WAAS Technical Memorandum
William J. Hughes Technical Center
Pomona, New Jersey
3/7/14
Author(s): Noah Rosen

DR#121 PRN 17 NANU and SV Alert on PRN 25 Affects WAAS Coverage
GPS Week/Day: Week 1782 Day 5 (3/7/2014)

Discussion:

On March 7, 2014, CONUS and Alaska coverage was lower than expected.

The reduction in CONUS coverage was due to a GPS NANU on PRN 17, which was unusable from 03:55 GMT to 09:46 GMT on March 7, 2014. The NANU caused a loss of LPV and LPV200 service in Northeastern CONUS and a loss of LPV200 coverage in western CONUS.

The reduction in Alaska coverage was caused by an SV Alert on PRN 25, which occurred at 09:25 GMT. The SV Alert reduced LPV200 coverage in Alaska for about 10 minutes.

Figure 1 shows a snapshot of WAAS service at 09:30 GMT. This snapshot is taken soon after the SV Alert on PRN 25 occurred..

Figure 1: WAAS Service at 09:30 GMT

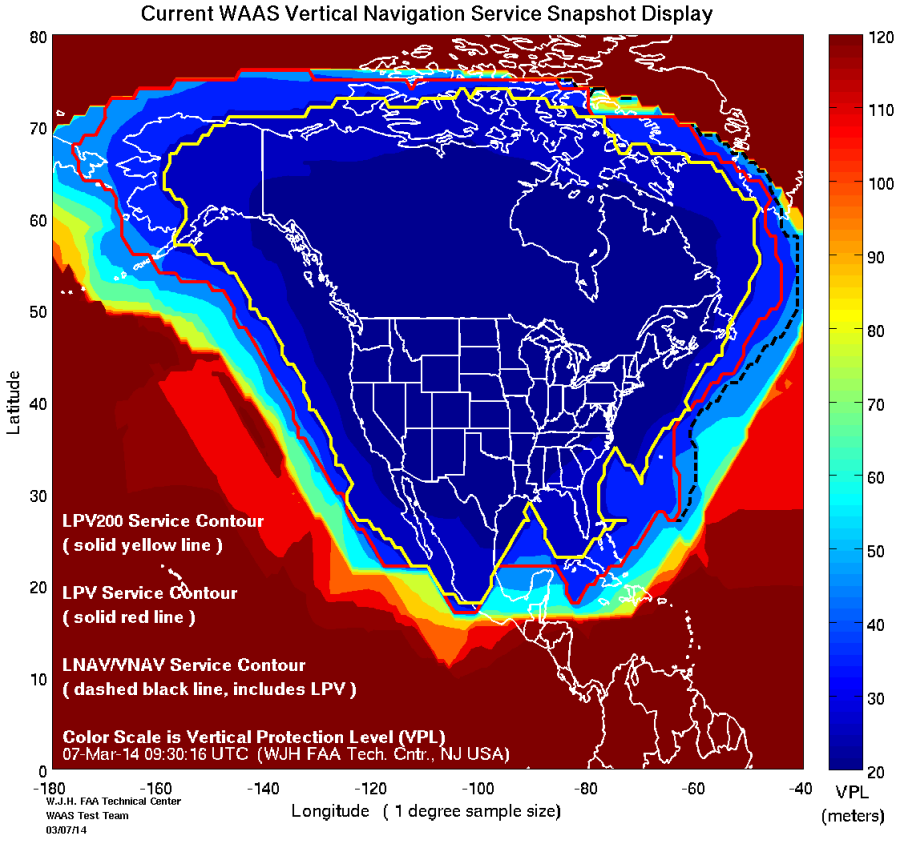


Figure 2 shows a snapshot of WAAS service at 05:30 GMT. LPV200 coverage in western CONUS is reduced.

