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Monitoring and Enforcing the Orbital Spectrum

Jan Verduijn
Chairman ITU SG1 WP 1C on Monitoring
Jan.verduijn@srcon.nl /
jan.verduijn@ties.itu.int

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Content

- Spectrum management and the role of monitoring
- Spectrum management cycle
- Types of monitoring
  - Terrestrial monitoring
  - Space monitoring
- Observing the orbital spectrum
- Enforcement
- Conclusions

Spectrum management and the role of monitoring

Definition of Spectrum Management:

Spectrum management is the combination of administrative, scientific and technical procedures necessary to ensure the efficient operation of radiocommunication equipment and services without causing harmful interference.

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Spectrum Management

- Main functions in Spectrum Management:
  - Frequency allocation and assignment
  - Licensing
  - Enforcement

- Impact of telecommunication on today's economics, theoretical planning is not enough anymore.
- Knowledge on the actual use of the spectrum is needed

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Role of Monitoring in the overall Spectrum Management process

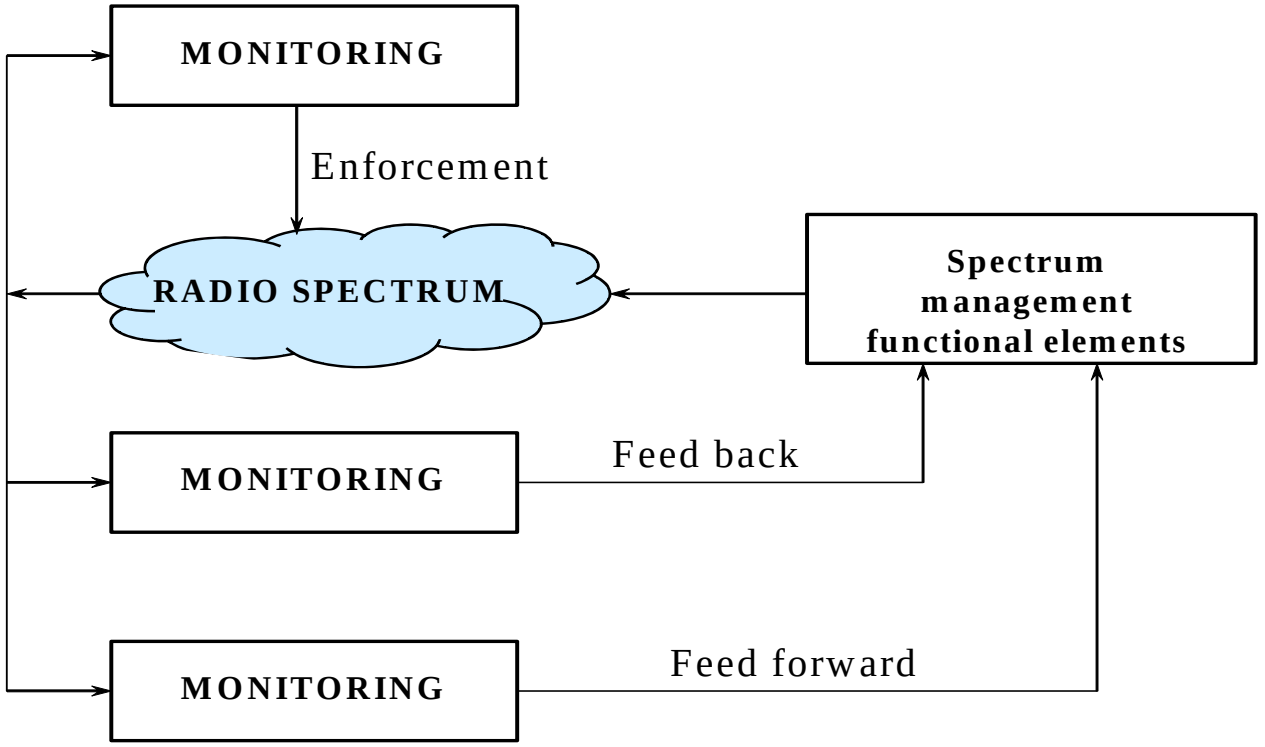
Monitoring can be defined as a process of:

