

Report by
Augment Working Group and
International Sub-Group

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SPACE-BASED POSITIONING
NAVIGATION & TIMING
NATIONAL ADVISORY BOARD

“Augment” part of Working Group 1



Status and reliability of other GNSS

- Terry outlined his most recent studies of other GNSS
~ concentrated on GLONASS and BeiDou:
- Restricted the study to Alternatives
- Addressed the two most mature alternative GNSS:
 - GLONASS (Russia)
 - Beidou (China)
- Considered as the non-GNSS alternative
 - eLoran

Status and reliability of other GNSS

- Terry's Conclusions:
- Although the development of GLONASS pre-dates that of Beidou, it seems Beidou may well develop into an accepted international system (e.g. for safety-of-life applications) before GLONASS;
- Major Issues:
 - For international acceptance: Transparency
 - Developmental criteria:
 - Integrity
 - Quality Control
 - Management and Technical Stability & Capability

Additional discussion around:

- *GLONASS and Beidou still valuable for many other applications.*

Criteria for accepting other GNSS

- As reported at our last meeting there is work in ICG to develop “International GNSS Monitoring and Assessment”.
 - The concept is... Rather than have separate monitoring networks with stations hosted by various countries under various agreements... Is it possible to develop a unified approach? e.g. could it be an extension of existing capabilities within IGS?
 - ICG Task Force is still developing a list of parameters that would be monitored under that approach.
- IGS Multi-GNSS Experiment (MGEX) is a source of valuable data and growing expertise;
- ***Overall feeling is that the ICG work still seems to be the best way forward and the PNT Advisory Board needs to continue to be aware of and not duplicate work in ICG.***

The Non-GNSS Alternative: eLoran

- Terry's Assessment:
- Accuracy specs are somewhat more modest than those of GPS, but acceptable for most real time applications.
- Difficult to jam.
- Discourages attempts to jam. (Makes its value difficult to assess.)

BUT

- Funding?
- Who would manage?
- Who will use?

Additional discussion around:

- *Russian work on Skorpion;*
- *eLoran mainly addresses the "N" in PNT.*

International Sub-Group



International Committee on GNSS

- Discussed the Board's next meeting in conjunction with ICG in Boulder;
- Concerns about Board meeting before ICG...
- Need to create opportunity for Board Members to consider the implications of ICG Discussions/Work for our work;
- Therefore need to ensure there is good integration of the PNT-AB and ICG Agendas;
- International sub-group happy to assist with development of such an integrated approach.

Matrix of International Activities

		System Provider Nations	Non-System Nations	International Organisations
Protect	Inbound	?	Learn from spectrum protection elsewhere	?
	Outbound	Share lessons from US spectrum sharing issues	Assist countries to ensure GNSS spectrum is protected	Encourage bans on jammers
	Cooperate	Ensure compatibility across systems	?	Encourage ITU protection for all GNSS signals
Toughen	Inbound	Evaluate signal authentication approaches		?
	Outbound		Use of hardened receivers	?
	Cooperate		?	?
Augment	Inbound	Support for the Americas	Developments like Locata from Australia UK's work on eLoran	Support and take advantage of IGS MGEX work
	Outbound	Ensure provider transparency so other systems can be trusted	Help developing countries with complementary PNT (e.g. eLoran)	Encourage IHO to adopt eLoran as backup to GNSS
	Cooperate	Continue push for compatibility, interoperability and transparency	Joint projects on GNSS and non-GNSS augmentations	Maintain strong involvement in ICG Engage with Regulatory bodies

Still interest is development of this concept...