

COST

Domain Committee "ICT"

COST Action IC0802

Start Date *18 November 2008*

*Propagation Tools and Data for Integrated
Telecommunication, Navigation and Earth
Observation Systems*

MONITORING PROGRESS REPORT

Reporting Period: 7 May 2010 to 30 April 2011

This Report is presented to the relevant Domain Committee.
It contains three parts:

- I. Management Report*** prepared by the COST Office/Grant Holder
- II. Scientific Report*** prepared by the Chair of the Management Committee of the Action
- III. Previous versions of the Scientific Report; i.e., part II of past reporting periods***

The report is a "cumulative" report, i.e. it is updated annually and covers the entire period of the Action.

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter *II.D. Self evaluation*.

Based on the monitoring results, the COST Office will decide on the following year's budget allocation.

Executive summary (max.250 words):

The Action had as a main objective for the 2010/2011 period to initiate at Global level the dissemination of scientific results to the end-users, including Industry, Operators and Standardization bodies.

To this end the Action coordinated with the the ITU-R Study Group 3 “Radiowave propagation”, (the UN body involved in the preparation of next World Radio Conference WRC-12) to organise the IC0802 1st International Workshop in occasion of SG3 meeting of November 2011. The workshop was a public forum to discuss the scientific background of the inputs to ITU-R SG3 and it was very effective in improving the coordination of IC0802 participants to radio regulatory activities.

The Action performed scientific dissemination by organising two convened sessions at EuCAP 2011 and session at ConTEL 2011. These events resulted in relevant scientific production (with several collaborative papers from COST participants) and increased the awareness of the IC0802 Action within researchers in the field of applied electromagnetism and more in general in Telecom systems.

The MC promoted collaborative work by means of two MC meetings, 6 STSMs and a WG meeting. The Action has formally constituted from SGMP a group of experimenters (EGAT5) aimed at acting cooperatively in the field of campaigns for satellite systems within national and international activities, with the support of the main EU space agencies.

It is evaluated that the Action is well positioned for continuing its collaborative activities, for an effective contribution to regulatory bodies and to scientific publications and for the organization of training activities.

I. Management Report prepared by the COST Office/Grant Holder



I.A. COST Action Fact Sheet

- **COST Action** *IC0802, Propagation Tools and Data for Integrated Telecommunication, Navigation and Earth Observation System*
- **Domain** *Information and Communication Technologies (ICT)*

- **Action details:**

CSO Approval: *(18/06/2008)*

End date: *(18/11/2012)*

Entry into force: *(07/08/2008)*

Extension: *(day/month/year)*

Objectives

Telecommunication, Navigation and Earth Observation systems and services are developing world-wide with a multiplicity of standalone terrestrial and space systems that operate in diverse frequency bands. Global Integrated Networks (GIN) will be necessary in the near future to provide better integrated services. Their design requires a comprehensive knowledge of the various propagation media. Up to now radio channel modelling has been performed separately for each type of radio systems. This activity will develop a coordinated set of models, techniques and data related to the radio channel in order to improve the design and performance of Global Integrated Networks. The activity will recommend and provide the most appropriate radio channel models, channel assessment techniques and data for the design and operation of these GINs. The frequencies of interest range from 100 MHz to 100 GHz (VHF to W band) and cover optical free space communications. The target architectures include mobile and fixed, satellite and terrestrial communication systems (including optical links), satellite navigation systems and Earth Observation systems. The physical propagation fundamentals will be based on experimental and climatological data. The activity will bring together remote sensing, propagation and systems experts at the European level, thus contributing to advance the state-of-the-art in the field, with a clear added value for Europe.

Keywords 1) Convergence between fixed and mobile Terrestrial and Satellite Telecommunications, Earth Observation and Navigation systems, 2) Global Integrated Networks (including GMES & Disaster Management and Relief), 3) Radiowave Propagation (including Optical Free Space Links) 4) Atmospheric Remote Sensing techniques & Meteorology

- **Parties:** *list of countries and date of acceptance*

| | | |
|-------------------------|-------------------------|----------------------------|
| Austria (03/10/2008) | Greece (22/09/2008) | Poland (17/2/2010) |
| Belgium (07/08/2008) | Hungary (4/12/2008) | Portugal (01/10/2008) |
| Bulgaria (30/3/2010) | Iceland (no) | Romania (no) |
| Croatia (no) | Ireland (no) | Serbia (13/5/2009) |
| Cyprus (no) | Israel (6/4/2010) | Slovakia (10/11/2008) |
| Czech Rep. (14/11/2008) | Italy (08/10/2008) | Slovenia (05/02/2009) |
| Denmark (22/6/2009) | Latvia (no) | Spain (07/08/2008) |
| Estonia (no) | Lithuania (no) | Sweden (27/01/2009) |
| Finland (03/02/2009) | Luxembourg (03/03/2009) | Switzerland (25/11/2009) |
| FYR of Macedonia (no) | Malta (no) | Turkey (no) |
| France (07/08/2008) | Netherlands (no) | United Kingdom(07/08/2008) |
| Germany (07/08/2008) | Norway (22/09/2008) | |

- **Intentions to accept:** *list of countries and date*

- **Other participants:**

EU Organization: ESA/ESTEC, The Netherlands, Noordwijk

NON-COST Organizations:

National University of Computer, Lahore, Pakistan; McMaster University, Hamilton, Ontario, Canada; CRC, Ottawa, Canada; Telecommunications Center at Catholic University of Rio de Janeiro, Rio de Janeiro, Brazil; Indian Institute of Technology, Kharagpur, India; Northrop Grumman Aerospace Systems, USA, CA.

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Administrative Officer:

Ms Aranzazu Sanchez,
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• **Working Groups** (*list of WGs and names and affiliations of participants*)

Action activities are organised according to the following Working Groups:

- *WG1, "Channel modelling for mobile Satcom & Satnav systems from VHF to C band"*
Chaired by Uwe Fiebig, DLR, Germany
Participants: 49 (31 Organizations)

- *WG2, "Channel Modelling for radio systems from C to W band",*
Chaired by Laurent Castanet, ONERA, France
Participants 61 (40 Organizations)

- *WG3, "Channel modelling for free-space optical systems and airborne terminals",*
Chaired by Erich Leitgeb, Technical University of Graz, Austria
Participants 28 (22 Organizations)

- *SGMP "Specific group on measurements and products"*
Chaired by:
Carlo Riva, Politecnico di Milano and
Mike Willis, STFC Rutherford Appleton Laboratory, England
Participants 54 (42 Organizations)

| Name | Country | Organiz. | WG1 | WG2 | WG3 | SGMP |
|-------------------------|---------|------------------|-----|-----|-----|------|
| Leitgeb Erich | AT | Tu Graz | | | Y | Y |
| Mandl P. | AT | Tu Graz | | | | |
| Schonhuber Michael | AT | JR | Y | | | Y |
| Walewski J. | AT | Siemens | | | Y | |
| Amaya C. | CA | CRC | Y | Y | | Y |
| Bouchard Pierre | CA | CRC | | Y | | Y |
| Hranilovic Steve | CA | Univ Mcmaster | | | Y | |
| Rogers Dave | CA | CRC | Y | Y | | Y |
| Berne A. | CH | EPFL | | Y | | |
| Buonomo Sergio | CH | ITU | Y | | | |
| Cermak Dusan | CZ | UPCE | Y | Y | | |
| Fiser Ondrej | CZ | CAS | | Y | Y | |
| Grabner Martin | CZ | CMI | Y | Y | Y | Y |
| Horak P. | CZ | CVUT | Y | Y | | |
| Jan Pidanic | CZ | | | | | |
| Koriniek T. | CZ | | | | | |
| Kvicera Milan | CZ | CVUT | | Y | | |
| Kvicera Vaclav | CZ | CMI | | | | Y |
| Pechac Pavel | CZ | CVUT | Y | Y | | Y |
| Pesek Jiri | CZ | UFA | | | Y | |
| Pesice Petr | CZ | CAS | | | Y | Y |
| Schejbal Vladimir | CZ | UPCE | | Y | | |
| Zdenek Nemecek | CZ | | | | | |
| Fleury B. | DK | Un Aalborg | Y | Y | | |
| Martellucci Antonio | ESA | ESTEC | | Y | | Y |
| Prieto Cerdeira Roberto | ESA | ESTEC | Y | | | |
| Valtr Pavel | ESA | ESA | Y | Y | | |
| Wittig Manfred | ESA | ESTEC | | | Y | |
| Hovinen Veikko | FI | OULU | Y | Y | | Y |
| Salonen Erkki | FI | OULU | Y | Y | | Y |
| Ait Ighil M. | FR | ONERA | Y | | | |
| Bousquet Michel | FR | ISAE | Y | Y | Y | Y |
| Carrié Guillaume | FR | ONERA | Y | Y | | Y |

