MINUTES OF THE 8TH MC MEETING

Minutes taken by Dr Caglar Arpali

8th MC Meeting was held at Fraunhofer Heinrich Hertz Institute (HHI) Berlin, Germany on March 13, 2015.

The session started at 9:00 with a welcome speech by HHI Director Dr. Ronald Frued. He presented some general information about the Institute and described the research areas of the Institution which include Multimedia communications, Image and Video coding, Computer vision, embedded systems and image processing, Ultra High Resolution Video Communication, Fiber optical sensors, Wireless Communication Networks (MIMO, 5G core access) and Photonic Technologies. They have facilities for production of photonics components including High speed detectors, photo receivers, lasers, diffraction optics, components for fiber optic networks up to 100Gbit/s. They are also interested in network design and modeling such as free space optical communications, space communication, and visible Light communications (VLC).

After Dr. Ronald Frued's presentation, the Action Chair Prof Uysal made a presentation on the current status of the Action and informed about some recent developments since the last MC meeting. The major points are summarized below

- **Participation in IEEE Standartization activities:** As decided at the previous meeting, Prof Uysal contacted IEEE to participate in 802.15.7. Through these communications, the IEEE agreed to extend the scope from "optical camera communication" to "optical wireless communication (OWC)". In December 2014, IEEE approved the creation of the related Task Group (TG) which would work on the OWC standardization. First meeting was held in Atlanta, USA in January 2015 and, on behalf of OPTICWISE, Prof. Uysal participated and gave a presentation on OPTICWISE. He was also elected as a Technical Editor of 802.15.7. Second meeting was in Berlin just before the MC meeting. A tutorial on OWC was presented by TG members to IEEE 802.15 community. Dr. Volker Jungnickel, on behalf of OPTICWISE, participated in this presentation. Prof Uysal and Dr Jungnickel also made an additional presentation on OPTICWISE research activities to IEEE 802.15.7 Wireless Next Generation Committee. A VLC demo was also made during the meeting. Prof. Uysal invited all OPTICWISE participants to contribute to future IEE802.15.7 activities.

- **Participation in 5G PPP:** After a long wait for related paper work, OPTICWISE officially became an Associate Member of 5G PPP. The 5G PPP is a joint initiative between the European ICT industry and the European Commission and has telecom giants Alcatel-Lucent, Ericsson, Nokia Solutions and Networks, Orange as its founding members. As an Associate Member of 5G PPP, OPTICWISE aims to promote OWC as a possible part of the 5G standart.
- **Meeting Preparations:** Prof Uysal said that the Action will end on November 2015 and provided information on the preparations for the 9th (Final) MC/WG meeting and 4th Annual workshop which will be held in Istanbul.
- **Budget issues:** Prof Uysal explained that there is some surplus from the "Meeting" budget and opened discussion on re-allocation. It was discussed that STSM visits are very useful to initiate collaborations and some money can be used to support additional STSMs. It was also pointed out that students had provided very positive feedbacks about previously held training schools. Some extra money can be also allocated to support more trainees during the Training Scholl which will be held in September 2015. After this discussion, the following MC decision was anonymously taken:

  MC Decision: The left-over budget from "Budget Item 1 - Meetings" (28000 €) will be transferred to "Budget Item 2 – STSMs" and "Budget Item 3 - Training Schools". Specifically, 14000 € will be allocated to support additional STSMs and 14000 € will be allocated to support additional trainees during the next Training School in Istanbul. If there is additional left-over from Berlin meeting, that will be further added to Training School budget.

- **Final publication:** As decided at the previous meeting, an edited book will be published as the final publication. Prof Uysal, as the Lead Editor, approached Springer and will submit a book proposal based on the OPTICWISE participant inputs. More discussion on content is required and would take place in the afternoon session. Prof. Uysal also explained that COST provides additional support for final publication and asked MC approval for related application. The following MC decision was anonymously taken:

  MC Decision: The Action will request grant for Final Action Dissemination (FAD). Prof Uysal, in his capacity as the Action Chair and the Lead Editor of the planned Edited Book, will prepare the FAD application and submit to COST Office.