Figure 2: WAAS Service at 05:30 GMT

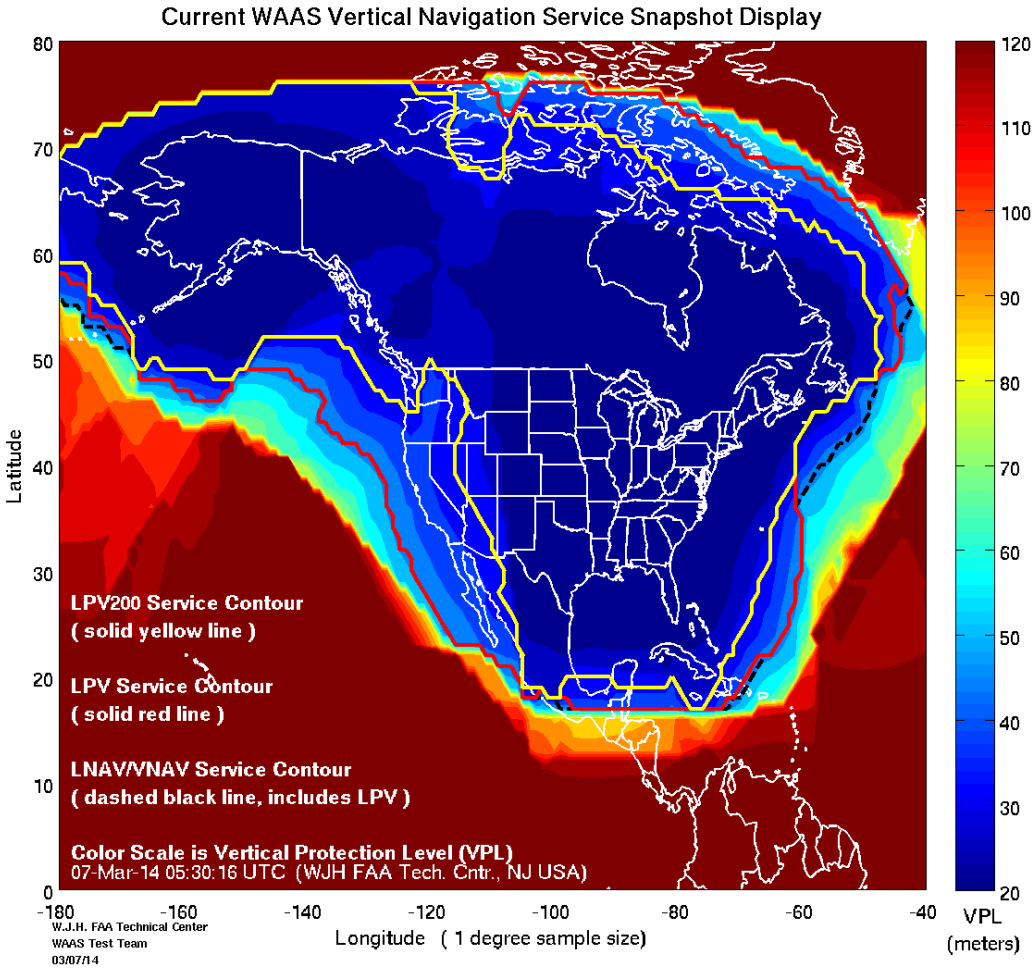


Figure 3 shows a snapshot of WAAS service at 06:27 GMT. LPV200 coverage in eastern CONUS is reduced.

