Chapter 9

Using Telephone and Cable Networks for Data Transmission

9-1 TELEPHONE NETWORK

Telephone networks use circuit switching. The telephone network had its beginnings in the late 1800s. The entire network, which is referred to as the plain old telephone system (POTS), was originally an analog system using analog signals to transmit voice.

Topics discussed in this section:

Major Components
LATAs
Signaling
Services Provided by Telephone Networks

Figure 9.1 *A telephone system*

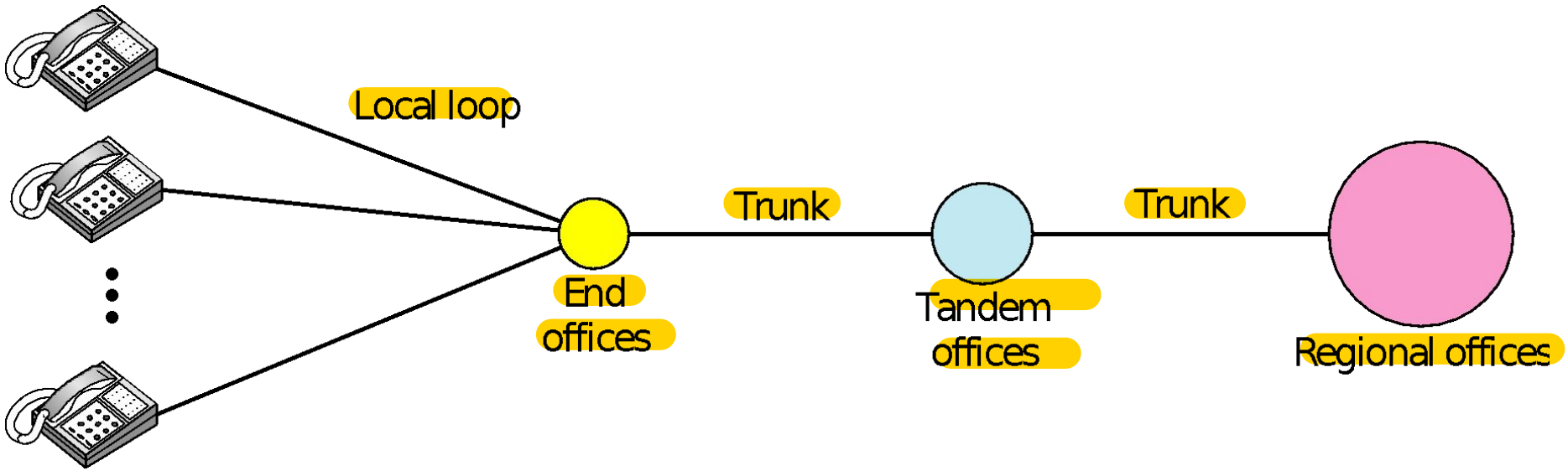


Figure 9.2 *Switching offices in a LATA*

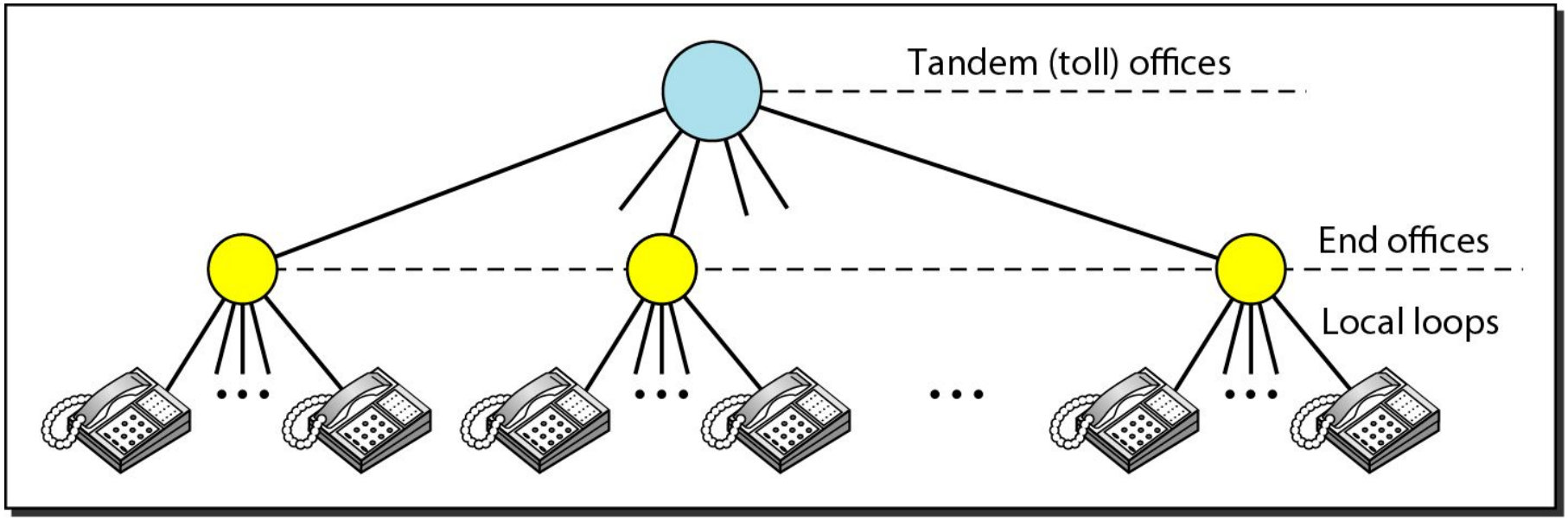


Figure 9.3 *Point of presences (POPs)*

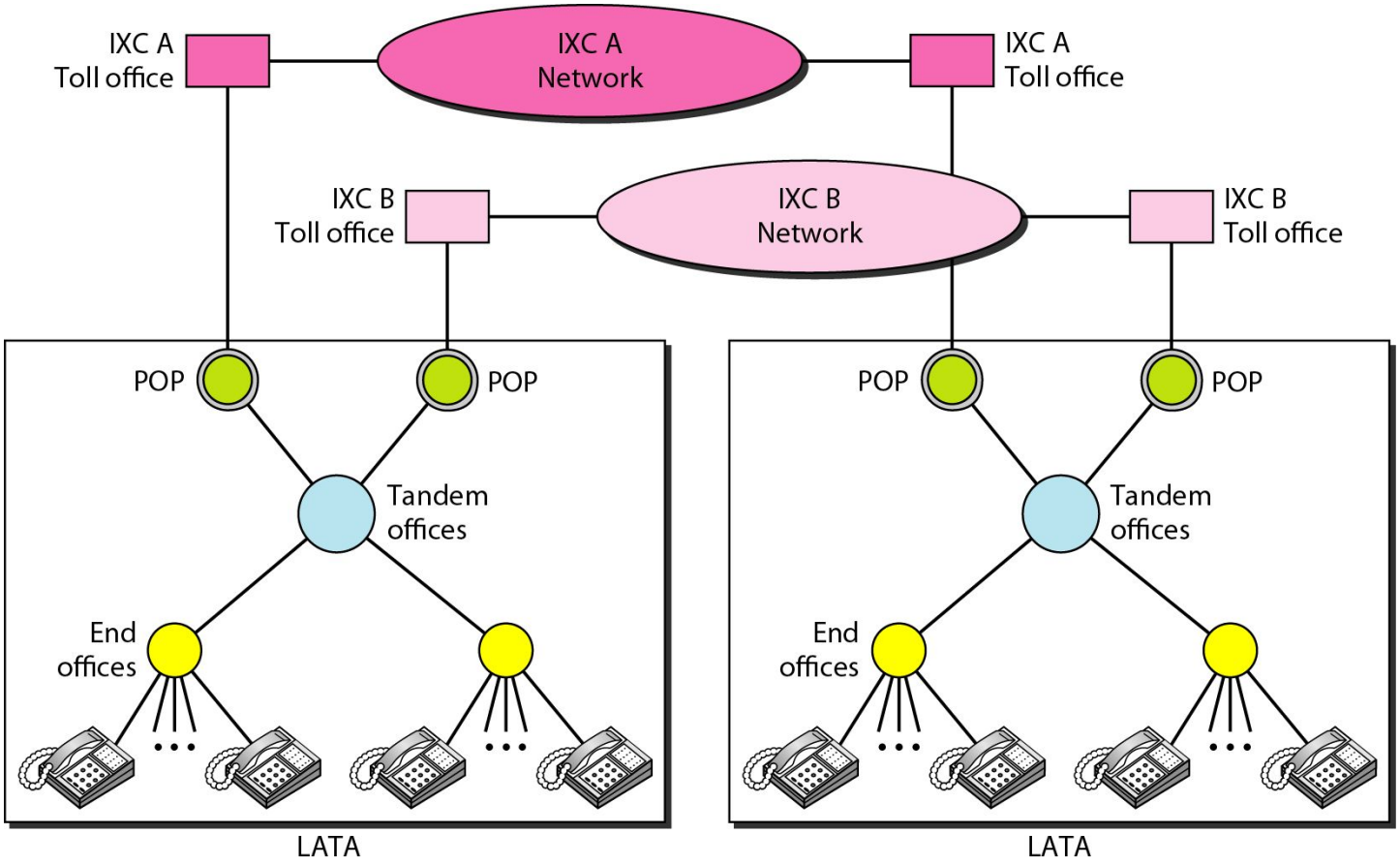
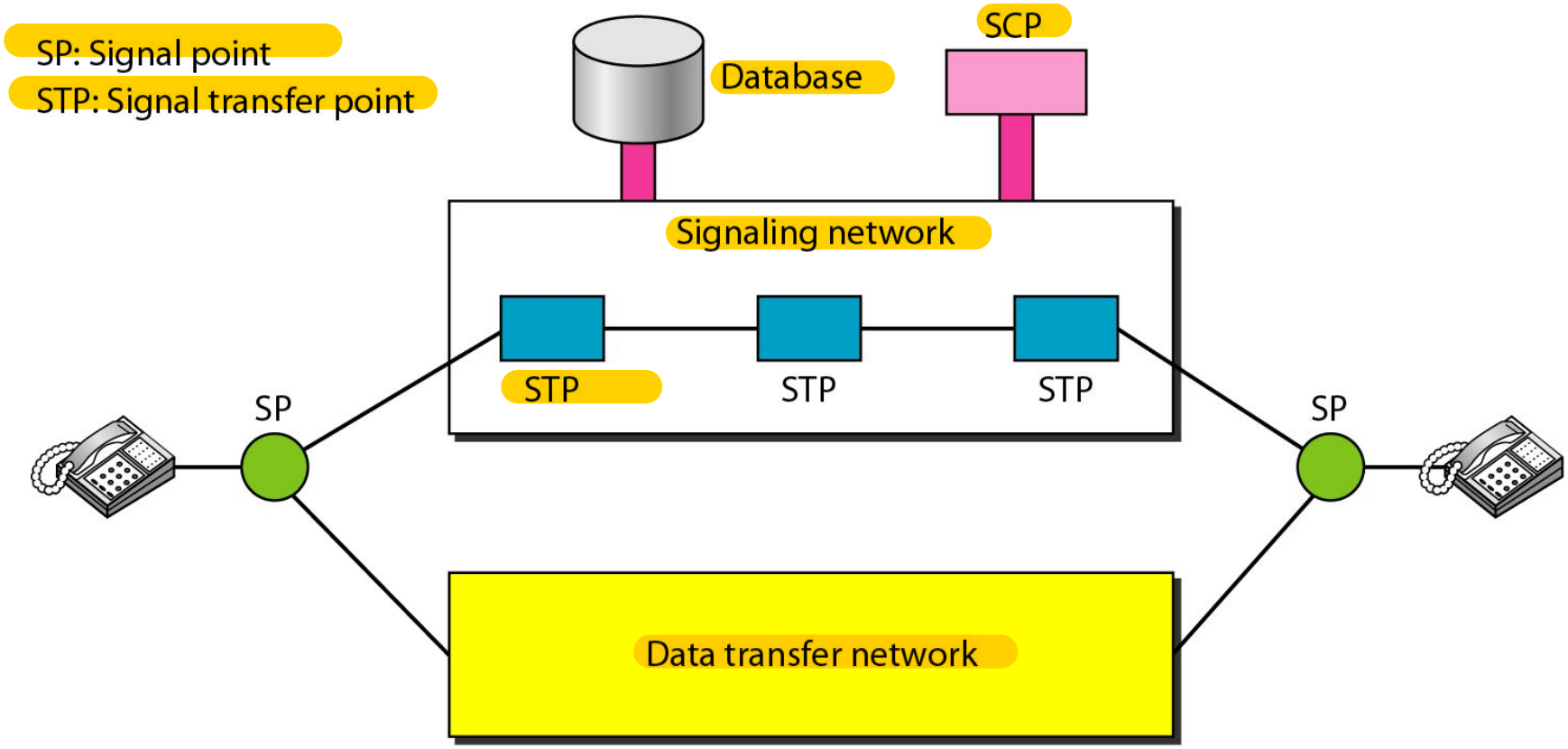


