WAAS Technical Report
William J. Hughes Technical Center
Pomona, New Jersey
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DR# 29: Localized Loss of Availability over Central CONUS
GPS Week/Day: Week 1360 Day 4 (2/2/06)

Discussion:

Towards the end of day 4 of week 1360 (2/2/06) a loss of WAAS LPV service availability was observed over central CONUS. Figure 1 shows the LPV contour coverage plot for Week 1360 Day 4.

Figure 1 – LPV Coverage for Week 1360 Day 4

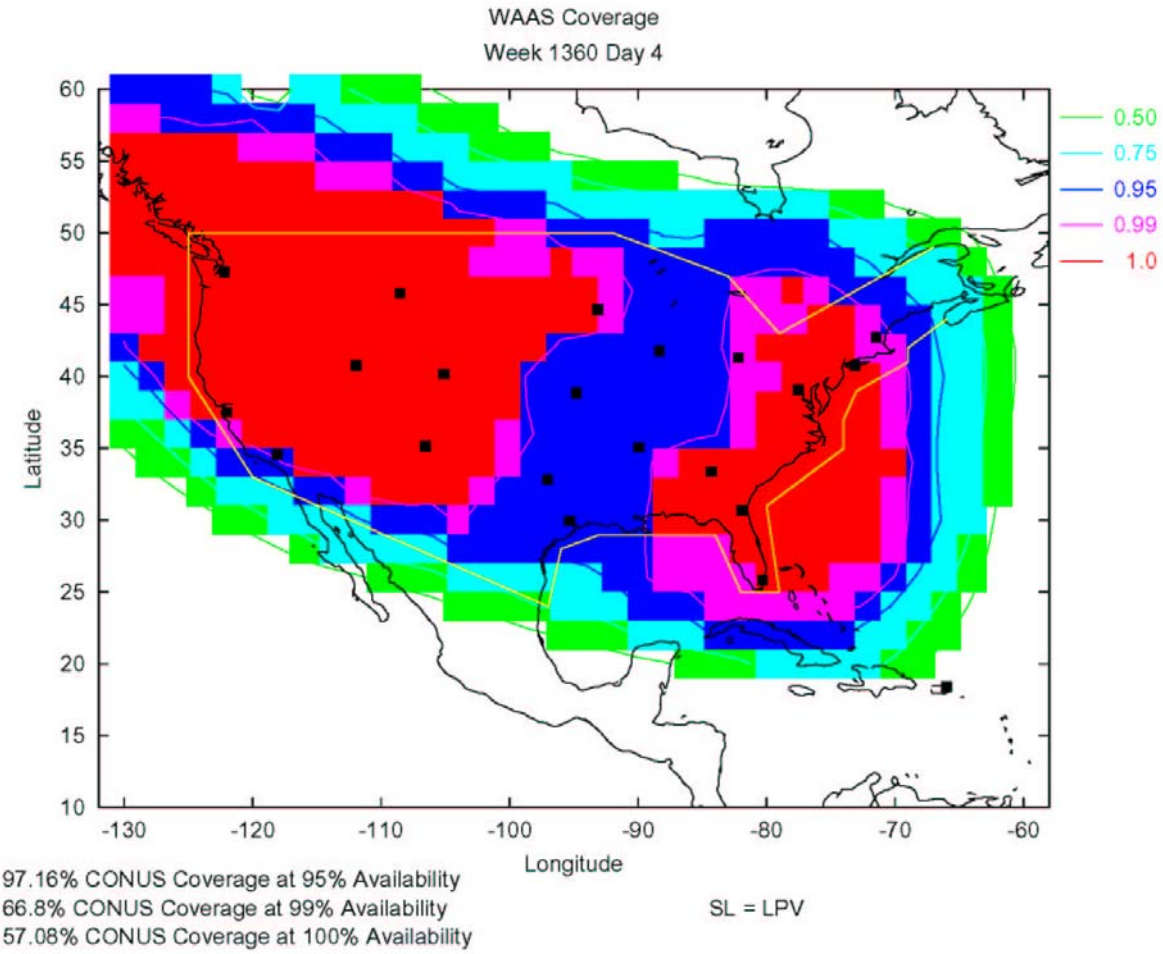


Figure 2 is a plot of instantaneous LPV coverage (30 sec sampling) over CONUS on Week 1360 Day 4, indicating that the outage lasted from around GPS Time 429300 to 431340.