| | | | | | | |
|------------------------|----|--------------|---|---|---|---|
| Castanet Laurent | FR | ONERA | Y | Y | | Y |
| Fabbro Vincent | FR | ONERA | Y | | | |
| Jeannin Nicolas | FR | ONERA | Y | Y | | |
| Kourogorgas c. | FR | ONERA | | Y | | |
| Lacoste Frederic | FR | CNES | Y | Y | Y | Y |
| Lemorton J. | FR | ONERA | | Y | | |
| Rougerie S. | FR | ONERA | | Y | | |
| Arndt Daniel | GE | IIS | | | | |
| Chandra Madhukar | GE | TU Chemnitz | | Y | | Y |
| Eberlein. E. | GE | IIS | Y | Y | | Y |
| Fiebig Uwe-Carsten | GE | DLR | Y | Y | | Y |
| Ihlow Alexander | GE | TUIL | Y | | | |
| Jost Thomas | GE | DLR | Y | Y | | |
| Koenig Jonas | GE | IIS | Y | | | |
| Schubert F. | GE | DLR | Y | | | |
| Wang Wei | GE | DLR | Y | | | |
| Arapoglou D. | GR | NTUA | | Y | | Y |
| Kamalakis T. | GR | UOA | Y | | | |
| Kanatas Athanasios | GR | Univ. Pireus | Y | Y | | |
| Karagiannidis G. | GR | UnThessaloi | Y | | Y | |
| Liolis K. | GR | NTUA | Y | Y | | |
| Michailidis M. | GR | Univ. Pireus | Y | Y | Y | Y |
| Moraitis Nektarios | GR | NTUA | Y | Y | Y | |
| Panagopoulos A. D. | GR | NTUA | Y | Y | Y | |
| Bito Janos | HU | BME | Y | Y | Y | Y |
| Csurgai-Horvath Laszlo | HU | BME | Y | Y | Y | |
| Frigyes Istvan | HU | BME | | Y | Y | |
| Kalyan Bandhyopadhyay | IN | IIT | | | | Y |
| Rajat Acharya | IN | ISRO | | Y | | Y |
| Shlomi A. | IR | BGU | | Y | | |
| Capsoni Carlo | IT | POLIMI | | | Y | |
| Codispoti Giuseppe | IT | ASI | | Y | | Y |
| Fionda Ermanno | IT | FUB | | Y | | Y |
| Graziani Alberto | IT | UNIBO | | | | Y |
| Luini Lorenzo | IT | POLIMI | | | | Y |
| Marzano Frank S. | IT | UniRoma1 | | Y | | Y |
| Matricciani E. | IT | POLIMI | | | | |
| Montopoli Mauro | IT | UnirRoma1 | | | | Y |
| Paraboni Aldo | IT | POLIMI | | Y | | Y |
| Pulvirenti Luca | IT | UniRoma1 | | | | Y |
| Riva Carlo | IT | POLIMI | | Y | | Y |
| Tortora Paolo | IT | UniBO | | | | Y |
| Vernucci Antonio | IT | SE | | | | Y |
| Nakazawa S. | JP | NHK | | Y | | |
| Pettinger Marcel | LU | ASTRA | | Y | | |
| Russchemberg H. | NL | TU Delft | | | | Y |
| Braten Lars Erling | NO | FFI | Y | Y | | Y |
| Cheffena M. | NO | UNIK | Y | | | Y |
| Tjelta Terje | NO | TELENOR | | Y | | Y |
| Muhammad Sajid | PK | NUC | | | Y | |
| Marian Marciniak | PL | WAW | | | Y | |
| Wilk J. | PL | EPFL | | | Y | |
| Rocha Armando | PT | UnAveiro | | Y | | Y |
| Turan Jan | SK | TUKE | | | Y | |
| Kandus Gorazd | SL | IJS | Y | Y | Y | |

| | | | | | | |
|-----------------------|-----|---------------------|---|---|---|---|
| Smolnikar Miha | SL | IJS | Y | | | |
| Vilhar A. | SL | IJS | | Y | | |
| Del Pino G. | SP | UPM | | | | |
| Machado F. | SP | UVIGO | | | | Y |
| Perez-Fontan Fernando | SP | UVIGO | Y | Y | | Y |
| Riera Jose-Manuel | SP | UPM | | Y | | Y |
| Djordjevic Goran | SR | ELFAK | Y | | | |
| Hult Tommy | SW | LTH | Y | | | |
| Mohammed Abbas | SW | BTH | Y | | | |
| Basarudin H. | UK | UnWarwick | | | Y | |
| Ghassemloy Z. | UK | UNN | | | Y | Y |
| Green R. | UK | UnWarwick | | | Y | |
| Gremont Boris | UK | UnPortsm | | Y | | Y |
| Paulson K. | UK | Univ. HULL | | Y | | Y |
| Willis Michael | UK | STFC | Y | Y | Y | Y |
| Berger H. | USA | Northrop Grumman | | Y | | |

I.B. Management Committee member list

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I.C. Overview activities and expenditure

(2008-2011) Budget

Total Action Budget

| | |
|-------------------------------------|------------------|
| 2008- 2009 | 39000.00 |
| 2009- 2010 | 90800.00 |
| 2010- 2011 | 85800.00 |
| Total | 215600.00 |
| Remaining Action Commitment: | 44310.00 |

Meetings

| Meeting Type | Date | Place | Cost |
|---------------------|---------------------------|--------------------------------------|--------------------------------------|
| MCM1 | 9-11/3/2009 | ESTEC, Noordwijk, The Netherlands | 30314.42 |
| MCM2 | 4-6/11/2009 | ISAE, Toulouse, France | 31454.75 |
| COST 2100 | 3/2/2010 | NTUA, Athens, Greece | 950.00 |
| MCM3 | 26-28/4/2010 | NTUA, Athens, Greece | 31000.00 |
| MCM4 | 8-10/11/2011 | EMFCSC, Erice, Italy | 24778.57 |
| SGMP | 11-12/4/2011 | ISCOM, Rome, Italy | 7400.00 |
| MCM5 | 14-16/6/2011 | TU Graz, Graz, Austria | 29500.00 <i>(forecast)</i> |
| Total | Does not include forecast | | 125897.74 |

STSM

| Beneficiary | Date | Place | Cost |
|---------------|-----------------|---|-----------------|
| N. Miccoli | 9-26/6/2009 | ESTEC, Noordwijk, The Netherlands | 2400.00 |
| F. Fontan | 18-22/5/2009 | CTU, Pargue, Czech Republic | 930.74 |
| T. Jost | 6-13/9/2009 | Un. Vigo, Vigo, Spain | 1194.18 |
| L. Resteghini | 10-19/2/2010 | ESTEC, Noordwijk, The Netherlands | 1210.00 |
| F. Schubert | 31/5-4/6/2010 | Aalborg University, Aalborg, Denmark | 1700.00 |
| N. Jeannni | 16-21/5/2010 | SES-ASTRA, Betzdorf, Luxembourg | 1200.00 |
| B. Fiorelli | 21/3-1/4 2010 | ESTEC, Noordwijk, The Netherlands | 1600.00 |
| M. S. Awan. | 21/3-4/4 2010 | Northumbria Univ., Newcastle, UK | 2000.00 |
| J. Pesek | 6-11/6/2010 | TU Graz, Graz, Austria | 640.00 |
| L. Luini | 19-23/7/2010 | SES-ASTRA, Betzdorf, Luxembourg | 1000.00 |
| X. Boulanger | 15/9-14/10/2010 | CETUC-PUC, Rio de Janeiro, Brazil | 1300.00 |
| R. Graziani | 16-20/1/2011 | Univ. of Cologne, Cologne, Germany | 1000.00 |
| B. Montenegro | 7-11/2/2011 | ESA-ESTEC, Noordwijk, The Netherlands | 1100.00 |
| T. Jost | 1-8/5/2011 | Univ. Vigo, Vigo, Spain | 1190.00 |
| F. Schubert | 24/5-2/6/2011 | Aalborg University, Aalborg, Denmark | 1800.00 |
| Total | | | 20264.92 |

Workshops

| Title | Date | Place | Cost |
|---|-----------------|--|------|
| ESA Propagation WS 2008 | 3-5/12/2008 | ESA/ESTEC, Noordwijk The Netherlands | 0 |
| IC0802 1 st WS | 8-9/11/2011 | EMFCSC, Erice, Italy | 0 |
| EUCAP 2011 IC0802 convened sessions | 8 and 13/4/2011 | Rome, Italy | 0 |
| CONTEL 2011 IC0802 session | 16/5/2011 | TU Graz, Graz, Austria | 0 |

General Support Grants

| Beneficiary | Date | Cost | Total |
|-------------|---------|------|---------|
| TeSA | 12/2009 | | 2000.00 |

**Total
Scientific**

148162.66:

II. Scientific Report

Action activities were implemented according to the approved work plan and by taking into consideration the review and inputs received from the COST ESF for the management of the WP and BP during 2010 and 2011.

Specific areas of work of the activity include:

- Radio channel models from L to W band.
- Models and data for Free-Space-Optical systems.
- Satellite-to-indoor channel modelling for Satellite communication and navigation.
- Terrestrial channel models for navigation (L band) and gap-fillers (S and C band)
- MIMO for land mobile satellite channel
- Signal processing schemes for mobile channel assessment techniques
- Design, implementation and planning of experiments including instruments and infrastructure.
- Coordination and exchange of existing experimental databases.

The MC defined its objectives for 2010-2011 after an assessment of the good level of integration of the WGs participants, reached during the activities performed in the previous grant periods (from 2008 to mid-2010, from KoM to MCM3, see Annex I, II and III to this report).

The main objective for the grant period from July 2010 to June 2011 was to initiate at European and Global level the dissemination and transfer of scientific results to the end-users, including Industry, Operators and Standardization bodies and to gather feedback on the Action activities.

In order to achieve this objective the Action coordinated actively with the activities of the ITU-R Study Group 3 "Radiowave propagation", the UN body involved in the preparation of next World Radio Conference WRC-12.

The Action pursued also the objective of scientific dissemination by organising two convened sessions at the 5th European Conference on Antennas and Propagation (EuCAP 2011, see Annex I, point 3) and an open IC0802 session at ConTEL 2011 (see Annex I, point 4).

The organisation of convened sessions at EuCAP 2011 aimed at promoting collaborative key papers to the community of researchers in the field applied electromagnetism, and in this occasion Action participants interacted actively with experts from Industry and from other Actions (e.g. COST 2100) which were also attending EuCAP 2011.

ConTEL 2011 session is intended to present specific Action results to the academic and industrial community involved in information and communication technology for the telecommunications systems in general.

The collaborative activities of the Action continued during this period by means of the meeting of the SGMP held on April 2011 (see Annex III, point 3). This SGMP meeting had the objective to progress in the production of a Handbook on Data and Measurements that is aimed to be a reference for the experimenters on radio systems.

In the same occasion it was also formally constituted the Experimenter's Group of Alphasat TDP5 (EGAT5) aimed to perform a propagation and telecom campaign in Ka and Q/V bands using the Alphasat and other satellites.

The Action actively pursued also the research activity of Early Stage Researchers by promoting and encouraging Short Term Scientific Missions (with a total of 15 missions of which 6 performed during the last grant period).

II.A. Innovative networking

In the period between May 2010 and June 2010 the Action performed a number of activities aimed at achieving its work plan objectives.

Coordination with the ITU-R SG3 activities.

The Action organised the 1st IC0802 International Workshop on 8 and 9 November 2010 (see Annex I, 2), just before the ITU-R SG3 Meeting. The Workshop was attended by about 70 experts, several of which were also national delegates to ITU-R SG3 from non-EU countries. The workshop it was intended to act as a public forum to discuss the scientific background of the input documents presented to the SG3 during its activities.

