



Promoting Cooperative Solutions for Space Sustainability

Understanding Space Systems

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“Wilton Park Dialogue WP1875V :
Responsible behaviours in space,
national submissions to the UN”

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Low Earth orbit (LEO): 160-2000 km; Earth observation, telecom, weather, missile warning/ISR satellites

Medium Earth orbit (MEO): 2000-35,786 km; navigation, missile warning/ISR satellites

Geosynchronous Earth orbit (GEO): 35,786 km; telecommunications, weather, missile warning/ISR, Earth observation satellites

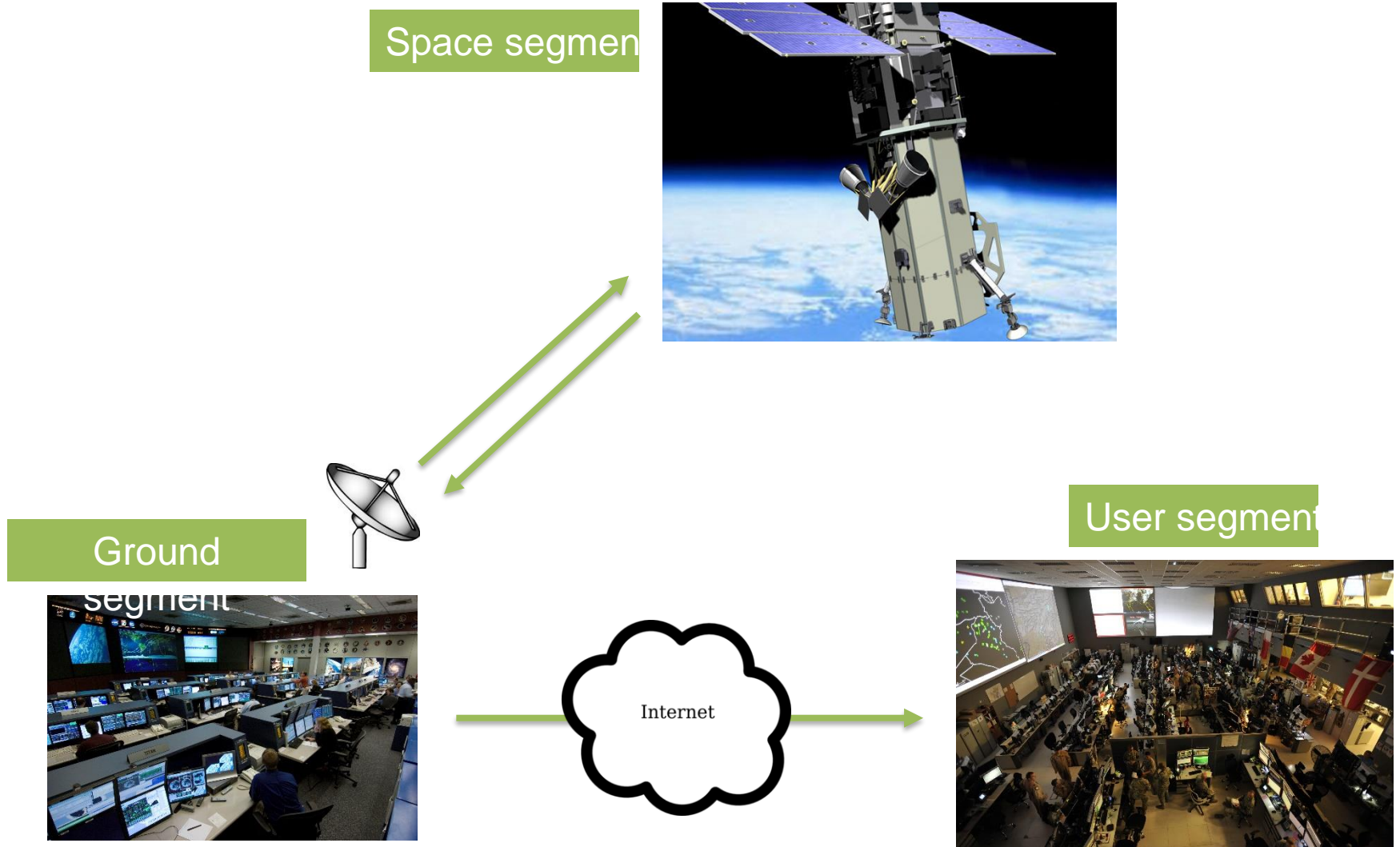
High Earth orbit (HEO): >35,786km; communications satellites



