# INTERFERENCE AND SATELLITE ACCESS - TDMA

With time-division multiple access, only one carrier uses the transponder at any one time, and therefore, inter modulation products, which result from the nonlinear amplification of multiple carriers, are absent. This leads to one of the most significant advantages of TDMA, which is that the transponder traveling-wave tube (TWT) can be operated at maximum power output or saturation level. Because the signal information is transmitted in bursts, TDMA is only suited to digital signals. Digital data can be assembled into burst format for transmission and reassembled from the received bursts through the use of digital buffer memories. Figure 1 illustrates the basic TDMA concept, in which the stations transmit bursts in sequence. Burst synchronization is required, and in the system illustrated in Fig. 1, one station is assigned solely for the purpose of transmitting reference bursts to which the others can be synchronized. The time interval from the start of one reference burst to the next is termed a frame. A frame contains the reference burst R and the bursts from the other earth stations, these being shown as A, B, and C in Fig. 1.

Figure 2 illustrates the basic principles of burst transmission for a single channel. Overall, the transmission appears continuous because the input and output bit rates are continuous and equal. However, within the transmission channel, input bits are temporarily stored and transmitted in bursts.

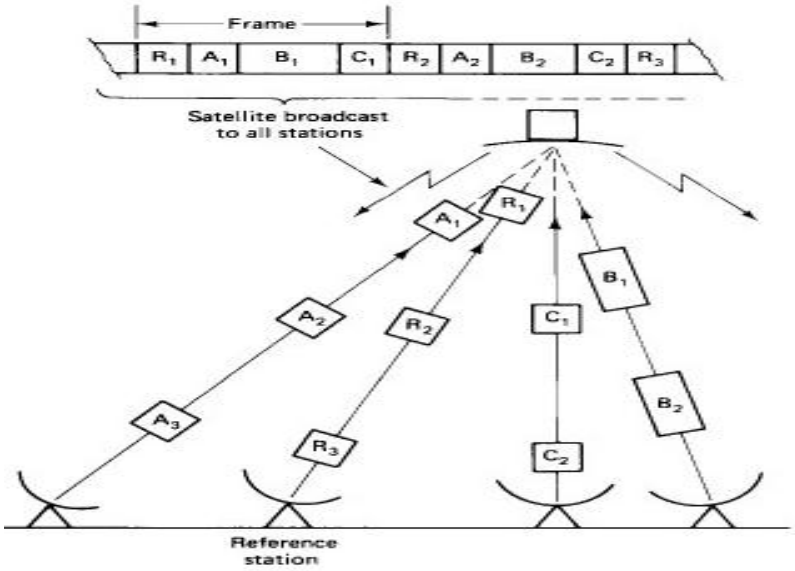

Fig 1

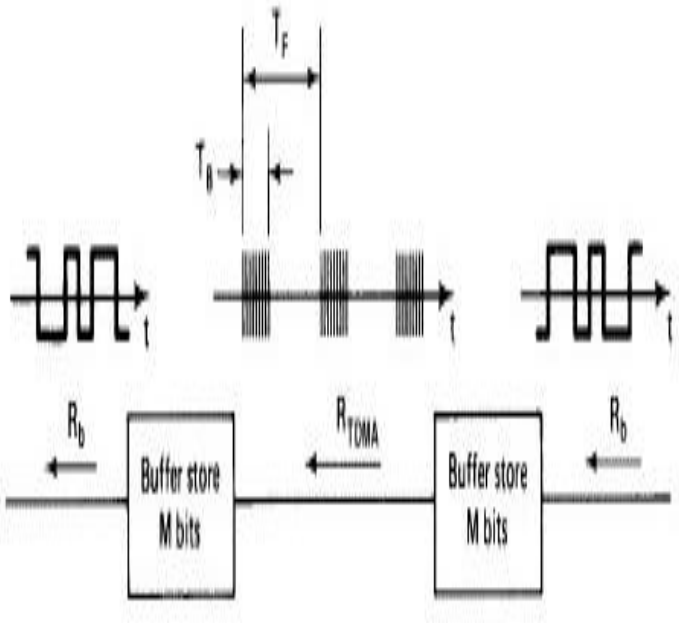


Fig2

