SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF AUTOMOBILE ENGINEERING

AUTOMOTIVE SAFETY & INFOTRONICS

UNIT V – INFOTRONICS FOR AUTOMOBILES

TOPIC 1 :GLOBAL POSITIONING SYSTEM

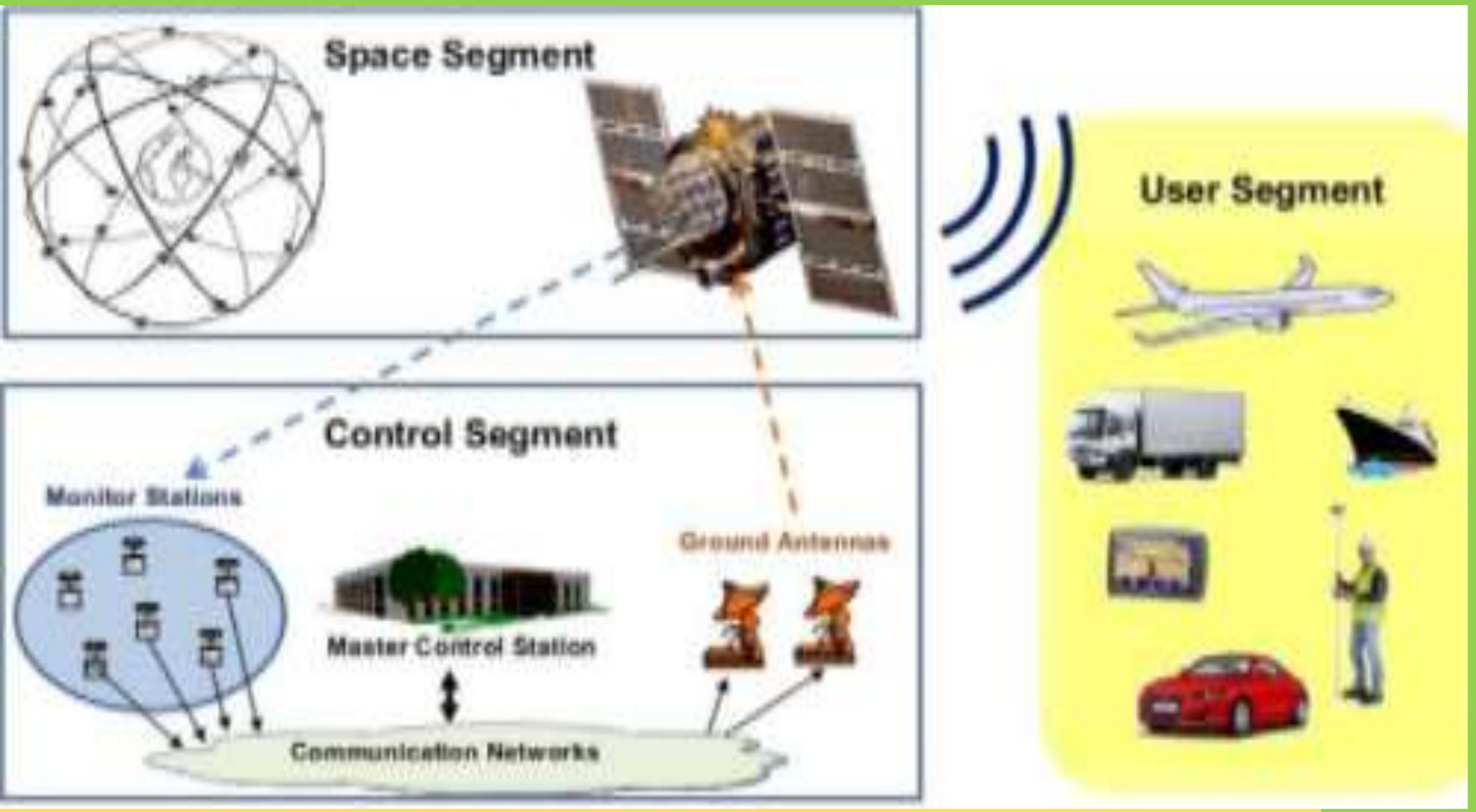
PRESENTATION OUTLINE

- GPS
- Architecture of GPS
- Working
- GPS Satellite Geometry
- Sources of GPS Errors
- Other Satellite Navigation System
- Application

GPS

- Global Positioning System
- It is a satellite based navigation system
- GPS Permits land, sea and airborne user to determine their three dimensional position, velocity and time