- ***observing the radio frequency spectrum***

and

- ***reporting on the use of it.***

Spectrum Management cycle



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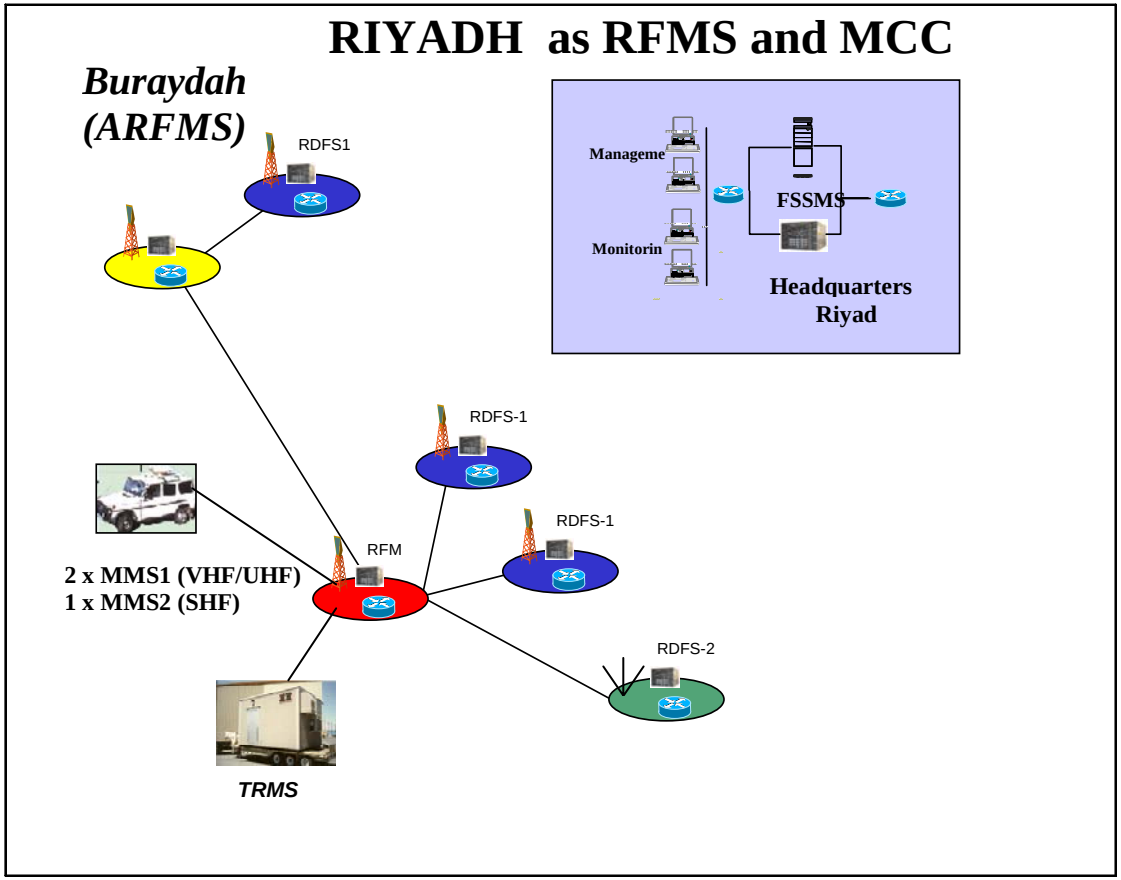
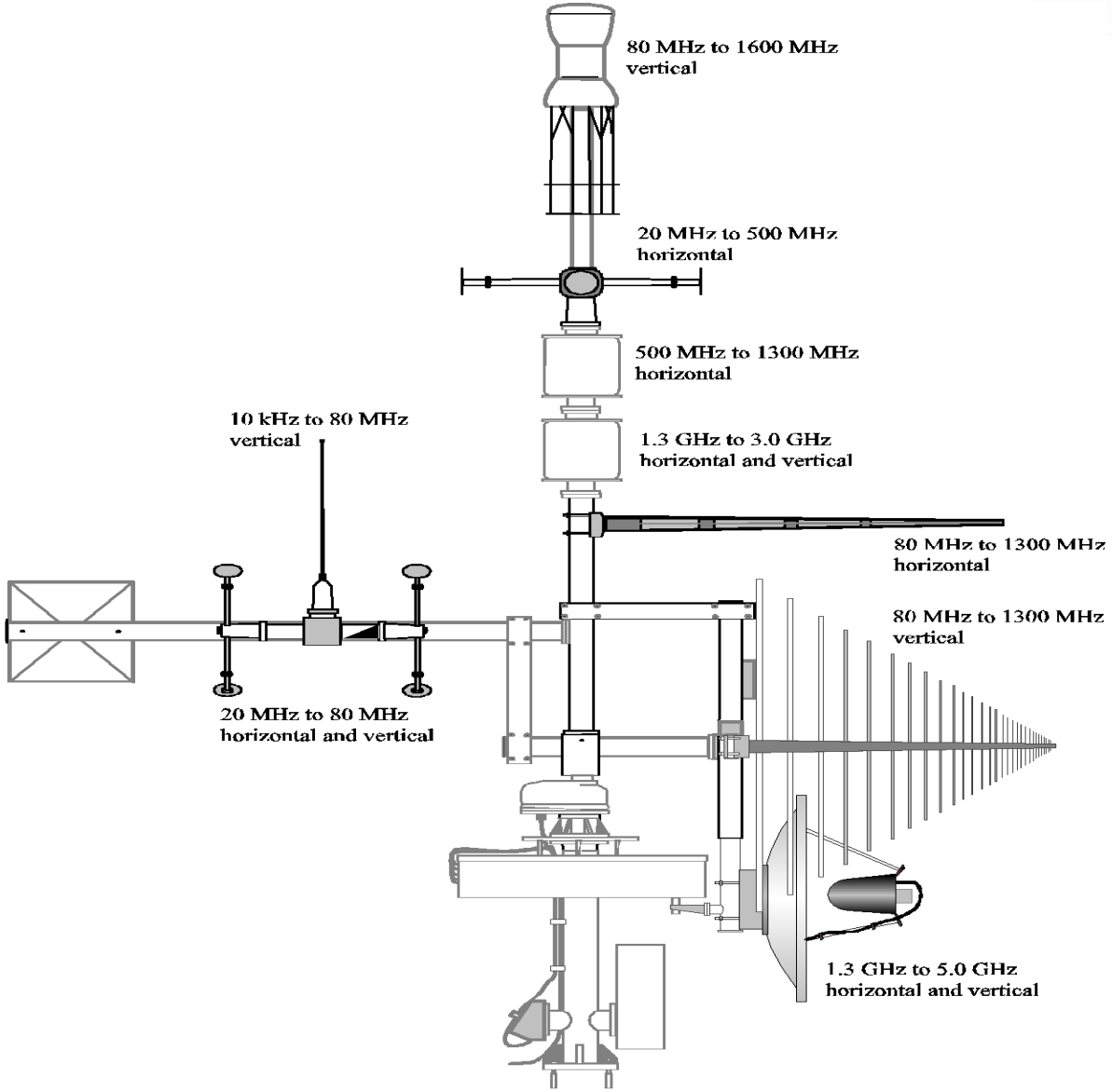
Typical monitoring configuration for terrestrial monitoring