Figure 3 shows some of the basic units in a TDMA ground station, which for discussion purposes is labeled earth station A. Terrestrial links coming into earth station A carry digital traffic addressed to destination stations, labeled B, C, X. It is assumed that the bit rate is the same for the digital traffic on each terrestrial link. In the units labeled terrestrial interface modules (TIMs), the incoming continuous-bit-rate signals are converted into the intermittent-burst-rate mode. These individual burst-mode signals are time-division multiplexed in the time- division multiplexer (MUX) so that the traffic for each destination station appears in its assigned time slot within a burst.

Certain time slots at the beginning of each burst are used to carry timing and synchronizing information. These time slots collectively are referred to as the preamble. The complete burst containing the preamble and the traffic data is used to phase modulate the radiofrequency (rf) carrier. Thus the composite burst which is transmitted at rf consists of a number of time slots, as shown in Fig. 4. These will be described in more detail shortly. The received signal at an earth station consists of bursts from all transmitting stations arranged in the frame format shown in Fig. 4. The rf carrier is converted to intermediate frequency (IF), which is then demodulated. A separate preamble detector provides timing information for transmitter and receiver along with a carrier synchronizing signal for the phase demodulator, as described in the next section. In many systems, a station receives its own transmission along with the others in the frame, which can then be used for burst-timing purposes.

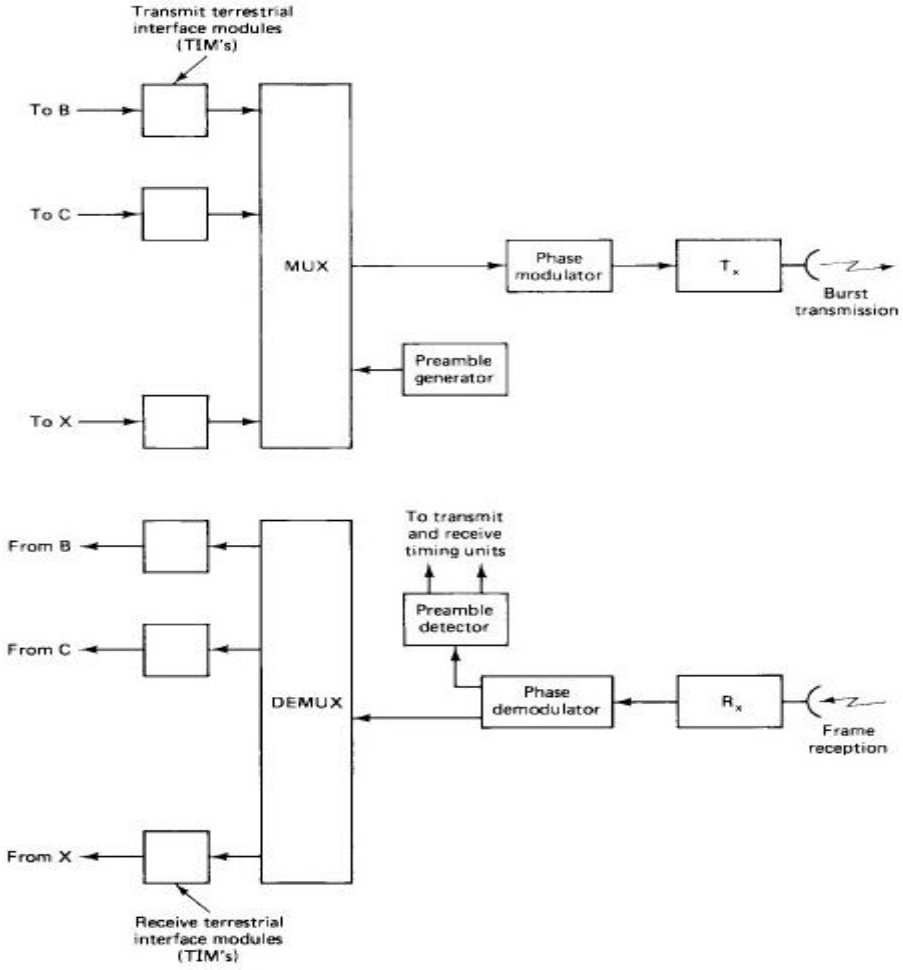
Transmit terrestrial interface modules (TIM's)
To B
To C
To X
MUX
Phase modulator
$T_x$
Burst transmission
Preamble generator
From B
From C
From X
DEMUX
To transmit and receive timing units
Preamble detector
Phase demodulator
$R_x$
Frame reception
Receive terrestrial interface modules (TIM's)