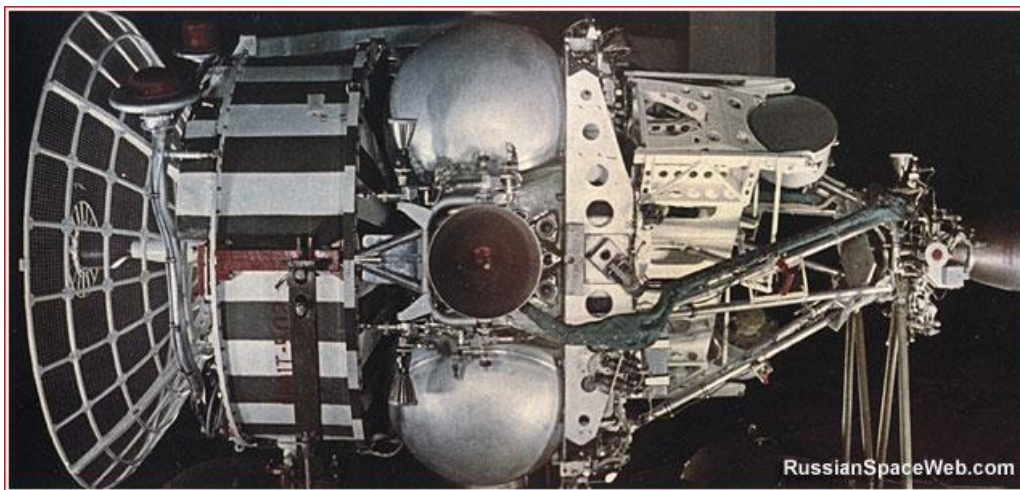
Spacecraft Subsystems Overview

- Payload
- Attitude
- Thermal
- Power
- Propulsion
- Structure
- Data handling

Elements of a space capability



Many Ways to Attack Satellites



Soviet IS killer satellite (1960-1987)



