ESA actions supporting to World Radiocommunication Conference (WRC-15) preparations and interference mitigation

Frank Zeppenfeldt
ESA Telecommunications

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Support for the development of innovative and competitive satellite communication products by European and Canadian Industry for the world market.

→ ARTES (advanced R&D in satellite communication systems)
A number of space systems are being developed with European industry:

**Hylas** – flexible payload for Ku/Ka-band

**Inmarsat/Alphasat** – just launched – improved L-band and technology demonstrator for Q/V-band and optical

**EDRS** – optical data relay for earth observation satellites and RPAS/UAS -

**SmallGEO** – a new smaller sized telecommunication satellite

Satellite with full-electric propulsion

More under discussion.....
WRC-15 and the satellite telecommunications industry

1. The World Radio Conference 2015 will decide upon important issues for the satellite telecommunications industry

2. Some decisions will be threats, e.g. less radio frequency spectrum → No spectrum, no satcom

3. Some decisions can be opportunities, e.g. for new satellite systems or access to new spectrum

4. To counter threats and exploit opportunities, each national administration should be lobbied for a satellite-favourable position

→ ESA would like to support in this effort by increasing awareness and technical support
1. C-band is used for many services which need **high availability** (e.g. tropical or equatorial regions that suffer from heavy rainfall).

2. C-band carries **critical services** such as emergency communications, meteorological services, the Global Maritime Distress & Safety System (GMDSS), Air Traffic Management,....

3. C-band allows **large global beams** to cover large regions.

4. C-band is extensively used for **backhauling services** from e.g. Africa to Europe.

5. More than 283 satellites in-orbit carry C-band transponders. 2000 C-band transponders in operation, representing a yearly turnover of **several B€** for the satellite communications industry.
1. An ESA-funded activity supports the European satellite industry in their overall preparation for WRC-15: the activity allows for **coordination** between satellite industry and operators and **preparation of contributions** to regulatory meetings.

   → This includes contributions **to avoid new agenda items** for mobile spectrum in satellite bands.

2. The spectrum needs of the mobile industry are based on **excessive traffic demands**.

   → ESA, in cooperation with ESOA (European Satellite Operator Association), and GVF (Global VSAT Forum) supporting an activity to counter these demands and corresponding spectrum claims.

3. Study on **C-band importance in Africa**, by Euroconsult, see satellite-spectrum-initiative.com
More awareness is required……

At the World Radiocommunication Conference (WRC-15) only administrations have decisive power.

Besides operators: teleports, equipment manufacturers, downstream services.
Taxonomy of threats

Intentional threats
  - Ground-based
    - Interception
  - Space-based
    - Directed Energy
    - Interference oriented

Unintentional threats
  - Ground-based
    - Sabotage
    - Jamming
  - Space-based
    - Space objects (de-orbiting)
    - Space environment (solar and cosmic, temperature)
    - Interference oriented

Space weather
  - Interference oriented
  - Other terrestrial and space systems

Natural disasters
  - earthquakes, floods

Power outages

Physical destruction
1. Develop **technical sharing solutions** for C-band and Ka-band: e.g. what will be the cost impact on consumer Ka-band terminals?

2. Assessment whether **commercially feasible** to embark **anti-jamming solutions** on the satellite

3. Support the development and **in-orbit flight** heritage of products to counter uplink jamming

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**Eutelsat To Field Test New Anti-jamming Capability**

By Peter B. de Selding | Jan. 28, 2013

PARIS — Commercial satellite fleet operator Eutelsat is placing an experimental anti-jamming capability on one of its upcoming satellites to be stationed over the Middle East, a decision prompted by increased intentional interference in the region and made possible by a program financed by the French and European space agencies.

If the technology works as designed, it could facilitate wider adoption of interference mitigation technology by commercial fleet operators, especially those operating in regions, such as the Middle East, where intentional signal interference has been a growing problem, industry officials said. The cost of anti-jamming technology up to now has been prohibitive, they say.

Some operators concede they have been loath to accept the idea that interference may be more than a temporary phenomenon.
4. Improvements to ground-based geo-location products and **on-board spectrum monitoring** equipment development.

5. Development of equipment for **future frequency bands** (Q/V-band)

6. DVB Carrier ID equipment developments

7. Small (and many) LEO satellites....

8. A small satellite-based spectrum monitoring/measurement mission?
1. Sustained demand for C-band satellite services

2. A large number of C-band carrying satellites are in the pipeline