Figure 3: WAAS Service at 06:27 GMT

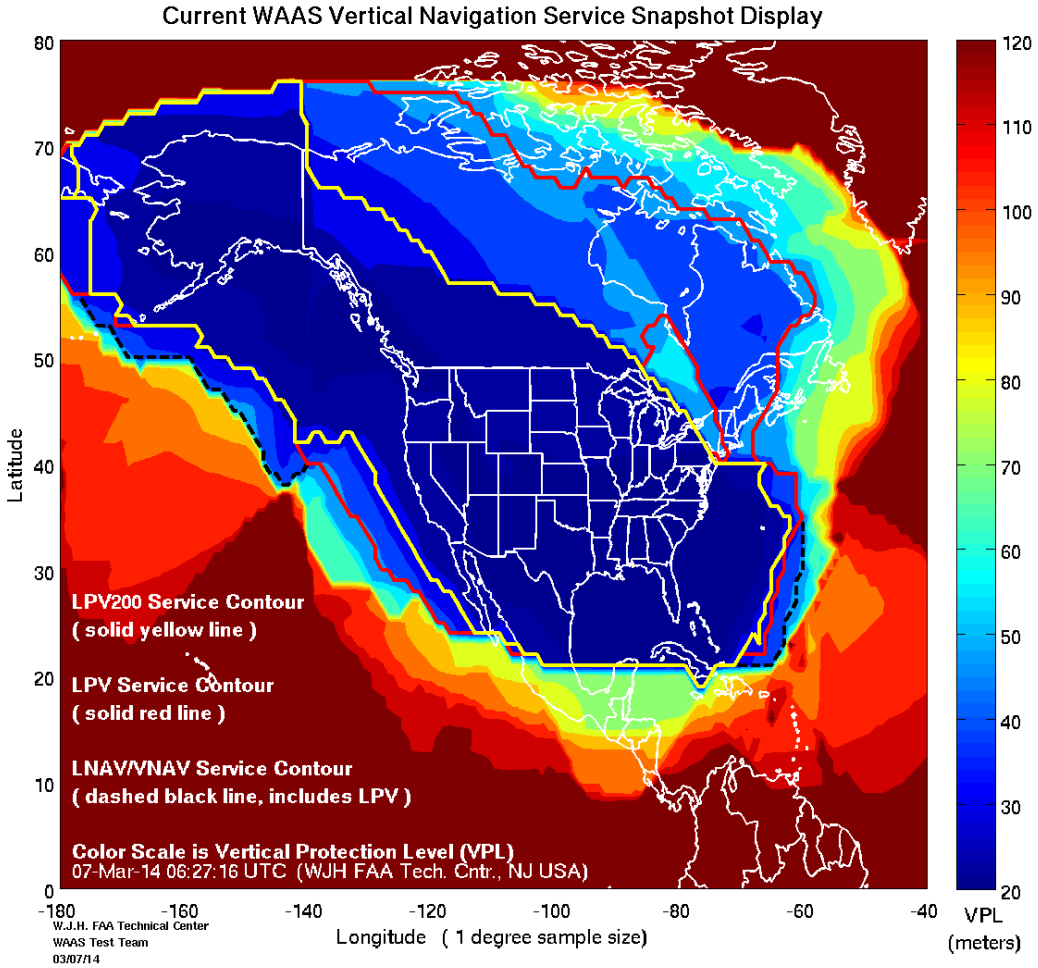


Figure 4 shows a plot of satellite positions and WAAS status at 06:54 GMT. With PRN 17 set to "Do Not Use" the satellite constellation geometry is significantly weakened. Notice that there are only 9 satellites in PA mode at this time.

