



International Committee on  
Global Navigation Satellite Systems

# What is Spectrum "Protection"

# How do you protect a ghost?

- you can't touch it
- you can't feel it
- you can't build a fence around it...
- So, how do you protect spectrum?



# Clean spectrum

- protection is about keeping the spectrum 'clean'
- Clean spectrum means keeping the frequencies near to GNSS free from licenced, unlicensed and illegal transmissions that interfere with GNSS reception, eg
  - GNSS jammers
  - uncontrolled GNSS repeater installations
  - spurious emissions from radio equipment, eg motors
  - other radio services, eg TV broadcasts
  - malfunctioning electronic equipment



# Why keep it clean?

- clean spectrum for GNSS minimizes signal errors and maximizes the performance for GNSS receivers
  - better and more reliable positioning and timing
  - faster time to first fix
  - better tracking performance in challenging environments



# Keeping it clean

- Keeping spectrum clean requires technical means to detect when such interference occurs
- national regulators usually have the capacity to detect **strong** interferers
  - direction finding equipment or geolocation techniques
  - the ITU can also help coordinate such activities when cross border interference occurs



# Interference to GNSS

- Strong interferers are relatively easy to detect
- However, if weak interferers are far away from the detectors, they will not be seen
- The weak interfering signals are still stronger than GNSS and will have widespread impact on GNSS reception



# Finding GNSS interference

- to find weak interferers (eg GNSS jammers) requires more specialised local equipment or a dense detector network
- the ICG has been considering this challenge
- example techniques will be discussed in a later session



# Effective spectrum management

- finding interference is only half the story, more important is preventing it in the first place
- GNSS jammers are illegal in most countries
  - national regulators need to make sure they are not manufactured or sold in their countries
  - a key role for national market surveillance authorities
- GNSS repeaters are useful, but only if deployed where no regular GNSS signals can reach
  - specific authorisation and licensing are recommended on a case by case basis





# Effective spectrum management

- National regulators should not authorise other radio services in GNSS bands
- Before considering new radio services in adjacent bands, national regulators should also thoroughly check that the new services are compatible with GNSS
  - eg mobile broadband adjacent to GNSS is a bad idea
- This requires expertise and effort, but the ITU process/recommendations can help
- It's better to engineer effective spectrum management than to deal with the effects of bad management

