

**COST meetings and IWOW 2012 workshop, held at CNIT, Pisa, October 22<sup>nd</sup> until 24<sup>th</sup> October 2012.**

**Date: 22<sup>nd</sup> October 2012.**

IWOW workshop: 5 sessions were held, being (1) Outdoor system experiments, chaired by C. Capsoni (2) Indoor system modelling and design, chaired by E. Ciaramella (3) Outdoor system modelling and design, chaired by R. Green (4) In-home high speed systems, chaired by R. Corsini, and finally (5) Round table and Conclusion remarks, jointly chaired by E. Ciaramella and M. Uysal.

The Workshop was opened by G. Prati, the Director of the Institute of Communication, Information and Perception Technologies (TeCIP), Scuola Superiore Sant'Anna, Pisa, Italy. All sessions were well attended, and an interesting variety of papers were presented. Between sessions 2 and 3 a visit around the TeCIP Lab was arranged, which proved to be very interesting in terms of the breadth and depth of the work demonstrated, especially in the Optical Wireless area, although work on optical fibre communications and related technologies was also taking place. The Workshop finished by 18.30 on the first day (the 22<sup>nd</sup>) and was followed at 20.00 by a social dinner at a downtown restaurant – a very pleasant evening to round off the day's events.

The 23<sup>rd</sup> and the 24<sup>th</sup> of October were given over to COST related actions and activities. As the agenda for these meetings was presented in advance, this will not be presented here but the discussions which took place therein, as follows:-

**Date: 23<sup>rd</sup> October 2012.**

MC Meeting – II : Professor Uysal gave an overview of the order of the day. He discussed the current action budget of 22,399 Euros. The Istanbul budget left over amount was 13,601 Euros, which made the available budget to be 43,601 Euros. Further financial details were presented in respect of revised budgets against current plans, and to cover items such as 10 STSMS, and a Training School budget. A budget was agreed for 2012-13.

The MC member for Ireland withdrew and will be replaced. New partners from outside the EU COST boundary were introduced including Steve Hranilovic from McMaster University in Canada and Jean Armstrong from Monash University in Australia. Approval was given for various STSMS and a report on one of these by

Professor Ghassemlooey was given. Professor Uysal gave an annual Action Report assisted in detail by Professor Stanislav Zvanovec. Various cooperations were discussed including those with Antonio Martelluci of COST action IC0802, and with Marta Martinez-Vazquez. Some Flagship Projects were mentioned.

Professor Uysal emphasised the importance of “input documents” and the template to be used. State of the art needed to be included in these. Responsibilities of WGs and their Chairs were discussed, and also those of the SIGs.

MC Meeting – III : After a coffee break, this took place. A further Annual Progress report was given. The importance of networking by the WG and SIG leaders was emphasised. The WG and SIG Chairs were expected to produce a document and presentation in time for the next COST meeting in Prague in 2013. For the subsequent COST meeting Professor Ghassemlooey offered Newcastle as the venue to be. The Logo competition had come to an end and a winner announced: the logo will be circulated. Dissemination activities were discussed, and open documentation was agreed (at least between the COST participants). An Action leaflet/newsletter was agreed and Dr. Florian Moll would take responsibility for this. The Logo was approved at this MC by attendants. Social networking sites, such as Facebook, LinkedIn and Twitter, could be considered as outputs. 3 tasks where COST was involved were mentioned: Professor Uysal at Portsmouth, Professor Ghassemlooey in Beijing, China, and Dr. Jurgen Van Erps elsewhere and who was awarded 2816 Euros for this. On the subject of China, this was a rapidly developing market and before the COST talk there was no awareness of COST at all in China. Professor Uysal confirmed that funding support for such actions was available currently from the budget.

Invited Speakers session after lunch.: Professor Jean Armstrong of Monash University gave a talk on Optical Wireless and OFDM. Professor Dominic O’Brien of Oxford University followed this with a talk about the challenges of RF wireless communications versus Optical Wireless communications, referring to a former UC project “OMEGA”. Dr. Hubertus Haan from Cassidian/Carl Zeiss Optics gave a talk about the history of optical components and structures up until the present day. Included were applications in inter-satellite links, near- and far field imaging and sensing, and Optical Wireless satellite to ground links. Airborne tracking systems,

with gimbals etc, were discussed and underwater optical communications optical structures, lenses and so on.

