WAAS Technical Memorandum
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Pomona, New Jersey
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WAAS set PRN 23 set to Not Monitored Following the Conclusion of NANU 2015086 GPS Week/Day: Week 1867 Day 2 (10/20/15)

Discussion:

On 10/19/15 and 10/20/15 (W1867D1 and W1867D2 respectively), there was an UNUSABLE NANU (NANU 2015086) on PRN 23 that lasted from 18:00 GMT on Oct 19 to 14:56 GMT on October 20th.

The PRN 23 outage affected coverage on 10/20/15. The PRN 23 outage caused WAAS LPV outages in Alaska as well as LPV200 outages in Alaska, Canada, and CONUS.

Figure 1 shows WAAS LPV Coverage on 10/19/15 and Figure 2 shows WAAS LPV Coverage on 10/20/15. Figures 3 and 4 show the LPV200 Coverage plots on 10/19 and 10/20.

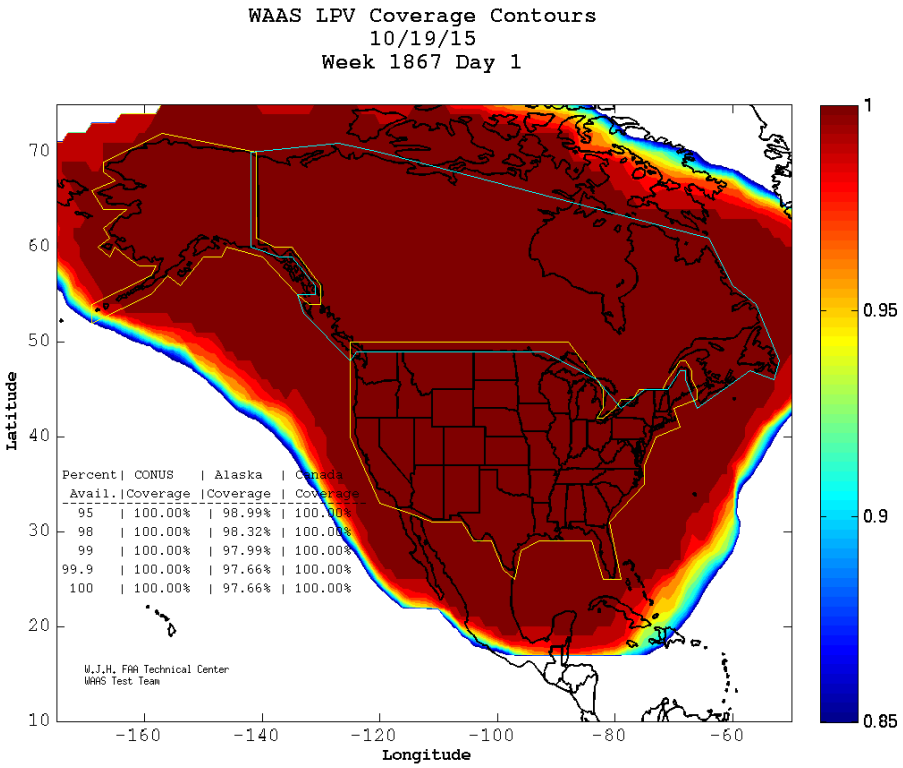

Figure 1: WAAS LPV Coverage on 10/19/15

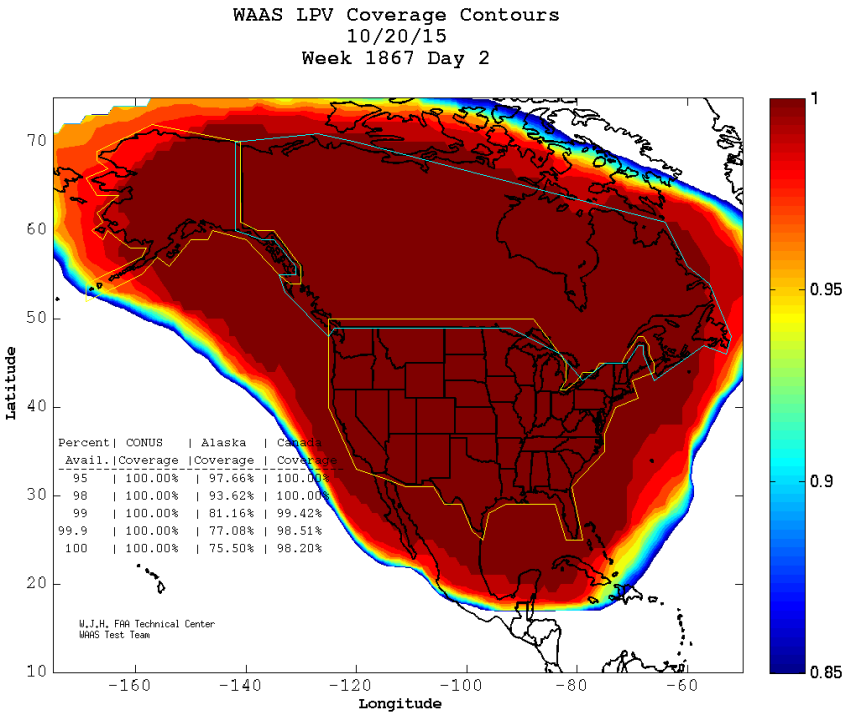

Figure 2: WAAS LPV Coverage on 10/20/15

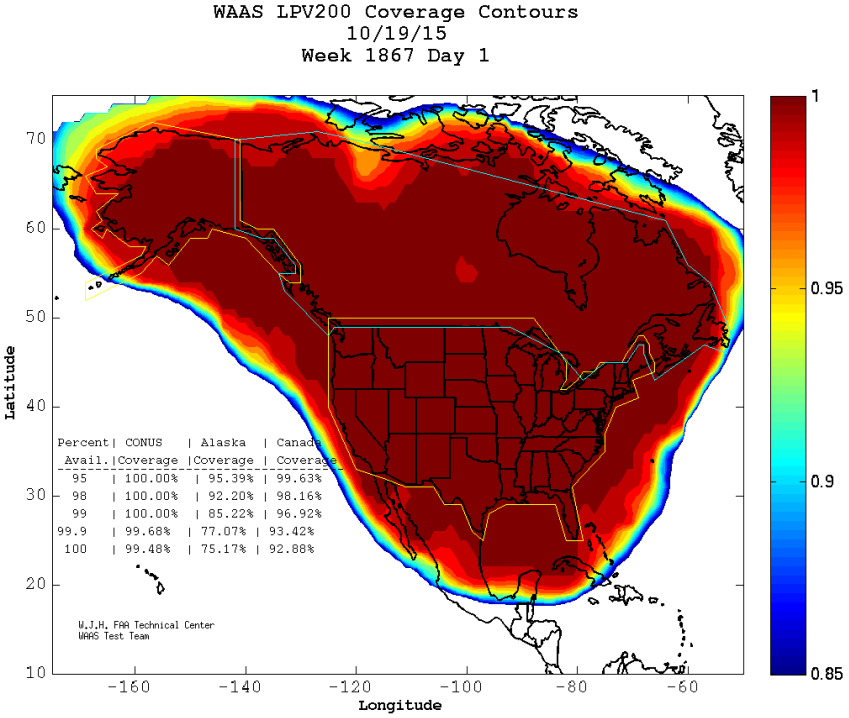

Figure 3: WAAS LPV200 Coverage on 10/19/15

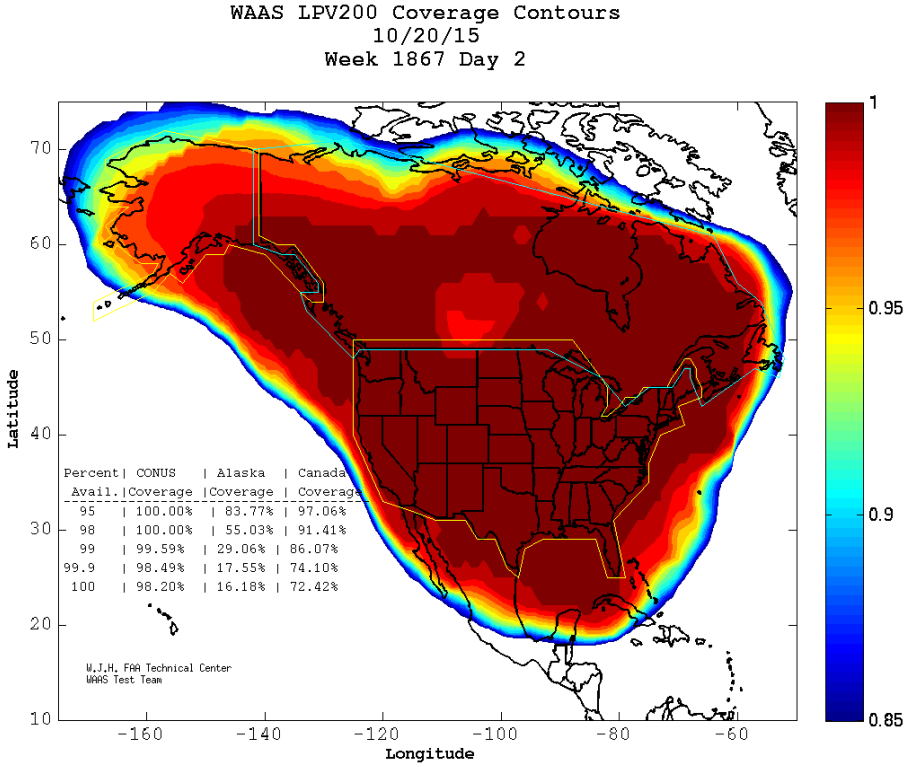

Figure 4: WAAS LPV200 Coverage on 10/20/15

After the PRN 23 outage ended on October 20th, the UDRE for PRN 23 remained in the WAAS "Not Monitored" state until October 21.

Figures 5, 6 and 7 show the UDRE profiles for PRN 23 on October 19, 20, and 21 respectively. PRN 23 should have been usable by WAAS on 10/20 following the conclusion of the outage, but was not usable until October 21. In the figures, the red trace shows the actual UDRE, while the green trace shows the expected UDRE profile for PRN 23.

