

Topic

- Scans
 - Hieght's page 32 (2.8)
 - Multipath interference 280 (6.8)
 - Availability
 - figure 337 (7.10)
 - 339 (7.13)
 - 340 (7.14)
 - 341 (7.15)
 - 383 (8.2)
 - 494 (9.21)
 - 495 (9.22)
 - 525 (9.35)
- Up to speed
 - latitude and longitude
 - Geoid
 - Oblate Spheroid
 - draw shape
 - Datum
 - WGS 84
 - 6378km
 - Different datums will give rise to different lat/long, heights
 - Four heights
 - Ellipsoid
 - Geoid (sea-level)
 - feature of the earth
 - In the U.S. the Geoid is below the Ellipsoid
 - Topography
 - User (height to ellipsoid)
 - GPS is beacon-based
 - intersecting spheres
 - TOA concept
 - GPS gives time,position, velocity
 - velocity may be integrated or based on doppler shift
 - timing error adjustment
 - System Time
 - Satellite Time
 - Receiver Time
 - 3-D fix requires 4 satellites or assumptions
 - Satellite provides two types of data

Topic

- Ephemeris data
 - Where is the satellite, what is it's path
 - ranging data
- Question:
 - What is a single-frequency SPS GPS User?
- Augmentations
 - Ground-based and Space-based
 - Differential Systems or Sensor-based Systems
 - Differential Systems
 - Concept: Reference station
 - Additional Information
 - Corrections to range measurements
 - Corrections to satellite clock or position data
 - Raw reference stations measurements
 - Integrity data (use, don't use)
 - auxiliary data about the reference station
 - How does that additional information arrive
 - broadcast radio
 - dedicate wire
 - Internet
 - Satellite feed
 - Maybe not real-time
 - Absolute or Relative
 - Absolute
 - Flight Path of an airplane at airport
 - Ship entering a harbor
 - Relative
 - Plane landing on a carrier
 - code-based vs carrier based
 - local, regional, or wide-area
 - Draw Local DGPS concept
 - Sources of error
 - correlated in time and space?
 - satellite clock error
 - same for all satellite observers
 - ephemeris errors
 - Show scan
 - ephemeris error of 5m, user-reference separation of 100km, correction error of 2.5 cm

Topic

- tropospheric effects
 - environmental effects
 - basically path based
 - 100km -> 2 cm error.
 - weather front -> 40 cm error
- ionospheric effects
 - angle of path
- Code based techniques
 - Local Area DGPS
 - First obvious idea - transmit different positions
 - Problems
 - satellite combos
 - algorithmic differences
 - Second idea - transmit different ranges
 - Regional Area DGPS
 - Multiple reference stations
 - Calculate positions
 - Weight based on range.
 - Wide-Area DGPS
 - broadcast separate estimates of error components
 - lots of ground stations combining information centrally then broadcasting analysis
 - Space-based systems
 - WAAS (!)
 - EGNOS
 - MSAS (Southeast Asia)
 - GAGAN (India)
 - Precise Point Positioning (beyond WADGPS) (< 10 cm accuracy)
 - These systems don't use any of the position or clock information from the satellite
 - get that info from seperate feed
 - satellite antenna lever arm
 - phase wind-up
 - solid tides
 - dual-frequency receiver
 - Starfire
 - CORS
 - offline corrections
- Carrier based techniques

Topic

- Changes in doppler shift of carrier wave
- Sensor augmentation
 - Kalman filter
 - Dead Reckoning
 - Deals with Signal loss
 - Dynamic environment between updates
 - Two scans
- Mobile systems
 - Mobile-assist
 - Mobile-based
 - Show scan