ARCHITECTURE GPS

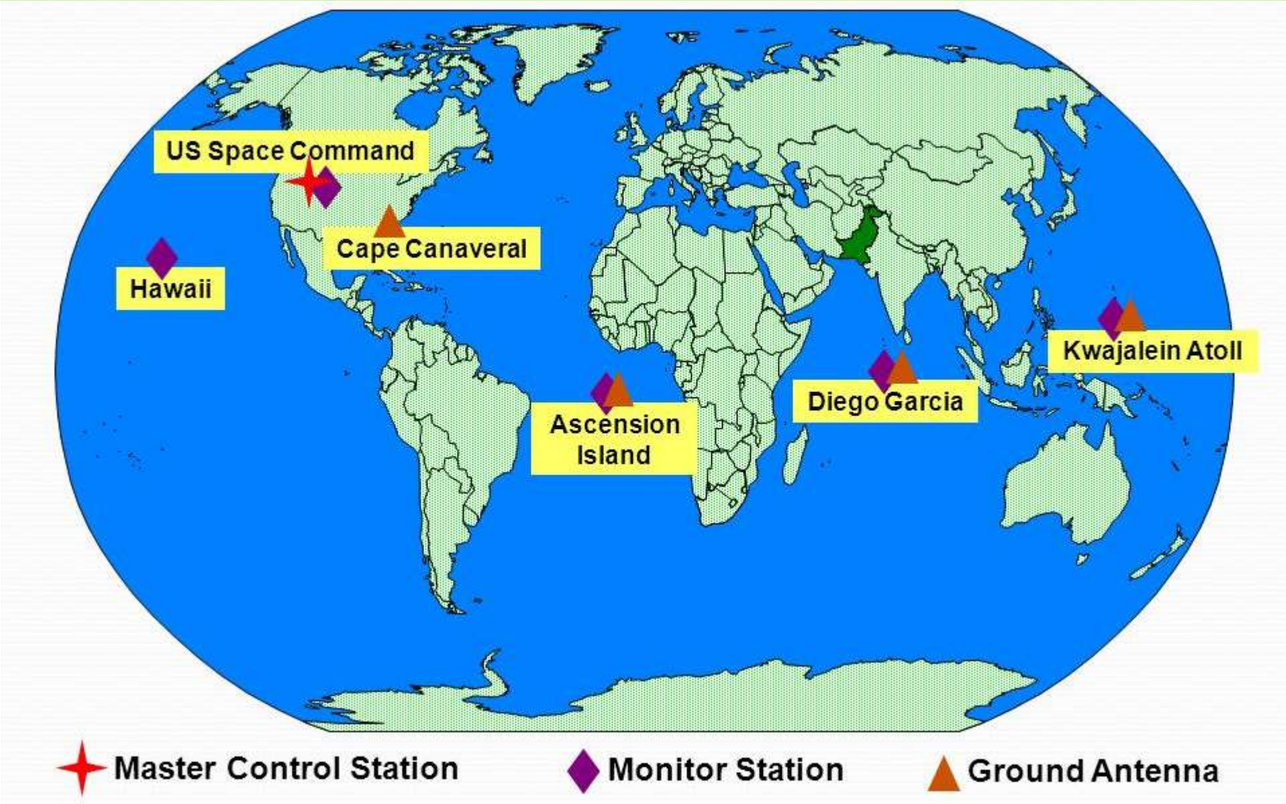


- To run all the system of GPS technology properly, highly advance architecture of GPS has been developed that includes three major segments called the Space, User and Control Segment

SPACE SEGMENT

- Minimum of 24 satellites in orbit around earth at altitude of 20,000 km
- It transmit radio navigation signals, and store and retransmit the navigation message sent by the control segment

CONTROL SEGMENT



- Combination of a master control station, four dedicated ground antennas and six dedicated monitor stations
- Responsible for the proper functioning of all the operation of GPS such as changing unhealthy satellite with a healthy one