The Workshop had also the objective to discuss experimental techniques and measurements, which constitute the main output of the SGMP and provide the basis for model testing and validation activities of the other WGs.

The results of the workshop can be evaluated the relevant numbers of joint contributions to both the workshop and SG 3 Input documents (see as an example documents from 117) to 123) and by the reports of SG3 working parties (in particular 3J and 3M).

It can be concluded that the activity of the Action has been instrumental in achieving a coordinated approach of COST participants to radio regulatory activities and to strengthen the ITU-R SG3.

It is evaluated that the Action is fairly well positioned to support the approval of new ITU-R recommendations by the next SG3 meeting (Autumn 2011).

Scientific Networking

IC0802 Convened sessions at EuCAP 2011.

The Action Chair, in collaboration with WG chairs, actively pursued the organisation of IC0802 convened sessions with the EuCAP 2011 conference organisers.

In the IC0802 convened sessions, the session chairs had the objective of encouraging to the maximum extent the production of joint scientific papers that should constitute the reference on various issues and should present the state-of-the-art on channel modelling for radio systems.

On the basis of the feedback obtained during the conference and the discussions had with participants from other COST activities and non-COST countries, it can be evaluated that the objective of increasing the awareness of the IC0802 Action within researchers in the field of applied electromagnetism has been reached.

IC0802 Session at ConTEL 2011

The evaluation of the effectiveness of this event will be provided in the next Progress report. Nevertheless it can be already anticipated that this event will be useful to disseminate results to a wider audience of experts in the field of ICT for different types of telecommunication systems from all over the world.

Constitution of a group of experimenters for satellite radio systems

The launch of the Alphasat satellite in 2012/2013 will provide the possibility to perform extensive set propagation campaigns and telecommunication tests.

The Alphasat satellite will complement the existing satellites, operating in Ka band, permitting an assessment of channel properties and radio links also at Q and V band.

The scientific objectives of this type of campaign can be reached only by the collaboration between experimenters all over the European coverage area, in particular with respect to design of the ground segment, data analysis techniques and modelling activities.

Therefore the SGMP has formally constituted a group of experimenters (EGAT5) aimed at coordinating activities in the field of campaigns for satellite systems. This group has already identified more than 10 research groups interested at performing measurements (some of them are already active, see papers presented at EuCAP 2011 and IC0802 1st WS) and will act cooperatively for within national and international activities, with the support of the main EU space agencies.

Scientific Production

The level of increase of the scientific production of this Action is demonstrated by the papers presented since the Action inaugural Workshop (see Annex I, 1) up to the last ConTEL 2011 IC0802 session (see Annex I, 2), 3) and 4) and by 2009/2011 scientific publications listed in Annex IV.

Most of the scientific results have been presented at International conferences (including the European Conference on Antennas and Propagation, EUCAP, and at the Ka and BroadBand

Communications, Navigation and Earth Observation Conference) and published in international peer-reviewed journals (including the IEEE AP Transactions and the International Journal of Satellite Communications).

On top of the scientific production of each organization (more than 240, with an increase of the 70% w.r.t. to the previous report), a major fraction of publications (about 40% of the total production) were also jointly prepared by different Action organizations.

It must be also evidenced the relevant number of input documents (from both single countries and from joint countries) to ITU-R SG3, which demonstrate the on-going transfer of knowledge from the Action WGs to radio regulation.

II.B. Inter-disciplinary networking

Some of the Action participants are active also in other COST actions, like COST 2100, IC0906, IC0902 and ES0702.

It is evaluated that this will provide enough visibility of the results of the other actions. Nevertheless an effort on establishing active collaboration with other ICT actions shall be pursued and maintained in the future.

During the 2011 an active collaboration with ES0702 has been pursued by means of involvement of participants from that Action into the preparation of the IC0802 Handbook on Measurements and Data (with particular regard to radiometric techniques, Numerical Weather Prediction data and meteorological instruments) and by supporting actively the ES0702 MWRNet initiative.

II.C. New networking

The Action has now about 120 participants (20% more than last year), of which 10% are women and about 50% Early Stage Researchers.

During the last grant period the Action has stabilised its level of support from COST member countries, but it is still attracting new WG participants from COST and non-COST countries.

In particular the joint Workshop with ITU-R SG3 and EuCAP 2011 convened sessions have been very useful in contacting interested parties from European Industry and non-COST countries (Australia, USA). This should lead in the next grant period to maintain the increase rate of the number of participants.

In general it appears that the Action is quite effective in aggregating new teams that present proposals for National, EU or ESA research activities. Examples from published and WG papers include national programs for radio systems, ESA and EU projects.

II.D. Self evaluation

It is evaluated that after a period spent in establishing a cooperative environment (2008-2010) the last period (2010-2011) has been quite successful in disseminating the results of the Action in various areas (radio regulation, technical and scientific communities).

It is now evaluated that the Action is fairly well positioned for continuing its activities within ITU-R and scientific events (Conferences).

The active role of a group of experimenters, with competencies in various fields (design of radio receivers and optical systems, Channel assessment for SatCom and SatNav systems, atmospheric remote sensing, meteorology, and data analysis) provides a valuable asset for future activities both at EU and National level.

Due to its area of activity, the Action has an inherent capability to attract participants world-wide and this constitute an advantage for both technical and scientific activities.

As a result of the evolution from an initial core community to a wider audience, the Action shall improve the level of dissemination by improving the dissemination tools (web site, handbooks, etc.) and perform a new effort on training activities.

III. Previous scientific report(s)

III.1 2008-2009

The period covered by this report (November 2008 – April 2009) corresponds to the start of the scientific activities of COST IC0802 Action.

Following the kick off meeting held in Brussels on 18th of November 2008 a relevant number of the participants to this COST Action IC0802 attended the Workshop on “*Radiowave Propagation Models, Tools and Data for Space Systems*” held at ESA/ESTEC, Noordwijk ZH, The Netherlands on the 3-5 December 2008. The objective of the workshop was the opportunity to promote coordination and collaborative efforts of European (including EU, ESA and national projects) and non-European (including ITU-R SG3) and to provide to the new Action the opportunity to present the latest scientific results relevant for the Action. Proceedings of the WS have been distributed to the COST participants through the project WEB tool. The Workshop was attended by more than 60 persons and more details can be found on: <http://www.congrex.nl/08c26/>. In addition, during the first MC meeting held in from 9 to 11 March 2009 also scientific papers from WG1 were presented in a specific plenary session.

III.1.A. Innovative networking

The first management committee meeting (MCM1), that took place on the 9-11 March 2009 at ESA/ESTEC, represented the first occasion to gather together all the organizations and the researchers interested on participating to the COST Action.

Meetings of Working groups took place during the MCM 1 and the composition and members of WGs were identified (see details earlier in this document). Following the decision of Actions and WG chairs, the WG activities focussed on presentation of areas of work from each participating organization and an initial discussion on areas of collaboration. Therefore the COST IC0802 has therefore already constituted a working environment for the collaboration between researchers and telecommunication engineers on areas like experimental campaigns, data exchange, data processing, model development, testing and standardization.

The COST Action IC0802, due to its objectives, is characterised since its start by a relevant participation and interest from space agencies and satellite operators: including CNES (FR), DLR (GE), ASI (IT), ESA (EU), SES-ASTRA (Luxemburg) to which recently joined the Indian Space Research Organization (ISRO).

Therefore MC invited an expert external expert from ISRO, India, Dr. R. Acharya to give a presentation on the new Ka band Telecommunication satellite, GSAT-4, to be launched later this year and to illustrate the planned propagation campaign to be conducted in INDIA with the collaboration of CNES and ONERA (FR). As well the preparation for the Alphasat TDP5 scientific experiment, whose space segment is being implemented by ESA with the support of ASI, has been identified as an argument of work for the SGMP WG.

Other relevant examples are: in the field of Mobile SatCom and SatNav systems (WG1), where several campaigns are being performed or are being planned or in the WG3 which already demonstrated a remarkable level of integration and is working actively for future scientific events.

Most of the Action participants are also active members of study groups of the International Telecommunication Union (ITU, a United Nation body) for the standardization and harmonization of data and models and for the preparation of the World Radio Conference for radio spectrum management, therefore the COST IC0802 permits the coordination between the European countries on relevant issues relevant for European industry and service providers.

In order to

III.1.B. Inter-disciplinary networking

As illustrated by the composition of WGs (reported earlier in this document), the WGs of COST IC0802 are characterised by a good and balanced level of participation, cross-fertilization and

interdisciplinary approach. Indeed there are several cases of organizations participating to two or more WGs (in some cases even with different researchers).

Another relevant aspect of the COST IC0802 Action is that it gathers organizations, which have a long-term track record of scientific results on propagation for Satellite communication, together with groups which have a specific background on issues like free space optics or radio techniques for terrestrial systems.

A final consideration is on the involvement of some of the COST IC0802 participants into other running COST actions, on issues like ionospheric propagation (which is not included into the Action objectives see also Action 296) and meteorological and climatological observations (e.g. ES0702, which is partially dealt also by COST Action IC0802). This will make possible the coordination with this other actions.

As a result of the activities performed during the reported period for setting of WGs, the COST IC0802 Action appears to have reached the critical mass (in terms of participants and background) required by its objectives and the scope.

III.1.C. New networking

The COST Action managed to attract in a relatively short time (i.e. last part of 2008) a relevant number of participants even from organizations were relatively new Space issues for Spatial systems. This can be considered as remarkable result in view of the need to enlarge and enrich the network of researchers and organizations. The first MC and WGs meeting was attended by 46 participants over a current contact list of about 75 participants. The list of participants exhibits a good balance between experienced and young researchers. Even if it is in its early stage, the Action MC has currently planned 2 STSMs within June 2009 with four more to be performed from July 2009 to June 2010.

The project, also due to its focus on issues for the development of global systems, attracted a widespread interest also out of the COST countries and received requests join the Action from researchers in India, Brazil, Pakistan and Canada, including:

Telecommunications Center at Catholic University of Rio de Janeiro, Brazil
National University of Computer and Emerging Sciences, Lahore, Pakistan
Indian Institute of Technology, Kharagpur, India
McMaster University, Hamilton, Ontario, Canada

There are also ongoing contacts with other organizations like ISRO, INDIA (see also section II.A), Communications Research Centre, Ottawa, Canada and experts from Space Industries in USA.

