WAAS Technical Report
William J. Hughes Technical Center
Pomona, New Jersey
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Author(s): Noah Rosen

DR#75: C&V Initialization Caused WAAS Service Outage
GPS Week/Day: Week 1498 Day 6 (September 27, 2008)

Discussion:

On September 27, 2008 (GPS Week 1498 Day 6) several events occurred which caused Message Type 0 to be broadcast from both the CRW and CRE geosynchronous satellites. At about 7:12 GMT, CRW and CRE sent out Type 0 messages within a few seconds of each other. This caused receivers to discard stored corrections and download new WAAS corrections from both GEOs. This led to a WAAS Service Outage.

Table 1: Events leading up to WAAS Service Outage:

GMT Time	GPS Time Of Week	Event
7:02:15 - 7:02:19	543749-543753	CRE Gus Switchover
07:02:16	543750	QWE changes from Primary to Backup
07:02:18	543752	BRE changes from Backup to Primary
7:02:19 - 7:02:26	543753-543760	Type 0 Messages sent from CRE
7:12:05 - 7:12:06	544339 - 544340	C&V Source Select Change from ZLA to ZTL for APA, APC, BRE, QWE
7:12:07 - 7:12:08	544341-42	ZLA C&V Fault
7:12:06 - 7:12:18	544340-544352	CRE GUS Switchover
7:12:08	544342	BRE changes from Primary to Backup
7:12:09 - 7:12:12	544343-544346	Type 0 Messages sent from CRW
7:12:12	544346	CRW Geo Stream Initialization
7:12:15	544349	QWE changes from Backup to Primary
7:12:18 - 7:12:26	544352-544360	Type 0 Messages sent from CRE
7:12:25	544359	CRE Geo Stream Initialization
8:45:27 - 8:45:31	549941-549945	CRE GUS Switchover
8:45:28	549942	QWE changes from Primary to Backup
8:45:30	549944	BRE changes from Backup to Primary
8:45:31 - 8:45:38	549945-549952	Type 0 Messages sent from CRE

The C&V Fault at ZLA was caused by a timing error. The GUS switch which took place at 7:12:05 got processed by SP1 at absolute GPS Time 906534739.99 (7:12:05), while SP2 processed the switch at 906534740.00(7:12:06). Since the O&M commanded GUS switchover took place during different epochs, SP1 and SP2 produced different WAAS User messages. This caused a comparator error, which faulted the C&V.

Since CRW and CRE geosynchronous satellites broadcasted Type 0 messages at the same time, there was a loss of WAAS service. Figures 1 and 2 show LPV service for Conus and Alaska respectively on 9/27/08.

