

WAAS Technical Report
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DR#61: ZDC C&V Faulted, Followed By Geo Initialization.
GPS Week/Day: Week 1433 Day 5 (6/29/2007)

Discussion:

On Week 1433 Day 5, the ZDC C&V faulted. CP1 faulted at GPS time 440568 (2:22:49 GMT) and CP2 faulted at 440569 (2:22:50 GMT). The primary GUSs for AOR, POR and CRW switched the C&V selected source to ZTL from ZDC at the same time the ZDC CP1 faulted. The backup GUSs switched at the same time when the ZDC CP2 faulted. There was a missing message for one second at the time ZDC CP2 faulted. Two seconds later at GPS time 440571 (2:22:52 GMT), both AOR and POR transmitted four Type 0 messages. However, CRW transmitted the type 0 messages a few seconds earlier at GPS time 440565 (2:22:46 GMT) before the C&V faulted because of a GUS switchover. Table 1 shows the timeline of events for ZDC C&V, all GEOs and GUSs during this event. ZDC C&V was set to normal mode again at GPS time 445131 (3:38:52 GMT) for CP1 and 445132 (3:38:52 GMT) for CP2.

The transmission of the type 0 messages caused all the WAAS sites to drop to SPS mode and later NPA mode for approximately 180 seconds before returning to PA mode again. The 100% availability in the CONUS and Alaska were also lost as a result of initialization. Figure 1 show the WAAS CONUS coverage availability for this day.

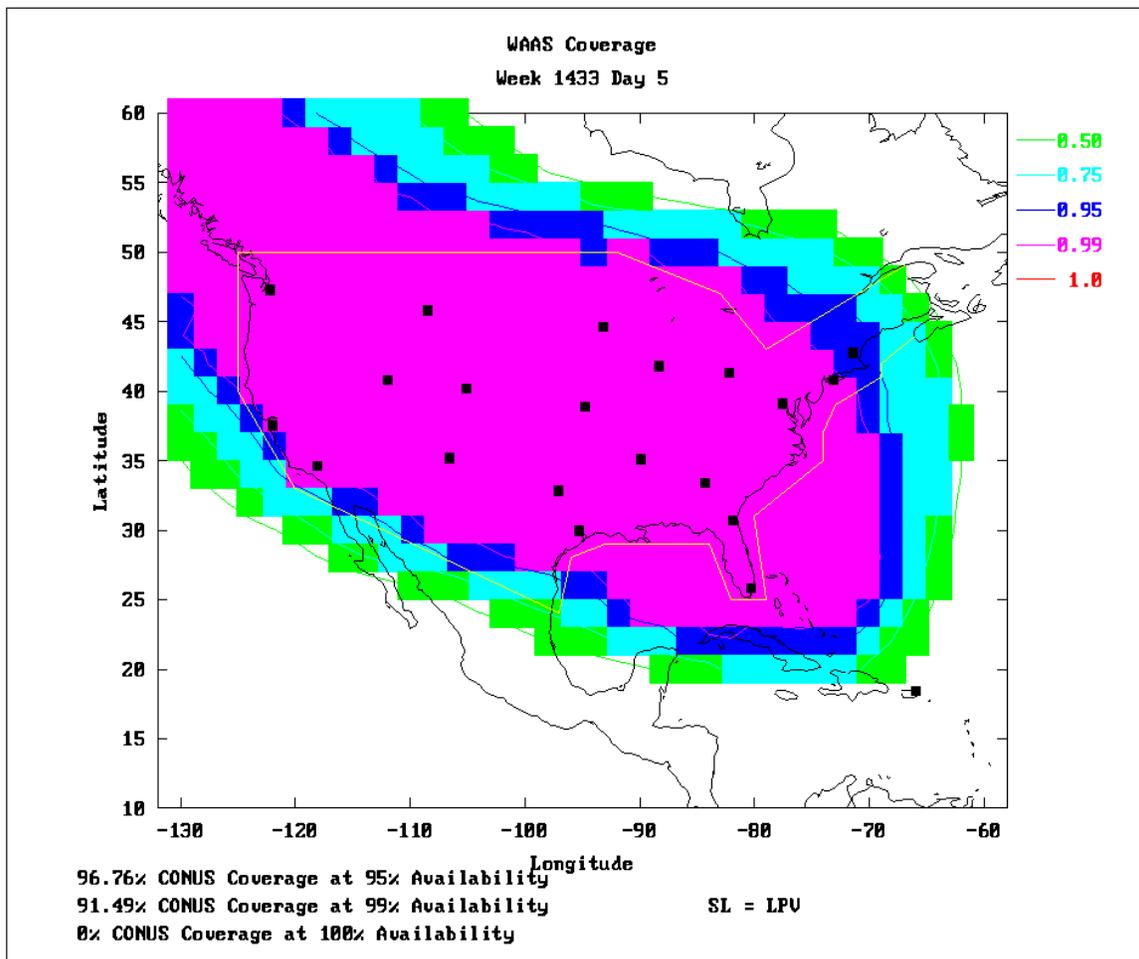
ZDC 'try-faulted' due to a time to alarm (TTA) error. The time of receipt of the WAAS user message from all WREs is averaged to determine that time to alarm is being met by the system. At the time of ZDC faulting two WREs were reporting times in the future (OTZ-B and JNU-B). Since there are many WREs reporting times having two with timestamps in the future is normally not a problem. However, in this case, only two WREs were reporting WAAS user messages for CRW due to the switchover. One of the WREs reporting was JNU-B and this caused the TTA average to exceed the .333 seconds tolerance. Note that in Release 8/9.1 a change is being made to WAAS so timestamps in the future will not be used in the TTA calculation.

Table 1 – Timeline of Events

GPS time	GUS / C&V /GEO	Events
440553	CRW	GUS switchover
440565	CRW	Start of 5 seconds Type 0 initialization
440568	C&V – ZDC – CP1	From Normal to Faulted

440568	GUS – BRE	Selected source switch from ZDC to ZTL
440568	GUS – STA-A	Selected source switch from ZDC to ZTL
440568	GUS – LTN	Selected source switch from ZDC to ZTL
440569	C&V – ZDC – CP2	From Normal to Faulted
440569	GUS – STA-B	Selected source switch from ZDC to ZTL
440569	GUS – CLK	Selected source switch from ZDC to ZTL
440569	GUS – APC	Selected source switch from ZDC to ZTL
440571	AOR	Start of 4 seconds Type 0 initialization
440571	POR	Start of 4 seconds Type 0 initialization
440781	C&V – ZDC – CP1	From Faulted to Maintenance
440782	C&V – ZDC – CP2	From Faulted to Maintenance
443250	C&V – ZDC – CP1	From Maintenance to Verification
443251	C&V – ZDC – CP2	From Maintenance to Verification
445131	C&V – ZDC – CP1	From Verification to Normal
445132	C&V – ZDC – CP2	From Verification to Normal

Figure 1 - CONUS LPV Coverage for 6/29/2007



Conclusion

A C&V fault at ZDC caused a C&V selected source switch for all GUSs and initialization of all 3 GEOs. The initialization resulted in the loss of WAAS availability across CONUS and Alaska area. All 3 GEOs also reported one common missing message at the time when the C&V CP2 was faulted.