satellite Interference Reduction Group (IRG)

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Satellite Interference

Commercial Industry Views

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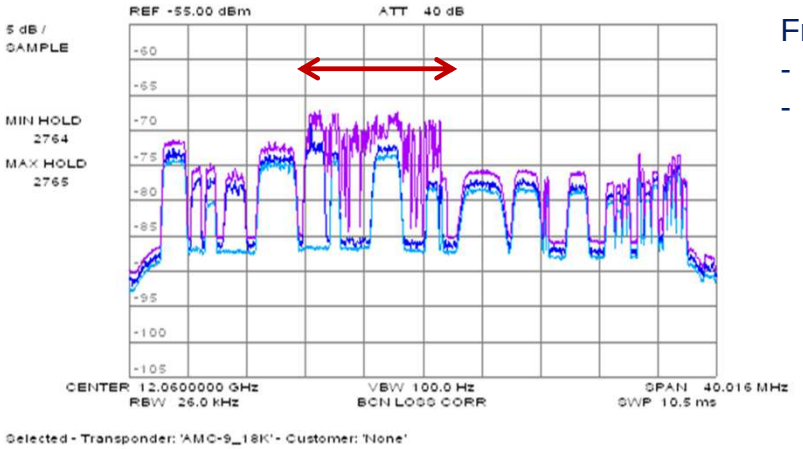
What is interference?

- Sustainability of space – two main aspects:
  - Physical security (collision avoidance, debris mitigation)
  - *Electro Magnetic Interference (EMI) / Radio Frequency Interference (RFI)*
- Satellites are a shared resource (space, satellite, transponder)
  - In-band RFI (RFI within the operating frequency range of the satellite)

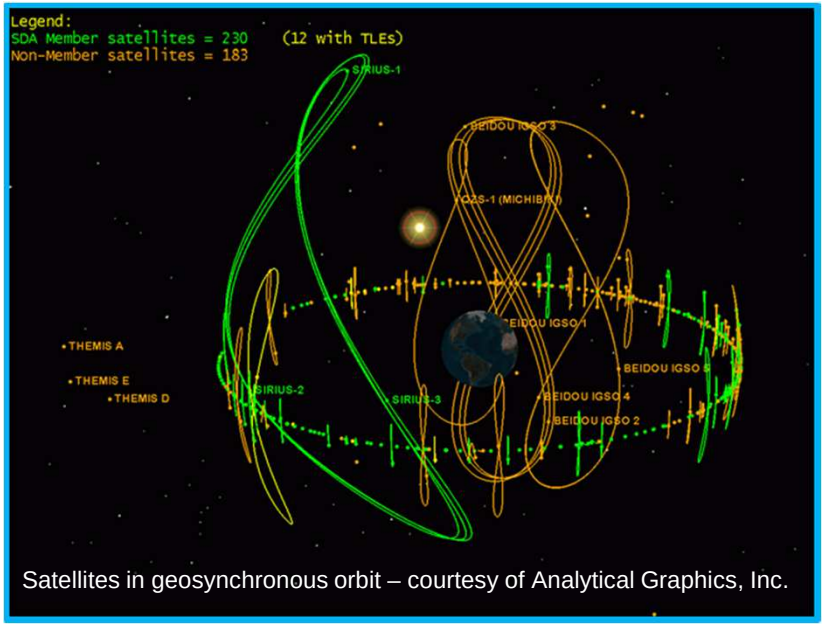


Frequency spectrum of a satellite transponder
- *Blue trace is the authorized user signals*
- *Purple trace is authorized plus interference*

Users must be:
- *On the right satellite*
- *At the right frequency*
- *At the right power*

  - Out-of-band (RFI from adjacent frequency bands from the satellite)
    - Much higher power (e.g. terrestrial/mobile services) can affect the adjacent very low power satellite signals

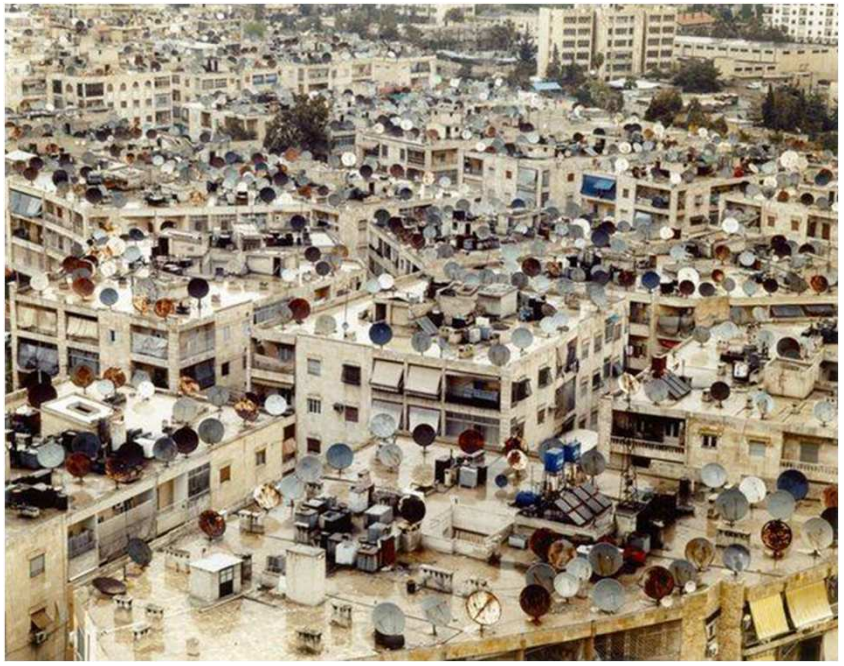
What is the cause of RFI?



