

## ConferenceReview

# CGSIC and ION 2011

## GPS—Greater than the Sum of its Parts

**T**he 51st Meeting of the CGSIC and the ION GNSS 2011 was held September 19-23, 2011 in Portland, Oregon. I can think of no better combination of conferences that serves to illustrate (to paraphrase Aristotle) how the “whole” of GPS/GNSS is certainly “greater than the sum of its parts”. These two events are “the” place to interact directly with the constellation operators, policy makers, manufacturers, and cutting edge end users from all disciplines of GPS/GNSS; surveying, marine, aviation, science, timing, and consumer. For we

surveyors, what goes on with regards to the “whole” of GPS/ GNSS can be both directly and by extension critical to the future of our own uses. Policy, receiver and antenna design, software developments, and application innovations can all share common elements, as do the concerns of the end user communities and manufacturing interests. While there was, at both the CGSIC and ION a hint of anxiety over some recent events (at varying levels) over the whole of both proceedings, if an outsider was to casually drop in, the amazing array of educational opportunities, innovation, and enthusiasm present would not otherwise indicate

any overwhelming sense of doom and gloom. The whole of GPS/GNSS moves forward; despite a very strange year...

The name: **Civilian GPS Service Interface Committee (CGSIC)**, while not exactly rolling off the tongue is spot on in describing exactly what the body is: “the” officially commissioned interface between the civilian users of GPS and the constellation provider. Open to anyone and everyone, it attracts not only end users, but the policy makers, manufacturers and USAF operations and implementation teams, for official updates and reports to the public, and direct feedback. This



Col. Bernie Gruber (left), Lt Col. Jennifer Grant of the USAF GPS Wing, and Col. Robert Hessin of the National Coordination Office for PNT answer audience questions following presentations on GPS constellation status and broadband proposal interference testing.



Ray Clore, Senior GPS Advisor for the U.S. State Department details ongoing international negotiations between GNSS constellation providers.



Sergey G. Revnivkykh, Director, Russian Satellite Navigation Dept hands off his constellation status update duties to Ekatarina Olyenik of Roscosmos' Central Research Institute – the report was full speed ahead for GLONASS.

year did not disappoint, and with the added “bonus” of some open and frank dialogue and official statements on some hotly contested issues. Only a year ago at the 50th meeting, also held in Portland in conjunction with the ION (Institute of Navigation) GNSS 2010; the buzz was about the Government Accounting Office reports of launch schedule challenges for satellites that might also affect the GPS modernization efforts. Many viewed this as “much ado about nothing” as the fears were addressed by the USAF showing that by some metrics the modernization efforts were ahead of schedule. Then fast forward to this year where issues were about spectrum and

best for an operator to interface with navigation displays and positions (GNSS included) to gain an optimal *a priori* assessment of hazards. Tests were done with 2D maps, north-up maps, 3D maps, and other options one might even see on a car navigation device. Factors like experience with navigation and even age were taken into account. To no surprise, a 3D view seems to provide the best results. Full presentations and reports of this and other CGSIC presentations can be found at: [www.navcen.uscg.gov/?pageName=CGSIC51stAgenda](http://www.navcen.uscg.gov/?pageName=CGSIC51stAgenda)

**The States and Localities sub-committee** session were quite northwest centric this year, but a good

worldwide in the form of the atomic clocks in the GNSS satellites. Worldwide synchronization is about to take another leap forward; VLBI (Very Long Baseline Interferometry), much like that which is used to align tracking of GNSS satellites, will very soon be used to sync over oceans to pico seconds; something GNSS cannot quite do. And within contiguous land masses, fiber optics may be the choice for this picosecond level sync. There are few applications that directly need picoseconds so GNSS will remain as the mechanism for delivering the time worldwide at the end use level.

**Good news as usual from the GPS Wing** during the plenary sessions on the second day; the enhanced 24+3 satellite constellation deployment announced last year is performing better than expected, satellite modernization is on schedule, the OCX (modernization of the ground control segment of GPS) is on track for full deployment in 2015, evaluations of the Atlas V are looking promising for upcoming dual satellite launch and most important of all; there are still no user fees for using GPS signals (not that anyone has seriously proposed as such). On the latter, Lt Col. Jennifer Grant, Commanding Officer, Second Space Operations Squadron quipped while presenting and all-good-news operations and performance report that if the estimated 2 billion users worldwide of GPS were to have paid 1 cent each time they acquired signal from GPS that “we would have no debt”. There is a sense that the average end user takes for granted the benefits of this dual use system. GPS is possibly the only weapons system that has direct benefit for civilian uses; as long as the military can realize benefits from the system, then the costs are in some ways already buried for the civilian users. Many see the military operation of the constellation as particularly appropriate; Raymond Clore, senior GPS advisor, U.S. Department of State quipped that the military are best suited for the job, citing “technical expertise, working 24/7, and never going on strike”. The military continues to reap benefits from encoded elements of GPS, and though there have been a few isolated calls from industry to do things like drop the encryption of the P Code, this is generally viewed as a non-starter and several of the military present offered “we rely on it too much”. Offline, PNT officials explained that if the constellation did not serve fully as dual use, then what would stop some from calling for users fees (which the

“Like the music of Beethoven, Bach and Charlie Parker, the Beatles’ music was built to last—proving that a thing of beauty is a joy forever.”

—David Amram

interference that had some feeling that it was “not enough ado about something”. But more about that later.

The proceedings of the CGSIC were altered this year; with sub-committee sessions the first day and plenary sessions, which include the all important GPS program updates, on the second day. Subcommittee presentations and discussions certainly reinforced the overall good health of the “whole” with examples of innovation and promising trends.