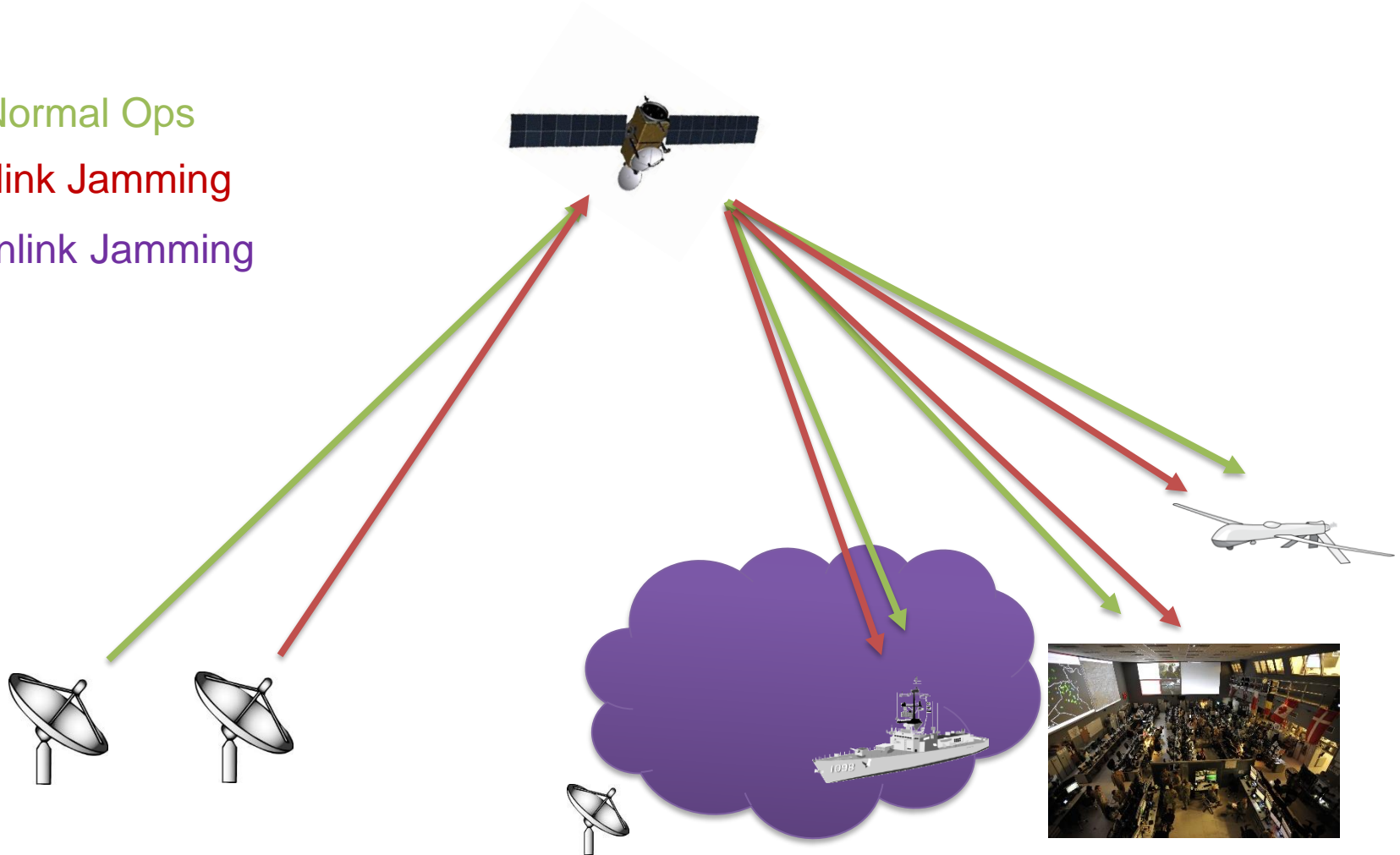
*U.S. Air Force F-15
launching an ASM-135
ASAT missile (1978-1988)*



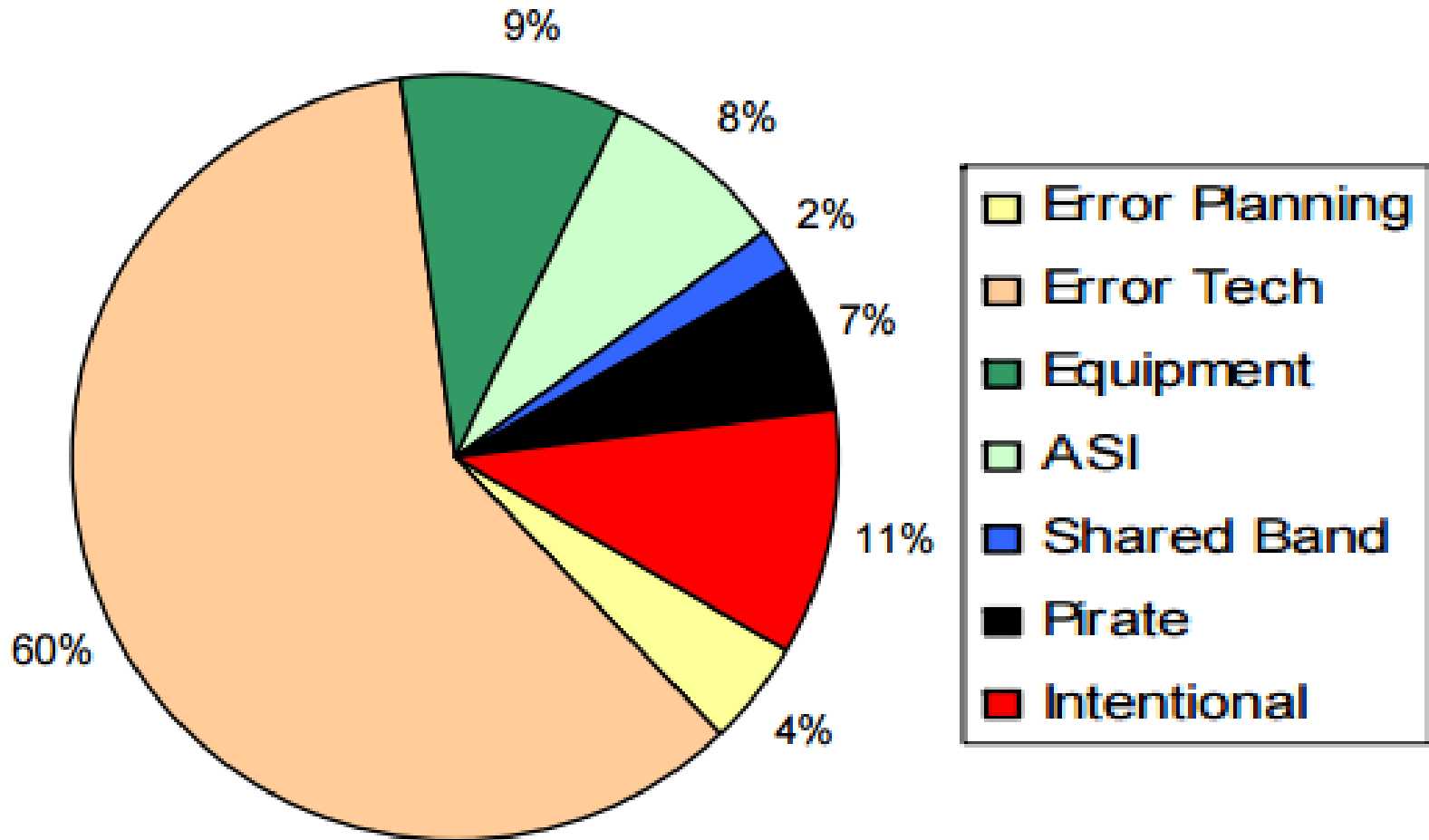
*Commercially-
available GPS
jammer (2014)*