III.1.D. Self evaluation

The COST IC0802 Action starts from a valuable success story of European researchers on the field of propagation for Satellite applications, as demonstrated by scientific literature and events. The IC0802 managed to attract in a relatively short time (6 months) a great interest also from organizations which were not in the original core of experts for the proposal. Furthermore the area of participation, in terms of background and research, is now much larger than the original one and includes a relevant contribution from Universities, R&D organizations and Space agencies. In this sense has already demonstrated that its objectives correspond to needs and ongoing researches in COST and non-COST countries.

This initial period has seen the constitution of the Action WGs and their current composition can be considered as adequate and balanced with respect to Action requirements. The Action has a considerable intellectual portfolio in terms of: scientific background, experimental capability, competence networking and has a good potential to provide support on Communication technology to the European society.

The Management committee must therefore pursue the effective operation of WGs, to avoid dispersion of efforts, to maintain the focus on objectives and a to promote interaction and cross-fertilization between the Action WGs, other COST actions, EU and National programmes.

III.2 2009-2010

Action activities were implemented according to the approved work plan and by taking into

consideration the review and inputs received from the Action DC Rapporteur, Dr. Murat Aydos, following the COST-ICT APC 2009.

The strategy adopted by the Action was based on: receiving inputs and feedback from external experts and invited contributions; promoting WG activities by supporting the participation to meetings of WG members and by encouraging scientific exchanges via STSMs for Early Stage Researchers (ESRs).

The period covered by this report (November 2008 – April 2009) corresponds to the start of the scientific activities of COST IC0802 Action.

Following the Kick-off meeting held in Brussels on 18 November 2008, a relevant number of participants to COST Action IC0802 attended the Workshop on “*Radiowave Propagation Models, Tools and Data for Space Systems*” held at ESA/ESTEC, Noordwijk ZH, The Netherlands on 3-5 December 2008. The objective of this Workshop was to promote coordination and collaborative efforts of European (including EU, ESA and national projects) and non-European (including ITU-R SG3) organisations and to expose the Action to the latest scientific results relevant for its activities. Proceedings of this Workshop were distributed to COST participants through the project WEB tool. The Workshop was attended by more than 60 persons and the programme is found in Annex I.

The first Management Committee Meeting (MCM1), that took place on 9-11 March 2009 at ESA/ESTEC, represented the first opportunity to gather all the organizations and the researchers interested in participating to the COST Action and to set-up the Working Groups.

III.2.A. Innovative networking

In the period between May 2009 and April 2010 the Action performed a number of activities aimed at achieving its work plan objectives.

External experts and Action advisory committee

At MC meetings (MCM2 and MCM3), plenary sessions were organized to present selected inputs to the project from both internal and external experts for a total of about 15 invited contributions (about 5 per meeting, see Annex II).

The selection of invited contributions was aimed at receiving inputs from organizations that use channel models to develop new products or services (like Siemens, Germany or NHK, Japan) and at conveying information to Action participants on other COST and EU projects (COST Actions 2100 and ES0702, BONE etc.), in order to stimulate clustering and collaboration with other research areas. External experts will also be involved as Action advisory committee, to provide an external feedback on the relevance of Action results to their activities.

Integration of participants into working groups

WG meetings co-located MCM2 and MCM3 contributed to the integration among participating organizations by discussing a relevant number of input documents (see Annex III). More than 50 documents have been discussed in parallel sessions, with a balanced distribution between theoretical and experimental contributions. These activities provided the participants with a fairly complete overview of all the main areas of the Action and of participants’ background scientific production (made up of more than 200 papers/year), including channel models for mobile satellite communication systems (both indoor and outdoor), vegetation effects, signal processing techniques for mobile channel assessment techniques, terrestrial channel models for navigation (L band) and gap-fillers (S and C band), MIMO for land mobile satellite channel, design and implementation of instruments, planning and execution of propagation experiments, radio channel models from L to W band, models and data for Free-Space-Optical systems, interference between different radio systems.

Almost all Action participants are contributing to more than one WG and several contributions were found to be relevant for different WGs. This shows the effectiveness of the interdisciplinary approach.

In general, the level of active participation and discussion in WGs has been very satisfactory, and new areas of collaboration between the WGs have been identified.

Scientific Production

The level of scientific production of the organizations involved in this Action is demonstrated by the papers presented at the Action inaugural Workshop (see Annex I) and by 2009/2010 scientific

publications listed in Annex IV.

Most of the scientific results have been presented at International conferences (including the European Conference on Antennas and Propagation, EUCAP, and at the Ka and BroadBand Communications, Navigation and Earth Observation Conference) and published in international peer-reviewed journals (including the IEEE AP Transactions and the International Journal of Satellite Communications).

On top of the scientific production of each organization (about 140), a relevant number of publications (about 40% of the annual production) were also jointly prepared by different Action organizations.

Coordination with International and National programmes

Most of the activities presented during MC and WG meetings were funded by national, EU, ESA or industrial contracts. The composition of Action participants involved so far is quite balanced between R&D organizations, national and international space agencies (ASI, CNES, CRC, DLR, ESA, ISRO) and industry and service operators (Astra, Northrop Grumman, NHK, Siemens). Such balance appears to be optimal for coordination and collaboration. The presentation of invited contributions from national agencies (CNES, ASI, ISRO) and industries (Siemens, NHK) or research organizations (Fraunhofer, ONERA, GMV, etc.) provided an accurate description of current plans.

A good example of collaboration within the Action is the creation - at MCM2 - of a group of experimenters for current and future propagation experiments (including the Alphasat TDP5 Ka and Q/V band experiments) called EGAT5. The aim of this group is to provide guidelines for radio propagation experiments and to identify cooperative experimental activities. The group has already started to draft an experimental handbook and identified current satellite signals. The EGAT5 group will be able to identify and perform activities which will be coordinated between national and EU/ESA research projects. EGAT5 could act as the core for future EU Framework Programmes experimental proposals.

Contribution to radio regulatory activities

A relevant number of Action participants have also actively contributed in 2009 to Study Groups 3 of the International Telecommunication Union (ITU, a United Nations body) for the preparation of the World Radio Conference. Input documents for ITU-R are listed in Annex III. This international collaboration recently resulted in the update of a number of ITU-R recommendations.

Additional contributions of radio regulatory activities are expected in the medium term on areas like: free space optical systems, propagation modelling for radio interference, data and measurements for radio system design.

III.2.B. Inter-disciplinary networking

Collaboration with other COST activities was carried out by coordinating with the Chair of COST Action 2100 Prof. Verdone so as to participate to the 2100 MCM held in February 2010. As a result WG1 (chaired by U. Fiebig) was identified as contact point and COST 2100 members were involved (Dr. C. Oetsges, Belgium) and later joined IC0802 activities (Dr. Sirkova, Bulgaria). Review of models, data and techniques used in terrestrial radio systems were presented during the MC plenary sessions and in WG activities.

All IC0802 MC members which are also involved in 2100 will liaise to ensure coordination on terrestrial channel model during the preparation of the final report of Action 2100.

The Action, on the basis of invited project contributions, identified areas of collaboration with other COST-ICT and COST-ESSEM Actions: the task to liaise with them was assigned to Prof. A. Panagopoulos, NTUA Prof. S. Crewell, Univ. of Cologne and Prof. F. Marzano, Univ. of Rome.

In particular, areas of collaboration with COST Action ES0702 and the MWRnet network for atmospheric remote sensing techniques and for the data provided by numerical weather prediction systems have been identified and have a potential to improve quality and accuracy and radio channel models.

Areas of collaboration with COST IC0603 “*Assist*” related to the design of antennas for mobile, navigation and broadcasting systems and experimental equipment have been identified and will be discussed with IC0603 Action Chair with the objective to perform joint activities at future EUCAP conferences.

The EU/FP7 BONE “*Building the future Optical Network in Europe*” has issued a formal invitation to the IC0802 Action to perform joint activities in the field of Optical Wireless system. WG3 has been delegated to coordinate interaction with BONE participants with particular regard to the CSNDSP 2010 conference.

At the end of 2009, MC members - on the basis of the scientific activities performed so far - identified two options for training activities to be performed by the Action:

- An engineering school on channel modelling and channel assessment techniques aimed at experts in industries, service providers and national bodies involved on the design and the operation of radio systems;
- An advanced theoretical school on theoretical models and experimental techniques for radio channels aimed at PhD or Post-Doc students who need an interdisciplinary approach to this research area.

Preparations for these training activities to take place in 2011 were started at MCM3.

III.2.C. New networking

In the period between May 2009 and April 2010 the Action experienced a relevant increase in the number of participants. In particular, 6 new COST countries (*Bulgaria, Denmark, Israel, Poland, Serbia and Switzerland*) as well as 6 organizations from 5 non-COST countries (*Brazil, Canada, India, Pakistan and USA*) joined the Action.

Participation from other non-COST countries and countries with a Reciprocal Agreement (Australia) is also currently under discussion with interested parties.

Moreover, the number of approved WG participants increased from 29 to 44 during the reporting period. In total, about 50 European organizations are currently involved in the Action. Over a total of about 110 participants, more than 10 % are women and 41 % are Early Stage Researchers.

During the period from June 2009 to April 2010, 6 STSMs were performed on areas like navigation, mobile communication systems, free space optical links and their results were presented and during the WG meetings. Up to 4 additional missions are expected to take place by the summer of 2010. In total, 9 (7 men and 2 women) Early Stage Researchers went on STSMs.

The list of scientific publications and documents for radio regulation resulting from collaborations among Action participants is found in Annex III. Considering that IC0806 is at an early stage, it can be concluded that there is significant room for improvement, especially in view of future dissemination activities and Workshops.

Finally, the Action Chair contributed to the COST Strategic Workshop “Benefits of Research Infrastructures beyond Science - The Example of the Square Kilometre Array (SKA)”. As a result, contacts with the radio science community have been started and will be considered for future Action activities.

II.2.D. Self evaluation

During the period from November 2008 to April 2010 (about 16 months) the Action has been very successful in attracting researchers and experts with different specializations from all over the world and from a wide range of types of organizations (R&D, government agencies, operators and industries). At the same time, the scientific level and quality of activities performed by the WGs during their meetings (from MCM1 to MCM3) and during STSMs is assessed as very positive, thanks also to the support and the enthusiasm of all participants, and in particular of Early Stage Researchers. The Action has already generated a relevant contribution to radio regulatory activities (ITU-R) and has now the potential to provide more. At the same time it has established links with other COST and EU activities (COST 2100, ES0702, BONE and others) which will be essential to attain the goal of a coordinated approach to radio channel modelling.

