**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
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| Re: |  |
| Abstract | Meeting notes on the 802.15 IG THz November 2012 Plenary meeting |
| Purpose | Meeting Minutes |
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**Minutes of the November 2012 THz IG**

The THz IG meeting took place on 13 and 15 November 2012 in the Time slots Tuesday AM1+AM2 and Thursday PM1+PM2.

Meeting was called to order at 8 pm on 13 November 2012. The patents statement was mentioned and no patent contributions were discussed. The July 2012 meeting notes and the October 2012 Telcon meeting notes were approved.

Call for contributions/Changes of the agenda or for any other business, no discussions followed.

6 contributions were presented:

**Contribution #1 :** Eshan Afshari, Cornell University (USA), “The Next Frontier for Circuit Designers: CMOS THz Systems”; (Document **15-12-0621-00-0thz**)

There has been a growing interest in mm-wave and Terahertz frequencies for communication, imaging, and sensing applications. In this talk, we will look into recent advances in CMOS implementation of various building blocks. First, we show how to implement mW-level signals up to 500GHz. Then we show different amplifiers as well as two transmitters at 260GHz and 350GHz.

**Contribution #2 :** Josep Miguel Jornet, Georgia Tech (USA), “Design of Graphene-based Nano-antennas for Terahertz Band Communication”; (Document **15-12-0618-01-0thz**)

A novel graphene-based nano-antenna that exploits the behavior of Surface Plasmon Polariton (SPP) waves in semi-finite size Graphene Nanoribbons (GNRs), is proposed, modeled and analyzed. First, the conductivity of GNRs is analytically and numerically studied by starting from the Kubo formalism to capture the impact of the electron lateral confinement in GNRs. Second, the propagation of SPP waves in GNRs is analytically and numerically investigated, and the SPP wave vector and propagation length are computed. Finally, the nano-antenna is modeled as a resonant cavity, and its frequency response is determined. The results show that graphene-based plasmonic nano-antennas which are just one-micrometer long and few-nanometer wide can efficiently operate in Terahertz Band.

**Contribution #3 :** Chong Han (Georgia Tech), “Statistical Multi-path Propagation Modeling and Fading Analysis in Terahertz Band Communication Networks”; (Document **15-12-0615-03-0thz**)

In Terahertz Band, molecular absorption and rough surface scattering exert significant impact on ultra-broadband channels, which make the existing multipath models inaccurate for Terahertz communication. In this work, a statistical multi-path channel is proposed for indoor environment, which captures: (i) the spreading loss and molecular absorption loss in free space propagation, by means of radiative transfer theory, (ii) reflection loss due to scattering in rough surfaces, by means of Kirchhoff theory, and (iii) multi-path fading loss due to stochastically distributed scatters. The resulting distance-dependent channel behavior requires the development of dynamic distance-adaptive solutions for Terahertz Band communication networks.

**Contribution #4 :** Thomas Kürner, TU Braunschweig (Germany), “Presentation on Spectrum Issues at THz Frequencies to IEEE 802.18”; (Document **15-12-0619-01-0thz**)

The document summarizes the current status on spectrum availability for THz communications in the frequency band beyond 300 GHz.

**Contribution #5 :** Michael Grigat , Deutsche Telekom (Germany), “Link Budget Analysis for Terahertz Fixed Wireless Links”; (Document **15-12-0582-01-0thz**)

Based on Link Budget Analysis the basic properties of THz Waves are investigated and for Terahertz Fixed Wireless Links the achievable data rates for different atmospheric conditions are derived. Conclusions for the applicability of THz-waves for fixed wireless with distances up to 1km and technical requirements are given.

**Contribution #6 :** Thomas Kürner, TU Braunschweig (Germany),Davit Britz (AT&T Shannon Labs), Katsuhiro Ajito (NTT Corp.), Iwao Hosako (NICT); “Discussion document on next steps for creating a standard on THz Communications”; (Document **15-12-0652-01-0thz**)

The document lists a few items for discussion on the future of the IG THz. Possible use case models for consideration in a possible Study Group are introduced.

Report from 802.18

Furthermore two rounds of discussions have been made targeting:

1. **Discussion on the TED (11/745r6)**: The content of the TED has been updated based on the contributions made in the meeting.
2. **Discussion on a future of the IG THz:** As one possible application to start with creating a standard “Ultra-High Speed Wireless Connection in Data Centers (server farms)” has been identified. Before a SG can be started more participation form manufactures is required. The possibilities of creating a questionnaire to get feedback both from manufacturers and users on the possible application has been discussed. The chair will have a meeting will John d’Ambrosia from IEEE 802.3 to discuss the possibilities to create such a questionnaire probably via the “Industry Connection”. Until the March meeting first investigations on suitability of MACs form already existing 60 GHz standards will be investigated. Furthermore an informal presentation to WNG is planned for the March meeting.

The meeting was adjourned on 15 November at 5.30 pm.

**Attendees:**

Thomas Kürner, TU Braunschweig

David Britz, AT&T Shannon Labs

Katsuhiro Aijto, NTT Corp.

Shoichi Kitazawa, ATR Wave Engineering Labs

Rick Roberts, Intel

Philippe Bouchachard, Canon Research Centre France

Akifumi Kasamatsu, NICT

Iwao Hosako, NICT

Art Astrin, Astrinradio

Masahiko Kawamura, Kozo Keikaku Engineering Inc.

Nobuhiko Shibagaki, Hitachi

Norihiko Sekine, NICT

Josep Miquel Jornet, Georgia Tech

Chong Han, Georgia Tech

Hsieh Dung Rund, ITRI

Kwang Seon KIM, ETRI

Ho-Jin Song, NTT

Ehsan Afsahri, Cornell University

Tetsushi Ikegami, Meiji University

Masahiro Uno, ATR

Michael Grigat, Deutsche Telekom

Harry Worstell, AT&T Shannon Labs

Omar Nasr, National Telecom Regulatory Authority

Mohammed Nafire, Nile University

Jussi Haapla, Centre for Wireless Communications