DIRECT BROADCAST SATELLITE (DBS)

7.1 Introduction

Satellites provide broadcast transmissions in the fullest sense of the word, since antenna footprints can be made to cover large areas of the earth. The idea of using satellites to provide direct transmissions into the home has been around for many years, and the services provided are known generally as direct broadcast satellite (DBS) services. Broadcast services include audio, television, and Internet services.

7.2 Orbital Spacing's

Orbital spacing is 9° for the high-power satellites, so adjacent satellite interference is considered nonexistent.

It should be noted that although the DBS services are spaced by 9°, clusters of satellites occupy the nominal orbital positions. For example, the following satellites are located at 119°W longitude.

7.3 Power Rating

Satellites primarily intended for DBS have a higher [EIRP] than for the other categories, being in the range 51 to 60 dBW. At a Regional Administrative Radio Council (RARC) meeting in 1983, the value established for DBS was 57 dBW (Mead, 2000). Transponders are rated by the power output of their high-power amplifiers. Typically, a satellite may carry 32 transponders. If all 32 are in use, each will operate at the lower power rating of 120 W. By doubling up the high-power amplifiers, the number of transponders is reduced by half to 16, but each transponder operates at the higher power rating of 240 W.

7.4 Frequencies and Polarization

The requencies for DBS varies from region to region throughout the world.

The available bandwidth (uplink and downlink) is seen to be 500 MHz. A total number of 32 transponder channels, each of bandwidth 24 MHz, can be accommodated. The bandwidth is sometimes specified as 27 MHz, but this includes a 3-MHz guard band allowance. Therefore, when calculating bit-rate capacity, the 24 MHz value is used. The total of 32 transponders requires the use of both right-hand circular polarization (RHCP) and left-hand circular frequency plan for Region 2.

	1	3	5	RHCP	31
Uplink MHz	17324.00	17353.16	17382.32	. . .	17761.40
Downlink MHz	12224.00	12253.16	12282.32		12661.40

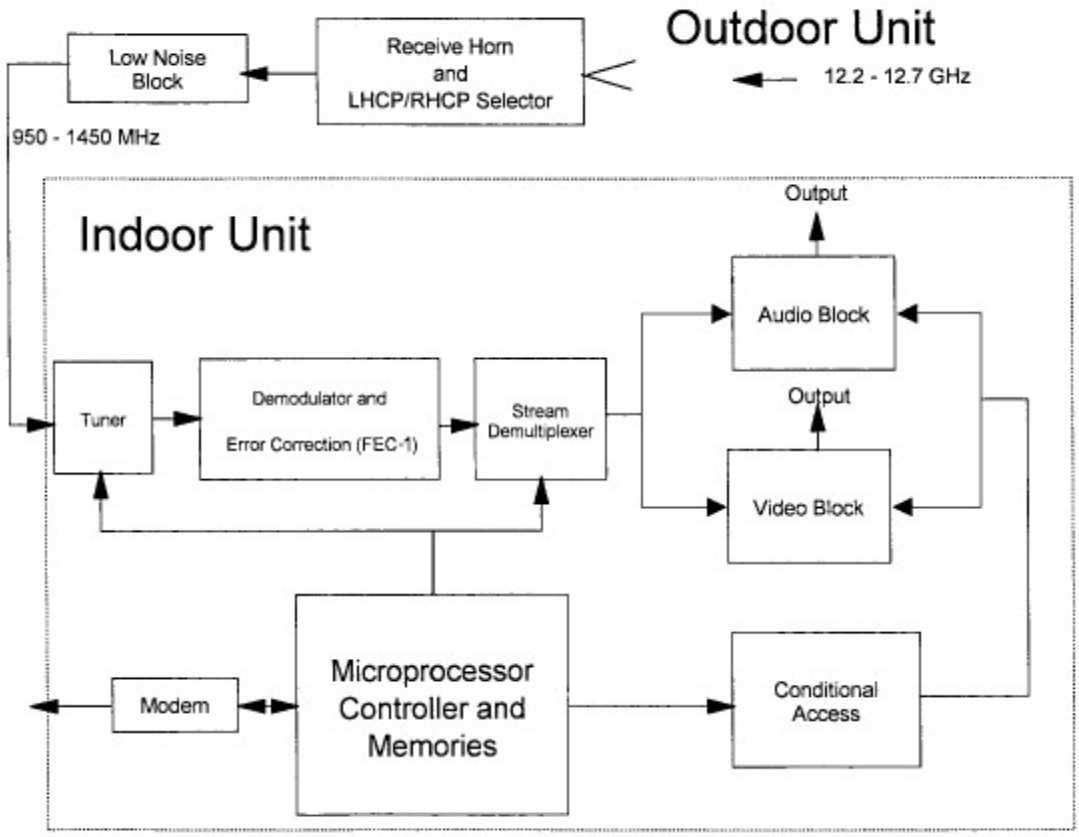
	2	4	6	LHCP	32
Uplink MHz	17338.58	17367.74	17411.46	. . .	17775.98
Downlink MHz	12238.58	12267.74	12296.50		12675.98