The constitution of the EGAT5 group of experimenters for current and future propagation campaigns has defined an environment for future activities and proposals beyond the duration of the IC0802 Action.

At the same time the administration of the Action grant according to COST rules has gone through the initial learning curve and provided a timely execution of the Work and Budget plan.

On the basis of these results and considerations the MC considered that the Action has now reached the required level of maturity to organize an open International Workshop by the end of 2010 and to initiate scientific dissemination at major Conferences (EuCAP 2011 and CONTEL

2011) and events (next ITU-R and SG3 meeting).Part II of past periods' reports are to be found here.

Annex I: Workshops organised in collaboration with IC0802

1) ESA Workshop on Radiowave Propagation, 3-5 December 2008

<http://www.congrex.nl/08c26/>

Day 1 - Wednesday, 3 December 2008

| | |
|-------------------|--|
| 08:30 | Registration |
| 09:15 | ESA Welcome and Introduction |
| Session 1 | Keynote s |
| 09:30 | Q/V Band for Next Generation Satellite Communication Systems <i>A. Vernucci, A. Martellucci</i> |
| 09:50 | Ka-band Propagation Experiment over India with the GSAT-4 Satellite <i>K.S. Dasgupta</i> |
| 10:00 | An Overview of ESA Activities on Radiowave Propagation and Interference Issues <i>A. Martellucci</i> |
| 10:30 | Coffee Break |
| Session 2 | Channel Modelling for Mobile Satellite Services |
| 11:00 | Satellite-to-Indoor Broadband Channel Measurement Campaign at 1.51 GHz and 5.2 GHz <i>T. Jost</i> |
| 11:20 | Propagation Measurements for Mobile Satcom and Satnav Systems using a Small Remote-Controlled Airship <i>P. Pechac</i> |
| 11:40 | Channel Models for Systems with Angle Diversity - The MiLADY Project <i>E. Eberlein</i> |
| 12:00 | A Physical/Statistical Model of the Propagation Channel for Land Mobile Satellite Systems <i>A. Abele</i> |
| 12:20 | Study of the Channel Propagation from Satellites to Indoor Environments at L and S Bands <i>I. Gonzalez</i> |
| 12:40 | Multipath Characterization via Scatterer Models and Return-to-Low Level Concept for Pseudolite Indoor Channels <i>A. Kalaitzi</i> |
| 13:00 | Lunch Break |
| Session 3a | Final of ESA Contract 19873/06/NL/LvH |
| 14:00 | Global Archive of Propagation Measurement for Satcom Systems <i>J. Lemorton D. Wendland</i> |
| 15:30 | Coffee Break |
| Session 3b | Final of ESA Contract 19873/06/NL/LvH |
| 16:00 | Global Archive of Propagation Measurement for Satcom Systems G. Carrie - B. Montenegro - L. Castanet |
| 17:00 | Conclusions |
| Session 4 | Poster Session |
| | Demonstration Session of the GA System <i>D. Wendland</i> |

Day 2 – Thursday, 4 December 2008

| | |
|------------------|--|
| Session 5 | Fixed Propagation Campaigns |
| 09:10 | Quasi-Instantaneous Slant Path Fading in Clear Air and Rain <i>E. Vilar</i> |
| 09:30 | Radiowave Propagation Experiments in Madrid <i>J.M. Riera</i> |
| 09:50 | Propagation Theory and Satellite Communications at Q/V Band and Above |

| | |
|------------------|---|
| | <i>D.V. Rogers</i> |
| 10:10 | Coffee Break |
| Session 6 | Spatial and Temporal Characterization of Propagation |
| 10:30 | Long-Period Statistics of the Power Distribution of a Multi-beam Reconfigurable Antenna for Satellite Broadcasting over the European Area <i>M. Buti</i> |
| 11:00 | Rain Cell Identification and Modeling based on Weather Radar Images <i>F. Perez Fontan</i> |
| 11:30 | Analysis of the Spatial and Temporal Properties of Rain Cells for Rainfall Modeling Purposes <i>L. Luini</i> |
| 11:50 | Study and Test of Rain Attenuation Time Series Synthesizers for Tropical and Equatorial Areas <i>G. Carrie</i> |
| 12:10 | Rain Attenuation Time Series Synthesizer for Tropical Regions <i>S.A. Kanellopoulos</i> |
| 12:50 | Lunch Break |
| Session 7 | Characterization of Rain for Propagation Modelling |
| 14:00 | Performance Evaluation of Models for the Conversion of Rainfall Statistics from Long to Short Integration Time <i>L. Luini</i> |
| 14:20 | Analysis of a New Rain Rate Database <i>A. Rocha</i> |
| 14:40 | Statistics of Rainfall for Radiowave Propagation Studies in Greece <i>A. Papatsoris</i> |
| 15:00 | The Effect of Rainfall Variability on Uncertainties in Microwave Link Rainfall Estimates <i>H. Leijnse</i> |
| 15:20 | Shapes, Variations and Orientations of Raindrops <i>M. Thurai</i> |
| 15:40 | Coffee Break |
| Session 8 | Atmospheric Channel Modelling for Satellite Services |
| 16:00 | Description of Alphasat TDP5 Propagation Experiment <i>A. Paraboni</i> |
| 16:20 | Dynamic Channel Modeling of Line-of-Sight Mobile Satellite Links at Ku Band and Above <i>A. Panagopoulos</i> |
| 16:40 | A Space-time Channel Model for Simulations on Continental Satellite Coverages for Adaptive Resource Management Optimization <i>N. Jeannin</i> |
| 17:00 | Long-Period Performances of a Meteorology-driven Optimum Control of a Multibeam Antenna in Satellite Telecommunications <i>M. Buti</i> |
| 17:20 | Propagation Effects on Non-fixed Elevation Angle Slant Paths at Frequencies Around 26 GHz <i>S. Ventouras</i> |
| 17:40 | Benefits of VCM Technique in Ka-Band <i>M. Cossu</i> |
| 18:00 | Prediction of Fade Slope and Scintillation Effects on Ka-band Earth-LEO Satellite Links <i>D. Michelson</i> |

Day 3 - Friday, 5 December 2008

| | |
|-------------------|--|
| Session 9 | Atmospheric Remote Sensing |
| 09:10 | A Novel Ground-Based Microwave Radiometer for High Precision Atmospheric Observations Between 10 and 90 GHz (ATPROP - Atmospheric Propagation and Profiling System) <i>D. Nörenberg</i> |
| 09:30 | Real-time Water Vapour Maps from a GPS Surface Network and the Application for Nowcasting of Thunderstorms <i>S. De Haan</i> |
| 09:50 | Retrieval Algorithms for Atmospheric Parameters using Thermal Emission Observed by Surface-based Microwave Radiometer Operated in Cabauw <i>E. Fionda</i> |
| 10:10 | Design and Implementation of Algorithms for Earth Troposphere Calibration from Dual-Frequency GPS Measurements <i>A. Graziani</i> |
| 10:30 | Coffee Break |
| Session 10 | Tropospheric Effects on RadioScience and Earth Observation Missions |
| 11:00 | Comparison of GPS-Based and Water Vapor Radiometer-Based Earth Troposphere Calibration Systems during Cassini's Radio Science Experiments in the Saturn System <i>A. Graziani</i> |
| 11:20 | Study of Tropospheric Propagation Effects in Space-Borne Sar Remote Sensing: Latest Results from Terrasar-X <i>A. Danklmayer</i> |
| Session 11 | Panel Discussion on COST IC0802, Satnex and Italian Programs 12:00-13:00 |
| 13:00 | Lunch Break |
| Session 12 | Ionospheric Propagation |
| 14:00 | Consideration of Ionospheric Scintillation in the Design of C-Band VSAT Systems <i>P. Thompson</i> |
| 14:20 | Spatial Decorrelation of 150 and 400 MHz Trans-Ionospheric Signals Measured on Ascension Island <i>M. Van de Kamp</i> |
| 14:40 | Measurements and Simulation of VHF and UHF Radar Signals (Qinetiq) <i>P. Cannon</i> |
| 15:00 | Use of Ionospheric Scintillations Models for Different Applications <i>R. Prieto-Cerdeira</i> |
| 15:20 | Workshop Closing |

2) EU COST Action IC0802 1ST International Workshop, Erice, Italy, 8-9 November 2010

Measurements and Models for the Propagation Channel Characterisation
Centre for Scientific Culture "Ettore Majorana",

| | | |
|--------------------|---|---|
| | Monday, 8 November 2010 | Feynman Lecture Hall Rabi Institute San Rocco Building |
| 9h30-10h30 | Opening Session | |
| 9h30-9h50 | ISQE Director | Welcome address |
| 9h50-10h10 | A. Martellucci | Welcome and presentation of the IC0802 COST Action |
| 10h10-10h30 | B. Arbesser-Rastburg | Overview of the ESA and SG3 activities |
| 10h30-11h00 | Coffee break | |
| 11h00-13h30 | Uwe Carsten-Fiebig, Michel Bousquet | Channel modelling for mobile Satellite Communication and Navigation systems |
| 11h00-11h20 | M. Cheffena et al. | Land Mobile satellite dual polarized MIMO channel along roadside trees: Modeling and performance evaluation |
| 11h20-11h40 | P. Valtr | Diffraction Models for Long-Range propagation over Terrain with Multiple Obstacles |
| 11h40-12h00 | E. Fionda | SafeTRIP Project Traget |
| 12h00-12h20 | F. Schubert et al. | Non-Stationary Channel Modeling and Simulation for Satellite Navigation |
| 12h20-12h40 | A. Hrovat et al. | Radio Coverage Calculation and Prediction Tool based on Open-Source GRASS System |
| 12h40-13h | M. Kvicera et al. | Influence of tinted windows on building penetration loss at high elevation angle |
| 13h00-13h20 | D. Arndt et al. | Empirical Studies of Angle- and Time Diversity for Mobile Satellite Broadcasting |
| 13h20-13h30 | All | WG 2 Discussion |
| 13h30-15h00 | Lunch break | |
| 15h00-17h00 | Laurent Castanet Danielle Vanhoenacker | Channel modelling for radio systems from C to W band - Part 1 |
| 15h00-15h20 | G. Carrie et al. | Tropospheric Impairments Time-Series Synthesizers for tropical and Equatorial Areas at Ka- and Q/V bands |
| 15h20-15h40 | J. Lemorton et al. | Prediction models for the radio propagation channel at low elevation angles for high frequency aerospace applications |
| 15h40-16h00 | N. Jeannin et al. | Physical statistical modeling of the effect of the environment on the LMS channel at Ku/Ka band |
| 16h00-16h20 | F. Marzano et al. | Sky-noise temperature modelling and prediction for deep space applications from X to W band |
| 16h20-16h40 | C. Capsoni et al. | A prediction model oriented approach for space exploration mission design and operation |
| 16h40-17h00 | E. Matricciani | Trade-off analysis of 1-Hop and 2-Hop deep-space radio links at Ka band and above |
| 17h-17h30 | Coffee/Tea break | |
| 17h30-18h30 | Laurent Castanet Danielle Vanhoenacker | Channel modelling for radio systems from C to W band - Part 2 |
| 17h30-17h50 | P. Valtr | Analysis of Interference Caused to a Deep Space Earth Station by Fixed Services |