Fig 3

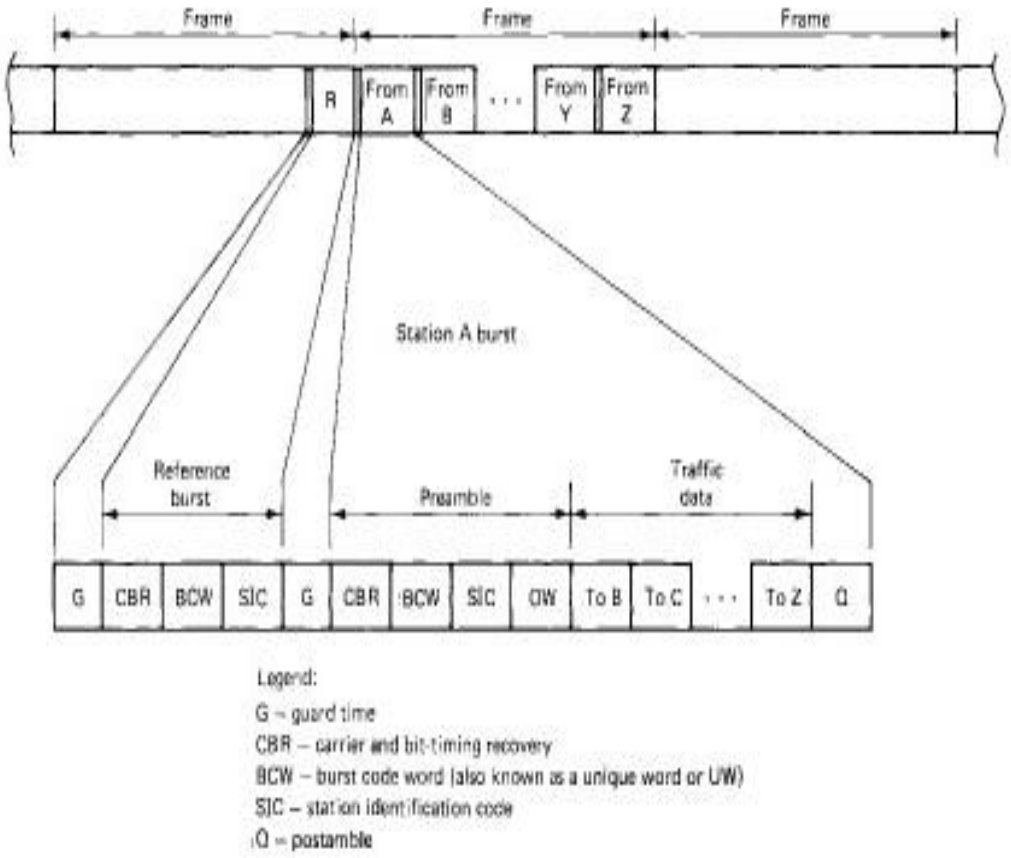


Fig 4

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