Figure 9.4 *Data transfer and signaling networks*



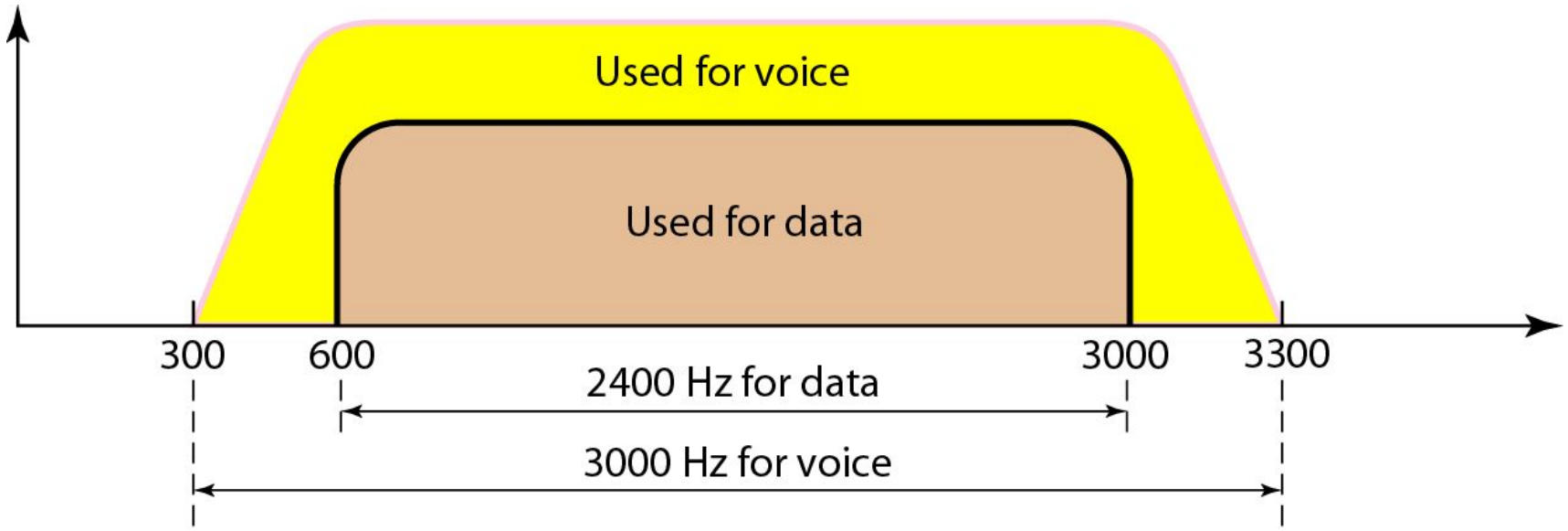
9-2 DIAL-UP MODEMS

Traditional telephone lines can carry frequencies between 300 and 3300 Hz, giving them a bandwidth of 3000 Hz. All this range is used for transmitting voice, where a great deal of interference and distortion can be accepted without loss of intelligibility.

