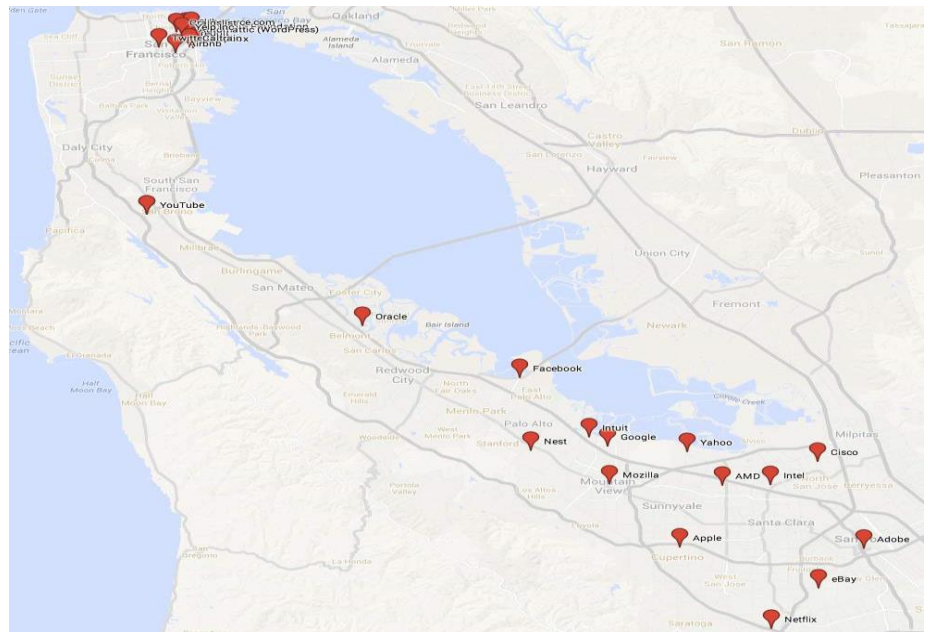
Lesson 4 of 6

Where Is the Internet Located?

Walkthrough of Key Locations

While there is no singular place that the Internet is located, there are certain hubs where many major companies and organizations are based. For example, Silicon Valley is a key location that houses many of the world's largest Internet-based organizations.

This is a region in and around San Francisco that acts as the home of companies like Facebook, Google, YouTube, and Apple. As you can see in the map, many companies are based in San Francisco (the northern cluster of pins in the map) and many other companies located further south.

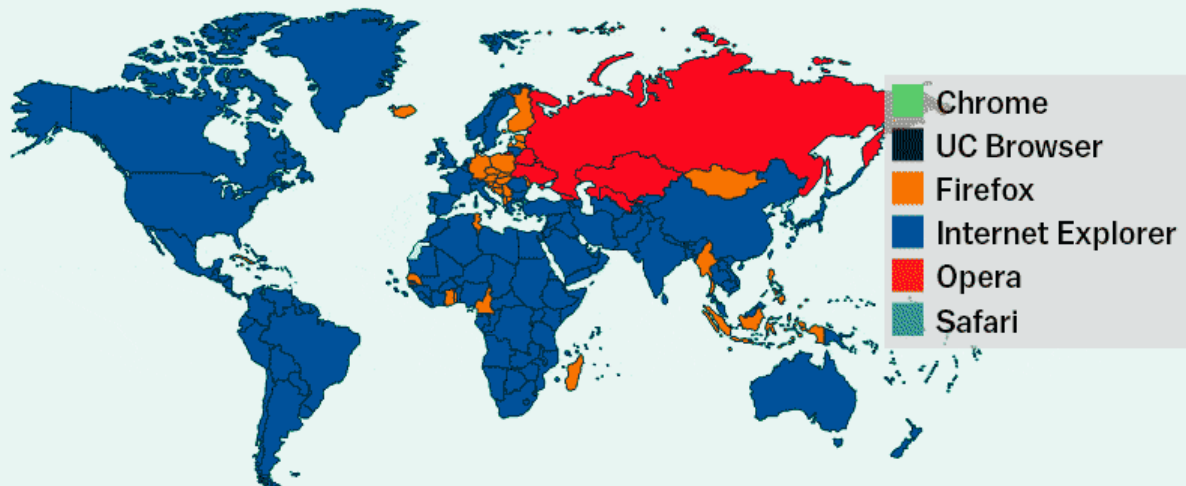


How Web Browsers Gained Popularity Around the World

During the relatively early stages of the Internet, Microsoft's Internet Explorer was the most-used web browser. In 2008, Google released the Chrome browser which quickly took off in terms of popularity. It's currently the most-used browser in just about every developed country. Meanwhile, in many sub-Saharan areas, the most-used browser is Opera. This is likely because Opera features a mobile browser that work well on basic phones.

Most popular web browsers, May 2009

Source: StatCounter

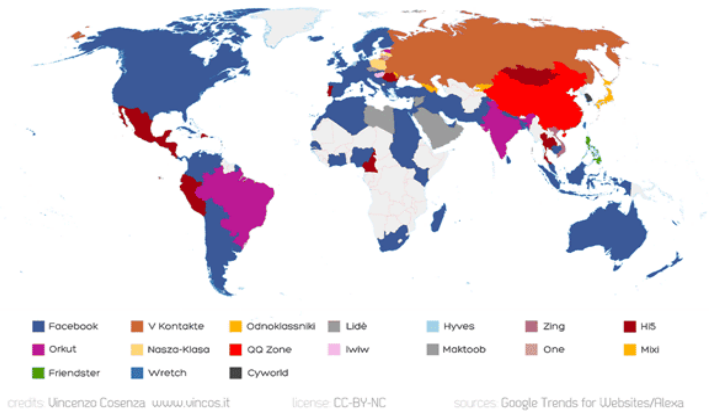


How Social Networks Have Expanded

Facebook is one of the most popular sites visited every day on the Internet. Whether it's on a smartphone or desktop browser, the site boasts more than a billion monthly active users. In terms of developing countries, a key reason Facebook has grown is the offering of Facebook Zero, a service where Facebook pays for data charges of users who log into the low-bandwidth version of the site from their mobile phones. According to Vox, this has “made Facebook accessible to millions of users who wouldn't otherwise be able to afford it.”

WORLD MAP OF SOCIAL NETWORKS

June 2009



Data Centers

Many websites use your name, email address, and other personal information in order to provide a product or service. If you typically use Google, Facebook, Microsoft, and similar websites then there is a good chance your information is being stored on or near one of the pins on this map. On this map, each pin represents a data center that consists of many servers. The red pins are Google data centers, Microsoft is yellow, Yahoo is purple, Facebook is blue. This map is not complete as the exact location of every data center in use today is not shared publicly.