Figure 5: PRN 23 UDRE on 10/19/15

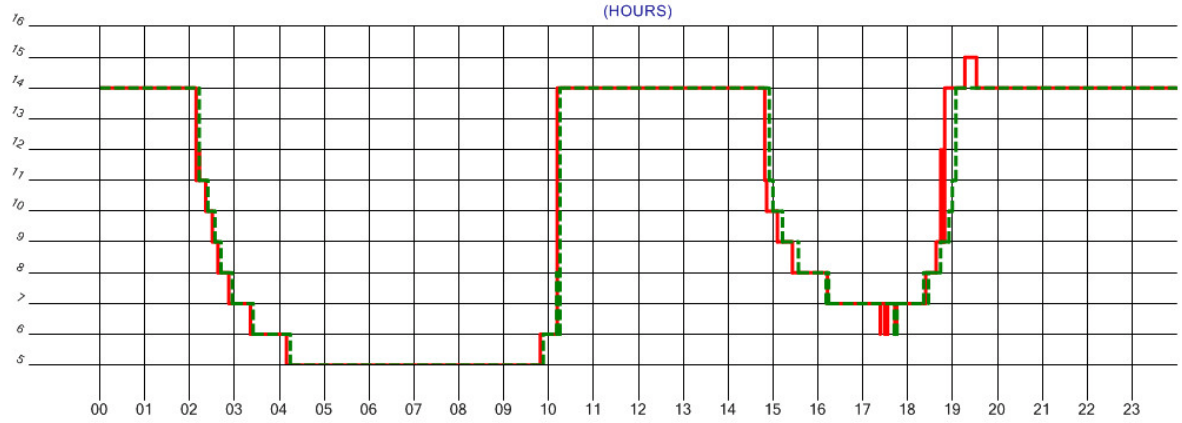

Figure 6: PRN 23 UDRE on 10/20/15

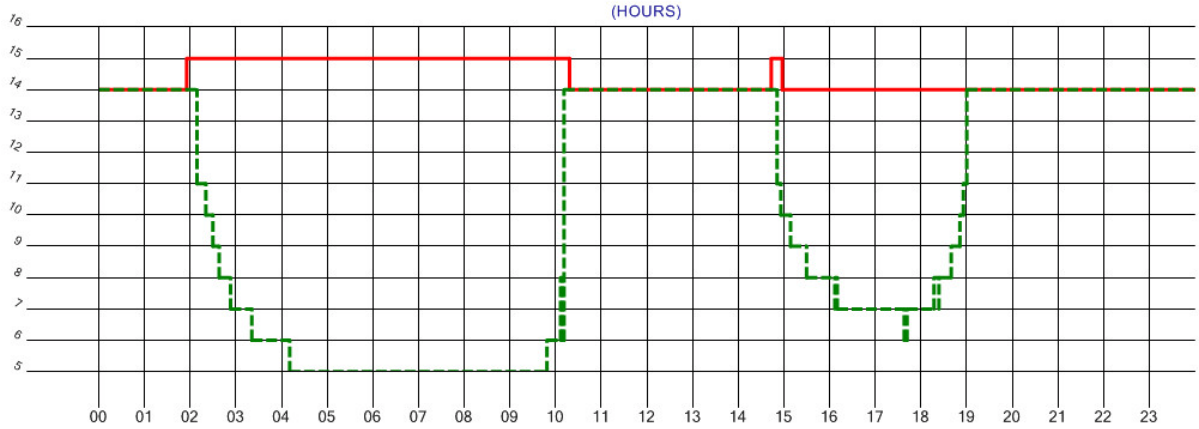

Figure 7: PRN 23 UDRE on 10/21/15

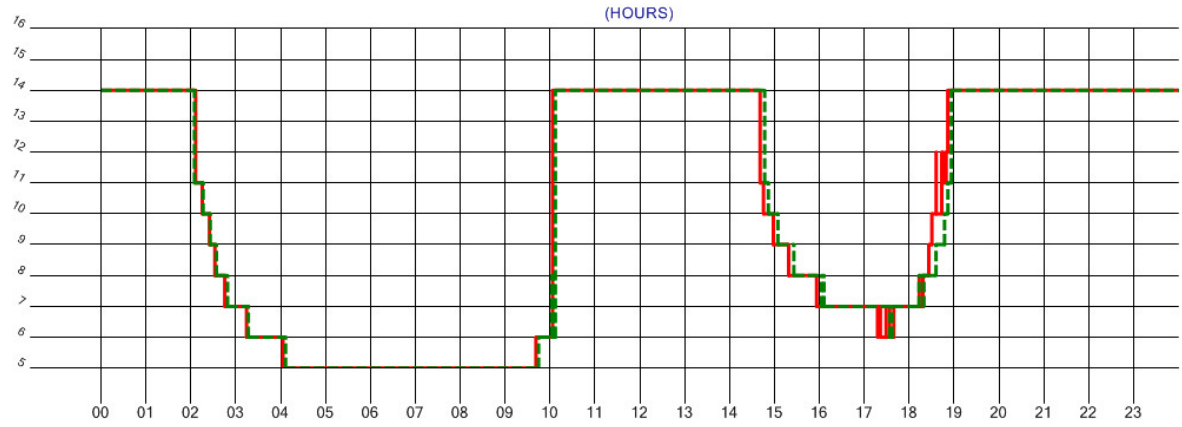

Figure 8: PRN 23 Geographic Position at 15:03 GMT

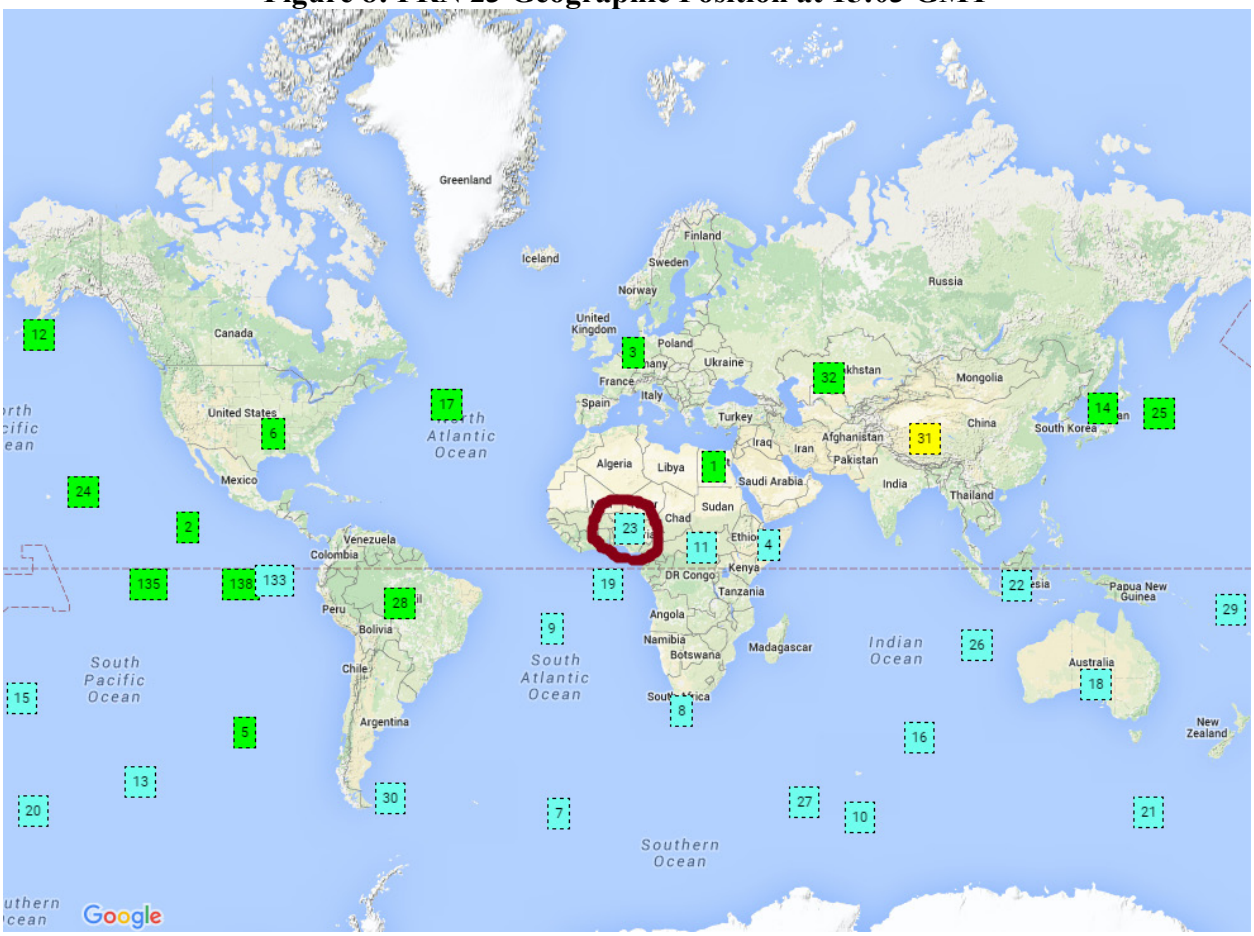

Figure 8 shows the geographic position of PRN 23 at 15:03 GMT, which is after the satellite returned to 'Healthy'. Reference stations on the eastern part of CONUS typically track the satellite at this time. Following NANU 2015086, however, only a few WAAS reference station receivers were able to track PRN 23 after the satellite was set to healthy following the conclusion of the NANU at 14:56 GMT