Topics discussed in this section:

Modem Standards

Figure 9.6 *Telephone line bandwidth*

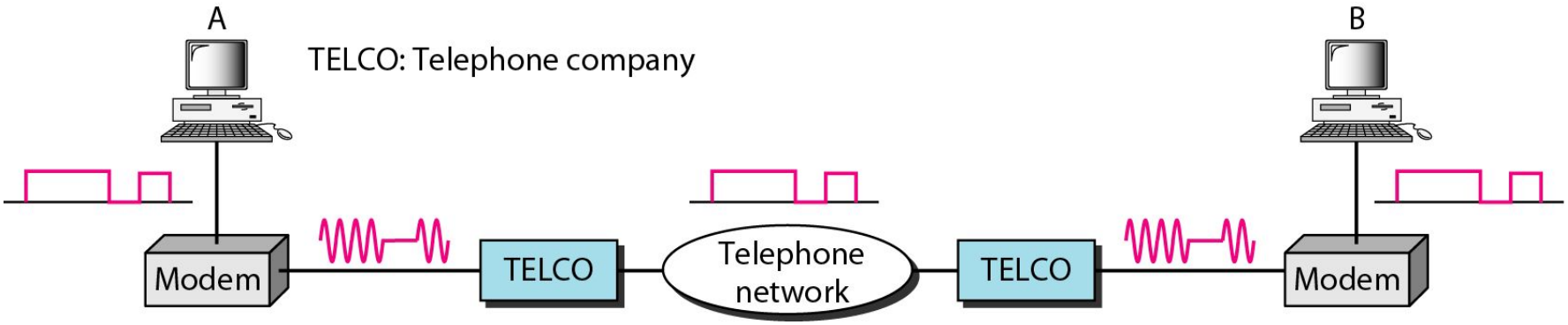


Note

Modem

stands for modulator/demodulator.

Figure 9.7 *Modulation/demodulation*



9-3 DIGITAL SUBSCRIBER LINE

After traditional modems reached their peak data rate, telephone companies developed another technology, DSL, to provide higher-speed access to the Internet. Digital subscriber line (DSL) technology is one of the most promising for supporting high-speed digital communication over the existing local loops.

Topics discussed in this section:

- ADSL
- ADSL Lite
- HDSL
- SDSL
- VDSL

Note

ADSL is an asymmetric communication technology designed for residential users; it is not suitable for businesses.