Figure 4: Satellite Position and WAAS Status at 06:54 GMT

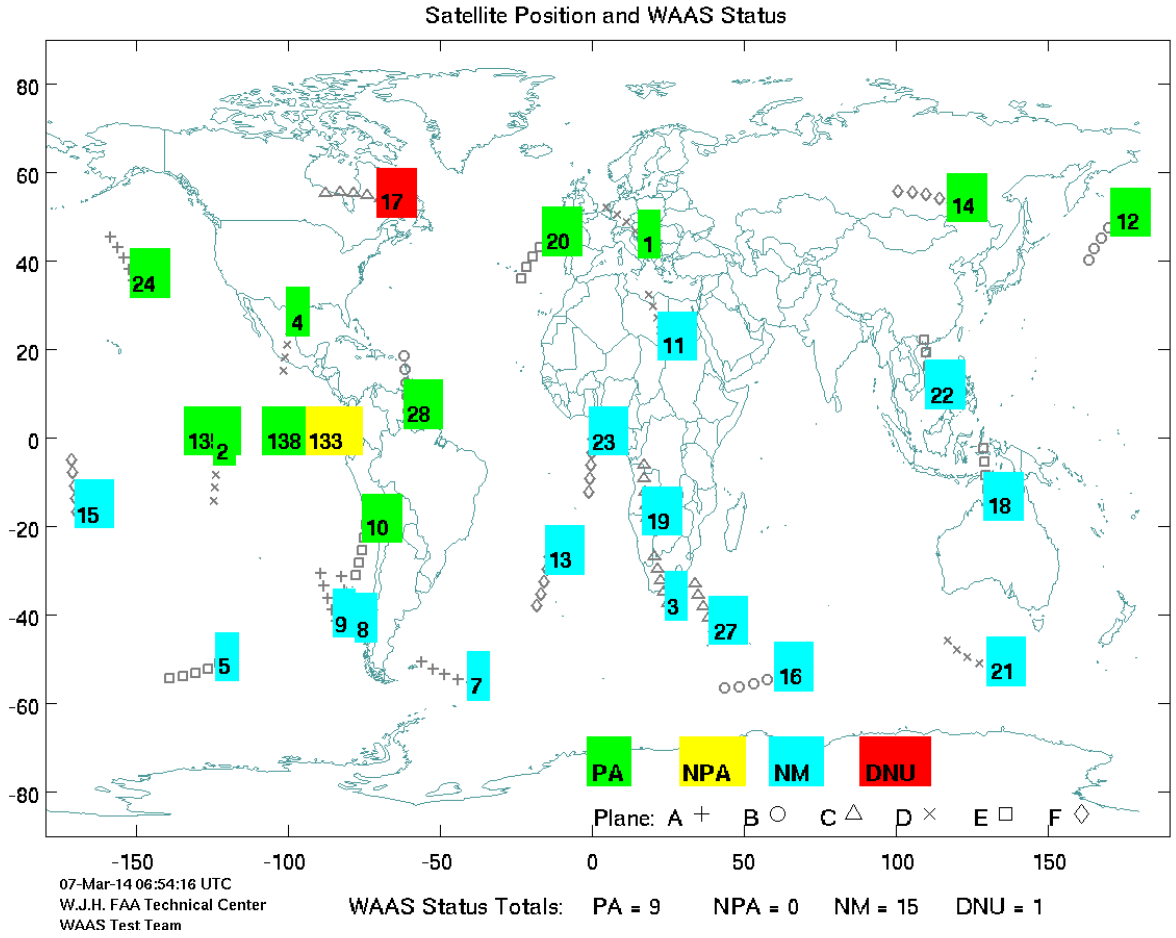
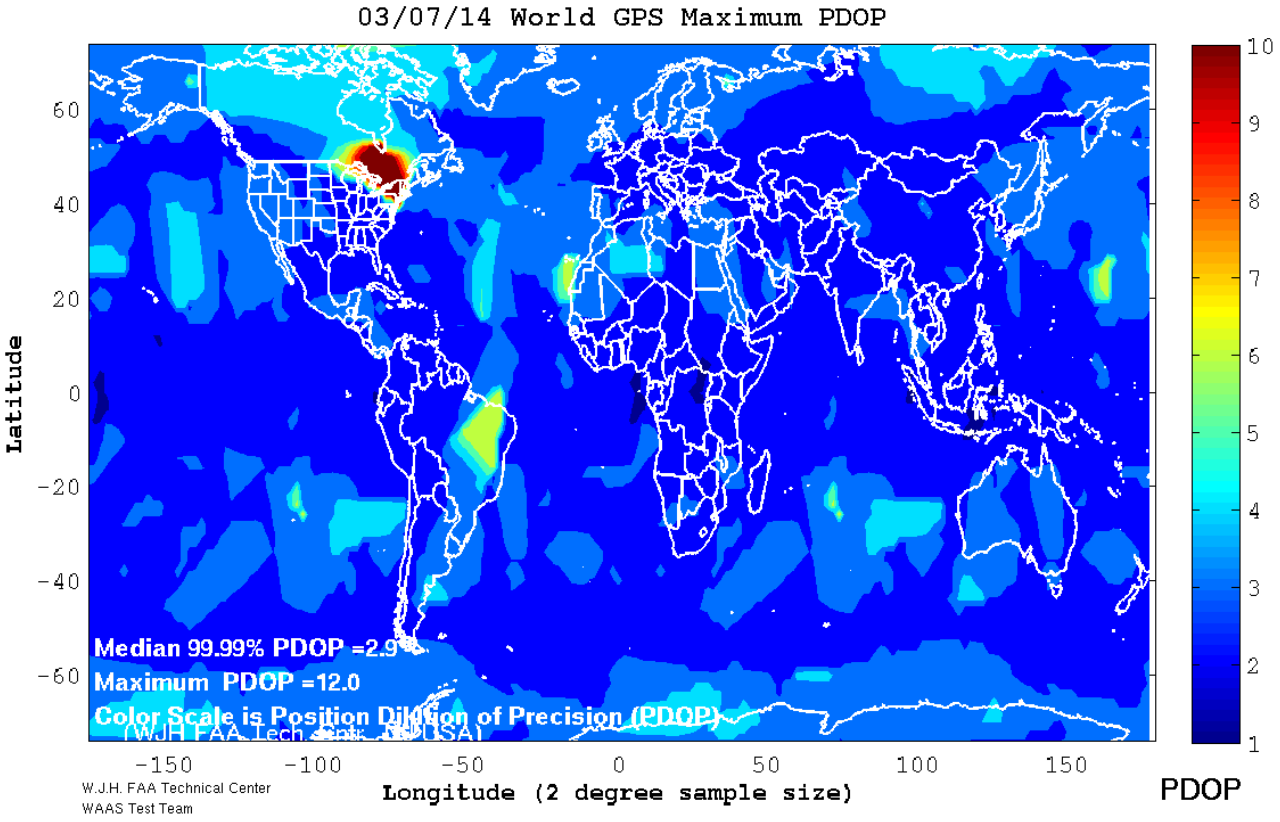


