WAAS Technical Report
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Pomona, New Jersey
2/22/2006

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DR# 25: Extended POR Signal-in-Space Outage after Communication failure
GPS Week/Day: Week 1363 Day 3 (2/22/2006)

Discussion:

On week 1363 day 3 POR was experiencing signal-in-space (SIS) outages after a switchover. The switchover occurred at GPS time 264364 (1:26:5 GMT) where Brewster GUS switched from primary to backup followed by a switch at Santa Paula GUS from backup to primary 5 seconds later. POR SIS degraded for approximately 330 seconds after that with SIS outages. The GUS switch signal was also too poor for many receivers to track it.

The cause of the outage started with a terrestrial communication failure with the Brewster GUS communication lines where Brewster was the primary GUS. When it did not receive data from the C&V a GUS switchover was commanded. Santa Paula GUS became the primary but the transponder offset frequency was set to 0. The transponder offset frequencies are transferred from the former primary to the new primary. If the last former value isn't available, then a default value is used. The accuracy of the default values varies with time and how quick the transponders are drifting in frequency. POR is now about 1.6 KHz off with a default of about 1.1 KHz where it takes a while to search out the error. Hence it took several minutes for the Santa Paula GUS to track POR and extended the time needed for the GUS switch to Santa Paula.

Conclusion

A transponder offset at Santa Paula GUS caused a longer than expected switch from Brewster GUS that had a communication failure. This issue at POR GUS is scheduled to be fixes as part of the Release 4 upgrade in WAAS operation system. With this change, even with a 0 offset the new GUS can begin tracking the satellite right away.