Towards Achieving Interoperability

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Open Service Interoperability

System Level Interoperability

Receiver Level Interoperability

Receiver Level Interoperability

- **Ten years ago it was complex and costly for receivers to combine the signals from two different systems (GPS/Glonass)**
- **today it is routine**
- **there is no barrier to incorporate other systems**
- **this is the current preferred Galileo position on achieving interoperability between systems**

System Level Interoperability

The key requirement is to know the timing offsets between two systems

- **an example is the Galileo-GPS Timing Offset (GGTO)**
- **allows Galileo to transmit the timing offset in its signal to achieve tighter interoperability**
- **this took considerable time and resources to implement at EU and US level**
- **adds system complexity**
- **as a system, Galileo prefers not to add further complexity at this point, no other TOs planned**

System Level Interoperability

- **GGTO is there, Galileo has invested in the infrastructure and will make use of it**

- **Other systems already have scope within their signals for a similar xGTO**

- **Unclear how using UTCr would work, and who manages?**

- **What if...**

System Level Interoperability - the Easy Way?

- **ICG should consider whether using an existing common timing reference or source would allow systems to achieve interoperability without adding further complexity**

- **Ideally, such an existing common reference would <u>already</u> be ubiquitous and widely used**

GPS as an intersystem common offset?

- **Most, if not all, GNSS already plan to have a defined timing offset to GPS - 'xGTO'**
- **We should consider whether combining these xGTOs would allow system level interoperability between all GNSS**
- **Could minimise the cost and complexity for all systems - only one xGTO required per system**
- **Should work, even if GPS satellites are not in view, provided the xGTO is well defined**
- **(Systems also free to implement a second xyTO, in addition to their xGTO)**

Risk of a common failure mode?

- **Potentially yes, but, GPS has been generally very reliable**

- **the benefits and cost/complexity savings could outweigh the potential negatives**

- **especially as only the open signals are considered**

- **receiver level interoperability is always available as the backup**

- **the idea for each system to specify their xGTO should be considered further, if multi-system level interoperability is the aim**

Recommendation

ICG should consider investigating whether using a timing offset GPS as an the common timing offset for each system would allow full system level interoperability to be more easily and cost-effectively achieved