



**GPS Innovation
Alliance**

Sustaining Open GNSS Markets and Benefits

Presentation by
GPS Innovation Alliance (GPSIA)
to
PNT Advisory Board
May 17, 2018

Status: Potential Barriers to Open GNSS Markets

- Lack of access to Galileo service offerings/markets
 - Open Service Navigation Message Authentication (OS NMA)
 - Commercial Service: High Accuracy (CS-HA) and Authentication
- May Implicate EU Radio Equipment Directive (RED)
 - Access to Galileo raised by European ETSI representatives
- “Popular” RED GNSS receiver standard EN 303 413 cited in OJEU Dec. 2017
 - Positive: allows GNSS products on EU markets with self declaration of conformity; uses internationally developed and approved GNSS receiver parameters
- New revision of EN 303 413
 - Introduces *radiocommunication* parameters for *radionavigation* (GNSS) receivers and rationale for why these parameters should **not** be included
 - Otherwise, if implemented, would lead to increased harmful interference and regulation of GNSS receiver performance
 - “Future EC mandates: receiver performance” raised by European ETSI representative

US-EU 2004 Agreement Working Group B (WGB)

- WGB Addresses Open GNSS Markets
 - Includes timely access to Galileo service offerings and markets
 - Recommend WGB seek EC timely release of information on Galileo service offerings
 - Includes access to EU markets under RED implementation
 - Requires understanding of the fundamental difference between radionavigation and radiocommunication.
 - Recommend WGB seek EC EU Satellite Navigation Programme coordination within EC DG GROW to avoid imposition of radiocommunication parameters on radionavigation receivers in revision of EN 303 413 (consistent with EG 203 336 “alternative technical means”)
 - Recommend WGB seek EU Member State, signatories to US-EU 2004 agreement, to support the above approach

Non-EU/US Equipment Industry Lacks Access to Galileo Service Offerings/Markets

- Lack of access to OS NMA, CS-HA & Authentication Service(s) includes:
 - Tech specs (ICDs) to build equipment are not published and include
 - Commercial encryption schemes
 - Mechanism for ongoing access to distributed decryption keys
 - Terms and conditions of access, if required
 - Unavailable from EC as yet
 - Fully functional Galileo test equipment, with unpublished services capability for test and receiver performance verification
 - Unavailable for export
 - Will OS NMA and CS-HA Authentication use be required in some commercial applications and/or market segments
 - Will fees for decryption keys be required?
 - Different fees depending on commercial application
 - Applied where in value chain?

EU/ESA Equipment Industry Has Access to Galileo Service Offerings/Markets

- **2014 to 2016: AALECs project** (Authentic and Accurate Location Experimentation) for EC DG ENTR, responsible for definition and management of Galileo CS
 - Goal: experiment with real architecture and satellite signals
 - Three phases
 - Early proof of concept (EPOC)
 - Develop distributed platform across Europe to transmit and receive real-time CS data from Galileo satellites
 - Platform integrates EC JRC simulation capabilities
 - Final: external providers test applications/solutions
 - Performed by EU/ESA industry consortium: GMV, CGI, Qascom, IFEN, KUL, and Veripos

EU/ESA Equipment Industry Has Access to Galileo Service Offerings/Markets

- European GNSS Agency (GSA) awards PATROL project to develop, supply, test Galileo OS NMA (April 2018)
 - Coordinated by Qascom
 - OS NMA, anticipated in 2019 and “reaching full service capability in 2020”
 - Before achieving full service, “a new generation of OS-NMA-enabled user terminals must be developed, tested, and implemented”
 - “Targeting the road sector, PATROL will develop a user terminal capable of providing a trusted position, velocity and precise time (PVT) to smart tachographs and other positioning applications”
 - € 2 264 853 allocated to PATROL from GSA’s Fundamental elements (supports development of European GNSS-enabled chipsets, receivers, and antennas)

Timeframe for EC Grant of Access: In Advance of Galileo Full Services Operation Declaration

- Status Galileo constellation:
 - 4 satellite launch on first anniversary of Galileo Initial Services declaration (Dec. 15, 2017)
 - 22 satellites in orbit (14 “usable”; 4 “under commissioning”; 2 “testing”; 1 “unavailable”; 1 “not usable”)
 - 30 satellites, including 6 spares, at full deployment
- Full operation timeframe: EU appears to be on track to deploying a full services operation constellation by 2020/2021
- GNSS product development timeframe: typical electronics product development timeframe is about two years, including GNSS products

