WAAS Technical Report
William J. Hughes Technical Center
Pomona, New Jersey
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DR# 34: Clarksburg GUS Failure
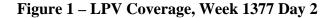**GPS Week/Day: Week 1377 Day 2 (5/30/06)**
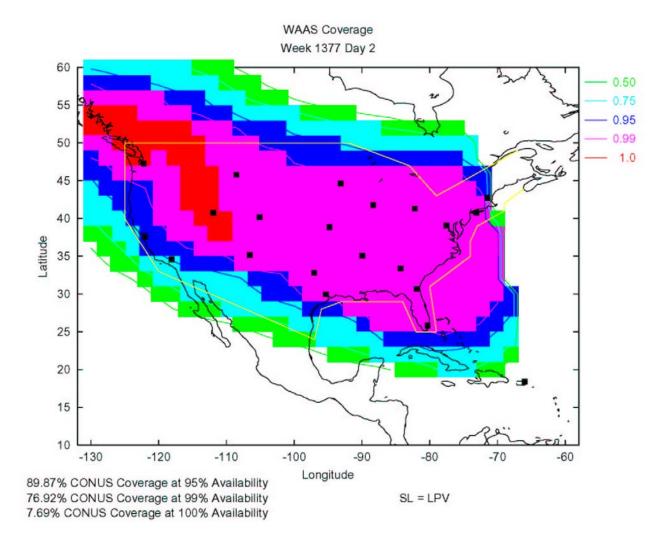
<u>**Discussion:**</u>

On GPS Week 1377 Day 2 a series of SIS (Signal in Space) outages were observed in the AORW WAAS data stream. Table 1 contains the output of data integrity processing, detailing these outages.

Table 1 – Data Integrity Gap Output for AORW, Week 1377 Day 2

Start Times	Stop Times	Duration
236395	236403	7
236913	236921	7
237081	237089	7
237186	237194	7
237305	237312	6
237356	237364	7
237433	237441	7
237504	237513	8
237615	237623	7
237675	237683	7
237780	237788	7
237915	237923	7
237923	237938	14

The effect of these gaps on WAAS LPV service can be seen in Figure 1, a plot of LPV coverage contours for Week 1377 Day 2.

Figure 1 – LPV Coverage, Week 1377 Day 2

Each of the gaps listed in Table 1 corresponds with an event reported in the WAAS Significant Events log posted on Raytheon's WAAS Performance Monitoring website. Table 2 contains a partial list taken from the WAAS Significant Events log from Week 1377 Day 2, focusing on GUS mode changes. These changes have been highlighted.

Table 2 – WAAS Significant Events log, Week 1377 Day 2

Date	UTC	UTC TOW	WAAS Subsystem	Event
5/30/2006	18:05:05	237905	CLK GUS-A	RFU M&C Communication Fault
5/30/2006	18:05:10	237910	CLK GUS-A	Mode change to Faulted
5/30/2006	18:05:10	237910	CLK GUS-A	Major failure of RFU Equipment
5/30/2006	18:05:13	237913	CLK GUS-A	Ant/Dummy SW Ctrl Status fault
5/30/2006	18:05:14	237914	CLK GUS-A	Ant/Dummy Switch Status fault
5/30/2006	18:05:15	237915	ZDC CV	No GEO Measurements Rcvd 122
5/30/2006	18:05:15	237915	ZTL CV	No GEO Measurements Rcvd 122
5/30/2006	18:05:15	237915	ZLA CV	No GEO Measurements Rcvd 122
5/30/2006	18:05:16	237916	ZDC CV	STA GUS-A switch to Primary
5/30/2006	18:05:14	237914	CLK GUS-A	Ant/Dummy Switch Status fault
5/30/2006	18:05:18	237918	STA GUS-A	Mode change to Primary
5/28/2006	7:05:11	241511	STA GUS-A	Test Loop: L1 WAAS Msg Missing
5/30/2006	18:05:19	237919	CLK GUS-A	RFU M&C Communication Fault
5/30/2006	18:05:19	237919	CLK GUS-A	RFU M&C Communication Fault
5/30/2006	18:05:10	237910	CLK GUS-A	Major failure of RFU Equipment
5/30/2006	18:07:20	238040	CLK GUS-A	Major failure of RFU Equipment

Table 3 contains data from a GUS O&M log for Week 1377 Day 2. Changes in the status of each GUS are detailed throughout the course of the day. The GUS at Clarksburg was set to primary at the beginning of the day and continued as such up until the series of gaps listed in Table 1 began to occur, after which it faulted and Santa Paula-A became the primary AOR GUS.

It should be noted that the times listed in Table 2 are in UTC and the time listed in Table 3 are in GPS, differing due to leap second adjustments made on UTC.

Table 3 – GUS O&M Status Log, Week 1377 Day 2

GPS TOW	GUS, Status change
172800	BRE From INITIAL to BACKUP
172800	STA-B From INITIAL to PRIMARY
172800	STA-A From INITIAL to BACKUP
172800	CLK From INITIAL to PRIMARY
237924	CLK From PRIMARY to FAULTED
237932	STA-A From BACKUP to PRIMARY
238138	CLK From FAULTED to MAINTENANCE
246372	CLK From MAINTENANCE to FAULTED
246433	CLK From FAULTED to MAINTENANCE
259200	BRE From BACKUP to BACKUP
259200	STA-B From PRIMARY to PRIMARY
259200	STA-A From PRIMARY to PRIMARY
259200	CLK From MAINTENANCE to MAINTENANCE

The final gap that occurred as listed in Table 1 is due to a GUS switchover from Clarksburg to Santa Paula-A (GPS TOW 237923) and correlates with information in Tables 2 and 3 concerning a fault at the Clarksburg GUS (GPS TOW 237910). After Santa Paula-A was set as primary, the series of SIS outages ended.

Conclusion:

A failure occurred at the Clarksburg GUS on Week 1377 Day 2, causing a series of intermittent AOR SIS outages that ended when it was set to faulted and the Santa Paula-A GUS was set to primary. LPV service was reduced with the most significant effects caused by the switch to Santa Paula-A that resulted from this failure.