Satellites in geosynchronous orbit – courtesy of Analytical Graphics, Inc.

Greater number of satellites

Reduced orbital separation



Growth of small ground terminals

Low equipment cost; lower quality; lower margins

Poor installations and maintenance

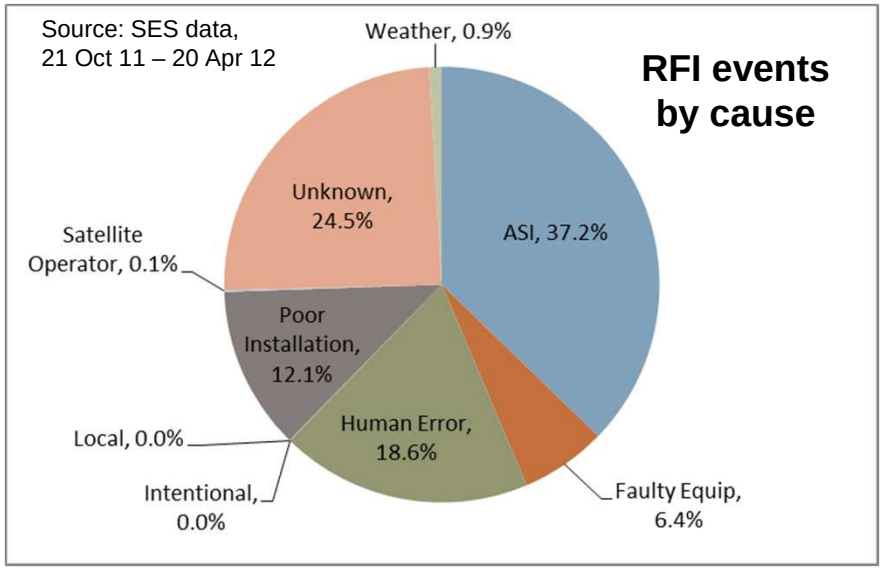
Lack of operational training

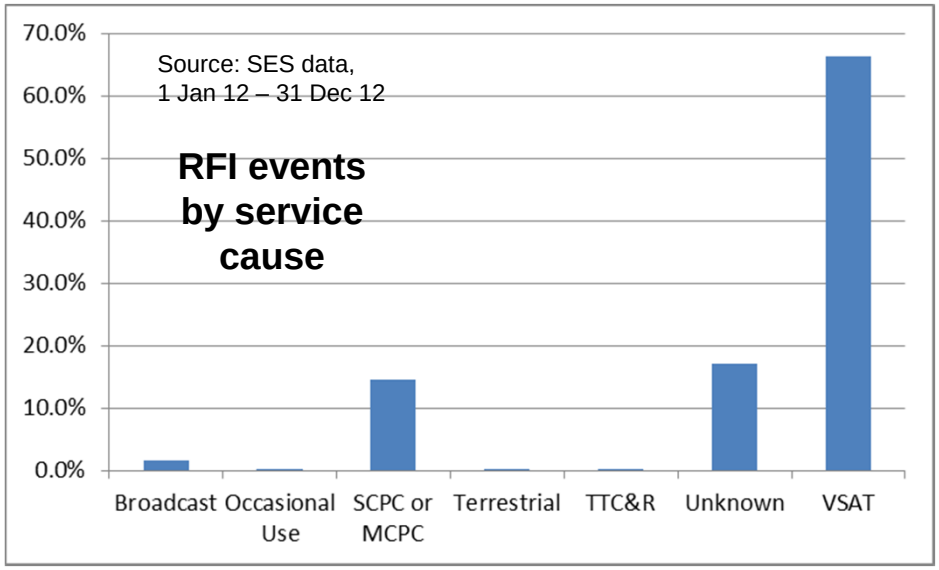
Faulty equipment

Sometimes intentional, but rare

Types of RFI, and impact to industry

- To put it in perspective:
  - The amount of capacity affected by RFI at any time, is very small compared to the total capacity
  - However, for an affected customer, it is harmful interference





