



GPS Innovation Alliance

Urgent Action

Performance (Capability) of GPS/GNSS Receivers in Europe – Potentially Worldwide
Can Be Read As Unilaterally Regulated Under A Mod of RED
Using A Radiocommunication (Terrestrial Broadband) Operating Paradigm

Presentation by

GPS Innovation Alliance (GPSIA)

To

Space-based PNT Advisory Board

Meeting in Alexandria, VA

June 6-7, 2019

Urgent Action

1) Recommend USG GPS/GNSS Stakeholder engagement with EU, EU Member States, EC at decision level to ensure continued availability of the GPS/GNSS spectrum environment to support your mission(s):

- Space Council (USAF Space; DOD Space): if unaddressed, Europe would effectively assert unilateral regulation over GPS/GNSS spectrum environment in a manner that could undermine the global harmonized spectrum allocation and interoperability
- DoT/FAA: if unaddressed, current approach to RED implementation of M/536 using EG 203 336 could require RNSS to accommodate interference from adjacent channelized communication networks in restricted RNSS bands
- Commerce/USTR/State: if unaddressed, current approach to RED implementation would effectively unilaterally regulate GPS/GNSS receiver performance and design—not to support user-driven GPS/GNSS innovation—but to support introduction of terrestrial channelized communications

2) Seek timely EU, EU Member States EC support for ETSI Guide (EG 203 336) to include GNSS receiver parameters within scope of radiodetermination, a newly explicit RED category

- Current guide includes only terrestrial channelized wireless broadband receiver parameters for the regulatory regime
- *July 3rd, 2019 is ETSI Technical Committee ERM to finalize revision of the guide*

3) Seek timely EU, EU Member States EC support for EC assessor to either sustain EN 303 413 (cited OJEU 12/2017) or cite the current WG SES SCN revision of EN 303 413, Annex F Rationale of Non-applicability (ETSI REN SES 00445) in the OJEU

- Includes receiver sensitivity, co-channel rejection and other parameters; no values assigned
- Includes rationale for why channelized terrestrial communication receiver parameters do not apply to Radiodetermination/RNSS/GNSS receivers (Annex F)
- Cites exclusion provision for Radiodetermination from ETSI guide EG 203 336
- *October 2, 2019 is ETSI Working Group SES SCN to finalize revision of EN 303 413*

If unaddressed, the EC RED Assessor may reject the revision of EN 303 413; then EC can request recommended action by RED administrations and mandate including these parameters in the GNSS receiver standard; values could be assigned by CEPT/ECC Reports

RED Implementation Review

<p><i>EU Notification of RED Proposal To WTO CTBT – Feb 2013</i></p> <ul style="list-style-type: none"> • Directive in force (R&TTE) • 3 essential requirements: <ul style="list-style-type: none"> • Health & public safety • Electromagnetic compatibility • Avoidance of harmful interference (Art. 3.2) • “Regulatory approach is considered to remain valid, a fundamental revision of the Directive is therefore not necessary.” <p>• <u>R&TTE Article 3.2:</u> “In addition, radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communication and orbital resources so as to avoid harmful interference.”</p>	<p><i>RED Cited OJEU – May 2014</i> <i>Entered in force – June 2017</i></p> <ul style="list-style-type: none"> • 3 essential requirements: <ul style="list-style-type: none"> • Health & Public safety • Electromagnetic compatibility • Avoidance of harmful interference (Art. 3.2) <p>• <u>RED Article 3.2:</u> “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.”</p> <ul style="list-style-type: none"> • Omits: <ul style="list-style-type: none"> • “Allocated” • “Terrestrial/space radiocomm. and orbital resources” • Adds: “efficient use of spectrum” 	<p><i>Report from the Commission To The European Parliament and Council on Operation of the RED - Nov 2018</i></p> <p>“The RED sets out [3] essential requirements for</p> <ul style="list-style-type: none"> • Safety and health • Electromagnetic compatibility and • The efficient use of spectrum
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Modification of RED Art. 3.2, Can Be Read As Introducing Spectrum Use Policy/Regulatory Framework For Terrestrial Wireless Broadband

- EC Mandate 536 (OJEU April 2015) to European standards organizations to develop RED harmonized standards (“EN”) can be read as introducing regulation of receiver performance and characteristics that effectively
 - Requires development of receiver sharing and mitigation techniques “to achieve efficient use of radio spectrum in line with the electronic communication regulatory framework”
 - Shifts interference burden (overload/desensitization) to incumbent receivers from adjacent and/or in-band new entrant terrestrial wireless broadband for “efficient use of spectrum”
 - Places on mute RED Art. 3.2 “effectively uses” (i.e., receiver performs its intended function) and “in order to avoid harmful interference”

