EARTH SEGMENT - II

5.5 Master Antenna TV System

A master antenna TV (MATV) system is used to provide reception of DBS TV/FM channels to a small group of users, for example, to the tenants in an apartment building. It consists of a single outdoor unit (antenna and LNA/C) feeding a number of indoor units. It is basically similar to the home system already described, but with each user having access to all the channels independently of the other users. The advantage is that only one outdoor unit is required, but as shown, separate LNA/Cs and feeder cables are required for each sense of polarization. Compared with the single-user system, a larger antenna is also required (2- to 3-m diameter) in order to maintain a good signal-to-noise ratio at all the indoor units.

Where more than a few subscribers are involved, the distribution system used is similar to the CATV system described in the next section.

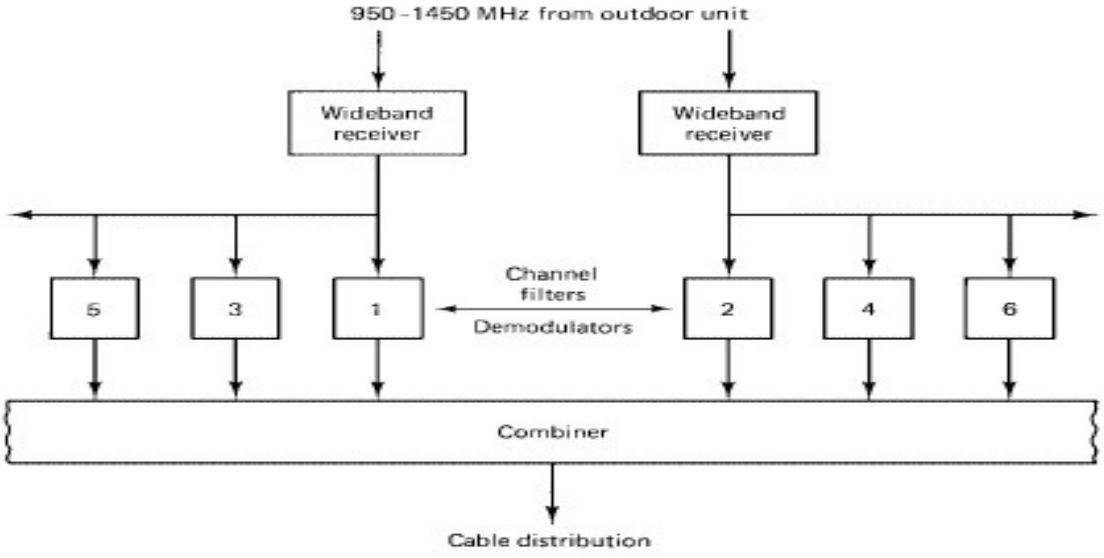
5.6 Community Antenna TV System

The community antenna TV system employs a single outdoor unit, with separate feeds available for each sense of polarization, like the MATV system, so that all channels are made available simultaneously at the indoor receiver. Instead of having a separate receiver for each user, all the carriers are demodulated in a common receiver-filter system. The channels are then combined into a standard multiplexed signal for transmission over cable to the subscribers.

