

Directorate-General
for Energy
and Transport



EUROPEAN
COMMISSION

European GNSS

Compatibility and Interoperability



● Outline

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

● Priority

- » 1- Compatibility
- » 2 - Interoperability

● 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

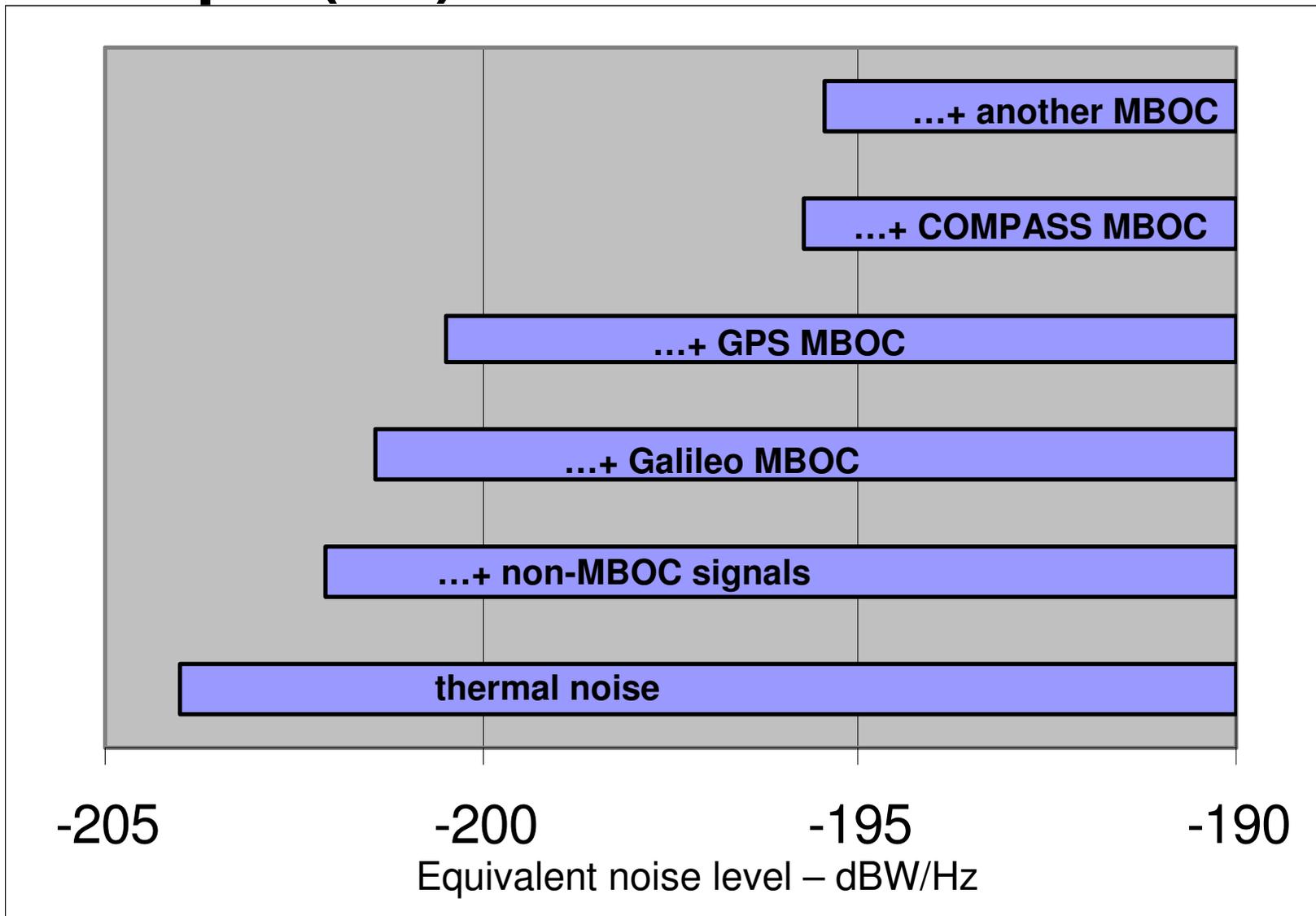
● Avoiding Harmful Interference

- 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
 - » 4 global systems transmit MBOC

● Example (1/2)

	GPS L1C	Galileo E1 OS	COMPASS MBOC	Other 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			

● 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