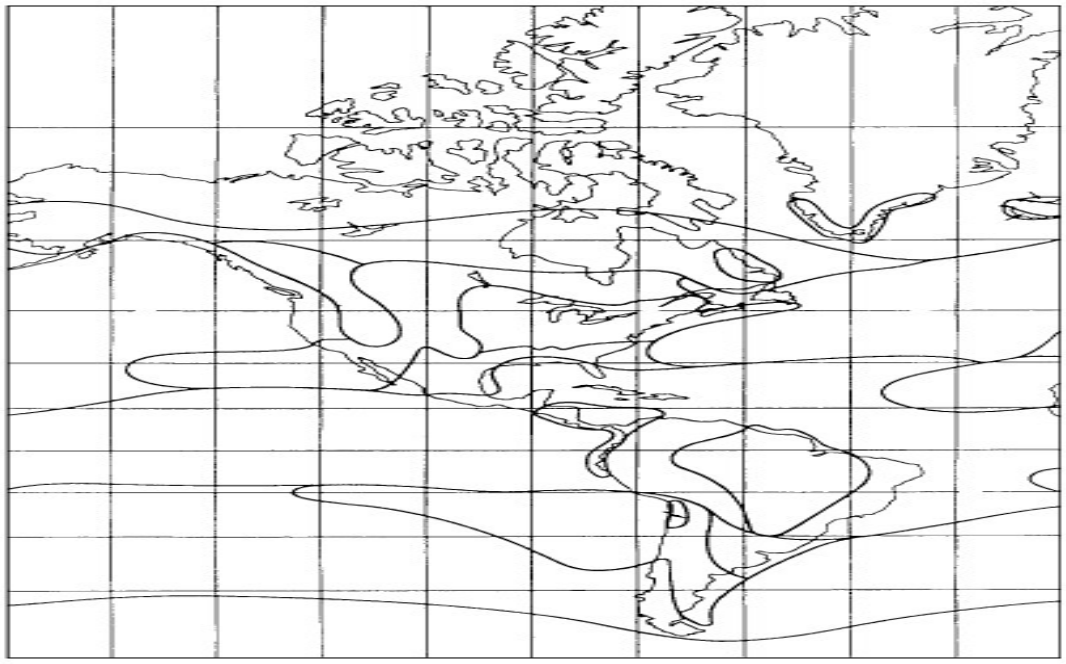
7.5 Transponder Capacity

The 24-MHz bandwidth of a transponder is capable of carrying one analog television channel. To be commercially viable, direct broad- cast satellite (DBS) television [also known as direct-to-home (DTH) television] requires many more channels, and this requires a move from analog to digital television. Digitizing the audio and video components of a television program allows signal compression to be applied, which greatly reduces the bandwidth required. The signal compression used in DBS is a highly complex process, and only a brief overview will be given here of the process. Before doing this, an estimate of the bit rate that can be carried in a 24-MHz transponder will be made.

7.6 The Home Receiver Indoor Unit (IDU)

The block schematic for the indoor unit (IDU) is shown in Fig1. The transponder frequency bands shown in Fig2 are down converted to be in the range 950 to 1450 MHz, but of course, each transponder retains its 24-MHz bandwidth. The IDU must be able to receive any of the 32 transponders, although only 16 of these will be available for a single polarization. The tuner selects the desired transponder. It should be recalled that the carrier at the center frequency of the transponder is QPSK modulated by the bit stream, which itself may consist of four to eight TV programs time-division multiplexed. Following the tuner, the carrier is demodulated, the QPSK modulation being converted to a bit stream. Error correction is carried out in the decoder block labeled FEC 1. The demultiplexer following the FEC 1 block separates out the individual programs, which are then stored in buffer memories for further processing (not shown in the diagram). This further processing would include such things as conditional access, viewing history of pay per-view (PPV) usage, and connection through a modem to the service provider (for PPV billing purposes). A detailed description of the IRD will be found in Mead (2000).





Source : http://elearningatria.files.wordpress.com/2013/10/ece-vi-satellite-communications-10ec662-notes.pdf