Figure 1: WAAS Conus LPV Availability Contours

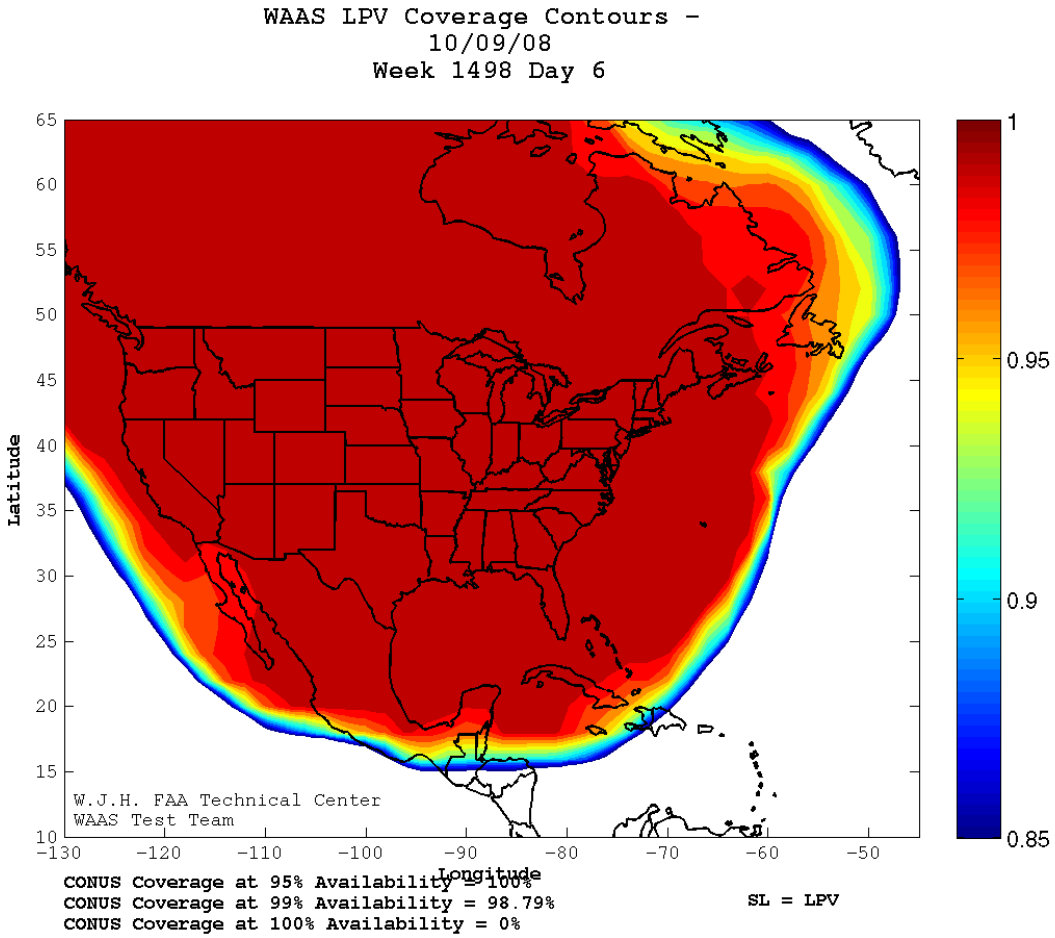
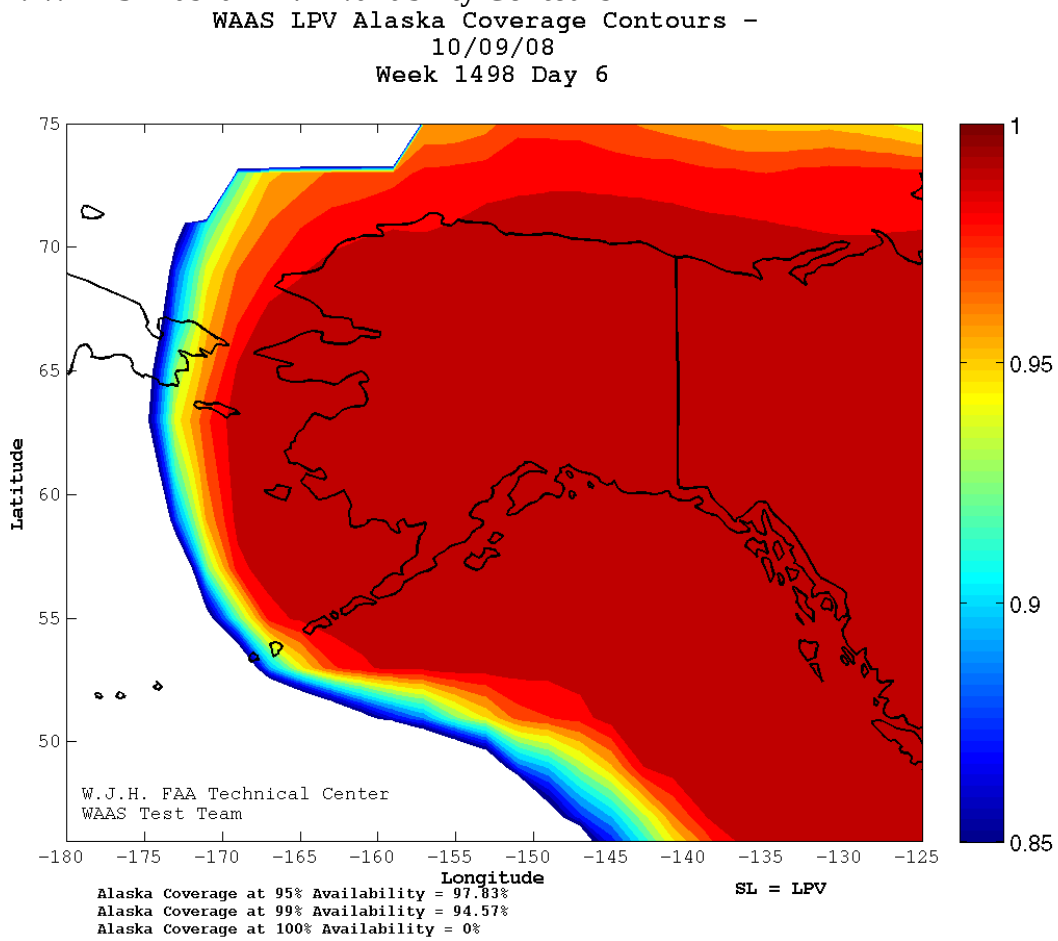


Figure 2: WAAS Alaska LPV Availability Contours



Conclusion:

The WAAS Service outage on September 27, 2008 was due to CRW and CRE geosynchronous satellites both broadcasting Type 0 messages simultaneously. In both the CONUS and Alaska areas, coverage at 100% availability was reduced.