Satellite jamming

Normal Ops
Uplink Jamming
Downlink Jamming

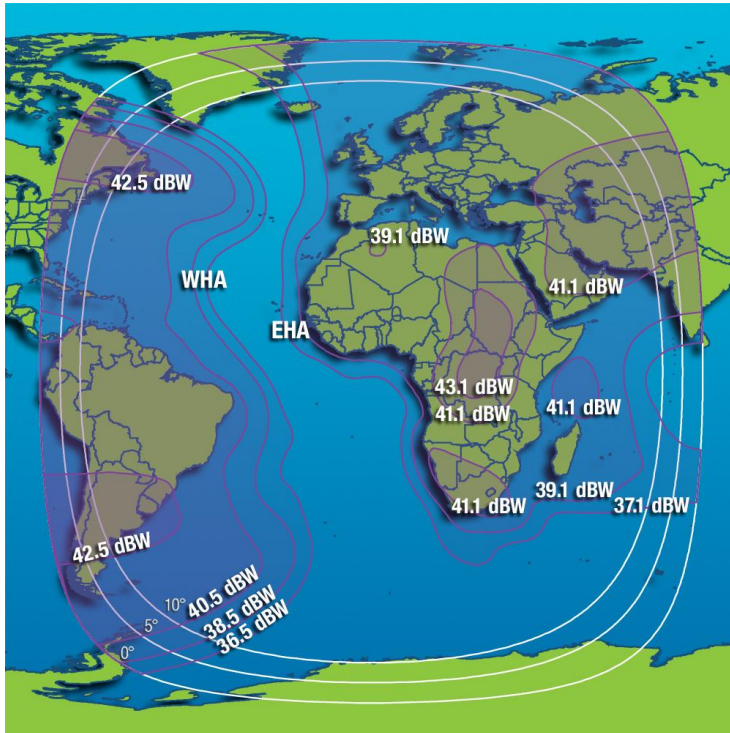


Sources of RFI interference



Source: [Eutelsat briefing to the ITU](#) (2013)