EC M/536 creates a precedent for unilateral treatment of spectrum use(s) that, by modifying an EU market entry requirement (RED Art. 3.2), can have worldwide consequence for spectrum use, users and markets, and stakeholders not covered under RED

EC Uses ETSI Guide 203 336 To Assess RED EN And Apply Terrestrial Channelized Radiocommunication Receiver Parameters

- ETSI Guide 203 336, an informative reference, only includes terrestrial channelized broadband radiocommunication receiver parameters
- EC uses ETSI Guide 203 336 to require ETSI Technical Committees (TCs) to apply all listed terrestrial wireless broadband receiver parameters, add values and minimum performance levels, or provide technical justification for non-applicability
 - “If a *relevant ECC coexistence study recommends a certain level of receiver performance then this should be respected in the Harmonised Standard.*” (ETSI Guide 203 336)
- If ETSI TC continues to dispute application of terrestrial channelized radiocommunication parameters to a RED EN,
 - The EC can seek a recommendation from RED Radiocommunication Administrations and overrule the TC

Status of Revision of ETSI Guide 203-336

- ETSI TC ERM (Electromagnetic Compatibility and Radio Spectrum Matters) developed ETSI Guide 203 336 omitting technical parameters (e.g., non-channelized) due to a tight publication deadline according to TC ERM participants.
- Several ETSI members, including GPSIA, supported ETSI opening a revision of Guide 203 336 to address this omission as the EC assessment of RED EN uses only terrestrial channelized radiocommunication parameters which do not apply to all technologies (e.g., non-channelized; radiodetermination receive-only space-based ranging signal)
- Some Radiocommunication Administrations opposed this revision to the ETSI Guide. One Administration commented,

“[W]e anticipated this would drive contributions for the revision work to exempt certain types or broad categories of equipment from certain technical requirements, based mainly on commercial rather than technical considerations.” Commenting on the GNSS contribution, “[c]learly the intention is to try to build in a kind of “get out clause” for GNSS receivers in the guide.”
- As a result, ETSI BOD decided the revision to ETSI Guide 203-336 would be “generic.”

The regulatory response appears to confirm that currently there is only one regulatory approach being applied to all spectrum use receivers based on the operational paradigm of terrestrial wireless broadband.

ETSI TC SES Submission To EC For RED Assessment Included An Unexpected Development (Potentially Implicating EN 303 413)

- RED EN 303 413 is developed in ETSI Working Group SES SCN that reports to ETSI Technical Committee SES
 - WG SES SCN has made progress on including most technical parameters listed in EG 203 336, including a rationale for non-applicability to GPS/GNSS receivers, and is working to complete this draft to submit to the EC for review
- ETSI TC SES recently submitted a Contribution for RED assessment to the Desk Officer and consultants that included
 - Commission Implementing Decision 2018/661; CEPT ECC Compatibility Reports 263, 65 and five draft revisions of MSS L-band harmonized standards for *MES operating in 1525-1559 MHz* (adjacent to RNSS L-band at 1559 – 1610 MHz where GPS/GNSS operate).
- TC SES Chair proposed to include the draft revision of EN 303 413 with the TC SES Contribution for submission to the EC for RED assessment
- GPSIA and WG SES SCN Rapporteur *agreed NOT to submit* draft Revision of EN 303 413 due to the incomplete status
 - Potential implications for the RED GNSS Receiver Standard, EN 303 413; addressed in the next slides

Commission Implementing Decision 2018/661

- Establishes an Out-of-band emissions (OOBE) of -30 dBm/MHz throughout the MSS L-band at 1518-1559 MHz
 - From a new entrant 5 MHz broadband signal interferer (LTE) operating below 1518 MHz in the band 1492-1518 MHz allocated to International Mobile Telephony (IMT)
- Did not consider GPS/GNSS operations in the RNSS L-band at 1559-1610 MHz

CEPT ECC Report 263 (Under M/536)
Adjacent band compatibility studies between IMT operated in 1492-1518 MHz and
MSS operation in 1518-1525 MHz (Approved March 2017)