Starting in September 2015, WAAS reference station receivers are being updated from Novatel "G2" version to the "G3" version. The upgraded WAAS G3 reference station receivers have improved satellite tracking capabilities when compared to their G2 counterparts.

As of October 19, 2015, the following WAAS reference stations were upgraded to G3 receivers: ZTL (Atlanta, GA), ZSE (Seattle, WA), ZLA (Los Angeles, CA), and ZDC (Washington, D.C.).

After PRN 23 was set to healthy on October 21 all three WAAS receivers at Atlanta and Washington, D.C. tracked the PRN 23 while it was in view. As the satellite became visible at different reference stations, some of the G2 receivers also tracked PRN 23, including Boston thread C and Goose Bay Thread C and Winnipeg Thread C. After PRN 23 was set to healthy, 47

WAAS receivers should have tracked PRN 23, but 40 WAAS reference receivers did not track PRN 23 following the NANU.

Conclusion:

The PRN 23 outage affected coverage on 10/20/15. The PRN 23 outage caused WAAS LPV outages in Alaska as well as LPV200 outages in Alaska, Canada, and CONUS.

Following the NANU on PRN 23 on October 20, 2015, there were many WAAS reference station receivers that did not track PRN 23, even though the ephemeris data was healthy. All of the upgraded WAAS G3 reference receivers at Atlanta and Washington, D.C. tracked the satellite after PRN 23 was set to healthy. The LPV and LPV200 outages on October 20, 2015 were due to PRN 23 being set unhealthy.