After a short coffee break, a tour of HHI labs was given. Nicholas Periot (an engineer from HHI) gave a presentation on FSO laser communication system and its capabilities for long range links in terms of modulation efficiency and adaptive optics. Responsible engineers made a demonstration on VLC with video streaming capability. They also showed an operational FSO link on top of the HHI building .

The lunch break took place between 12:00-13:00

The afternoon session started at 13:00 and focused on final book publication. Following discussions, the content of the book was decided as

Part 1 Outlook
Chapter 1 An Overview of Optical Wireless Communications
Part 2 Channel Modelling and Characterization
Editor for Part 2: Carlo CAPSONI
Chapter 2 Optical Propagation in Unguided Media
Chapter 3 Meteorological Effects on Free Space Optical Links
Chapter 4 Experimental Validation of FSO Channel Models
Chapter 5 Channel Modeling for Satellite-to-Ground Links
Chapter 6 Visible Light Channel Modeling and Characterization
Chapter 7 Ultraviolet Scattering Communication Channels
Part 3 Physical Layer Design Issues
Editor for Part 3: Zabih GHASSEMLOOY
Chapter 7 Information Theoretical Characterization of FSO Links
Chapter 8 Diversity Techniques for Mitigating Channel Effects in FSO Links
Chapter 9 MIMO Optical Wireless Communication Systems
Chapter 10-Performance analysis of FSO systems under correlated faidng condition
Chapter 11 Cooperative Visible Light Communications
Chapter 12 OFDM-based Visible Light Communications
Chapter 13 Frequency Domain Equalization for VLC
Chapter 14 Coherent FSO Communications
Part 4 Upper Layer Designs
Editor for Part 4: Anthony BOUCOUVALAS
Chapter 18 Multiple Access in Visible Light Communication Networks
Chapter 15 Link Layer Protocols for Short Range IR Communications
Chapter 17 Scheduling Protocols in FSO Networks
Chapter 16 FSO Network Design for Resilient Cellular Backhauling
Part 5 Implementation Aspects and Emerging Applications
Editor for Part 5: Eszter G UDVARY
Chapter 19 Overview of OWC Testbeds and An Open Source FSO Link Design
Chapter 20 VLC based Indoor Localization
Chapter 21 Vehicular Visible Light Communications
Chapter 22 Camera Communications
Chapter 23 Optical Wireless Body Area Networks for Healthcare Applications
Chapter 24 Ultraviolet Communications for Sensor Networks
Chapter 25 Free Space Quantum Key Distribution

After the coffee break, the second part of afternoon session took place. A new COST application was discussed. Prof Murat Uysal explained the new rules for proposals such as single-step application, blind review process , etc It was anonymously agreed that OPTICWISE has been a very succesful Action and championed OWC research in the last few years establishing European leadership in this area. It became also very succesful in dissemination activities and particularly active participation in 5G PPP and IEEE 802.15.7 is remarkable. To

continue this line of work and push OWC as an essential part of future generation heterogenous networks, a new Action is required. Discussion was made on the what kind of project should be prepared. Dr. Fary proposed that we should choose application areas first and it may include low energy devices, medicine, transportation, information technologies and optical information process. He suggested to focus on indoor (particularly VLC) based on LEDs instead of laser to provide cheap devices. Dr. Boucouvalas argued that we do not need to split outdoor and indoor communications and should cover both as in the current Action. Dr. Bruno talked about the importance of integration with RF community on this proposal. Dr. Haas suggested that we should mention challenges and internet of things as well as RF spectrum connections and detectors with energy harvesting. Based on the above discussion MC committee decided that each working group should define challenges and solutions with respective scenarios. Related discussion will continue through email exchanges and Prof Uysal will lead the writing of the new propoposal.

Prof. Uysal asked if there is any other business to discuss. None mentioned. The 8th MC meeting concluded at 16:30.