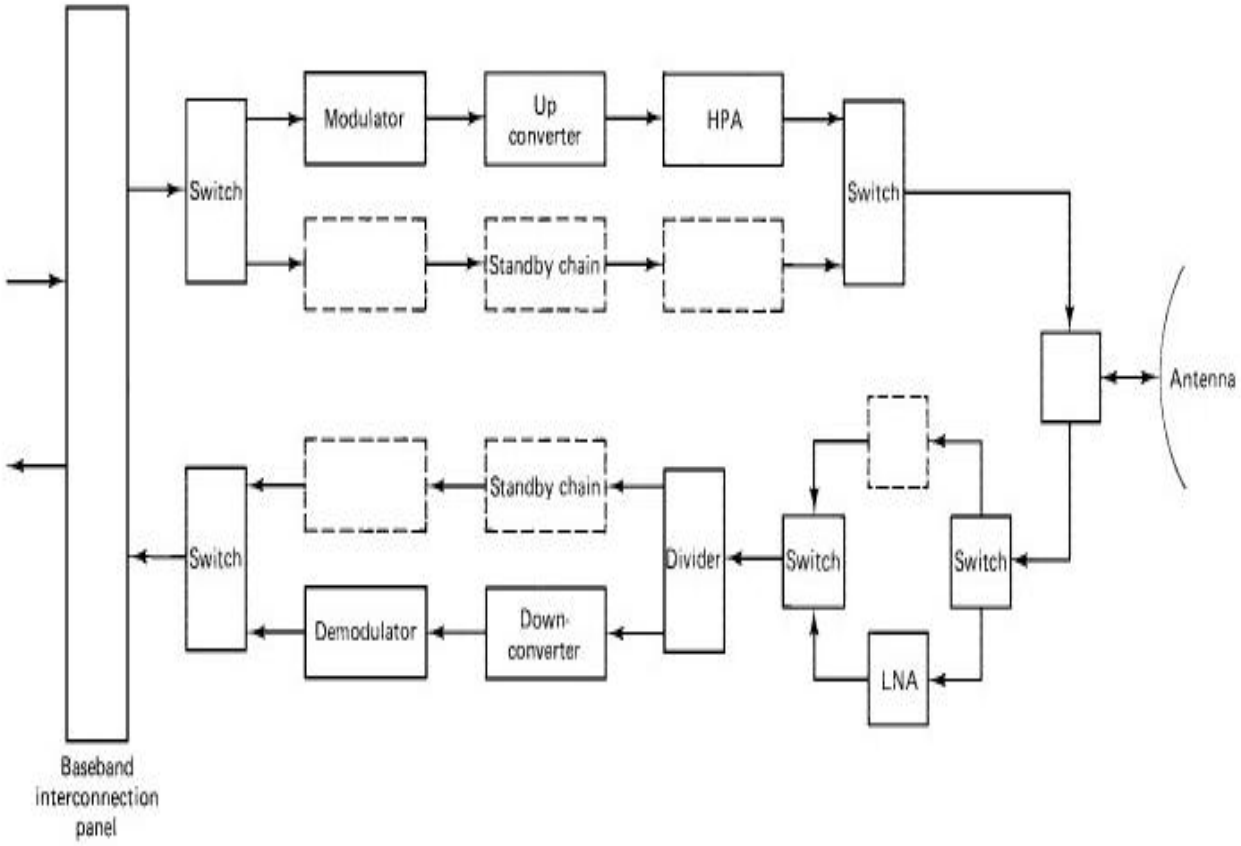
In remote areas where a cable distribution system may not be installed, the signal can be rebroadcast from a low-power VHF TV transmitter.

With the CATV system, local programming material also may be distributed to subscribers, an option which is not permitted in the MATV system.

5.7 Transmit-Receive Earth Stations



In some situations, a transmit-only station is required,for example, in relaying TV signals to the remote TV receive-only stations already described. Transmit-receive stations provide both functions and are required for telecommunications traffic generally, including network TV.



It may be that groupings different from those used in the terrestrial network are required for satellite transmission, and the next block shows the multiplexing equipment in which the reformatting is carried out. Following along the transmit chain, the multiplexed signal is modulated onto a carrier wave at an intermediate frequency, usually 70 MHz. Parallel IF stages are required, one for each microwave carrier to be transmitted. After amplification at the 70-MHz IF, the modulated signal is then upconverted to the required microwave carrier frequency. A number of carriers may be transmitted simultaneously, and although these are at different frequencies they are generally specified by their nominal frequency, for example, as 6-GHz or 14-GHz carriers.

It should be noted that the individual carriers may be multi destination carriers. This means that they carry traffic destined for different stations. For example, as part of its load, a microwave

carrier may have telephone traffic for Boston and New York. The same carrier is received at both places, and the designated traffic sorted out by filters at the receiving earth station.
The station's antenna functions in both the transmit and receive modes, but at different frequencies. In the C band, the nominal uplink, or transmit, frequency is 6 GHz and the downlink, or receive, frequency is nominally 4 GHz. In the Ku band, the uplink frequency is nominally 14 GHz, and the downlink, 12 GHz. High-gain antennas are employed in both bands, which also means narrow antenna beams. A narrow beam is necessary to prevent interference between neighboring satellite links. In the case of C band, interference to and from terrestrial microwave links also must be avoided. Terrestrial microwave links do not operate at Ku-band frequencies.

In the receive branch, the incoming wide-band signal is amplified in a low-noise amplifier and passed to a divider network, which separates out the individual microwave carriers. These are each down converted to an IF band and passed on to the multiplex block, where the multiplexed signals are reformatted as required by the terrestrial network. It should be noted that, in general, the signal traffic flow on the receive side will differ from that on the transmit side. The incoming microwave carriers will be different in number and in the amount of traffic carried, and the multiplexed output will carry telephone circuits not necessarily carried on the transmit side.
A number of different classes of earth stations are available, depending on the service requirements. Traffic can be broadly classified as heavy route, medium route, and thin route. In a thin-route circuit, a transponder channel (36 MHz) may be occupied by a number of single carriers, each associated with its own voice circuit. This mode of operation is known as single carrier per channel (SCPC), a multiple-access mode which is discussed further in Chap. 14. Antenna sizes range from 3.6 m (11.8 ft) for transportable stations up to 30 m (98.4 ft) for a main terminal.

A medium-route circuit also provides multiple access, either on the basis of frequency-division multiple access (FDMA) or time-division multiple access (TDMA), multiplexed baseband signals being carried in either case.

Antenna sizes range from 30 m (89.4 ft) for a main station to 10 m (32.8 ft) for a remote station.