Figure 2 – Instantaneous LPV Coverage, Week 1360 Day 4 (2/2/06)

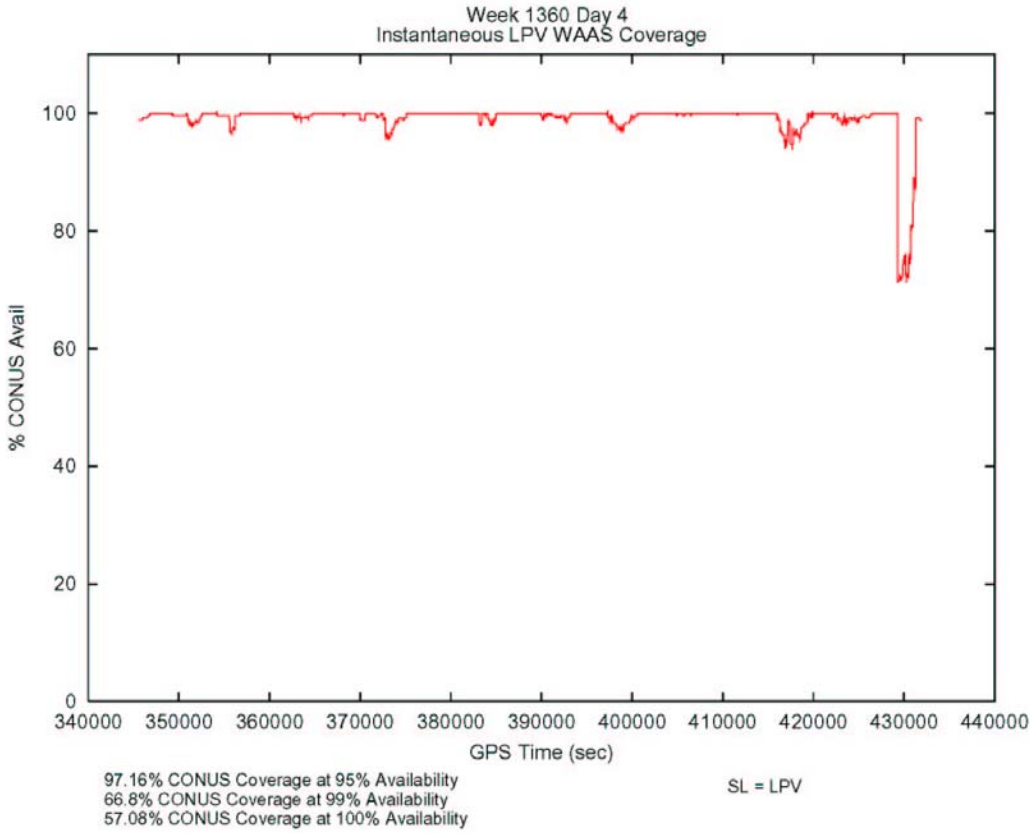
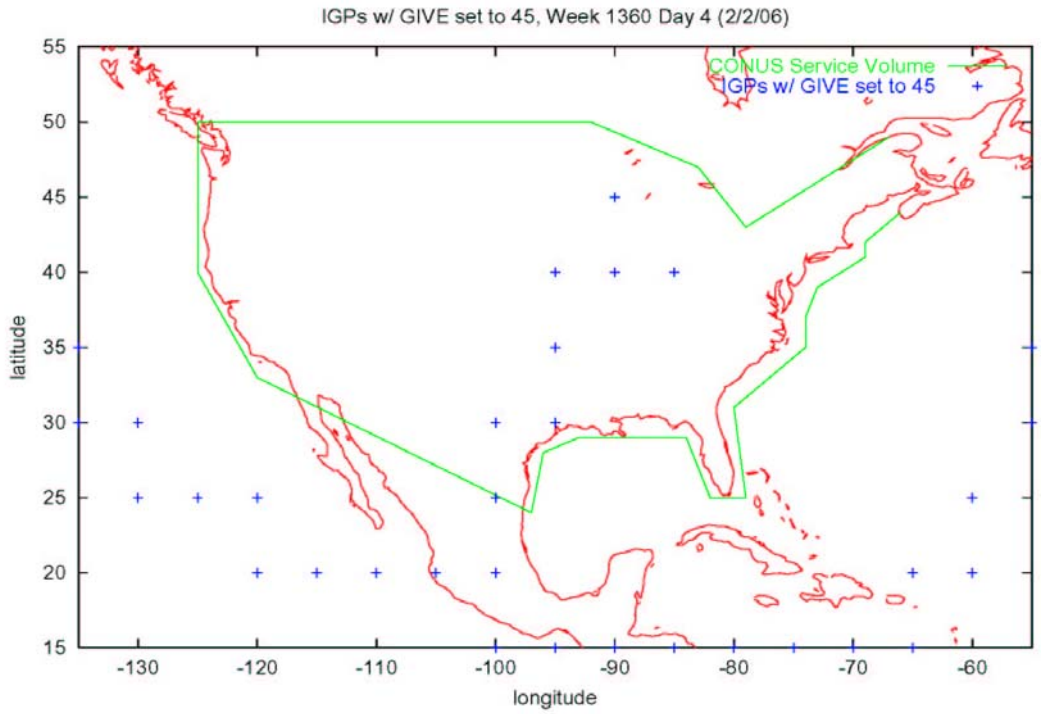