80 MHz to 1600 MHz
vertical
20 MHz to 500 MHz
horizontal
500 MHz to 1300 MHz
horizontal
10 kHz to 80 MHz
vertical
1.3 GHz to 3.0 GHz
horizontal and vertical
80 MHz to 1300 MHz
horizontal
80 MHz to 1300 MHz
vertical
20 MHz to 80 MHz
horizontal and vertical
1.3 GHz to 5.0 GHz
horizontal and vertical

Growing importance of space monitoring (1)

- Monitoring based on same principle as for terrestrial monitoring;
- Resolution ITU-R 23;
- Space – and terrestrial services sharing same frequency bands;
  - Increasing possibilities of interference

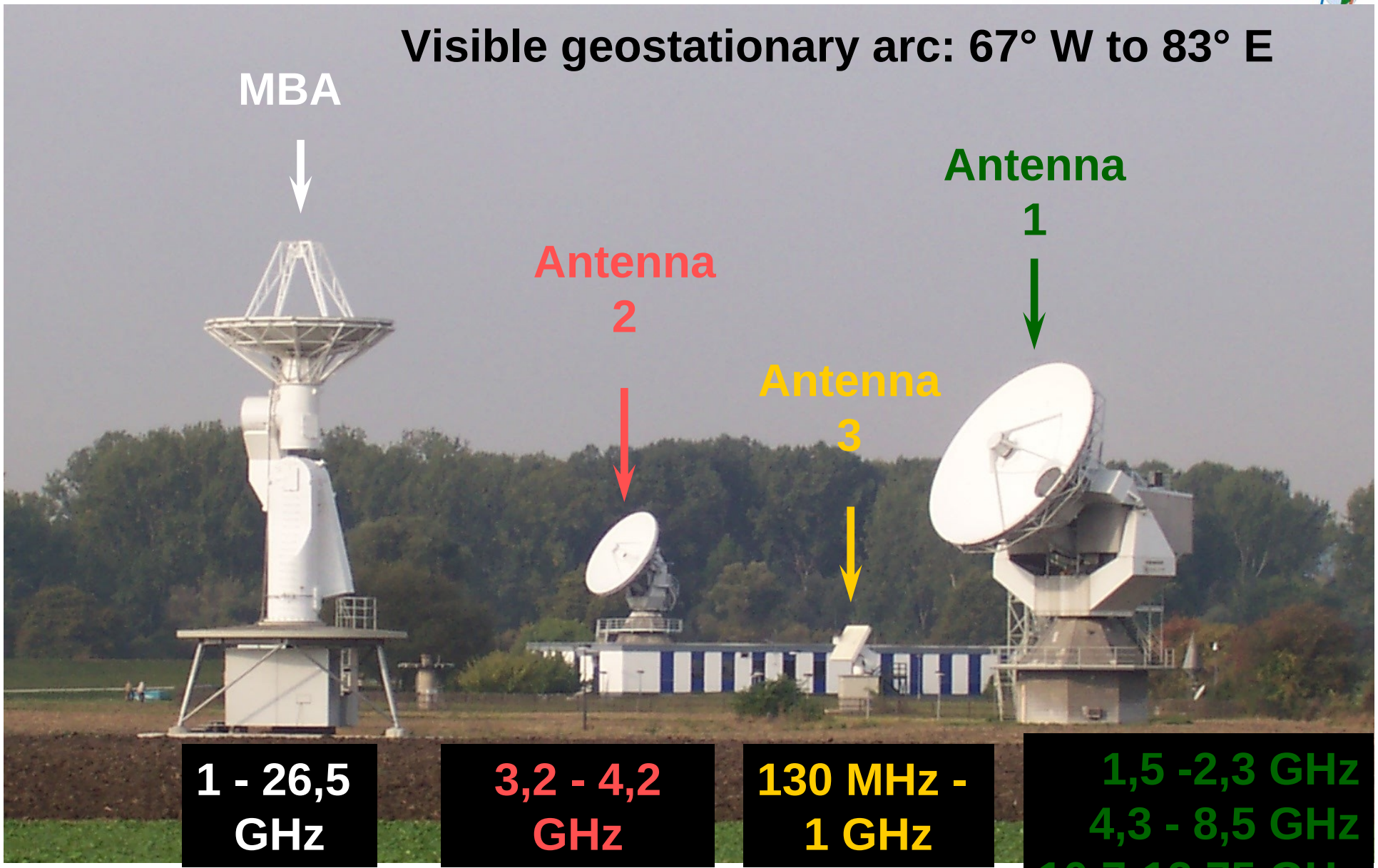
Growing importance of space monitoring (2)