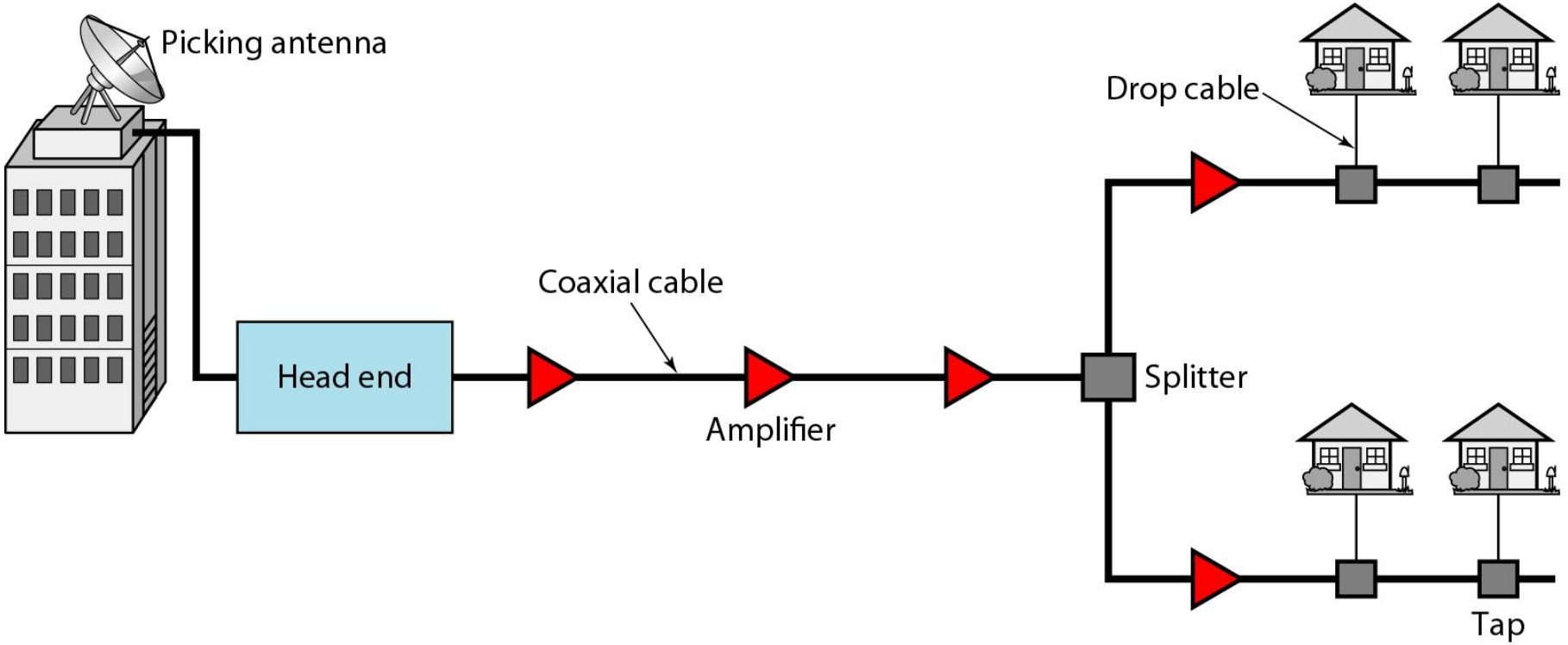
9-4 CABLE TV NETWORKS

The cable TV network started as a video service provider, but it has moved to the business of Internet access. In this section, we discuss cable TV networks per se; in Section 9.5 we discuss how this network can be used to provide high-speed access to the Internet.

Topics discussed in this section:

Traditional Cable Networks
Hybrid Fiber-Coaxial (HFC) Network

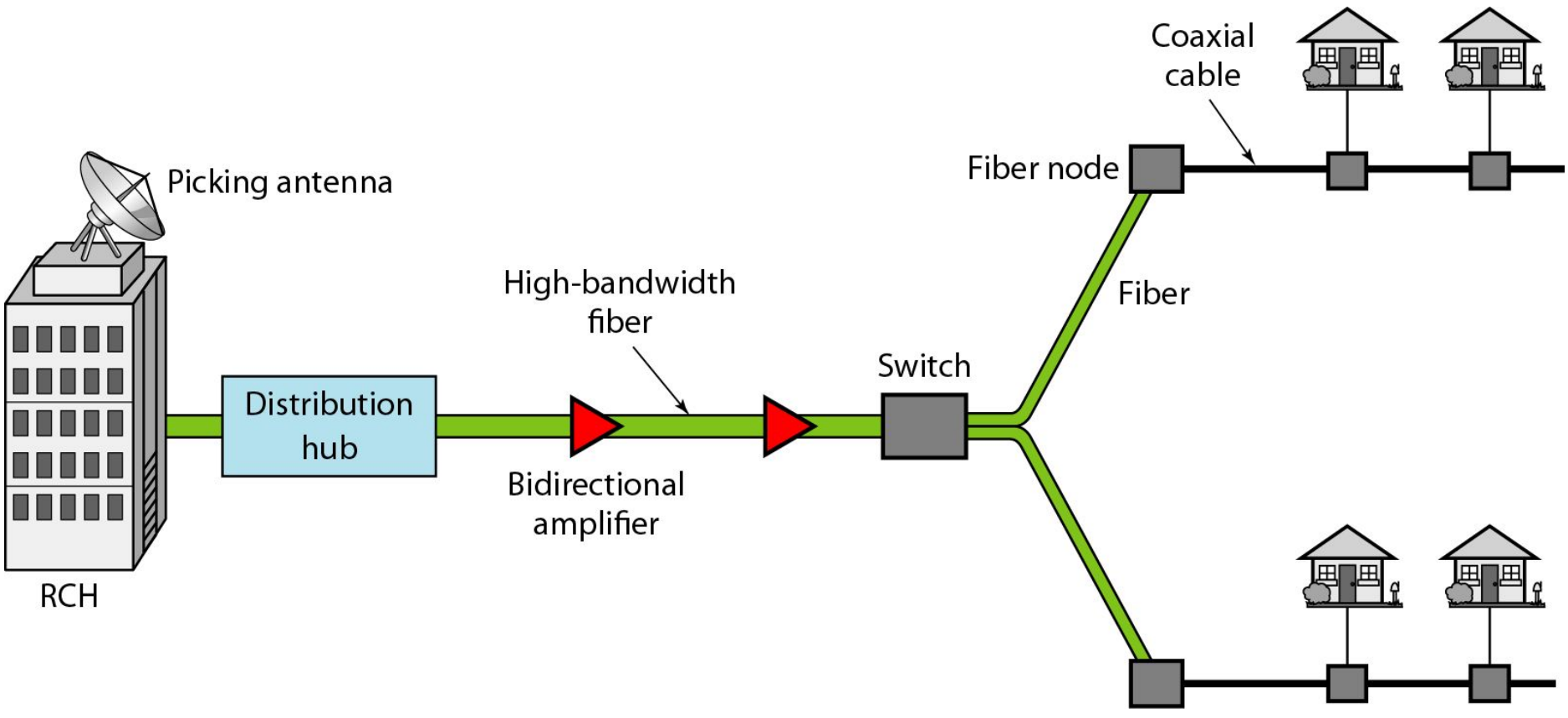
Figure 9.14 *Traditional cable TV network*



