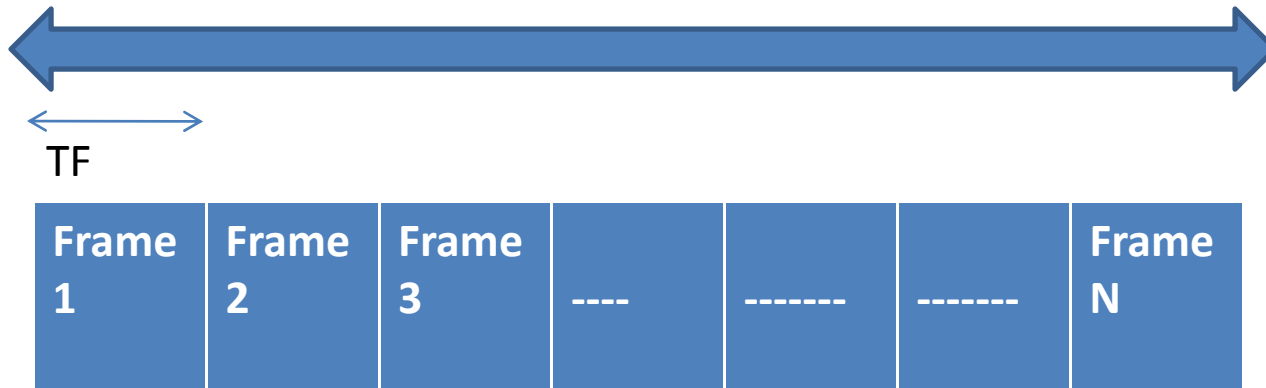# Unit 5
# MULTIPLE ACCESS TECHNIQUE

ALLOWS INTERCONNECTION OF LARGE
NO OF EARTH STATION TERMINALS
SIMULTANEOUSLY VIA SATELLITE

# TDMA super frame

# Contt….

- Transmit timing Channel of the reference Burst  position  of the burst
- Management Channel Coordination of Traffic burst

# TDMA BURST TIME PLAN

- Transmit Burst time plan

- Receive Burst time plan

A.   MESSAGE DATA

B.   BURST DATA

C.   SUBBURST DATA

# MESSAGE DATA

- Burst time plan identification
- Traffic station identification
- No of transmit burst
- No of receive burst

# Burst data

- Burst identification
- Transmit –Receive flag
- Transponder Identification
- Burst position
- No of transmit –Receive subburst

# subburst

- Transmit Receive subburst identification
- Subburst position
- Subburst length

# FRAME acquisition and synchronization

- Transmit in the assigned time slot
- Receiving traffic meant for them
- Transmit frame timing(TFT)
- Transmit Burst Timing(TBT)
- Receive Frame Timing(RTF)
- Receive Burst Timing(RBT)

# Contt...

- Receiver frame acquisition (RFA)
- transmit frame acquisition (TFA)
- Receiver frame synchronization (RFS)
- transmit frame synchronization (TFS)

# Acquisition

- Acquisition process is required when traffic station enters or reenters operation
- Synchronization process is needed due to satellite movement in the orbit
- Perturbation caused by moon and sun
- Variation in satellite moment
- Variation in time delay between earth and satellite
- Error in burst position as they arrive in the transponder