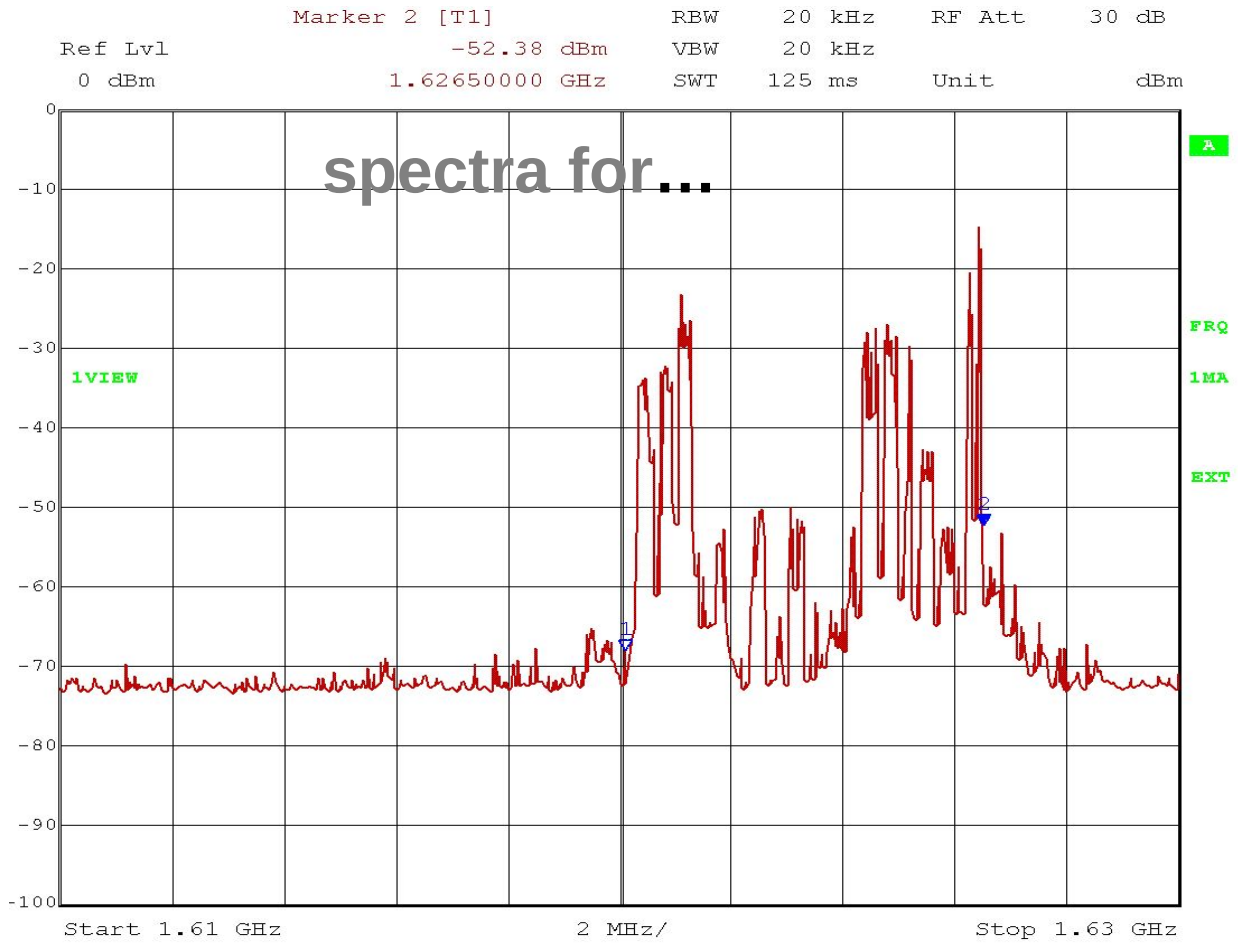
- Within CEPT: 6 countries established via a MoU their space monitoring via Leeheim
- Annual meeting of experts in space monitoring: this year in Washington, USA
- Within ITU-R:
  - Recommendation ITU-R SM.1681
  - Question ITU-R 232/1
  - Review Chapter 5.1 of HB Spectrum Monitoring

Tasks of a space monitoring station

- detecting and identifying space station emissions;
- determination of occupancy of space station transmitters;
- measurement and recording of the characteristics of space station emissions
- investigation and elimination of harmful interference;
- measurements and recordings for technical and scientific projects;
- detection of illicit use of transponders and identification of its source(s);
- pre-launch monitoring