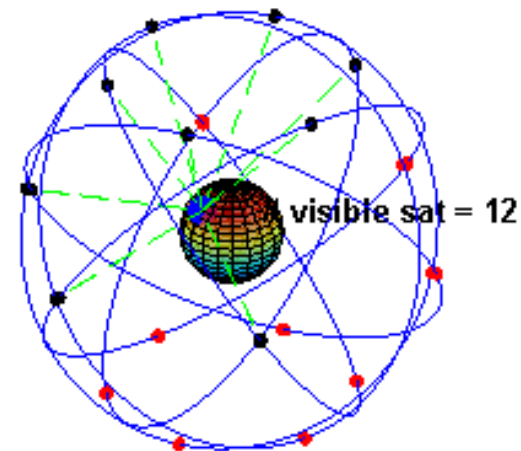
Major military activities in space



Field of view of a single geostationary satellite
Source: [Intelsat](https://www.intelsat.com)

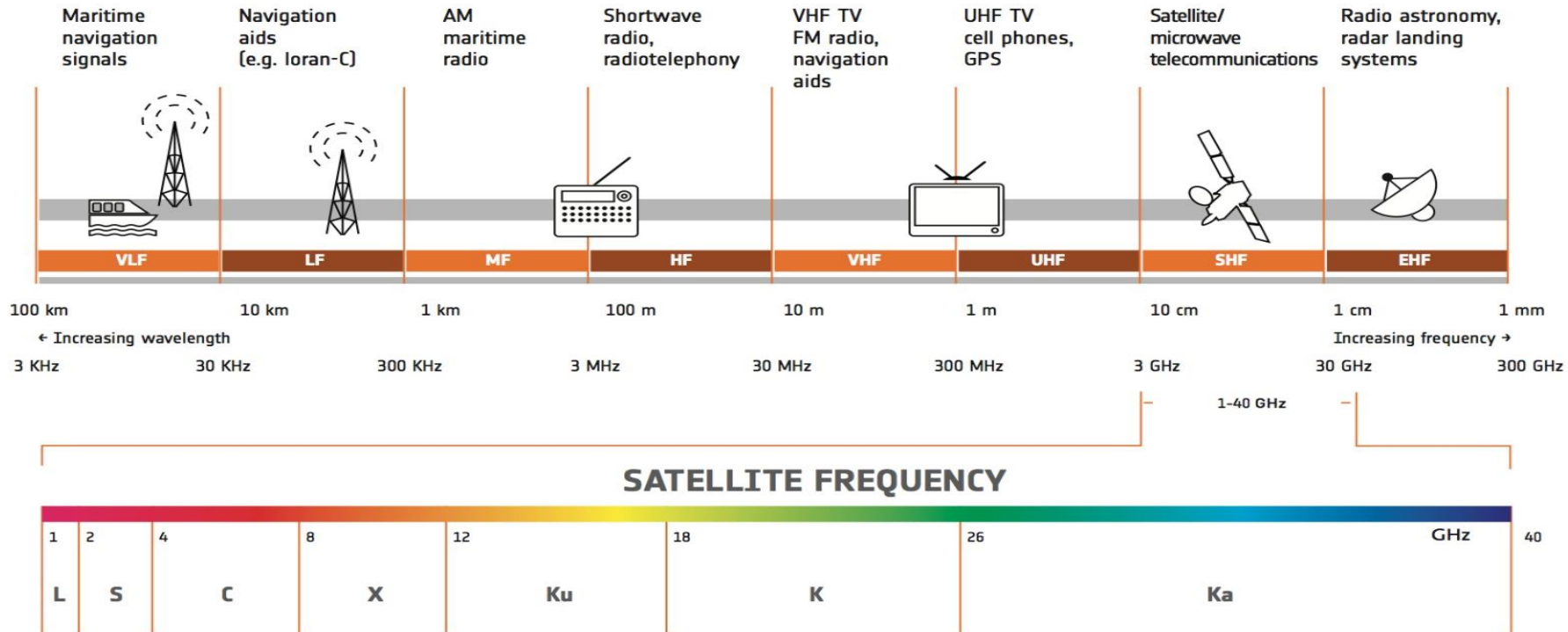


1-Meter Resolution Radar Image of the U.S. Capitol



GPS constellation

Satellite Frequency Bands





Questions?

Thanks.

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