

SUB TECHNICAL GROUP REPORT:

- **FREQUENCY PROTECTION**
- **PAST AND FUTURE MEETINGS**
 - **WORK ITEMS**

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Report/recommendations/actions of the last ITSC15

- **Degradation of radiometric resolution will disrupt the Numerical Weather Prediction (NWP) forecasts and climate models. Generally the impact of RFI within satellite passive bands is not precisely known**
- **Example of RFI.** One example especially deals with the sharing situation within the band 10.6-10.68 GHz: it was shown that large degradation due to interference is experienced over **Japan, UK and Italy**. Therefore, detectable interference at high levels, is a symptom of a problem but absence of detectable RFI does not imply that there is not a problem.

Report/recommendations/actions of the last ITSC15

- **If the RFI is such that the interference thresholds are exceeded (as in ITU-R recomment), what are the consequences in terms of reliability of the weather forecasting, climatology and monitoring of the environment? What happens on the weather forecast (or other similar output products) if, for example, some EESS satellite pixels are corrupted due to non-natural emissions at 24, 50 or 89 GHz?**
- **Another issue is the impact of missing data, due to high level of interference. As the data are known to be bad over the same area of the globe, they are systematically deleted from the dataset to be used.**

Report/recommendations/actions of the last ITSC15

- **Recommendation:** *Studies should continue to be conducted to assess the impact of corrupt data (exceeding the corresponding radiometric resolution of the passive sensor) showing the level of degradation of the NWP or climate modelling.*
- **Recommendation:** *Future passive sensors should be designed to detect potential anomalies, corrupt data or interference in order to report to national Administrations and international organisations in frequency management for further action. As a matter of urgency, the frequency bands which should be considered are the following:*
 - 1400-1427 MHz 10.6-10.7 GHz 18.6-18.8 GHz 23.6-24 GHz 31.3-31.5 GHz
36-37 GHz 50.2-50.4 GHz 52.6-54.25 GHz.
- There are number of documents addressing the usage of the microwave frequency passive bands, their scientific interest, the retrieved parameters and the technical characteristics of the corresponding passive radiometers. These documents are available from the International Telecommunication Union, radiocommunication sector (ITU-R), WMO and other organisations
- The ITU-R has adopted recommendations providing performance and interference criteria for satellite passive remote sensing (radiometric resolution and maximum interference level);
- **Action:** *Jean Pla to provide a list of all these existing documents; and to produce additional documents if necessary on related topics and to contribute to the update or improvement of those existing documents with a view to disseminate corresponding information to administrations and international organizations dealing with frequency management.*

Meetings and purpose between October 2006 and May 2008

- CEPT (Conférence Européenne des Postes et Télécommunications)
- ITU (International Telecommunication Union)
 - R sector (radiocommunication): Working Parties (WP), Conference Preparatory (CPM), World Radio Conference (WRC)
 - D sector (development): Study Group 2 for disaster management purposes
- SFCG (Space Frequency Coordination Group): frequency management between Space and Meteorological agencies
- Other meetings: NOAA workshop about passive frequencies

Meetings and purpose between October 2006 and May 2008

The issues which have been addressed are the following

- Preparation of the next ITU-R WRC within ITU-R and CEPT.
- European meetings for the purpose of protecting passive bands due of possible introduction of Short Range Devices (SRD) and Ultra Wide Band (UWB) devices.
- Disaster management: update of reports and studies, workshop.
- Review of passive bands through a NOAA workshop.

Passive bands between 275 and 3000 GHz

Agenda item 1.6 of WRC-2011

Spectrum use by passive sensors between 275 and 3000 GHz

Free space optical links

Preliminary document on passive remote sensing between 275 and 3000 GHz on the ITWG website. A first analysis shows that **there is some information available between 275 and 1 THz, but very little between 1 and 3 THz.**

Further work to be undertaken for optical links.

ITWG participants are encouraged to provide information for the agenda item: no frequency allocation envisaged, identification of frequency bands, reference windows, spectral lines, required bandwidths.

Possible liaison document from ITSC 16 to the next SFCG in Quebec city, September 2008

Protection of passive bands above 71 GHz

- **Agenda 1.8 of WRC-2011:** regulatory issues relative to the fixed service between 71 and 238 GHz (protection of the **passive band 86-92 GHz**)
- The **exclusive band 86-92 GHz** is widely used by many passive sensors. The usefulness of this band has been shown (**for example in case of a tropical cyclone as shown in the ITU-D workshop - December 2007 in Geneva - on the role of remote sensing in disaster management**) for many applications.
- In addition to electromagnetic compatibility studies conducted between active services for passive bands, it seems necessary to answer the following question: if the proposed limits (based on international agreed recomm. for the protection of microwave passive sensors), are exceeded, what are the **actual consequences in terms of reliability of the weather forecasting?**
- Importance of **getting a quantitative explanation of various levels of degradation**. It is still possible to keep arguing that it is not so obvious to derive this kind of information since complex algorithms are needed to model the atmosphere which is known to be very unstable by nature. It is true that it is hard to distinguish between weak radio frequency interference and naturally geophysical variability.

Protection of passive bands above 71 GHz

- ⇒ **Identify passive frequency bands** with a view of a precise future work plan. Focus on some frequency bands, especially for example the 86-92 GHz band which is under consideration within ITU-R, or around 50 GHz which is essential.
- ⇒ One aspect of degradation is the **lack of data**: already examined by **UK MET Office**. What is the impact of this lack of data on the overall output products if satellite data are systematically excluded in all geographic areas? Report published where **the main idea is to convert the impact of satellite data to a date which you have to go back to match the degraded level of performance.**
- ⇒ Better knowledge of the sensitivity of the passive frequency bands to RFI degradation ⇨
 - **Impact of corrupted measurements (non natural or derived from man made emissions) on the outputs of the NWP models.**
 - **Generally the impact of RFI or wrong measurements derived from non natural or man made transmissions within satellite passive bands is not precisely known, especially within ITU-R**

Space and meteorological agencies have to bring evidence that interference exceeding the interference quoted in RS.1029-2 will disrupt the existing or planned algorithms. Identify draft plan.