



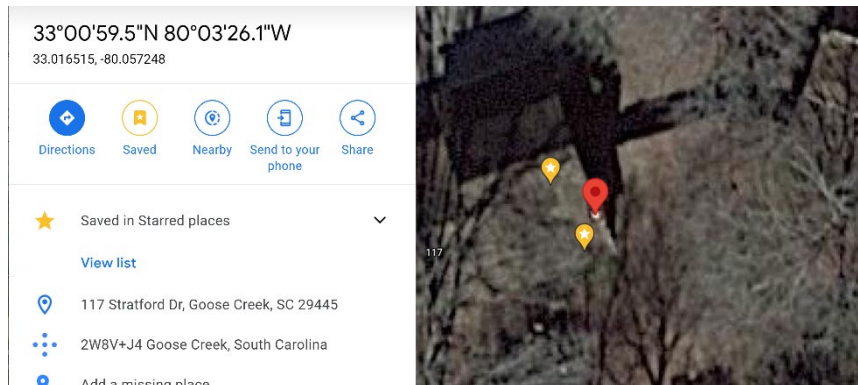
TECHNICAL PAPER 8

Overview Of Terrestrial Navigation Code Shift Key (CSK) Random Binary Codes

The Google addition of precision Lat-Long surveyed mapping in 2005 added the capability option to use a fixed Terrestrial global position reference for future “non-satellite” based navigation systems that are usable independent of satellite ephemeris information (therefore independent of Ionospheric delay parameters and Earth rotation irregularities). The Earth Tectonic plates move only a few inches per year. Therefore, the Google fixed mapping system with ranging and Universal Time precision to within 0.5 feet during every 12-month period is ideal for an advanced Terrestrial position LAT-LONG navigation system that is independent of satellites. Real ranges and precision Universal Time for communications acquisitions replacing pseudo-ranges used in satellite-based positions and time references with accuracies within 0.5 nanoseconds. This allows constant 24/7 communications with line-of-site cell towers that are within 5 to 20 miles to applicable cell phones in continental US today. With precision time known at the cell phone, all position determination algorithms do not require more than two ranges to local cell towers. Each line-of-site tower is assumed to be broadcasting precision LAT-LONG plus ALTITUDE (in Mean Sea Level parameters) parameters that are available from Google Maps from Internet. These precision parameters are independent of “time”.

The two LAT-Long-Altitude references plus known baseline between cell towers provide the Lat-LONG-Altitude parameters of cell location. With the CSK RANDOM binary codes of **Patent No. US 10056937** navigation fix rate of 6+ per second is possible. This Paper presents an example of the parameters available with a Terrestrial navigation system. The Google Global Maps have all required information to position cell

phones within a fraction of a foot in location on the Google Maps accessible on cell phones today. The Patent referenced above provides the precision navigation codes to replace the satellite Pseudo-ranging system, and thereby, eliminates the large ionospheric range errors. The continuous rotation wobble error and ionospheric range errors cause Random Walk Lat-LONG



errors of 20-to-40-foot radius around the actual LAT-LONG non-moving position around the REAL LAT-LONG shown by the RED marker in the figure above. This marker was specified by the precision LAT LONG provided in a Browser Search in Google Maps. In this example, the LAT LONG presented was: 33.016515 (to 33.016515), -80.057249 (to -80.057248). The distance calculated in this white circle is rounded to 4 inches with only the LONGITUDE changed by the least significant digit (W---249 to W---258) within the little white circle known to be about 8 inches across. This does not change with time so the Terrestrial navigation process could measure 6 precision positions per 1-second time span. Simple Pythagorean solutions from 10 groups of 2 close-range 2-to-20-mile range cell towers would be the normal for vehicles including autos and aircraft.

Primary CSK Codes Advantages

- All position plus altitude determination algorithms do not require more than 3 ranges to local cell towers
- Each line-of-site tower is assumed to be broadcasting precision LAT-LONG plus ALTITUDE
- These precision parameters are independent of “time”
- All network users can optimize the CSK Code and Symbol parameters