USER SEGMENT

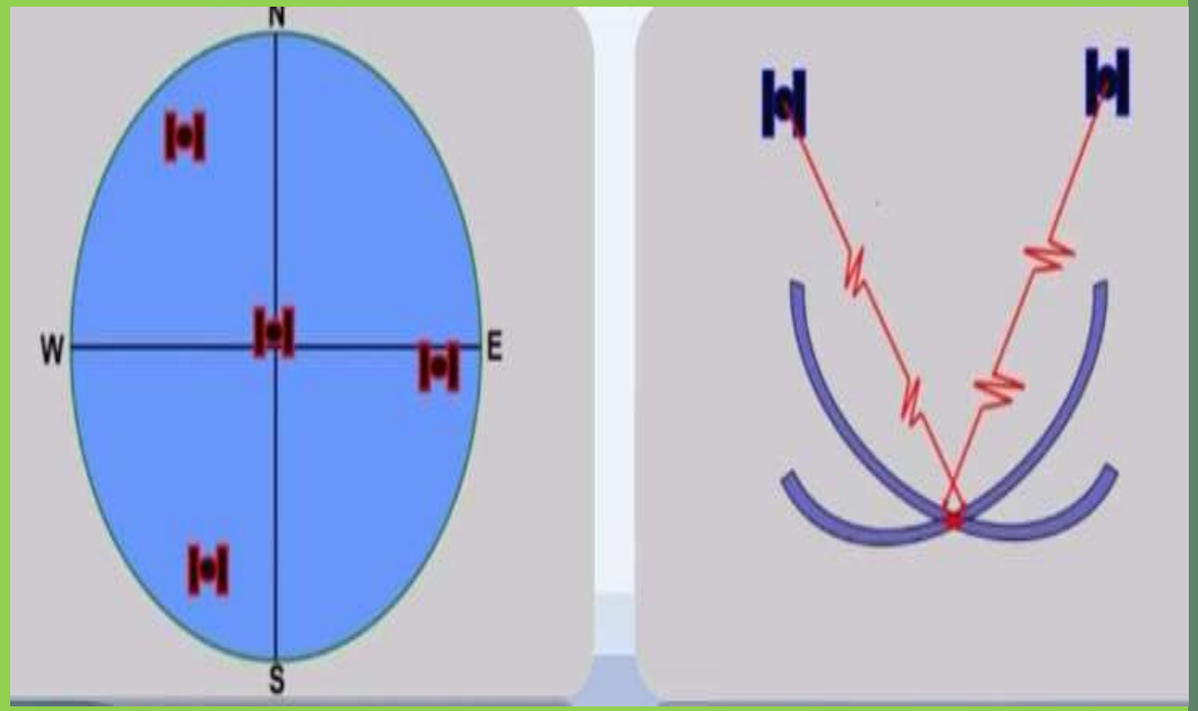
- The GPS User Segment consists on L-band radio receiver/processors and antennas which receive GPS signals, determine pseudo ranges (and other observables), and solve the navigation equations in order to obtain their coordinates and provide a very accurate time

WORKING

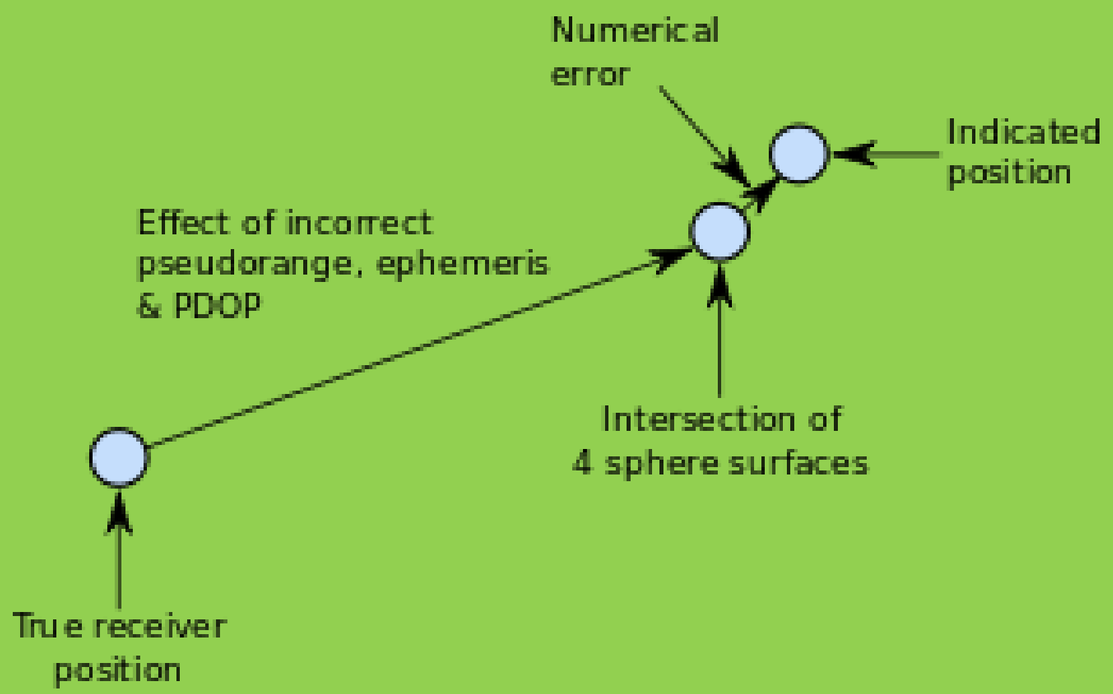
- Each satellites broadcast radio signals with their location and time
- GPS receivers receives radio signals and used these data to calculate its distance from at least four satellites
- Distance = Speed * Travel Time
- GPS radio signals travels at a speed of light
- Both satellite and receiver generates the same Pseudocodes