Note

Communication in the traditional cable TV network is unidirectional.

Figure 9.15 *Hybrid fiber-coaxial (HFC) network*



Note

Communication in an HFC cable TV network can be bidirectional.

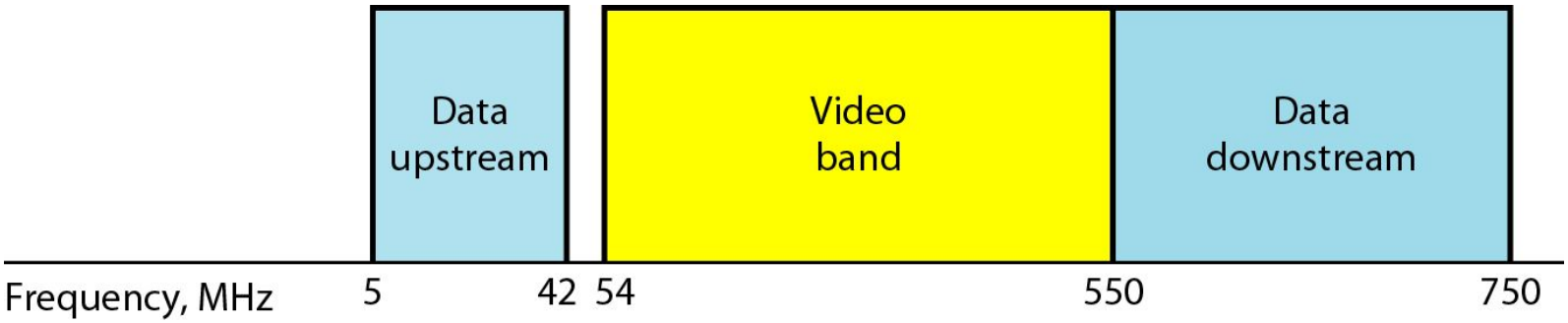
9-5 CABLE TV FOR DATA TRANSFER

Cable companies are now competing with telephone companies for the residential customer who wants high-speed data transfer. In this section, we briefly discuss this technology.

Topics discussed in this section:

Bandwidth
Sharing
CM and CMTS
Data Transmission Schemes: DOCSIS

Figure 9.16 *Division of coaxial cable band by CATV*



Note

Downstream data are modulated using the 64-QAM modulation technique.

Note

The theoretical downstream data rate is 30 Mbps.

Note

Upstream data are modulated using the QPSK modulation technique.