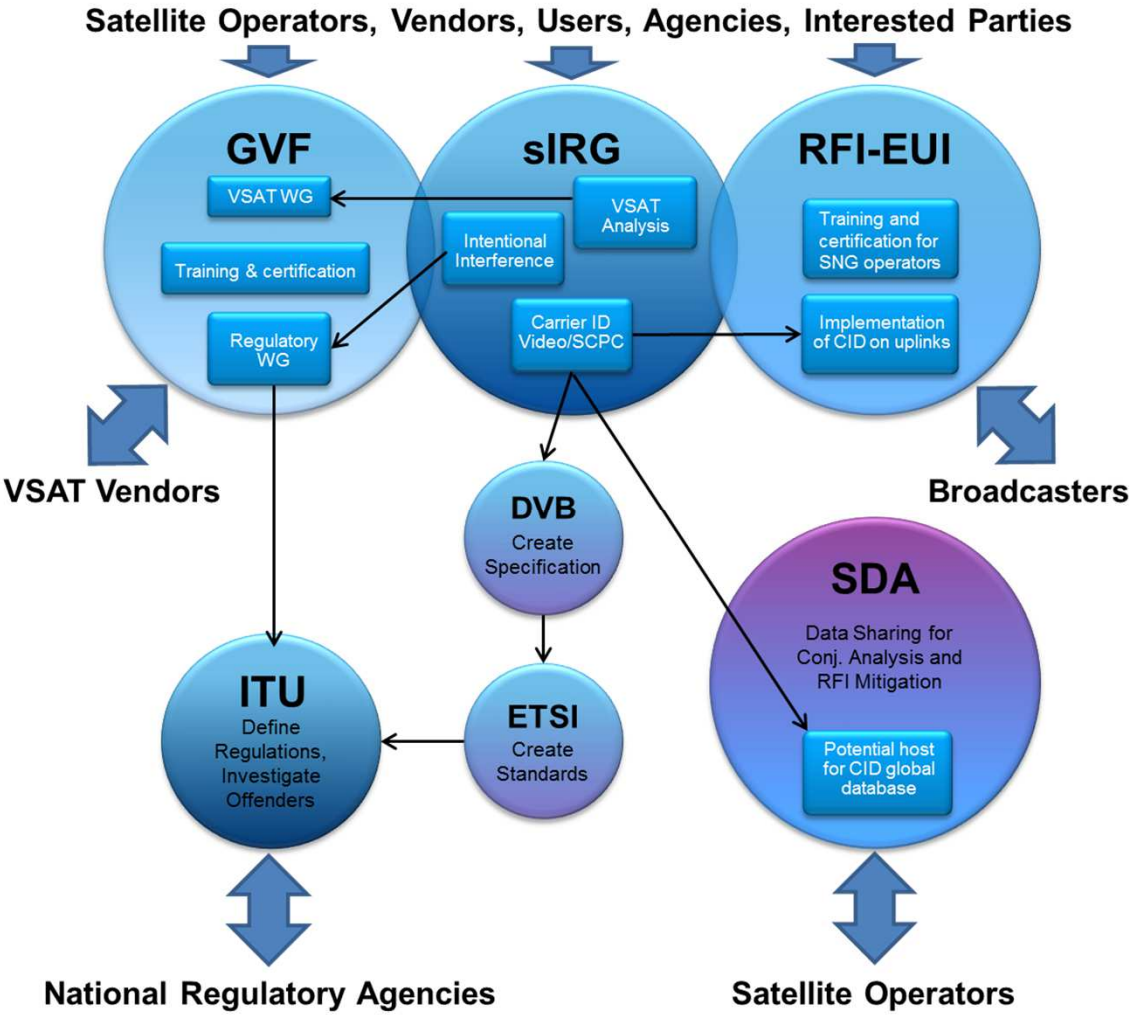
- Impact to industry:
  - Poor quality of service; affects revenue; bad perception of satellites

What are we doing about it?

No magic solution – needs multi-pronged approach

Problems:	Solutions:
	Proactive…
1. Improper Installations	✓ Training & Certification
2. Unskilled operators	✓ Training & Certification
3. Sub-Standard Equipment	✓ Type Approvals
	Reactive…
4. Unidentified Carriers	✓ Carrier ID
5. Incident Coordination	✓ Data Sharing

Industry cooperation



Companies and organizations cooperate, to address:

- Tools to mitigate RFI, detect RFI, and geolocate source
- Openness to talk about problems
- Share data to help all operators (e.g. through SDA RFI mitigation functions)
- New techniques, e.g. Carrier ID to identify carriers

Other areas for improvement:

- **Need help from ITU with intentional interference**
- **More training for users (espec. Gov operators) would help**
- **Communication/coord could be improved with US Gov (e.g. GSSC)**
- **Investigate VSAT RFI mitigation**
- **Improve equipment quality**

Thank You