# Synchronization

- Synchronization is achieved by introducing transmit frame delay

$$D_N = MT_F - \frac{2d_N}{C}$$

$T_F \cdot is \cdot the \cdot frameperiod$

$d_N is \cdot the \cdot disance.between.the.satellite.N$

$C.is.the.velocity.of.light$

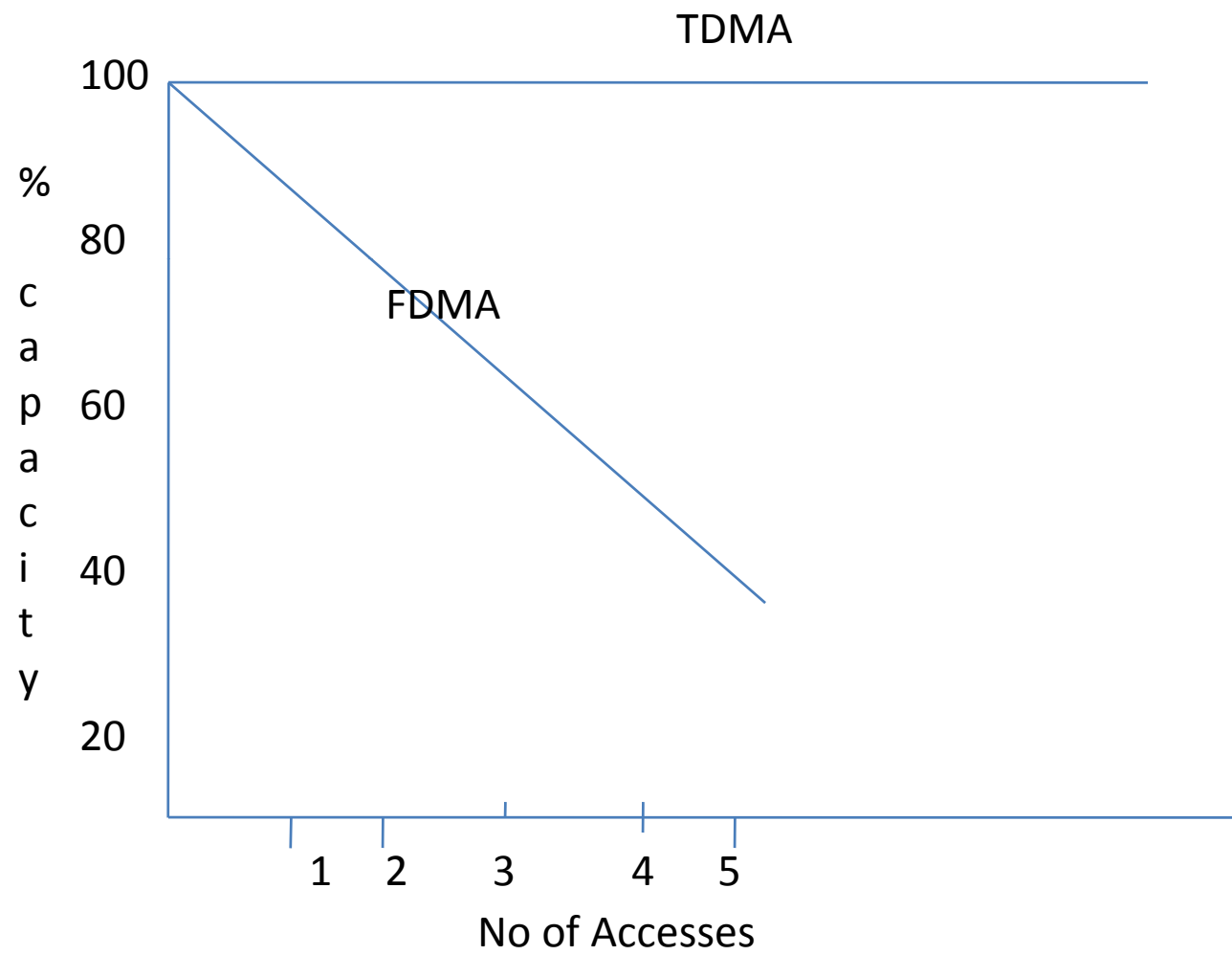$M.is.the.smallest \, \text{int} \, eger.chosen.such.as D_N \geq 0$

$for.all.d_N$

# synchronization

- CLOSED LOOP
- OPEN LOOP
- Closed loop:station observes the position of its own burst by measuring time interval between the reference burst unique word and traffic burst unique word computes the error
- Dn(i+1)=Dn(i)-En(i)

- Open loop : control  system listen to the bursts and sends instruction back to the transmitting station

- INTELSAT TDMA system, control station transmits Dn values to all network members once every 32 multiframes

# FDMA vs TDMA

| S.No | FDMA | TDMA |
|------|------|------|
| 1 | Not suitable for the increased system traffic Due to inter modulation products | Intermodulation distortion is avoided |
| 2 | As no of access increases the ,capacity decreases significantly | Capacity decreases a little |
| 3 | Modify the capacity is difficult | Easily modified by changing the duration and position of each burst |

Chart showing % capacity versus No of Accesses. TDMA remains constant at 100% across all accesses, while FDMA decreases linearly from 100% downward as the number of accesses increases.