Visible geostationary arc: 67° W to 83° E



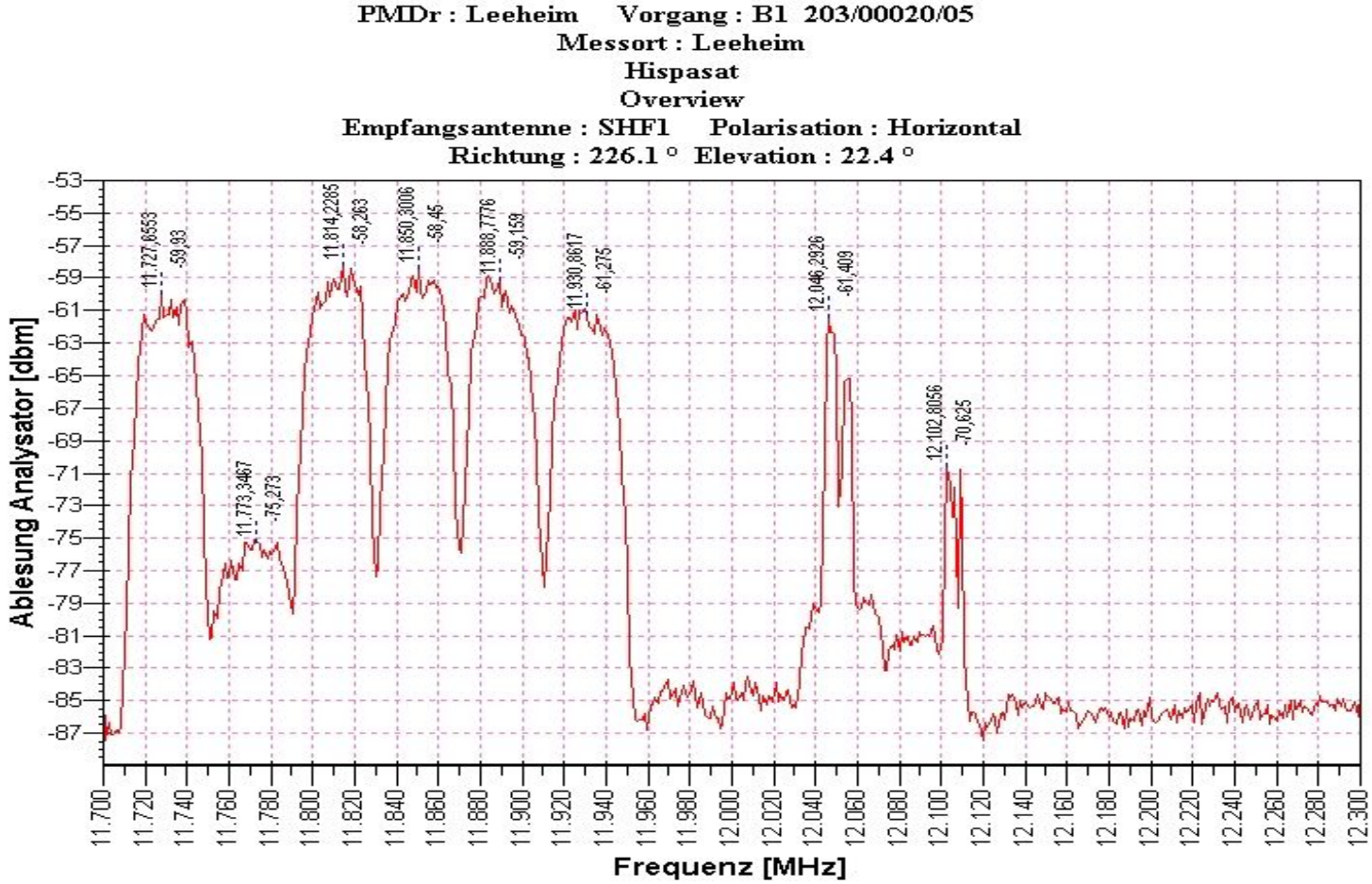


... Measurement of frequency, bandwidth, power level

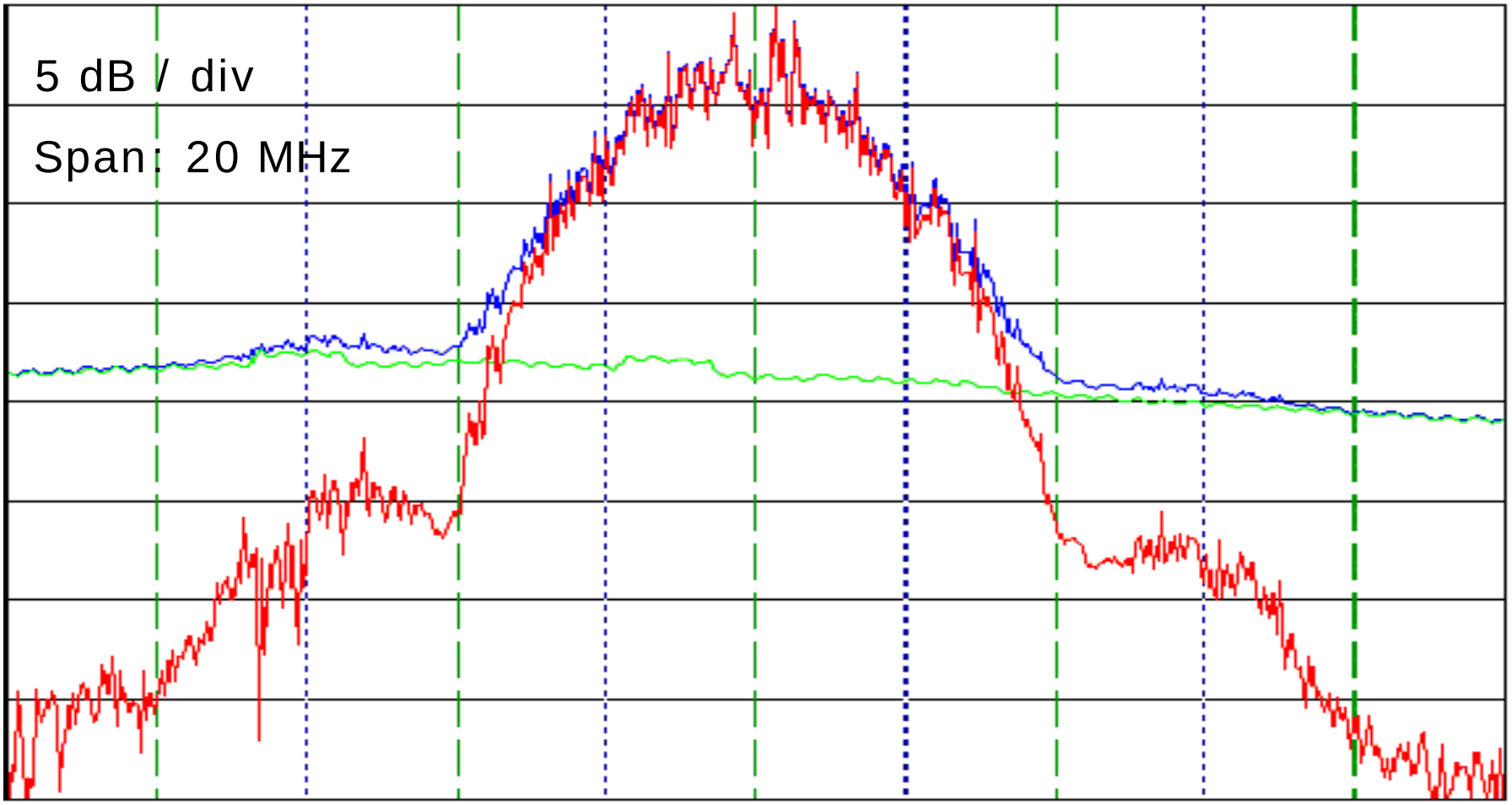
Calculation of p.f.d. and EIRP

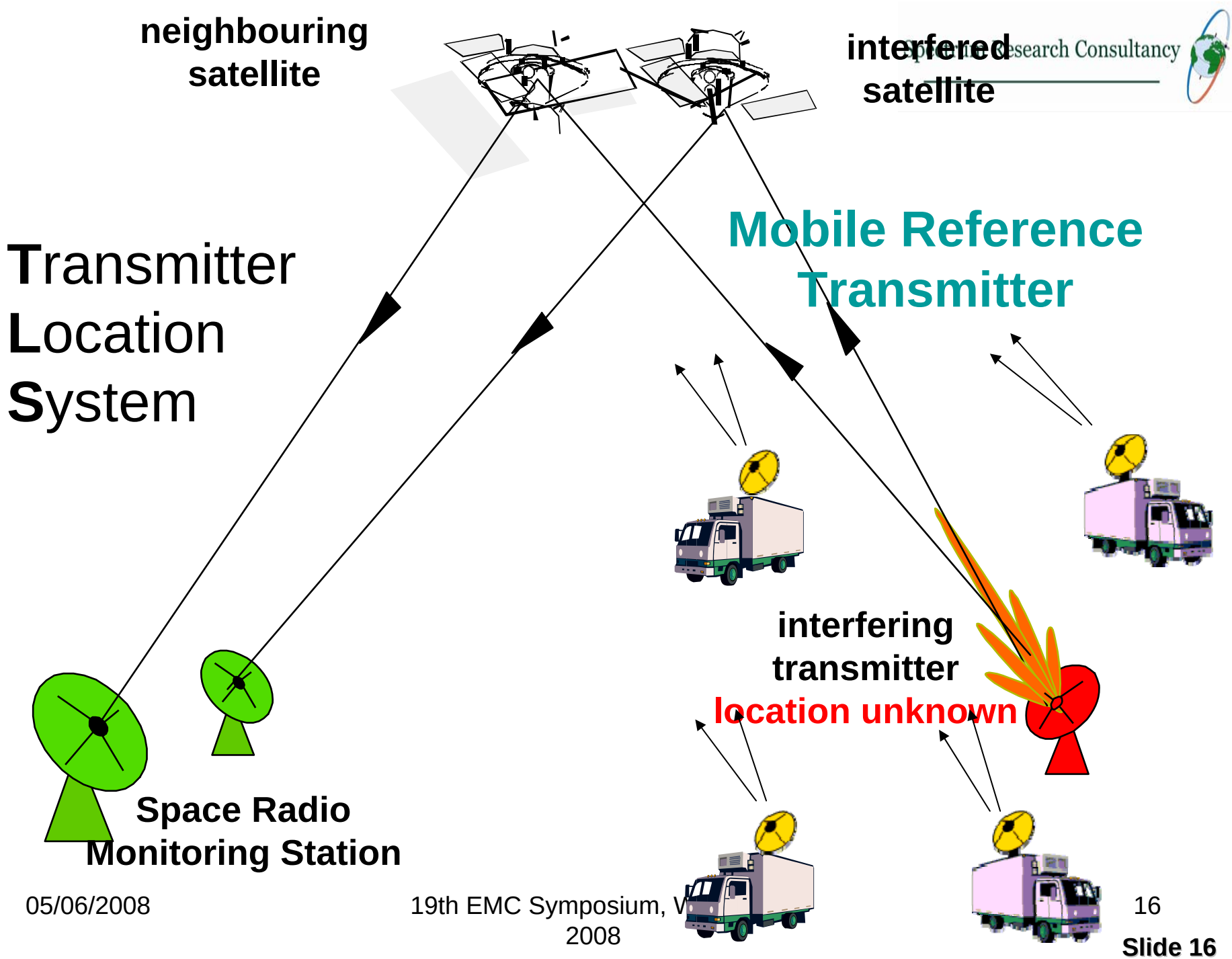
Judgement on class of emission, type of modulation

Example: Spectrum of a satellite



Wide band measurements below noise level




neighbouring satellite
interfered satellite
Transmitter Location System
Mobile Reference Transmitter
interfering transmitter location unknown
Space Radio Monitoring Station

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Conclusions

- Due to the growing importance of space monitoring:
  - Need for global coverage via visible arc;
    - Need for more space monitoring earth stations
  - Cooperation via Space monitoring Workshop;
  - Discussion with ITU Space Service Department on data collection of space monitoring

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Questions???