GPS SATELLITE GEOMETRY

- Satellite geometry can affect the quality of the GPS signals and accuracy of receiver
- Position Dilution of precision is the DOP value used most commonly in GPS



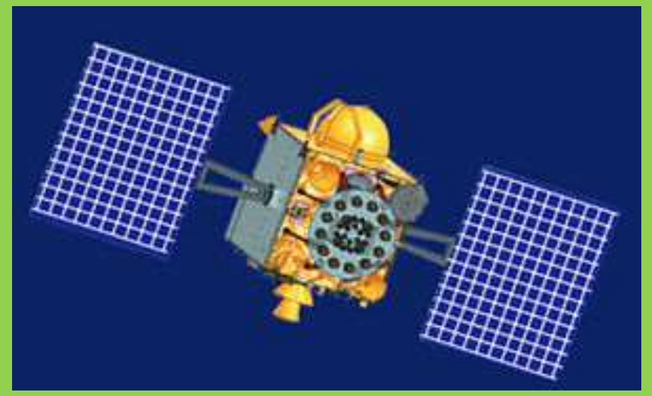
SOURCES OF GPS ERROR

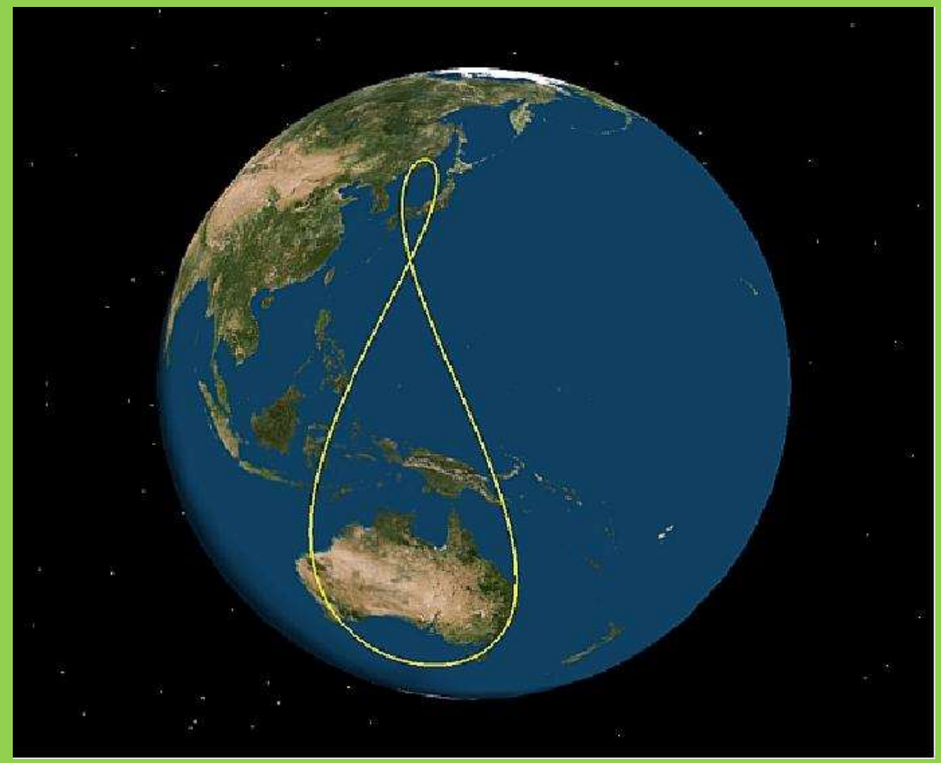


- Satellite Clocks
- Orbital Errors
- Ionosphere
- Troposphere
- Multipath
- Selective Availability
- User Error

OTHER SATELLITE NAVIGATION SYSTEM

- GLONASS
- GALILEO
- BEIDOU
- COMPASS
- IRNSS
- QZSS





APPLICATIONS

- In vehicle navigation
- Weather and Traffic Report
- Military navigation
- Mapping & Surveying

REFERENCES

- George A. Peters, Barbara J. Peters, “Automotive Vehicle Safety” CRC Press, 2002
- Richard Bishop, “Intelligent Vehicle Technology and Trends” Artech House, 2005

Thank you