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Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: WRC agenda item 1.6 and its possible implications on THz communications

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Abstract: This documents provides an overview on spectrum issues relevant to THz communications . Doc. IEEE 802.15-09-0230-00-0thz has been updated by the draft European Common Proposal to modify FN 5.565 as of April 2009

Purpose: Information of THz IG on ongoing discussion towards WRC

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Outline

- WRC 2011 agenda item 1.6
- Current situation in Radio Regulations
- Ongoing discussions
- Status of discussion in Europe/Germany
- Next steps for THz IG

Agenda item 1.6 of WRC 2011

- 1.6: *to review No. 5.565 of the Radio Regulations in order to update the spectrum use by the passive services between 275 GHz and 3 000 GHz, in accordance with Resolution 950 (Rev.WRC-07), and to consider possible procedures for free-space optical-links, taking into account the results of ITU-R studies, in accordance with Resolution 955 (WRC-07);*

Current Situation in Radio Regulations

Footnote 5.565 *The frequency band 275-1 000 GHz may be used by administrations for experimentation with, and development of, various active and passive services. In this band a need has been identified for the following spectral line measurements for passive services:*

- *radio astronomy service: 275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz, 795-909 GHz and 926-945 GHz;*
- *Earth exploration-satellite service (passive) and space research service (passive): 275-277 GHz, 294-306 GHz, 316-334 GHz, 342-349 GHz, 363-365 GHz, 371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz.*

Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations are urged to take all practicable steps to protect these passive services from harmful interference until the date when the allocation Table is established in the above-mentioned frequency band. (WRC-2000)

Situation on active services

- Active services are not on WRC 2011 agenda
- Changes of current footnote for passive services should not prevent development of THz communications!
- IEEE 802 should define a position and provide an input to ITU

Ongoing dicussion on agenda item 1.6

- Clearer specification of usage for passive services through three resolutions for the three passive services
- However, due to change of the footnote active services may not be explicitly mentioned anymore
- In the following slides a couple of publicly available positions are presented

Preliminary position of Canada (CITEL September 2008)

- Canada is of the view that the proposed revisions to No. **5.565** should not claim the whole spectrum between 275 GHz to 3 000 GHz for passive services, but rather list a set of best frequency bands in terms of importance and relevance for use by passive services.

Source: PT B(08)058 Annex 3draft CEPT Brief on WRC-11 Agenda item 1.6 (bands above 275 GHz); www.ero.dk

Preliminary Position of CEPT (November 2008)

1. CEPT supports the review of No. **5.565** considering in particular new technological advancements and planned applications for passive services (EESS, RAS and Space Research) to allow early assessment of scientific and meteorological next generation equipments.

CEPT is of the view that such review should not lead to monopolising spectrum for passive services and, considering in particular attenuation conditions related to the 275-3000 GHz frequency range,

CEPT recognizes that an identification of possible use of certain bands for passive services should not automatically preclude future consideration of these bands for active services.

However, CEPT is also of the view that the identification of bands for passive service should not be conditioned to other consideration.

To this respect, CEPT supports on-going work within WP 7C and 7D on detailed definition of passive services requirements.

Source: PT B(08)058 Annex 3draft CEPT Brief on WRC-11 Agenda item 1.6 (bands above 275 GHz); www.ero.dk

Preliminary Position of CEPT

CEPT believes that, considering specificities of different passive services/applications under consideration and the need to consider detailed requirements, this agenda item should lead to a revision of N° **5.565** that would refer to **3 different Resolutions, respectively addressing EESS, Radioastronomy and Aeronomy**. In particular, the case of aeronomy applications that is not obviously falling within a radio service would have to be specifically studied.

2. CEPT will consider any proposal for regulations for terrestrial free-space optical links, noting that such regulations should not constrain satellite optical applications. CEPT considers that for such satellite optical applications, neither regulations nor procedures are necessary

Source: PT B(08)058 Annex 3draft CEPT Brief on WRC-11 Agenda item 1.6 (bands above 275 GHz); www.ero.dk

State of Discussion in Germany

- Currently quite constructive discussion with all stakeholders in Germany within German conference preparatory group on the modification of FN 5.565
- German position on this issue developed keeping a sentence explicitly mentioning active services in the FN:
„Frequencies in the range 275 – 3000 GHz may also be used for experimentation with, and development of, various active services”
- Submission of input document to CEPT CPM
 - PT B(09)028 Proposal for revision of Footnote 5.565 Germany

Draft European Common Proposal (April 2009)

- **5.565** A number of bands in the frequency bandrange 275-43 000 GHz may be used are identified for current and planned use by administrations for experimentation with, and development of, various active and passive services applications, according to Resolutions [AAA], [BBB] and [CCC]. In this band a need has been identified for the following spectral line measurements for passive services:
 - radio astronomy service: 275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz, 795-909 GHz and 926-945 GHz;
 - Earth exploration-satellite service (passive) and space research service (passive): 275-277 GHz, 294-306 GHz, 316-334 GHz, 342-349 GHz, 363-365 GHz, 371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz.
 - Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations wishing to make these frequencies available for experiments and development of active service applications, are urged to take all practicable steps to protect these passive services from harmful interference, taking into account these Resolutions, until the date when the allocation Table is established in the above-mentioned 275-3 000 GHz frequency rangeband. (WRC-201100)

Source: CPG11(2009)006 Annex 1 Prel Draft ECP on AI 1.6.doc

Implications

- CEPT position (with proposed modification from Germany) will not worsen situation for THz communications!
- It enables experiments and development of active services like THz communications (note that this does not include already an allocation for future regular use)
- Passive services have to be protected (as it is the situation already now). Therefore interference studies are required
 - Is there any interference problem at all coming from THz communications? (low transmit power, indoor applications!)
- Interference studies are a must for the THz communications community!

Next steps

- Develop an IEEE802 position on agenda item 1.6
- Start working on
 - Interference studies
 - Identify future spectrum demand and possible allocations to be considered at future WRCs