Note

The theoretical upstream data rate is 12 Mbps.

Figure 9.17 *Cable modem (CM)*

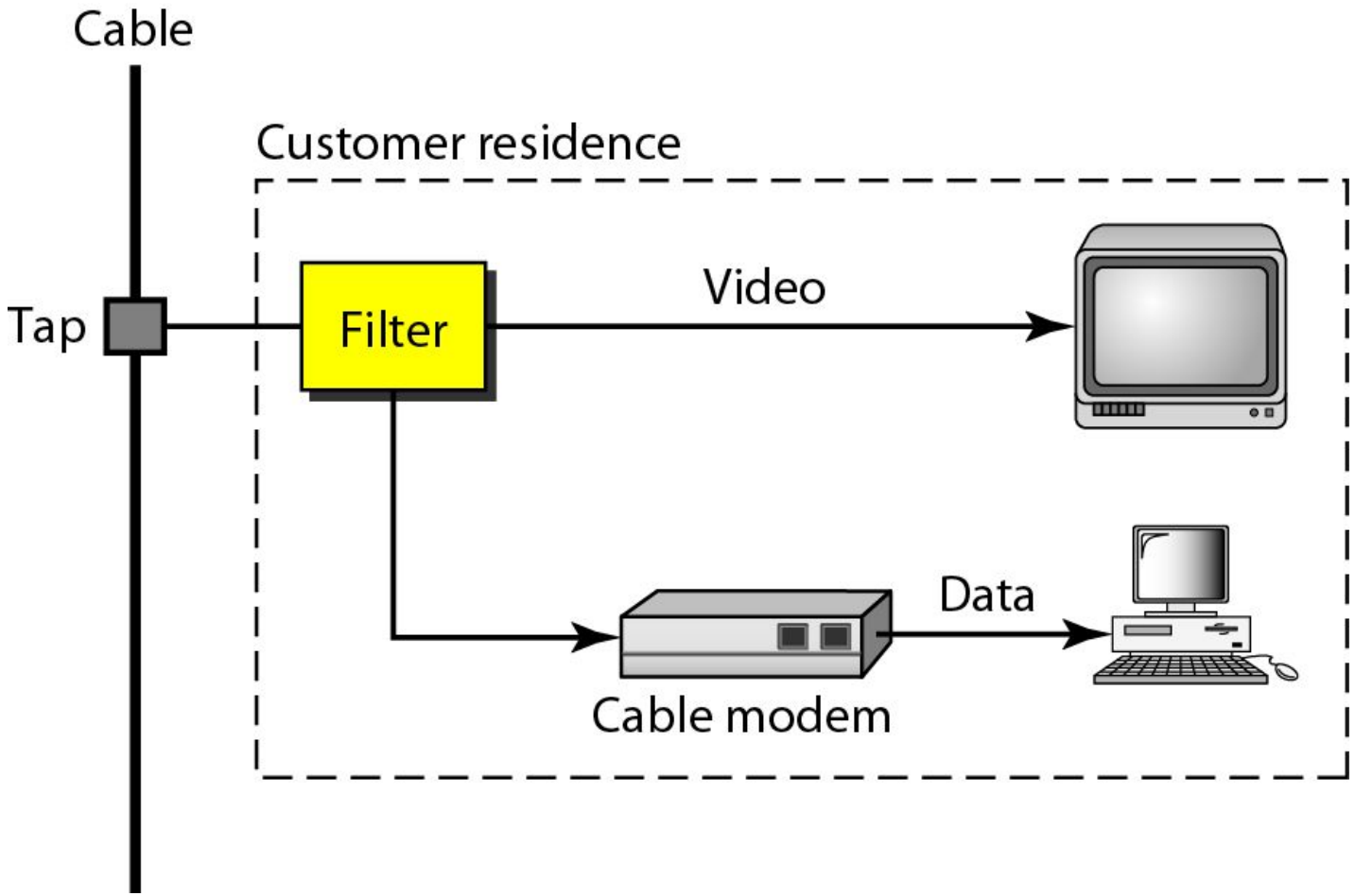


Figure 9.18 *Cable modem transmission system (CMTS)*