EARTH STATION TRACKING SYSTEM:

- Tracking is essential when the satellite drift, as seen by an earth station antenna is a significant fraction of an earth station's antenna beam width.

- An earth station's tracking system is required to perform some of the functions such as
  - i)Satellite acquisition
  - ii)Automatic tracking
  - iii)Manual tracking
  - iv)Program tracking.

EARTH STATION TRACKING SYSTEM:

i)Satellite Acquisition:

- Before communication can be established it is necessary to acquire a satellite.
- One method is to program the antenna to perform a scan around the predicted position of the satellite.
- The automatic tacking is switched on when the receiver signal strength is sufficient to lock the tracking receiver to the beacon.

ii)Automatic Tracking:

- After acquisition a satellite needs to be tracked continuously.
- This function is performed by the automatic tracking system.
- Auto-track systems are closed-loop control systems and are therefore highly accurate.
- This tracking mode is the preferred configuration when accuracy is the dominant criterion.

EARTH STATION TRACKING SYSTEM:

iii)Manual track:

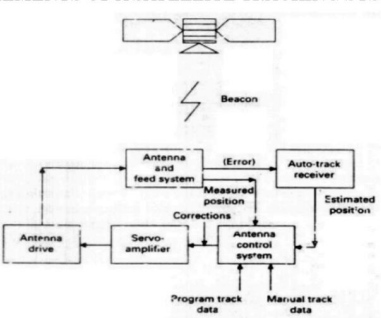
- To avoid a total loss of communication due to a failure in the tracking system, earth stations generally also have manual mode.
- In this mode an antenna is moved through manual commands.

iv)Program Track:

- In this tracking mode the antenna is driven to the predicted satellite position by a computer.
- The satellite position predictions are usually supplied by the satellite operators.
- It may be noted that since a program track system is an open-loop control system, its accuracy is mainly governed by the accuracy of the prediction data.

EARTH STATION TRACKING SYSTEM:

MAIN ELEMENTS OF A SATELLITE TRACKING SYSTEM



EARTH STATION TRACKING SYSTEM:

MAIN ELEMENTS OF A SATELLITE TRACKING SYSTEM

- Communication satellites transmit a beacon which is used by earth stations for tracking.
- The received beacon signal is fed into the auto-track receiver where tracking corrections or, in some auto-track systems estimated positions of the satellite are derived.
- In other auto-track techniques the feed system provides the required components of error signals.
- The outputs of the auto-track receivers are processed and used to drive each axis of the antenna to the estimated satellite position.

EARTH STATION TRACKING SYSTEM:

MAIN ELEMENTS OF A SATELLITE TRACKING SYSTEM

- In the manual mode, an operator sets the desired angles for each axis on a control console.
- This position is compared with the actual antenna position, obtained through shaft encoders, and the difference signal is used to drive the antenna.
- In the program track mode the desired antenna position is obtained from a computer.
- The difference in the desired antenna positions constitutes the error and is used to drive the antenna.

EARTH STATION TRACKING SYSTEM:

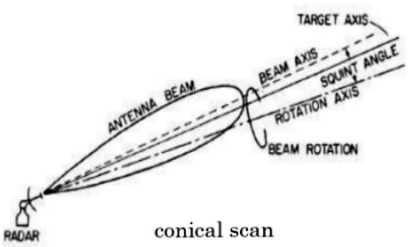
Auto Track system:

There are three main types of auto-track system which have been commonly used for satellite tracking;

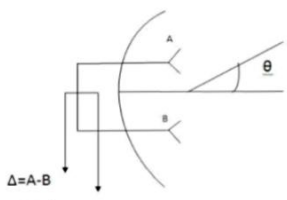
i) conical scan

ii)monopulse

iii)step-track



conical scan



monopulse