**From the International Subcommittee:** The wry humor of Ian Mallet of Australia makes his annual report on the evolution of aviation navigation innovation both informative and fun. One of his highlights was how the tremendous potential cost/fuel/pollution benefits of GNSS landing systems has been pitted against noise mitigation, and how in one example in Brisbane, the noise side may be winning. From Dr. Thomas Porathe of Swedish academia, a session called 3D Nautical Charts: Cognitive Off-Loading Using Egocentric Presentation Model was not so inaccessible as the title made it sound. A case study of a maritime collision between a vessel and a bridge pier in San Francisco Bay was used as a problem statement for a study of how

indicator of the kind of activities going on around the country. These sessions included “Inertially Aided Post-Processed Kinematic for Nautical Charting Survey” an example project along the Columbia River with some excellent statistical analyses from David Evans Associates, and more from both sides of the river - Multimodal GNSS from Kurt Iverson of the Washington State Department of Transportation, RTN establishment guidelines from Jim McLeFresh of Spokane County, Asset inventory management and an RTN update from the Oregon Department of Transportation.

**Position, Navigation, and Timing (PNT)** is not possible without the timing component, and Timing is always a large, albeit somewhat esoteric part of CGSIC and ION. Hidden to many, this world of timing actually touches many more globally than positioning or navigation; nearly everything we do with electronic communications, internet, and information technology is timed and synchronized by an international system of clocks that almost rightly belong in the realm of science fiction. Scientists and academia worldwide have managed to sync time to nano and picoseconds. GNSS has played a major role as the vehicle (literally) for delivering time

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Europeans have found is an impractical model for the Galileo project).

**The Russians have trod a parallel path with U.S.** with respects to their dual use GLONASS constellation. This year's all-thumbs-up GLONASS constellation update was presented by Ekatarina Olyenik Information Service & International Relations Specialist, Roscosmos' Central Research Institute and protégé of Sergey G. Revniviykh, Director, Satellite Navigation Dept., GLONASS Mission Control, also present. In addition to the update, the very measured and professional Ms. Olyenik demonstrated the updated online feedback website, and reiterated the firm commitment, codified by the Russian Government in 2005, that the constellation continue always as free of user fees, mandatory use for some government functions, with funding commitments for GLONASS as critical infrastructure. Offline both Ekatarina and Sergey spoke enthusiastically about the efforts to foster more commercial uses and industry for the system. There have even been commercial operations successfully spun off from the layers of space administration. When asked if funding of GLONASS is dependent in any way on the expectations for commercialization success of GLONASS related industries, Sergey explained that the funding is solid as this is critical infrastructure for dual uses.


**The annual NGS CORS forum** gave program updates for OPUS, the new multi-year solution but also a very informative session on absolute antenna calibrations, something for which the NGS is approaching with renewed emphasis: [http://www.navcen.uscg.gov/pdf/cgsicMeetings/51/23\\_abcals\\_CORS\\_forum2011.pdf](http://www.navcen.uscg.gov/pdf/cgsicMeetings/51/23_abcals_CORS_forum2011.pdf). The NGS crew on hand were asked what contingencies they have for the CORS system and its role in the operation and maintenance of OPUS and the National Spatial Reference Framework should the CORS be compromised by a substantial source of interference. They stated clearly that, considering resources and technology that there was no viable contingency.

**On the subject of interference detection** in general, John Merrill, PNT program manager for the Department of Homeland Security the data format and web interface for the Patriot Watch reporting system: [http://www.navcen.uscg.gov/pdf/cgsicMeetings/51/29\\_ION\\_CGSIC\\_September\\_2011.pdf](http://www.navcen.uscg.gov/pdf/cgsicMeetings/51/29_ION_CGSIC_September_2011.pdf). Interference, while somewhat limited and

isolated to date is a serious concern, and it is great to see a system for nationwide situational awareness. How this will information will eventually be available to end users in real-time and by what means has yet to be developed, but this is a great start. The session did prompt some obvious questions as to the legality of those little jammer devices one can find online (so far mostly used by a very few truckers to cover their GPS tracks). The Australians indicated that such devices were completely illegal down under. There have also been recent developments on the crackdown on such devices in the U.S.: <http://www.gps.gov/policy/interference/jamming/>

Situational awareness, efforts to broaden the public's knowledge of GPS matters and to provide useful information to the end user communities is an ongoing effort of national PNT officials. A virtual tour on the revitalized web offerings of [www.pnt.gov](http://www.pnt.gov) and [www.gps.gov](http://www.gps.gov) (which may be merged into one site: [gps.gov](http://gps.gov)) was given by Jason Kim Senior Advisor National Coordination Office for Space-Based PNT (I know, the titles are exhausting). Jason and crew have done a great job and are eager for feedback and suggestions for the site; take [www.gps.gov](http://www.gps.gov) for a spin!

But as mentioned earlier, there were omnipresent murmurs thought the proceedings with regards to the current GPS and broadband spectrum issue. A great example of this was the eagerly anticipated report on the recent FCC ordered testing of the original upper band proposal (re: the FCC conditional waiver DA 11-133). Col. Robert Hessin from the National Coordination Office for Space-Based PNT gave an overview of the testing process, the parties involved, criteria for testing, and the results which did reveal substantial interference for GPS devices pretty much across the board.

A crowded room at ION a few days later followed a similar discussion, but none of the frank discussions seemed to completely calm the fears of many who attended; simply because there is still the specter of a possible eventual move to the upper band, susceptible to the interference that the previous tests had shown. Despite this concern, and the storm (of sorts) that has been brewing all year and whatever outcome awaits us, conferences such as CGSIC and ION continue to evidence the enduring strength of "whole" of GPS/GNSS. 

—Amerisurv Staff