

Directorate-General



# **European GNSS**

# **Compatibility and** Interoperability



### Outline

- Priority
- Compatibility
  - » Avoiding harmful interference
  - » Noise floor protection criteria

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# Priority

- >> 1- Compatibility
- 2 Interoperability

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# Ensure Compatibility

- Compatibility: ability of space-based PNT services to be used separately or together without interfering with each individual service or signal, and without adversely affecting national security.
  - The International Telecommunications Union provides a framework for the radio frequency compatibility.
  - Respect of national security means spectral separation between PRS and all other signals



### Current Situation

- Galileo performs bilateral coordination to ensure compatibility with other GNSS
- Sufficient spectral separation between Galileo E1 and E6 PRS and other signals has not been achieved
  - > Unacceptable frequency overlap remains
  - Frequency overlap burden to be shared amongst systems providers
- Declaration of Compatibility and Interoperability is subject to a signed bilateral Agreement





### **Avoiding Harmful Interference**

- Protection of open signals
  - » Protection of noise floor
    - Maximum permitted increase
    - Protection of acquisition, tracking and demodulation
- Common interest in protection and balance
  - Agreement between Providers at ICG
    - Noise floor increase limits (compatibility)
    - DOP gain (interoperability)
- Example: protection of multi-GNSS interoperable L1/E1 MBOC users
  - y 4 global systems transmit MBOC





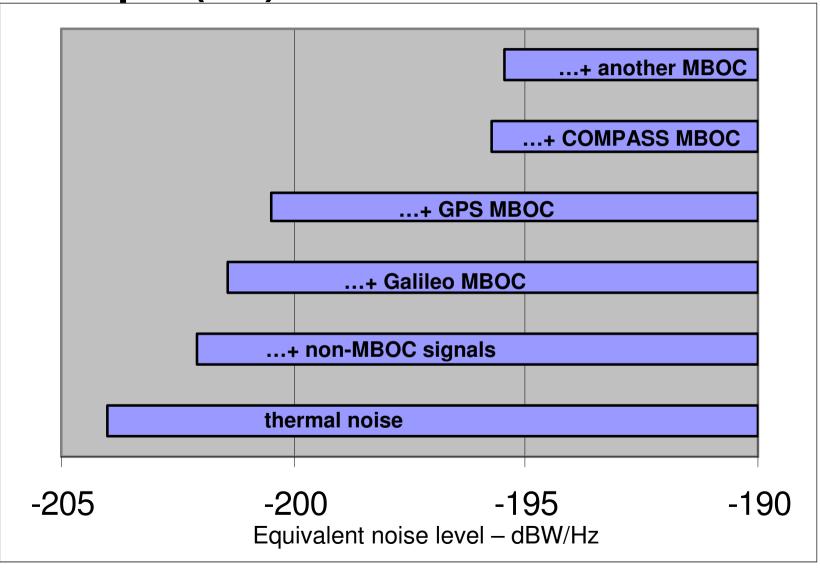
# Example (1/2)

		Galileo	COMPASS	Other
	GPS L1C	E1 OS	MBOC	MBOC
Maximum Received Power - dBW	-154	-154	-148	-154
Gagg (MEO and GEO) - dB	13	12	16	12
SSC - dB/Hz	-65,5	-65,5	-65,5	-65,5
Noise Contribution - dBW/Hz	-206,50	-207,50	-197,50	-207,50
Other signals (C/A, P,				
M-code, PRS etc) - dBW/Hz	-210			
Thermal noise - dBW/Hz	-204			
Total - dBW/Hz	-195,4			

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## **Example (2/2)**







#### **Conclusion**

#### Compatibility

- » First priority
  - Limit maximum noise floor to control harmful interference
- Spectral overlap of authorised signals
  - If negotiations do not resolve prior to IOV
    - Burden to be shared amongst Providers

#### Detailed discussion of Interoperability

- Premature prior to compatibility
- » Need to limit noise level increase for performance assurance
  - Revision of WGA Workplan