【Cn】Day2(2)

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【Ch1】Computer Networks and the Internet

1.2 The Network Edge

The computers and other devices connected to the Internet are often referred to as end systems. They are referred to as end systems because they sit at the edge of the Internet.

End systems are also referred to as hosts because they host(run) application programs such as a Web browser program, a Web server program, and e-mail client program.
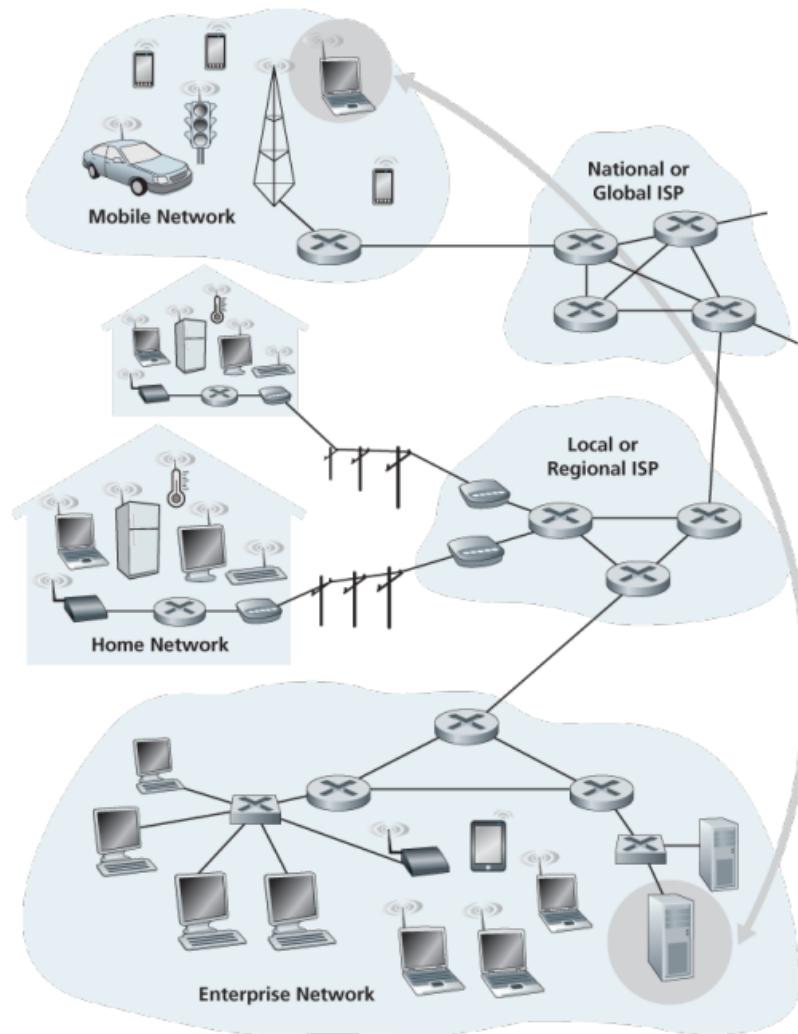
Figure 1.3 End-system interaction

Hosts are sometimes further divided into two categories: clients and servers. Most of the servers from which we receive search results, emails reside in large data centers.

1.2.1 Access Networks

Home Access: DSL, Cable, FTTH, Dial-Up, and Satellite

Today, the two most prevalent types of broadband residential access are digital subscriber line(DSL) and cable. A residence typically obtains DSL Internet access from the same local telephone company(telco) that provides its wired local phone access. Thus, when DSL is used, a customer's telco is also its ISP.

As shown below, each customer's DSL modem(a hardware that translates computer digital signals into telephone analog signals) uses the existing telephone line to exchange data with a digital subscriber line access multiplexer(DSLAM) located in the telco's local central office.(CO) The analog signals from many such houses are translated back into digital format at the DSLAM.
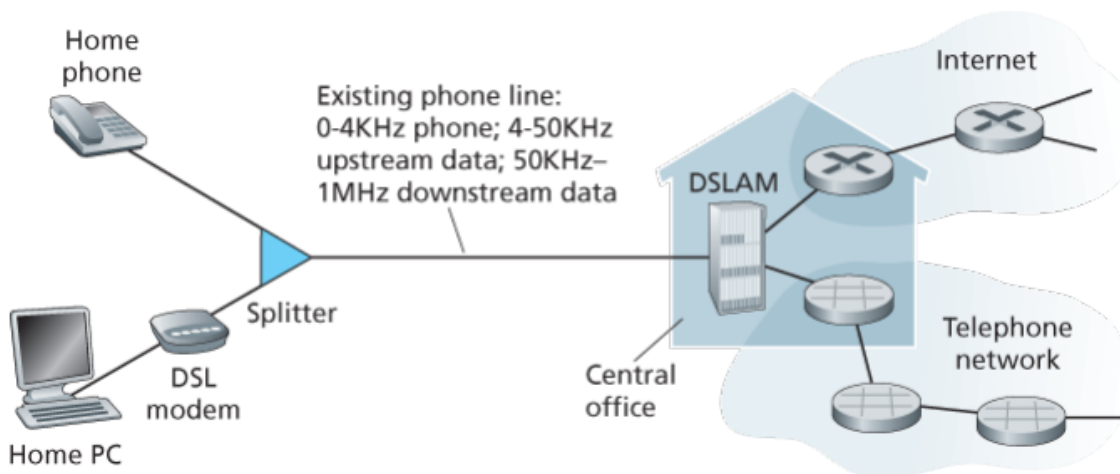

Figure 1.5 DSL Internet access

The residential telephone line carries both data and traditional telephone signals simultaneously, which are encoded at different frequencies:

- A high-speed downstream channel, in the 50 kHz to 1MHz band
- A medium-speed upstream channel, in the 4kHz to 50kHz band
- An ordinary two-way telephone channel, in the 0 to 4kHz band

This approach makes the single DSL link appears as if there were three separate links, so that a telephone call and an Internet connection can share the DSL link at the same time.

On the customer side, a splitter separates the data and telephone signals arriving to the home and forwards the data signal to the DSL modem.

On the telco side, in the CO, the DSLAM separates the data and phone signals and sends the data into the Internet.

The DSL standards define multiple transmission rates, including 12 Mbps downstream and 1.8 Mbps upstream, and 55 Mbps downstream and 15 Mbps upstream. The actual downstream and upstream transmission rates achieved may be less than the rates noted above, as the DSL provider may purposefully limit a residential rate when tiered service are offered.

The maximum rate is also limited by the distance between the home and the CO, the gauge of the twisted-pair line and the degree of electrical interference.