Development of EN 303 413 (Cited OJEU 12/2017)

- New harmonized standard for commercial/consumer GNSS receivers in new device category (radiodetermination) introduced in RED 2014
 - Aviation, military, marine GNSS receivers treated elsewhere
- OJEU citation enables a manufacturer to self declare conformity with EN 303 413 for a presumption of conformity with RED Article 3.2 essential requirements:
 - *“Radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference”*
- Developed using:
 - Established interference environment for *radionavigation* (RNSS) receivers from:
 - Int’l Table of Frequency Allocations (ITU Int’l Radio Regulations)
 - Definition of harmful interference (No. 1.169)
 - Technical characteristics from ITU-R Recommendations (M.1901 through M.1905)
 - Internationally developed and approved, including by EU member states
 - 1 dB decrease in C/No IPC for “avoidance of harmful interference” (for RED Article 3.2)
 - Test using adjacent band selectivity criteria (Art. 5, Table of Frequency Allocations)
 - RED method of assessing conformity of product standards with RED Art. 3.2 from ETSI EG 203 336v.1.1.1 (2015 06)
 - Listed as informative reference in EN 303 413

New ETSI Work Item to Revise Newly OJEU Cited EN 303 413

- ETSI Technical Committee & Working Group (TC SES SCN) are revising EN 303 413 because EC RED allowed OJEU citation *if* TC agreed to a new Work Item including:
 - Use of technical parameters developed for *radiocommunication* receivers from the RED method of assessment of product conformity, i.e., ETSI EG 203 336. v1.1.1 (2015 06)
 - “Electromagnetic compatibility and Radio spectrum Matters (ERM). *Guide for the selection of technical parameters* for the production of Harmonised Standards covering art. 3.1(b) and 3.2 of Directive 2014/53/EU” (EG 203 336 v1.1.1 (2015-06))
 - Includes “classical” technical parameters for *radiocommunication* receivers (e.g., receiver sensitivity; co-channel rejection that are not relevant to GNSS receiver RED compliance)
 - Lacks technical parameters for the new RED Category, Radiodetermination (e.g., RNSS)
 - Example: draft revision of EN 303 413 now includes “receiver sensitivity” defined as “the ability to receive a wanted signal at low input levels while providing *a predetermined level of performance*”
 - Radiocommunications receiver sensitivity “is generally valuable in minimizing interference as it allows the corresponding transmitter to be lower for a particular link budget”

Applying Radiocommunication Parameters for Assessing RNSS/GNSS Receivers Can Lead to Introduction of Harmful Interference

- Unlike radiocommunications
 - GNSS receiver design is independent from the GNSS satellite design
 - Maximizes user-driven application performance and innovation rate
 - Generally, radiocommunication receivers receive the transmission *above* the noise floor; radionavigation receivers receive the GNSS satellite transmission *below* thermal noise
- Assessing GNSS receivers for avoidance of harmful interference using radiocommunication parameters, if imposed, could lead to
 - Imposition of spectrum use decisions on Galileo and other GNSS providers that are not part of RED 2014 and are inconsistent with international and country-specific positions
 - Introduction of harmful interference from in-band sharing and potential future adjacent band devices
 - Regulation of performance potentially affecting the designed capability to provide intended PNT performance to meet user-driven demand

RED Method of Assessment (EG 203 336) Includes the Solution

- RED method of assessment (EG 203 336) solution
- “If the ‘classical’ parameters for radiocommunications receiver provided in the present document *are not relevant for some types of equipment* (e.g., radar), the Technical Body should include alternative technical means in the harmonized standard”
 - EN 303 413, cited OJEU Dec. 2017, already includes the appropriate technical means for determining the avoidance of harmful interference for RNSS receivers (i.e., 1 dB decrease in C/No)
 - TC SES SCN draft revisions of EN 303 413 include explanation of why radiocommunication receiver parameters are not appropriate for RNSS receivers
- Alternative approach: ETSI to open a new work item to revise EG 203 336 to include technical parameters for new RED Category, Radiodetermination, and RNSS/GNSS
- Outcome of EC RED review of revised EN 303 413 is uncertain

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