WAAS Technical Report
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DR# 26: Near-Simultaneous GUS Failures Caused AOR-W SIS Outage
GPS Week/Day: Week 1362 Day 4 (2/16/2006)

Discussion:

On week 1362 day 4 (2/16/2006), an AOR-W Signal in Space outage began at GPS time of week 364966 (05:22:46 GMT). It continued for 2002 seconds, until 366967 (05:56:07 GMT). An amplifier glitch had caused the primary AOR-W GUS (STA-A) to fault, and the WAAS attempted to perform a GUS switchover, but a near-simultaneous failure on the backup GUS (CLK) prevented this from occurring. There was no primary GUS selected for AOR-W during the SIS outage. Eventually, the STA-A GUS was brought back up, was again selected as the primary GUS, and the AOR-W SIS resumed. WAAS and NSTB reference stations dropped to SPS mode for the duration of the outage. Details are discussed below, and outlined in Table 1.

Six seconds after the AOR-W SIS outage began, Clarksburg was set as the primary GUS, as it would in the case of a GUS switchover, but it faulted immediately.

A minute and a half into the SIS outage, the Santa Paula-A GUS went from Faulted to Maintenance mode. About fourteen minutes later, its selected source was changed from ZDC to the ZLA C&V. About eleven minutes later, it faulted again. After 85 seconds, its selected source was changed back to the ZDC C&V. A minute later, STA-A GUS went to Maintenance mode, then to Verification mode, and back to the Primary AOR-W GUS over the course of about three minutes. AOR-W resumed its broadcast nine seconds after STA-A was set as the Primary. No Type 0 messages were sent.

All AOR-W non-dual GEO sites dropped to NPA mode 8 seconds after the beginning of the SIS outage, and then to SPS mode six seconds after that. They remained in SPS mode for the duration of the outage. All affected sites resumed PA or NPA service within a minute and a half after the end of the SIS outage, but some PA sites took nearly five minutes to resume PA service.

Dual-GEO sites switched to POR during the outage, so their service modes were unaffected.

Meanwhile, about three minutes into the SIS outage, CLK GUS was set to Maintenance, then Verification mode, then faulted again. Its selected source was changed to ZLA C&V, then it faulted again, then it went to Maintenance mode, then it faulted, before its selected C&V source was switched back to ZDC. About thirty seconds later, it went to Maintenance mode. After the AOR-W SIS outage had ended, over the course of seven and a half hours, CLK GUS faulted twice more, and went back and forth between Maintenance and Verification modes three times.

Conclusion:

On GPS week 1362 day 4, an amplifier glitch at the Santa Paula-A GUS and a near-simultaneous failure at the Clarksburg GUS caused a 2002-second AOR-W signal in space outage. When STA-A faulted, the WAAS attempted to switchover to the CLK GUS, but was unable because CLK had faulted as well. When the STA-A GUS was brought back up to Normal mode, it was again set as the Primary AOR-W GUS, and AOR-W's SIS broadcast resumed. AOR-W non-dual GEO reference stations dropped to SPS mode for the duration of the outage. They resumed in PA mode approximately one to five minutes after the SIS outage ended.

Table 1—WAAS AOR-W Events, 1362 Day 4

Index	GPS Time	GMT	Event	Details
0	345600	00:00:00	Beginning of day	• STA-A is primary AOR-W GUS • CLK is backup AOR-W GUS • Both GUS's using ZDC C&V
1	364966	05:22:46	AOR-W SIS outage begins.	Duration: 2002 seconds.
2	364968	05:22:48	STA-A GUS Faulted	Fault was caused by an amplifier glitch.
3	364974	05:22:54	CLK GUS set to Primary	
4	364975	05:22:55	CLK GUS Faulted	
5	365054	05:24:14	STA-A GUS set to Maintenance Mode	
6	365138	05:25:38	CLK GUS set to Maintenance Mode	
7	365173	05:26:13	CLK GUS set to Verification Mode	
8	365174	05:26:14	CLK GUS Faulted	
9	365885	05:38:05	Source Select Switch	CLK switched to ZLA C&V
10	365885	05:38:05	Source Select Switch	STA-A switched to ZLA C&V
11	366138	05:42:18	CLK GUS Faulted	
12	366255	05:44:15	CLK GUS set to Maintenance Mode	
13	366573	05:49:33	STA-A GUS Faulted	
14	366628	05:50:28	CLK GUS Faulted	
15	366712	05:51:52	Source Select Switch	CLK switched to ZDC C&V
16	366713	05:51:53	Source Select Switch	STA-A switched to ZDC C&V
17	366735	05:52:15	CLK GUS set to Maintenance Mode	
18	366771	05:52:51	STA-A GUS set to Maintenance Mode	
19	366793	05:53:13	STA-A GUS set to Verification Mode	

Index	GPS Time	GMT	Event	Details
20	366958	05:55:58	STA-A GUS set to PRIMARY Mode	
21	366967	05:56:07	AOR-W SIS outage ends.	Duration: 2002 seconds. Note: there were no Type 0 messages broadcast.
22	367600	06:06:40	CLK GUS Faulted	
23	367723	06:08:43	CLK GUS set to Maintenance Mode	
24	368272	06:17:52	CLK GUS Faulted	
25	370240	06:50:40	CLK GUS set to Maintenance Mode	
26	373603	07:46:43	CLK GUS set to Verification Mode	
27	374204	07:56:44	CLK GUS set to Maintenance Mode	
28	374372	07:59:32	CLK GUS set to Verification Mode	
29	393120	13:12:00	CLK GUS set to Maintenance Mode	
30	394030	13:27:10	CLK GUS set to Verification Mode	