Figure 5 shows a plot of the maximum SPS PDOP on 3/7/14. The PDOP plot emphasizes how the loss of PRN 17 led to a poor geometry, particularly in the northeast United States. The maximum PDOP for the day was 12.0

Figure 5: World DOP Plot for 3/7/14



Figures 6 and 7 show plots of LPV and LPV200 coverage respectively, for 3/7/14

Figure 6: LPV Coverage on 3/7/14

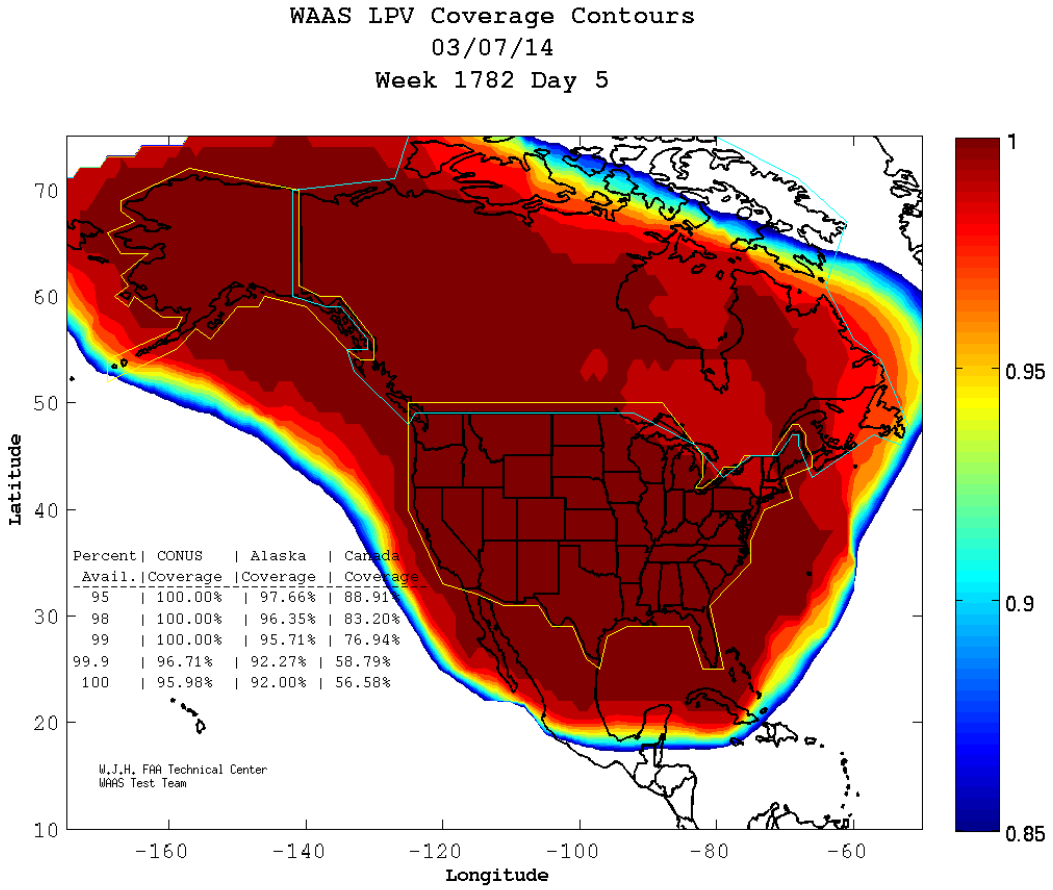
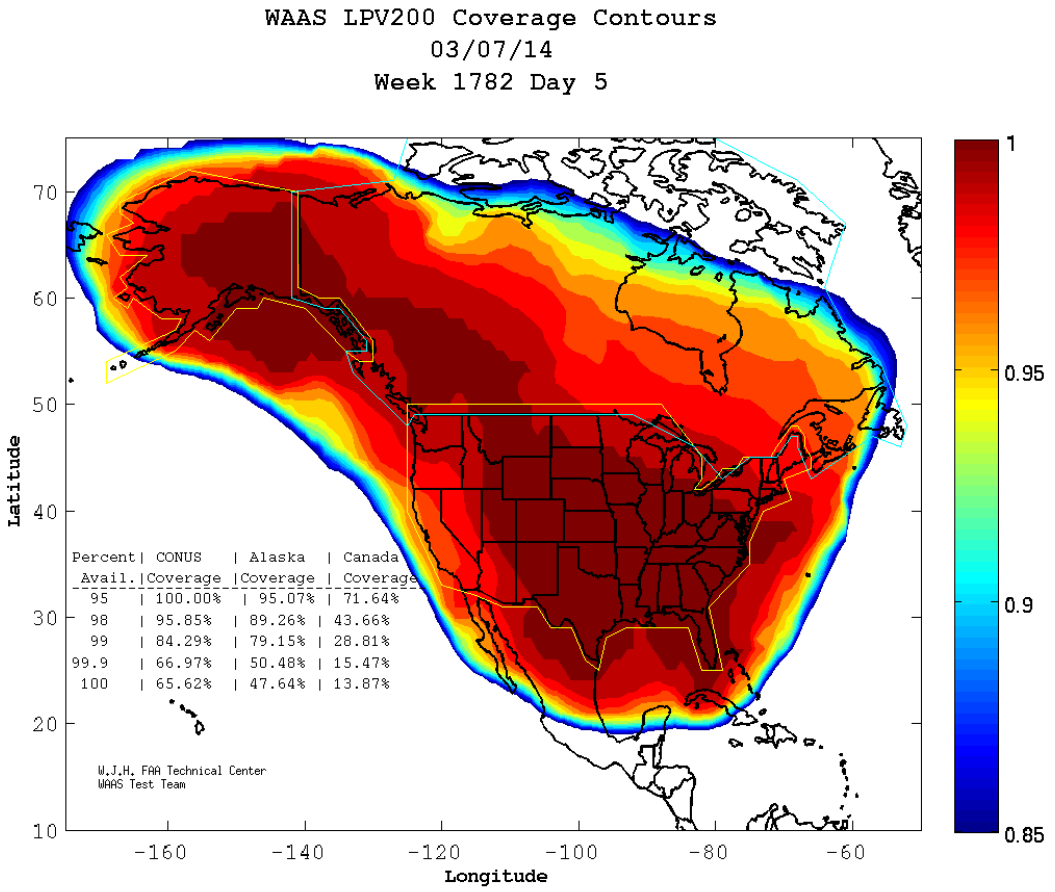


Figure 7: LPV200 Coverage on 3/7/14



Conclusion:

The PRN 17 NANU had a large impact on CONUS coverage. The western part of CONUS experienced an LPV200 outage, while the northeastern region CONUS had an LPV and LPV200 outage.

The LPV CONUS coverage at 100% availability dropped to 95.98%, and the LPV200 CONUS coverage at 100% availability dropped to 65.62%.

The LPV200 Alaska coverage at 100% availability dropped to 47.64%.

The CONUS coverage drop was caused by poor satellite constellation geometry during the time of the PRN 17 NANU. RNP1, RNP3, and LP coverage were unaffected by the PRN17 NANU.

The Alaska LPV200 coverage drop lasted about ten minutes. The coverage loss was caused by an SV Alert on PRN 25.