- “The frequency band 1518-1525 MHz was allocated to the mobile satellite-service (MSS) at WRC-03. The band is an extension to the frequency band 1525-1559 MHz, providing additional spectrum to the geostationary satellite networks which operated in this band.”
- “The operation of IMT may *cause interference* to receiving mobile and fixed communications networks operating in the adjacent frequency band *1518-1559 MHz due to blocking and out-of-band (OOBE) emission effects*”
- “***Based on the final results of its compatibility studies, it is concluded that the minimum in-band blocking characteristic for land mobile earth station receivers from a 5 MHz broadband signal interferer (LTE) operating below 1518 MHz shall be -30 dBm/MHz above 1520 MHz***”

CEPT ECC Report 299

Measures to address potential blocking of MES operating in bands adjacent to 1518 MHz at sea ports and airports (Approved March 2019)

- “In this report, “to provide the relevant background for aeronautical and maritime operations procedures, including those required prior to departure from sea ports or airports (NB: ***the situation along routes approaching or departing from destinations has not been addressed.***)
- “Each national administration exercising its sovereign rights over its land territory, territorial sea and air space in the field of frequency management will decide which areas or locations require protection and how to do so, e.g., by using options outlined in this Report if suitable to their national circumstances.
- “The MEL for one of Europe’s largest airlines states that loss of Satcom meant that ADS-C and CPDLS (used for safety of flight communications (1525-1559 MHz) in regards to safe separation of aircraft) cannot be used which would not comply with the ICAO EUR NAT Doc 007, (meaning that aircraft flying the North Atlantic at a minimum would need to carry more fuel or less cargo/passengers) since such an aircraft is not allowed to enter the airspace defined under the NAT datalink mandate.”
- **“Thus, while potential blocking of MSS is classified as a minor failure condition, and does not pose a direct threat to safety of flight in the vicinity of airports, it may result in the disruption of departures, delays and cost overruns for airlines.”**

ECC Report 299 demonstrates receivers not covered under RED (Airborne and Marine equipment for safety-of-life applications) share burden shift introduced by M/536.

Informing US-EU WGB

- Prior to March 2019 US-EU WGB meeting, GPSIA informed US-EU WGB that:
 - Commission Implementing Decision 2018/661 establishes an OOB of -30 dBm/MHz throughout the extended MSS L-band at 1518-1559 MHz
 - Does not cite the technical assumptions in ECC Report 263
 - Serious omission in CEPT ECC Report 263 report of a compatibility analysis between IMT operations in 1492-1518 MHz and GPS/GNSS operations in the RNSS L-band at 1559-1610 MHz
 - That would affect all GPS/GNSS stakeholders, not only commercial and consumer covered under RED
 - Thus, CEPT ECC 263 cannot serve to recommend receiver performance levels for EN 303 413 under draft revision

Backup

RED GNSS Receiver Standard, EN 303 413 (OJEU 12/2017)

- EN 303 413 was developed in ETSI Technical Committee (SES SCN)
 - GPSIA participates, encouraged by EC Galileo representatives
- EN 303 413 uses
 - Internationally developed and adopted standards (including by EU Member States):
 - GNSS receiver parameters
 - International standard for determining avoidance of harmful interference (RED Article 3.2): 1 dB degradation in C/N_0
 - Adjacent frequency band selectivity test based on international allocations
- EN 303 413 was cited in the OJEU 12/2017 and is in force for covered GNSS receivers

EC Mandated Revision of EN 303 413 To “Improve” GNSS Receiver Performance

- In return for OJEU citation, EC mandated ETSI TC SES to open a new work item (ETSI REN-SES 00445) to *revise* EN 303 413 to “improve” GNSS receiver performance:
 - Mandates use of ETSI guide EG 203 336 to assess EN 303 413
 - Requires misapplication of “classical” radiocommunication receiver parameters, e.g. “*receiver sensitivity and co-channel rejection*” (note: RNSS bands not channelized) for use in determining avoidance of harmful interference (in lieu of the international standard of 1 dB C/N₀)
 - Now requires application of all (10) receiver parameters for terrestrial channelized communication, including assignment of values and minimum performance levels
- Technical Committee SES SCN has an “early” draft revision of EN 303 413 that:
 - Addresses receiver sensitivity and co-channel rejection with no values assigned
 - Provides rationale for why these classical communication receiver parameters do not apply to GNSS receivers
 - Conforms to the “exclusion” provision for Radiodetermination in ETSI guide 203 336
- Challenge: In a recent meeting with the EC, ETSI representatives of Technical Committees, including SES (e.g. Space Radiocommunication) presented similar rationale that has not been accepted
 - EC and EC consultants are not Radiodetermination/RNSS/GNSS technical experts