# Multiple beam /(satellite switched)TDMA satellite system

- Zone beam
- Spot beam
- Narrowing the satellite beam
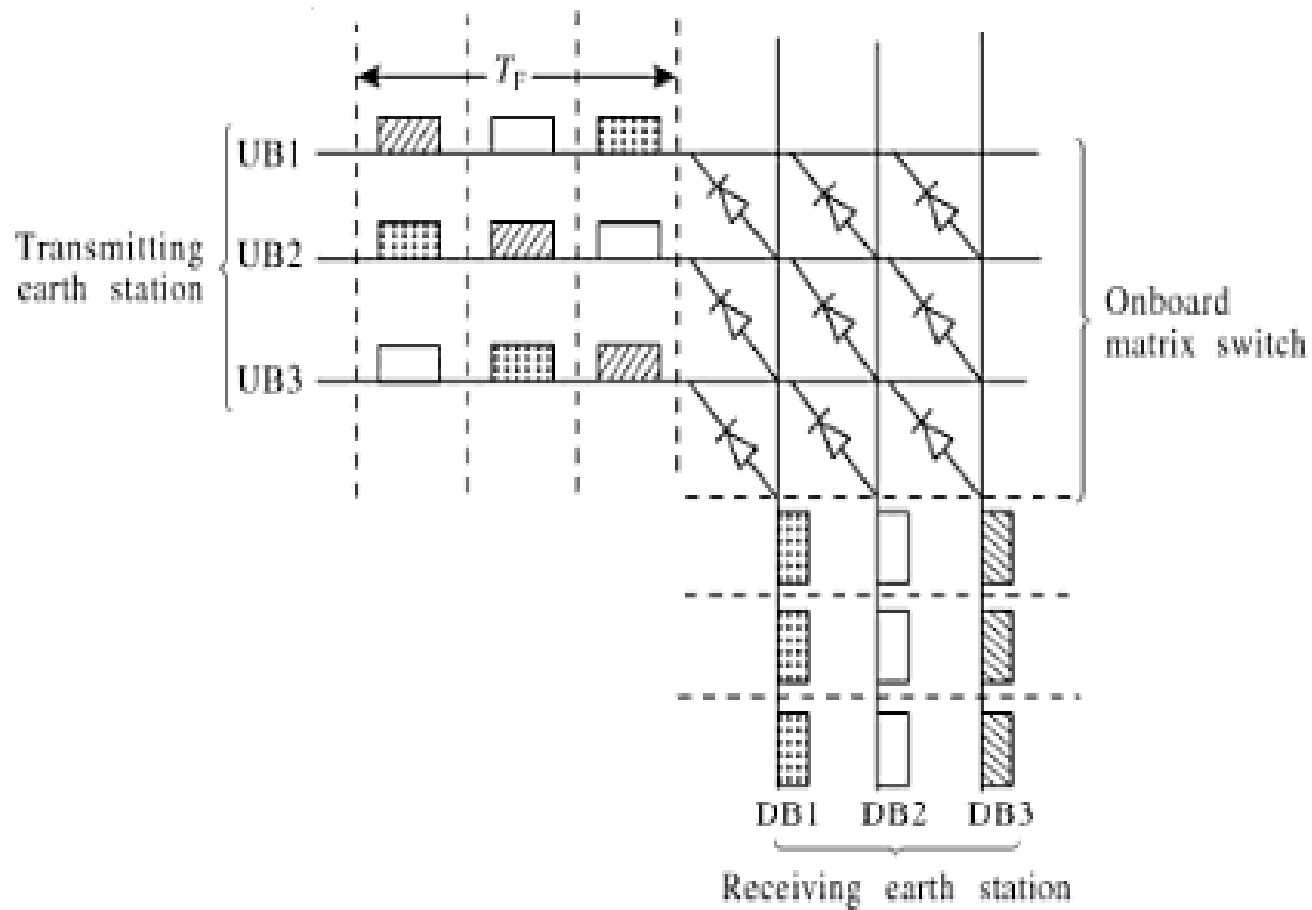
width ↑communication capacity

High gain for the coverage area

Power saving in uplink & downlink

Same frequency can be reused many times

- INTELSAT VI multi spot beam concept
- Six up beams (UBs)
- Six down beams(DBs)
- Interconnectivity
- On board switching technique(satellite switiching)
- SSTDMA– microwave satellite switch on board

Transmitting earth station

UB1
UB2
UB3

$T_F$

Onboard matrix switch

DB1  DB2  DB3

Receiving earth station

SS-TDMA concept used in INTELSAT-VI.