| | | |
|------------------|---|---|
| 17h50-18h10 | C. Riva et al. | VCM performance for Ka-band downlink with multiple ground stations |
| | Tuesday, 9 November 2010 | Feynman Lecture Hall, Rabi Institute, San Rocco Building |
| 8h30-10h | Laurent Castanet Danielle Vanhoenacker | Channel modelling for radio systems from C to W band - Part 3 |
| 8h30-8h50 | A. Martellucci et al. | Alphasat TDP5 Telecom experiment: Definition of design Criteria for a TLC experiment at Q/V band |
| 8h50-9h10 | A. Destounis et al. | A Simple Propagation-based Algorithm for Dynamic Power Allocation for Multi-Beam Satellite Networks Operating at Ka-band and Above |
| 9h10-9h30 | M. Bousquet et al. | Interest of space-time models and short term prediction of rain attenuation for performance evaluation of broadband satellite communication systems with FMT and optimised resource management |
| 9h30-9h50 | P. Gabellini et al. | The Performance Requirements for a Ka-Band Reconfigurable Broadcast Antenna for Atmospheric Fade Mitigation |
| 9h50-10h10 | L. Luini et al. | Evaluation of the impact of rain fade on the planning of future advanced SatCom systems using ACM |
| 10h30-11h | Coffee break | |
| 11h-13h15 | Z. Ghassemlooy G. Kandus | Channel modeling for Free-Space Optical (FSO) systems |
| 11h-11h20 | Z. Ghassemlooy | Experimental Measurement of Atmospheric Effects on FSO Communications in a Controlled Environment |
| 11h20-11h40 | J. Pesek et al. | Research of Atmospheric Structure Index Impact on FSO Link Attenuation |
| 11h40-12h | M. Grabner | Wavelength dependence of optical attenuation in atmospheric hydrometeors |
| 12h-12h20 | O. Fiser | Impact of Fog and Wind on FSO Link Attenuation – Quick Experimental Results |
| 13h-14h30 | Lunch break | |
| 14h30-17h | C. Riva M. Willis | Propagation campaigns, experimental techniques, Data and Instruments - Part 1 |
| 14h30-14h50 | A. Rocha | Beacon Receiver? Do it yourself |
| 14h50-15h10 | O. Fiser et al. | Rain Measurement for Microwave Propagation in Czech Republic |
| 15h10-15h40 | E. Matriccioni | A Mathematical Theory of De-Integrating Long-Time Integrated Rainfall and Its Application |
| 15h40-16h00 | C. Amaya et al. | Attenuation Characteristics at 20-GHz from Long-Term Slant-Path Measurements at Three Sites |
| 16h00-16h20 | A. Vilhar et al. | Development and comparison of new methods to process satellite beacon data using microwave profiling radiometer measurements - Application to the generation of total attenuation statistics from EUTELSAT HotBird 6 19.7 GHz beacon measurements in Toulouse |
| 16h20-16h40 | E. Fionda | Global Navigation Satellite Systems (GNSS): tool for water vapour estimation |
| 17h-17h30 | Coffee/Tea break | |
| b | C. Riva M. Willis | Propagation campaigns, experimental techniques, Data and Instruments - Part 2 |
| 17h30-17h50 | M. Chandra et al. | An Assessment of Current Remote Sensing Radars: Whither Progress |
| 17h50-18h10 | A. Benarroch et al. | Vertical Doppler Radar applied to propagation experiments |

3) EuCAP 2011, 5th European Conference on Antennas and Propagation

Rome, Italy, 11-15 April 2011

See: http://www.eucap2011.org/files/EuCAP2011_ConfBook_v10.pdf

Program of IC0802 Convened sessions

April 11, 14:00 - 18:20, Room: N1

CP09: COST IC0802: Channel modelling for free space optical links

**Chairs: Carlo Capsoni (Politecnico di Milano, Italy),
Erich Leitgeb (TUG, Austria)**

- *4-year Hydrometeor Attenuation Statistics Obtained At 93 GHz on an 850 M Terrestrial Path*
Vaclav Kvicera; Martin Grabner (Czech Metrology Institute, Czech Republic); et al.
- *Linearity in Optical Attenuations for Free-Space Optical Links in Continental Fog*
Muhammad Saeed Khan (TUG, Austria); Muhammad Saleem Awan (Graz University of Technology, Austria); et al.
- *Wavelength Selection on FSO-links*
Thomas Plank; Martin Czaputa; Erich Leitgeb; Sajid Sheikh Muhammad (National University of Computer and Emerging Sciences, Pakistan); et al.
- *Effect of Hydrometeor Scattering on Optical Wave Propagation Through the Atmosphere*
Roberto Nebuloni (Ieiti - Cnr, Italy); Carlo Capsoni (Politecnico di Milano, Italy)
- *FSO Link Attenuation Measurement and Modelling on Milesovka Hill*
Ondrej Fiser; Jaroslav Svoboda; Zuzana Chladova (Institute of Atmospheric Physics, Czech Republic); et al.
- *Free-space Optical High-Speed Link in the Urban Area of Southern Rome: Preliminary Experimental Set Up and Channel Modelling*
Frank S. Marzano; Saverio Mori; Fabrizio Frezza (Sapienza University of Rome, Italy) et al.
- *Measurement Data for FSO and E-band Radio Propagation Modeling*
László Csurgai-Horváth (Budapest University of Technology and Economics, Hungary); Erich Leitgeb (TUG, Austria); Jan Turan (Slovakia),
- *FSO Ground Network Optimization and Analysis Considering the Influence of Clouds*
Frederic Lacoste; Alexandre Guérin; Andre Laurens (CNES, France); Guillaume Azema, (Thales), et al.

April 13 09:00 - 12:40, Room: N1

CP08: COST IC0802: Channel modelling for radio systems from L to W band

**Chairs: Laurent Castanet (ONERA, France),
Antonio Martellucci (European Space Agency, The Netherlands)**

- *Radiowave Propagation Modelling for ITU and WRC Regulatory Activities*
Sergio Buonomo (ITU, Switzerland); Bertram Arbesser Rastburg (ESA - Estec, The Netherlands)
- *Clustering of the Multipath Radio Channel Parameters*
Susana Mota; Armando C Rocha (University of Aveiro, Portugal); Maura Garcia; Fernando Pérez-Fontán (University of Vigo, Spain)
- *Statistical and Physical-Statistical Modeling of the Land Mobile Satellite, LMS, Channel At Ku- and Ka-Band*
Fernando Pérez-Fontán (University of Vigo, Spain); Nicolas Jeannin; Laurent Castanet; Mametsa (ONERA, France) et al.
- *Propagation Modelling and Mapping of Rain, Clouds and Water Vapour to Cope with Spatial and Temporal Variability*
Aldo Paraboni; Carlo Riva; Carlo Capsoni; Lorenzo Luini (Politecnico di Milano, Italy); Laurent Castanet; Nicolas Jeannin (ONERA, France) et al.
- *Synergic Use of EO, NWP and Ground Based data for the Characterisation of Water Vapour field*
Nazareno Pierdicca (Uni Roma1, Italy); Fabio occa (Politecnico di Milano, Italy); Bjorn Rommen Estec, The Netherlands); et al.
- *Use of Remote Sensing Techniques and Navigation Data for Tropospheric Channel Assessment*
Susanne Crewell (Universität Köln, Germany); Frank S. Marzano; Vinia Mattioli (Sapienza University of Rome / Perugia, Italy) et al.

- *Dynamic Modelling of Atmospheric Microwave Transmission for Precipitation Quantification Using Mie Scattering*
Susanne Hipp; Uwe Siart (Technische Universität, München, Germany); Christian Chwala (Karlsruhe Institute of Technology, Germany) et al.
- *Joint Results of 20 GHz Recent Earth-Space Propagation Experiments in Canada and Europe*
Cesar A. Amaya; Tu Nguyen (Communications Research Centre, Canada); Armando C Rocha (U. Aveiro / IT Aveiro, Portugal) et al.
- *Use of Space-Time Channel Models and Data for Design and Control of Adaptive SatCom Systems*
Carlo Capsoni (Politecnico di Milano, Italy); Laurent Castanet (ONERA, France); Piero Gabellini (Space Engineering S.p.a., Italy) et al.
- *Review of Prediction Methods for Low-Elevation Aerospace Systems and New Achievements*
Joel Lemorton; Vincent Fabbro; Charilaos Kourogorgas (ONERA, France) et al.
- *Propagation Modeling for the Design of Data-Downlink of non-GEO Satellite Systems (Earth Observation / Space Exploration) and DRS*
Carlo Capsoni (Politecnico di Milano, Italy); Nazzareno Pierdicca; Frank S. Marzano (Sapienza University of Rome, Italy)