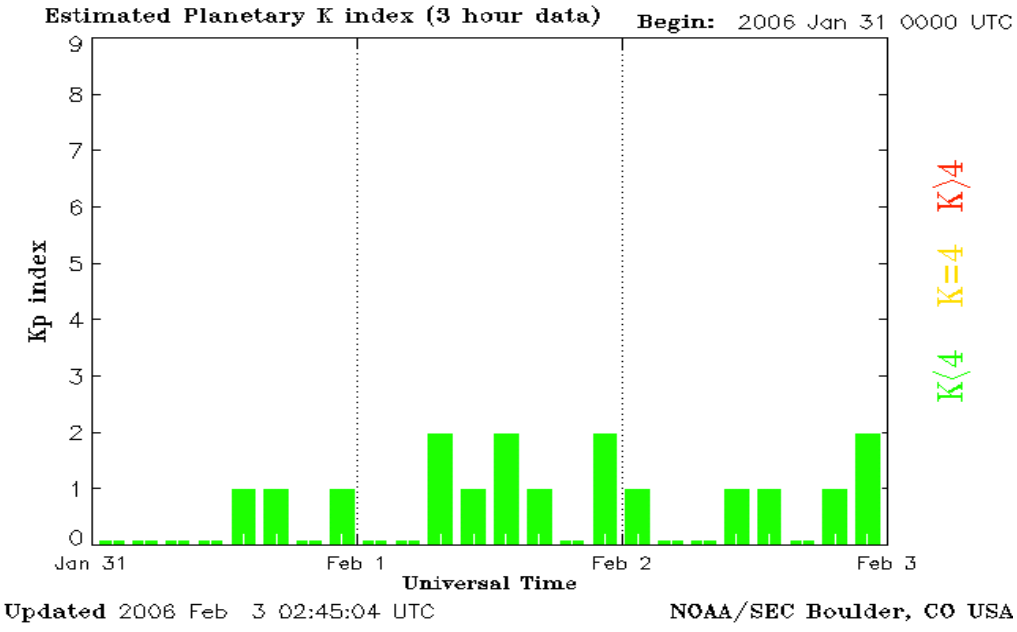
Figure 3 is a map of the CONUS coverage area with IGPs that were set to 45 at any point during the day marked with blue crosses. The fact that IGPs over the affected region (see Figure 1) reported GIVEs of 45 suggests that the loss of coverage on this day was possibly due to ionospheric activity.

Figure 3 – IGPs Over CONUS Service Volume set to 45, Week 1360 Day 4



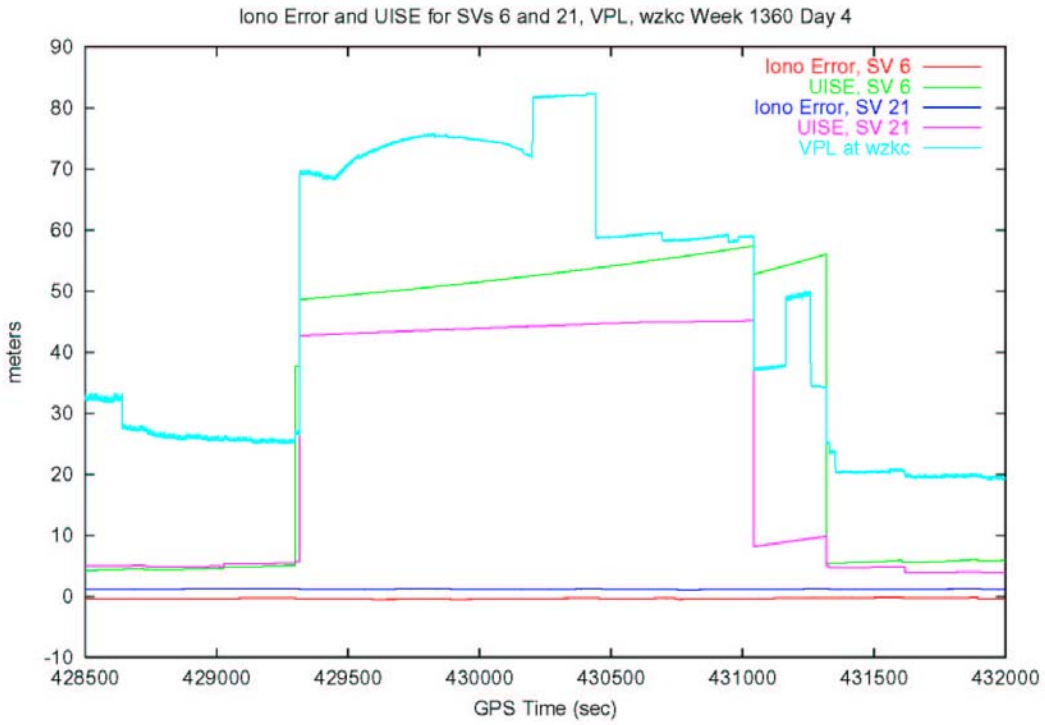
However, Figure 4 is a bar graph of the Kp index over the course of 2/1/06-2/3/06, showing that minimal ionospheric activity was observed.