After these interesting and varied talks, new MC members from France, Serbia, Romania, and Portugal were introduced.

WG sessions were held after the mid afternoon coffee breaks (separately recorded minutes by each Working Group).

**Date: 24<sup>th</sup> October 2012.**

General meeting: Professor Uysal introduced the WG1 – WG 4 presentations arising from the meetings the previous afternoon (Tuesday 23<sup>rd</sup> October from 3.30 pm until 6 pm). These were given by the Chairs of the WGs originally. The MC then opened up for wider discussions as a result. There was a view that research proposals ought to be discussed from now on, for which champions were needed. STREPs were mentioned, and how industry might be involved in collaboration with academia. There was the issue of age and gender balance. Younger colleagues ought to be encouraged by various means There should be synergy between the WGs. As coordinating a full-blown European Project “could be a nightmare”, it was recommended that STREPS could be a way forward. Industrial involvement was easier if “kind” rather than “cash” support was obtained. Typically 10% of applications were funded. It was agreed that we should be less in conference mode and more in terms of action mode. Whiteboards could be used for solidifying ideas. Marie Curie was another outlet or target for funding. Various MC members had had experience of this.

SIG meetings – reports by chairs: the SIG on underwater communications (Y Baykal, R. J. Green) discussed various issues such as scattering and absorption effects. The driver for data rates was mainly industrial-, scientific-, and defence driven. Even audio underwater communications was of interest – where the audio was modulation on an optical carrier.

The SIG on TESEO was then considered. New targets were set annually. Contacts had been made, and were being consolidated, with international standards bodies. Institutions such as ITU-R SG3, URSI, and the IrDA were involved. A market analysis had been undertaken, and a questionnaire for this had been set up. Links

with the WTSA -2012 (World Telecommunications Standards Assembly) had been made. Optical interconnect technology workers were mentioned, and their possible interactions with groups such as standards bodies for Optical Wireless communications.

The SIG on Visible Light Communications (VLC)( L. Alves, R.J. Green) discussed the Japanese experiences in car communication and navigation. Future lights on a vehicle could be replaced by VLC systems to enhance inter-vehicle communications. APDs were the device of choice in optical receivers when sensitivity was an issue.

Afternoon meetings of the MC: new input documents were presented. Localisation was also discussed, and an iPhone application. Further topics, challenges – such as outdoor environments, were discussed, including the use of telescope arrays for MIMO, allowing up to 100 Gbps in a free space (outer space) link. The Fraunhofer Institute responsible provided details. Power efficiency was one of these.

The CUSP initiative in New York was introduced (Centre for Urban Science and Progress) which had recently been inaugurated and attended by Professor R.J. Green. This gave possible new opportunities for developments of prototype Optical Wireless tests in an “Urban Observatory”.

The BER performance of Optical Wireless links in general was discussed, especially for QAM implementations. The performance of relay-assisted Optical Wireless links was also discussed, using cooperative diversity techniques. A “best effort” approach was used, although an ad-hoc approach was also under discussion.

The Global Outreach budget was presented, to fund all manner of interactions such as with the IEEE standards bodies.

The ROF (Radio over Free Space) technique was presented for RF field measurements in a short talk. Electro-optical probes were described which used Optical Wireless techniques, so as not to disturb the field patterns. Experimental work at the Czech Metrology Institute was then presented in another talk. Previous COST involvements by the Czech group were discussed, and wavelengths of importance, such as 860 nm and 1550 nm, were mentioned, along with RF work at 58 GHz and 93 GHz.

A talk was also given on INESC TEC in Porto, where work on underwater Optical Communications was being undertaken. Comparisons with acoustic- and radio frequency underwater communications were made. Associated bitrates for the different methodologies were also given, and which were range-related – the longer the range the lower the permitted bitrate. LED versus laser comparisons were drawn.

After the subsequent coffee break, the next venue was shown by a short Powerpoint presentation, including possible skiing options! Professor Uysal, Ghassemlooey, and the host Professor Ciaramella, then thanked everyone for their efforts and wished them all a safe return home. The meetings closed therefore at around 3.40 pm.