4) ConTEL 2011, 11th International Conference on Telecommunications

Graz, Austria, 15-17 June 2011

See: <http://www.contel.hr/>

June 15, 11:00 - 17

COST IC0802 Session

- *The impact of scattering conditions identification method on the processing of satellite beacon data using microwave profiling radiometer measurements in South of France*
Andrej Vilhar (Jozef Stefan Institute, Slovenia); Gorazd Kandus (Jozef Stefan Institute, Slovenia); et al.
- *Remote Sensing of Natural and Artificial Variations in the Earth-Ionosphere Cavity via Very Low Frequency*
Hans Eichelberger (Space Research Institute, Austria); Erich Leitgeb (TUG, Austria); et al.
- *Ground based and satellite communication channel influences and Ultra Low Frequency (ULF) remote sensing techniques*
Gustav Prattes (Austrian Academy of Sciences, Austria); Konrad Schwingenschuh (Austrian Academy of Sciences, Austria); et al.
- *The Effects of Climate Change on Microwave Telecommunications*
Kevin S Paulson (University of Hull, United Kingdom)
- *Cooperative Spectrum Sensing over Correlated Log-Normal Channels in Cognitive Radio Networks based on Clustering*
Nima Reisi (KN-Toosi University of Technology, Iran); Vahid Jamali (K. N. Toosi University of Technology, Iran); Mahmoud Ahmadian (K.N. Toosi University of Technology, Iran); Soheil Salari (K.N. Toosi University of Technology, Iran)
- *Analysis of Rain Effect on Free Space Optical and Microwave Communication Links*
Martin Grabner (Czech Metrology Institute, Czech Republic); Vaclav Kvicera (Czech Metrology Institute, Czech Republic)
- *Validating Relationship between Aerosol's Liquid Water Content and optical attenuation for Terrestrial FSO Links*
Muhammad Saeed Khan (TUG, Austria); Sajid Sheikh Muhammad (National University of Computer and Emerging Sciences, Pakistan); et al.
- *Characterization of Fog by Liquid Water Content for Use in Free Space Optics*
László Csurgai-Horváth (Budapest University of Technology and Economics, Hungary); Istvan Frigyes (Budapest University of Technologies, Hungary)
- *6-Year Propagation Statistics Obtained on Terrestrial Free Space Optical 860 nm Path*
Vaclav Kvicera (Czech Metrology Institute, Czech Republic); Martin Grabner (Czech Metrology Institute, Czech Republic); Ondrej Fiser (Institute of Atmospheric Physics, Czech Republic)
- *Combination of two visibility sensors to predict fog attenuation on FSO links*
Vladimir Brazda (Institute of Atmospheric Physics Prague, Czech Republic); Ondrej Fiser (Institute of Atmospheric Physics, Czech Republic); Petr Pesice (Institute of Atmospheric Physics Prague, Czech Republic); Jiri Pesek (University of Pardubice, Czech Republic)
- *Optical Wireless Communications: Link Availability Prediction for the City of Istanbul*
Filiz Sari (Ankara University, Turkey); Faruk Ozek (Ankara University, Turkey)
- *Preliminary Results using Free-Space Optical Link at 1550 nm within Mid-Latitude Urban Area*
Frank S. Marzano (Sapienza University of Rome, Italy); Saverio Mori (Sapienza University of Rome, Italy); et al.
- *FSO link attenuation and structure index derived from 3D sonic anemometer measurement*
Jaroslav Svoboda (Institute of Atmospheric Physics, Czech Republic); Zuzana Chladova (Institute of Atmospheric Physics, Czech Republic); et al.
- *Impact of Different Noise Sources on the Performance of PIN- and APD-based FSO Receivers*
Fang XU (University of Paul Cézanne, France); Mohammad-Ali Khalighi (Ecole Centrale Marseille, France); Salah Bourenane (Ecole Centrale Marseille, France)
- *On the study of the FSO link performance under controlled turbulence and fog atmospheric conditions*
Sujan Rajbhandari (Northumbria University, United Kingdom); Z. Ghassemlooy (Northumbria University, United Kingdom); et al.
- *Investigation of Turbulence Effect on the Free Space Optical Link for Ground-to-Train Communications*
Rupak Paudel (Northumbria University, United Kingdom); Z. Ghassemlooy (Northumbria University, United Kingdom); et al.

Annex II List of Invited IC0802 Project contributions to MC meetings

MCM1 ESA/ESTEC, Noordwijk 9-11 March 2009

- 1 *GSAT-4 Propagation Experiment,*
R. Acharya ISRO, India
- 2 *Satellite-to-Indoor Broadband Channel Measurements at L- and C-band
for GNSS Application,*
T. Jost DLR, Germany
- 3 *Three-dimensional HAP MIMO Channels: Modelling and Analysis of Spatial
Correlation,*
E. Michailidis, Univ. of Piraeus, Greece
- 4 *Simulation of the Satellite-to-Indoor Propagation Channel at L- and S- band,*
C. Carrascosa GMV, Spain

MCM2, IsAE, Toulouse, 4-6 November 2009

- 1 *Brief review on terrestrial propagation channel modelling*
M. Pontes, CETUC, Rio de Janeiro, Brazil
- 2 *Review of CNES requirements for channel modelling*
F. Lacoste, CNES, Toulouse, France
- 3 *Optical Wireless Communications: State of the Art and Prospects*
J. Walewski, Siemens, Munich, Germany
- 4 *Experimenters group for Alphasat TDP5*
Carlo Riva, Politecnico di Milano, Italy
- 5 *Propagation issues related to UAS LOS and SATCOM datalinks*
J. Lemorton, ONERA, Toulouse, France

MCM3, NTUA, Athens 26-28 April 2010

- 1 *Report on COST 2100*
U. Fiebig, DLR, Germany
- 2 *Report on COST actions on radio systems*
A. Panagopoulos, NTUA, Athens, Greece
- 3 *Presentation of COST ES0702 and MWRnet*
S. Crewell, Uni Koeln, Germany, F. Marzano, Univ. La Sapienza, Rome, Italy
- 4 *Antenna for atmospheric fading mitigation for satellite broadcasting at 21 GHz*
S. Nakazawa, NHK, Tokyo, Japan
- 5 *Overview of the propagation characterisation activities at Fraunhofer IIS*
E. Eberlein, Fraunhofer, Germany
- 6 *Research activities on Optical systems*
T. Kamalakis, Athens, Greece
- 7 *The Italian Space Agency Q/V band project*
G. Codispoti, ASI, Rome, Italy

Annex III List of IC0802 WG Input documents

1) MCM2, IsAE, Toulouse, 4-6 November 2009

WG1: Channel modelling for mobile Satcom and Satnav systems from VHF to C band

| Reference # | Title | First Author |
|--------------|---|------------------------------|
| MCM2_WG1_001 | Polarization and spatial diversity measurements of the Land Mobile Satellite propagation channel at S-band | Frédéric Lacoste et al. |
| MCM2_WG1_002 | Measurements of the macrocell propagation channel at 2.2 and 3.8 GHz and comparison with some analytical models | Frédéric Lacoste et al. |
| MCM2_WG1_003 | Mobile Satellite Propagation: narrow- and wideband experimental measurements at K-band | M. Schönhuber et al. |
| MCM2_WG1_004 | Comparison of the Satellite-to-Indoor Broadband Channel at 1.51 GHz and 5.2 GHz | Thomas Jost, et al. |
| MCM2_WG1_005 | Modelling radio coverage of terrestrial wireless networks using an open source system GRASS | Andrej Vilhar, et al. |
| MCM2_WG1_006 | Deployable mobile broadband communications in a forest area | Lars Erling Bråten, et al. |
| MCM2_WG1_007 | The Vegetation Attenuation for Satellite Communication: Measurement Campaign Description | Petr Horak, et al. |
| MCM2_WG1_008 | Propagation model for wave scattering effects caused by trees | F. M. Schubert, et al. |
| MCM2_WG1_009 | Estimation of the Radio Channel Parameters using the SAGE Algorithm | Susana Mota et al., |
| MCM2_WG1_010 | A new physical-statistical model of the land mobile satellite propagation channel | Anthony Abele, et al. |
| MCM2_WG1_011 | MIMO Channel Modelling for Satellite Communication Systems | Asad Mehmood, Abbas Mohammed |

WG2: Channel modelling for Radio systems from C to W band

| Reference # | Title | Authors |
|-------------------------------------|--|--|
| MCM2_WG2_001 | Development of a heterogeneous microwave network, fade simulation tool applicable to networks that span Europe | Kevin Paulson, Hafiz Basarudin |
| MCM2_WG2_002 | Potential contribution from EPFL-LTE to COST Action IC0802 | Alexis Berne |
| MCM2_WG2_003 | A Comprehensive Time Series Synthesizer of the Railway Satellite Channel at Ku band and Above for Analyzing Fade Mitigation Techniques | Pantelis-Daniel Arapoglou, Konstantinos Liolis, Athanasios Panagopoulos |
| MCM2_WG2_004 | Ricean K-Factor Statistics for Accurate Land Mobile Satellite Channel Modeling at Ku Band and Above in Temperate and Tropical Climatic Regions | Konstantinos P. Liolis, Athanasios D. Panagopoulos, Pantelis-Daniel M. Arapoglou, and Sandro Scalise |
| MCM2_WG2_005 (allocated to SGMP) | Joint statistics of rain attenuation at 20 GHz in Madrid and Aveiro | Pedro Garcia del Pino, Armando Rocha, Jose M. Riera, Jose M. García, Ana Benarroch |
| MCM2_WG2_006 | Time series synthesis from the maseng-bakken approach: main achievements and future work | Laurent Castanet, Guillaume Carrie, Nicolas Jeannin, Xavier Boulanger, Frederic Lacoste |
| MCM2_WG2_007 | Space-time rain field generators: possible applications for GIN and remote sensing instrument design | Nicolas Jeannin, Laurent Castanet, Laurent Féral, Frederic Lacoste |
| MCM2_WG2_008 | Study and modelling of tropospheric attenuation for land mobile satellite system operating at Ku and Ka band | Nicolas Jeannin, Laurent Castanet, Xavier Boulanger, Frederic Lacoste |
| MCM2_WG2_009 | Propagation effects on radar remote sensing | Mahdu Chandra |
| MCM2_WG2_010 | Propagation issues related to UAS LOS and SATCOM datalinks | Joel Lemorton |