Figure 4 – Kp Index, Week 1360 Day 3-5



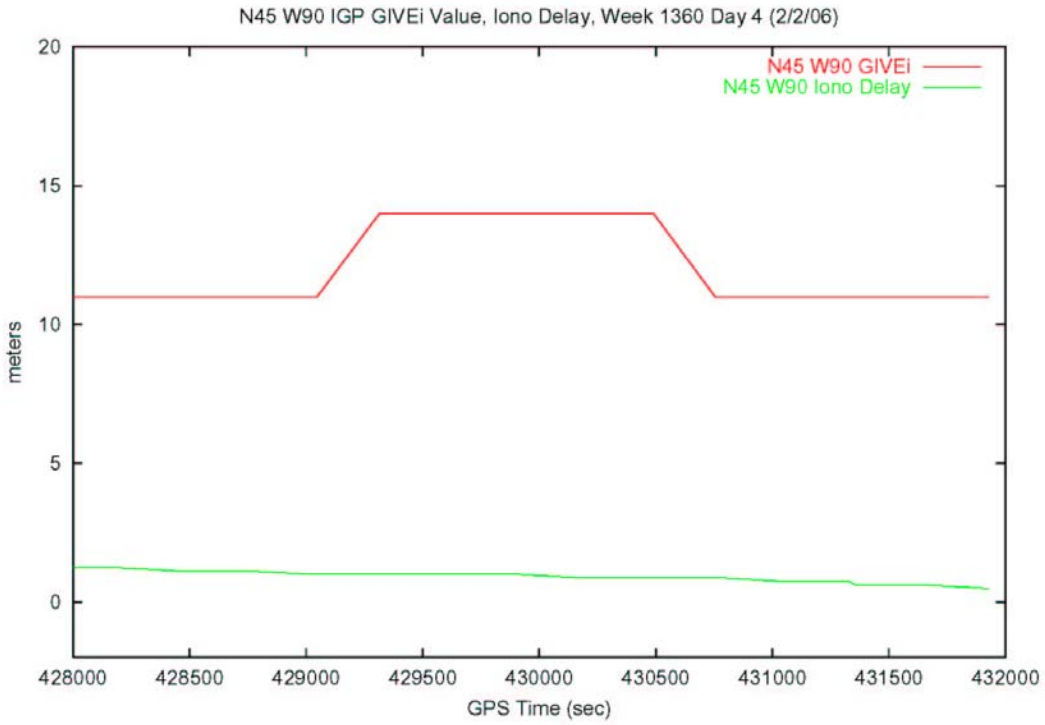
Analysis of satellite ranging outputs created from receiver data collected at a WRS in the affected area, wzkc (Kansas City), indicated that although the User Ionospheric Slant Error (ionospheric error bound set by WAAS, determined in part by GIVE values) jumped at the time of the service outage, the Ionospheric Error (determined by actual dual-frequency measurements) remained stable. Figure 5 is a plot of these values for SVs 6 and 21 as observed from wzkc. Note the accompanying jump in VPL at wzkc.

Figure 5 – Iono Error and UISE (SVs 6, 21), VPL at wzkc, Week 1360 Day 4



Further investigation indicated that although WAAS set the GIVEs of the IGPs in question to 45, the actual ionospheric delay associated with them was stable. Figure 6 is a plot of the GIVEi and the ionospheric delay at the 45 N, 90 W IGP, located in the affected area. This plot shows that the GIVEi, which jumped from 11 to 14 at the time of the service outage, corresponds to a relatively static ionospheric delay value.

Figure 6 – GIVEi, Ionospheric Delay at 45 N, 90 W IGP



Conclusion:

The localized loss of LPV service over central CONUS observed on Week 1360 Day 4 (2/2/06) was due to a response by the WAAS ionospheric storm detector that was apparently unrelated to any actual ionospheric activity.

Note:

A document issued by Raytheon with respect to this anomaly, dated February 10th, 2006, concludes that the event was apparently due to the rejection of measurements from the WRS in Atlanta (ZTL-A) by the ZLA C&V. Specifically, the timing of a thread switch at ZTL caused a conflict with ZLA's IC L1/L2 processing, which resulted in an artificial bump to GIVEs over eastern central CONUS.