WG3: Channel modelling for terrestrial free space optical systems and airborne terminals

| Reference # | Title | Authors |
|--------------|---|------------------------------|
| MCM2_WG3_001 | Activities at BME for millimeter band terrestrial radio connections | L. Csurgai, Janos Bito |
| MCM2_WG3_002 | Wind parameters influencing FSO attenuation | Ondrej Fiser |
| MCM2_WG3_003 | First results of statistical processing of optical/radio/meteorological data at CMI Prague | Vaclav Kvicera, M. Grabner |
| MCM2_WG3_004 | Proposal of methodology for use of gathered optical/radio/meteorological data for optical/radio channel modelling | Vaclav Kvicera, , M. Grabner |

SGMP: Specific group on measurements and data products

| Reference # | Title | Authors |
|---|--|--|
| MCM2_WG4_003 | An inexpensive satellite beacon receiver for propagation experimentation at Ka-Band | F. Machado, D. Naveiras, P. Mariño, F. Perez-Fontan |
| MCM2_WG4_004 | Review and assessment of modelling accuracy of tropospheric effects for GNSS | N.M. Miccoli, S. Bonafoni, A. Martellucci |
| MCM2_WG4_006 | Low-cost digital beacon receiver based on software defined radio | M. Cheffena, L. Erling Bråten |
| MCM2_WG4_007 | On Radiometric Retrieval Algorithms for Ka-band Propagation Experiment with the GSAT-4 Satellite | G. Carrie, L. Castanet, A. Martellucci |
| MCM2_WG4_008 (also discussed in WG2) | Brazilian activity on propagation data treatment and processing | M.E.C. Rodrigues, G. Carrie, L. Castanet, L.A.R. Silva Mello |
| MCM2_WG4_009 | Preliminary results of propagation measurements at 3.5 GHz in urban Rio de janeiro | C.V. Rodriguez-Ron, L.A.R. Silva Mello, M.S. Pontes |
| MCM2_WG4_010 | Automatic sleet attenuation detection in measured data series | B. Heder, J. Bito |
| MCM2_WG2_005 (allocated to SGMP) | Joint statistics of rain attenuation at 20 GHz in Madrid and Aveiro | Pedro Garcia del Pino, Armando Rocha, Jose M. Riera, Jose M. García, Ana Benarroch |

2) MCM3, NTUA, Athens 26-28 April 2010

List of Input documents for Working Groups

WG1: Channel modelling for mobile Satcom and Satnav systems from VHF to C band

| Reference # | Title | Authors |
|--------------|---|---|
| MCM3_WG1_001 | Deployable Mobile Broadband Communications in a Forest Area | Lars Erling Bråten, Jan Erik Voldhaug, Jostein Sander |
| MCM3_WG1_002 | Measurements of Frequency Dependence of Attenuation due to Vegetation for Satellite Services | Petr Horak, Milan Kvicera, Michal Simunek, Pavel Pechac: |
| MCM3_WG1_003 | Land mobile satellite channel simulator along roadside trees | Michael Cheffena, Fernando Perez-Fontan: |
| MCM3_WG1_004 | Effect of 3-D Spatial Correlation on the Capacity of HAP-MIMO Channels | Emmanouel T. Michailidis and Athanasios G. Kanatas, |
| MCM3_WG1_005 | A Three-Dimensional Statistical Simulation Model for HAP-MIMO Channels”. | Emmanouel T. Michailidis and Athanasios G. Kanatas, |
| MCM3_WG1_006 | Evaluation of Time-Variant Multipath Characteristics for Localization Channel Model in Terrestrial Mobile Radio | Wei Wang and Thomas Jost, |
| MCM3_WG1_007 | Performance analysis of partially coherent QPSK receiver over Nakagami-m fading/gamma shadowing – Simulation approach | Goran T. Djordjevic, Dejan N. Milic, Bojana Z. Nikolic: |
| MCM3_WG1_008 | Interference analysis between terrestrial cellular and multiple airborne wireless networks | Nektarios Moraitis, Athanasios Panagopoulos, Philip Constantinou: |
| MCM3_WG1_009 | Analysis of interference and separation distances between CGC base stations and mobile satellite receivers | P. Valtr, A. Martellucci, R. Prieto-Cerdeira |
| MCM3_WG1_010 | Performance analysis of SC diversity system with different correlation models in <i>alpha-mi</i> fading environment, | Jelena A. Anastasov, Mihajlo C. Stefanovic and Stefan R. Panic |

WG2: Channel modelling for Radio systems from C to W band

| Reference # | Title | Authors |
|--------------|--|---|
| MCM3_WG2_001 | New method for predicting gaseous absorption at low angles” | Bouchard P. |
| MCM3_WG2_002 | A Novel Fixed/Mobile Rain Attenuation Time Series Synthesizer for Temperate and Tropical Regions operating above 10GHz | Kanellopoulos S.A., et al. |
| MCM3_WG2_003 | Temporal Trends in Rain Rate Near Outage Levels | Paulson K. |
| MCM3_WG2_004 | Study of an adaptive approach based on a reconfig. Antenna | Resteghini L., Martellucci A. |
| MCM3_WG2_005 | Derivation of Rain Attenuation from Experimental Measurements of Drop Size and Velocity Distributions” | Riera J.M., García-Rubia J.M., García-del-Pino P., Benarroch A. |
| MCM3_WG2_006 | Parabolic equation method applied to coastal and maritime microwave links modeling – a brief review | Sirkova I. |

WG3: Channel modelling for terrestrial free space optical systems and airborne terminals

| Reference # | Title | Authors |
|--------------|---|--|
| MCM3_WG3_001 | A simple fog density measurement setup and its application in attenuation calculations | László Csurgai-Horváth, János Bitó |
| MCM3_WG3_002 | Gbit/sec wireless via Free-Space Optics and E band radio; | István Frigyes, László Csurgai-Horváth |
| MCM3_WG3_003 | Availability performance assessment for simulated terrestrial hybrid 850 nm/58 GHz system | V. Kvicera, M. Grabner, O. Fiser |
| MCM3_WG3_004 | FSO link attenuation versus visibility or wind turbulent energy | Ondrej Fise, Jaroslav Svoboda Jiri Pesek, Vladimir Schejbal |

SGMP: Specific group on measurements and data products

| Reference # | Title | Authors |
|--------------------|---|--|
| MCM3_WG4_001 | Ka-band propagation measurements at CRC with the Anik F2 satellite | C. Amaya and T. Nguyen |
| MCM3_WG4_002 | RF Backend and Digital Detector for Beacon Propagation Experiments | A. Rocha, E. Rodrigues, E. Ornelas, |
| MCM3_WG4_003 | A Ka/Q band Ground Propagation Terminal for the Alphasat TDP5 scientific experiment | D. F. Prim, G. Faustmann, M. Schönhuber, M. Flohberger, A. Paraboni, F. Perez Fontan, A. Martellucci |
| MCM3_WG4_004 | Processing measured data in the scope of GSAT-4 campaign | A. Vilhar, G. Carrie, L. Castanet |

3) SGMP Meeting,

ISCOM/ASI, Rome, 11-12 April 2010

Agenda of the Meeting

11/04/2011, Monday, 14:00 – 18:30

Room: B0336 "Sala Rossa", 3rd floor

ISCOM centre, Ministero dello Sviluppo Economico, Viale America 201, Roma

- | | |
|--------------------|--|
| 14:00-14:30 | Opening and Introduction (C. Riva and M. Willis) |
| 14:30-14:45 | Welcome of Dr. Rita Forsi, director of ISCOM, Ministero dello Sviluppo Economico |
| 14:45-18:30 | Review of IC0802 Handbook on Data and Measurements (part I) |
| 14:45-15:00 | Remote sensing chapter: general structure (F. Marzano/S. Crewell) |
| 15:00-15:20 | Remote sensing chapter: MW Radiometers (F. Marzano/S. Crewell) |
| 15:20-15:40 | Remote sensing chapter: Radar (M. Chandra) |
| 15:40-16:00 | Remote sensing chapter: GPA (E. Fionda) |
| 16:00-16:30 | Coffee break |
| 16:30-17:00 | Data processing chapter (G. Carrie) |
| 17:00-17:30 | Data archive chapter (G. Carrie) |
| 17:30-18:00 | Meteorological Instruments chapter (O. Fiser) |
| 18:00-18:30 | Test-bed measurements chapter (J.M. Riera) |

12/04/2011, Tuesday, 8:45 – 12:15

Room: B0336 "Sala Rossa", 3rd floor

ISCOM centre, Ministero dello Sviluppo Economico, Viale America 201, Roma

- | | |
|--------------------|---|
| 08:45-12:30 | Review of IC0802 Handbook on Data and Measurements (part II) |
| 08:45-09:30 | NWP chapter (A. Martellucci) |
| 09:30-10:00 | Receivers chapter (A. Rocha) |
| 10:00-10:30 | Coffee break |
| 10:30-11:00 | Handbook structure discussion and finalization |
| 11:00-12:15 | Editorial issues (authors, contributions, template, exchange of documents, schedule, next editorial meeting, etc) |
| 12:30-14:00 | Lunch |

12/04/2011, Tuesday, 15:00 – 19:00

Cassini Meeting Room

Italian Space Agency, ASI, viale Liegi 26, Roma

- | | |
|--------------------|---|
| 15:00-19:00 | EGAT5, Coordination activities for SatCom experiments |
| 15:00-15:10 | Opening (C. Riva and M. Willis) |
| 15:10-15:30 | Italian Space Agency programs (G. Codisposti) |
| 15:30-15:50 | Alphasat Scientific Experiment (C. Riva) |
| 15:50-16:20 | Coffee break |
| 16:20-16:40 | Alphasat Communication Experiment (M. Ruggieri / T. Rossi) |
| 16:40-17:00 | An overview of COST, ITU and ESA RW propagation for SatCom (A. Martellucci) |
| 17:00-17:45 | Presentation of current and planned National SatCom campaigns (EGAT5 participants) |
| 17:45-19:00 | Planning of activities for future coordination and collaboration for EGAT5 group and schedule for future activities/meetings (up to 2012 and 2013-2016) |

Annex IV: List of publications

(in bold, Paper on Journals and invited conference papers)

IC0802 related publications with more than one participating organisation:

- 1) Schubert, F. M.; Fleury, B. H.; Robertson, P.; Prieto-Cerdeira, R.; Steingass, A.; Lehner, A.: Modeling of Multipath Propagation Components Caused by Trees and Forests. In EuCAP 2010 - The 4th European Conference on Antennas and Propagation, Barcelona, April 2010.
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