

SATELLITE AND SPACE COMMUNICATIONS

<http://www.comsoc.org/socstr/org/operation/techcom/satellite.html>



IEEE COMMUNICATIONS SOCIETY



SSC Newsletter

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The Satellite and Space Communications (SSC) Committee is a volunteer group actively involved in advancing satellite and space communication technologies within the IEEE. This committee is approved by the IEEE Communications Society and is governed by the constitution and bylaws of the IEEE as well as the other twenty Technical Committees in the Society.

SATELLITE & SPACE

- JOIN US -

All conference attendees are welcome to join us in the SSC Committee meeting.

Location: Hyatt Regency Dallas

Room: Reverchon/Atrium

Date: Wednesday, Dec. 1st

**Time: Start time: 12.00
End time: 14.00**

Future SSC Meetings

May 2005 Seoul, Korea

Nov/Dec 2005 St. Louis, MO, USA

GC 2004 SSC Committee Activities

TUTORIALS (Nov. 29th and Dec. 3rd, 2004)

Tu02: Architectures and Protocols of the Wireless IP

Duration: Full Day (Monday, Nov. 29) 8:30-5:00

Instructor: Abbas Jamalipour, University of Sydney, Australia

TECHNICAL SYMPOSIA (Nov. 30th-Dec. 2nd, 2004)

WC04: Satellite Communications - Tuesday, 30 November, 10:30 - 12:00

WC06: TCP - Tuesday, 30 November, 10:30 - 12:00

CT06: Sensor Networks and Cross-Layer Optimization - Tuesday, 30 November, 14:00 - 17:30

CT07: Turbo Codes - Tuesday, 30 November, 14:00 - 17:30

GE03: Traffic Modeling - Tuesday, 30 November, 14:00 - 17:30

GE07: TCP - Wednesday, 1 December, 14:00 - 17:30

GE13: Coding and Modulation II - Thursday, 2 December, 14:00 - 17:30

DESIGN AND DEVELOPERS FORUM

Next Generation Wireless Systems and Devices

Tuesday 30 November 2004 • 14:00 – 15:30

Session Organizer & Chair: Peter Wang, Nokia Research Center

Technologies for Next Generation Networks

Wednesday, 1 December 2004 • 10:30 – 12:00

Session Organizer & Chair: Jeremy Bicknell, Integrated Device Technology

Emerging Mobility Communications Technologies

Wednesday, 1 December 2004 • 14:00 – 15:30

Session Organizer & Chair: Roman Kikta, Genesis Campus



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MESSAGE FROM THE CHAIR

Abbas Jamalipour

This is my first entry in this column as the Chair of the Satellite and Space Communications (SSC) Technical Committee (TC). Elections for SSC TC officers were held at our TC meeting in Paris, during ICC2004. Together with me, Dr. Mario Marchese and Dr. Michael Hadjitheodosiou have been elected as the Vice Chair and Secretary of the SSC TC. I would like to thank Dr. Ron P. Smith our previous TC Chair for his long service to the TC as Chair, Vice Chair, and Secretary. Ron has contributed enormously to the satellite research activities and I hope he will continue to advise our TC of his great experiences.

SSC TC is an international volunteer organization governed by the IEEE Communications Society. SSC has been providing a forum for technical advancement of space borne communications since our founding in 1962. Please help us to continue our contributions to this exciting field by finding your own way to participate in our committee. SSC meets twice per year at ICC and Globecom conferences, and there are numerous ways to be active through the Internet by visiting our web site. Organizing special issues in journals and magazines, conferences, symposiums and technical sessions, and also reviewing papers related to satellite communications are among those activities.

This year the members of SSC TC have organized two special issues in IEEE Journal on Selected Areas in Communications (J-SAC) in February and April

on the topic of "Broadband IP Networks via Satellites". It was a great success for the satellite communications research community after several years of having such an interesting issue in the Journal. Next year we will have two special issues on satellite communications in IEEE Wireless Communications Magazine in August 2005. They are on important topics of "Key Technologies and Applications of Present and Future Satellite Communications" and "The Synergy of Space and Terrestrial Communications in Next-generation Hybrid Wireless Systems" and the deadline for paper submission will be December 15, 2004. All members are encouraged to submit their papers to these special issues. Other than IEEE publications, SSC TC members have been also active in organizing special issues in other professional journals.

SSC is actively involved in organizing sessions and workshops for major IEEE ComSoc conferences such as ICC and Globecom. You can help us by volunteering to serve as a technical program representative or as a paper reviewer. If you have suggestions for workshops or tutorials, you can submit your ideas directly to the conferences as well as coming to SSC for support. We are always interested in participating in other events cosponsored by the IEEE, such as the AIAA International Communications Satellite Systems Conference (www.aiaa-icssc.org), so please contact us if SSC can help with your favorite event.

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Since our last meeting, SSC TC has endorsed several international conferences including the 23rd AIAA International Communications Satellite Systems Conference (ICSSC-2005), IWSC 2005 to be held in Siena, Italy, from 8 - 9 September 2005, which is also endorsed by the EU's 6th IST framework program SatNEx, the Satellite Communications Network of Excellence, and the IEEE 2005 International Symposium on Microwave, Antenna, Propagation and EMC Technologies For Wireless Communications (MAPE 2005) to be held August 8-12, 2005 in Beijing, China.

As part of TC's commitment to promote research and development activities in the area of satellite communications within the industry and academia research community, we have established the "Distinguished Contributions to Satellite Communications Award" in 2001. This annual award is usually presented during Globecom conference and this year I am pleased to announce our 2004 award winner during TC meeting at Globecom2004. Please

join us to congratulate the winner. For more information about eligibility criteria and how to apply for this award, please visit the SSC TC web.

Next year, I will be the Chair of IEEE Globecom2005, Wireless Communications Symposium. I would like to encourage members who are interested in proposing special sessions and tracks on satellite communications for Globecom2005 to contact me.

As you can see, there are numerous ways for you to participate with SSC to help advance our field and the professional careers of our members and yourself. I have found this to be a rewarding endeavor and invite you to join us. By attending one of SSC TC meetings, you will automatically become a member and can participate in a warm research community toward future of satellite communications.

*Prof. Abbas Jamalipour, Chair
Satellite and Space Communications
Technical Committee*

SCANNING THE WORLD

Mario Marchese

My first "Scanning the World" will be dedicated to a review of the importance of the satellites in future technology and applications. In June 2004, at ICC in Paris, an important Panel was dedicated to the "Role of Satellites in Future Broadband Networks". Dr Riccardo De Gaudenzi, European Space Agency, the session organizer, together with the panelists, Harald Skinnemoen, Nera, Jacques Couet, Alcatel, Roberto Campitelli, Hughes, and Benjamin Pontano, Viasat Comsat, raised the following key questions: What is the role of satellites in bridging the digital divide? Are emerging standards going to make broadband satellite technologies affordable? What are the key space and ground technologies required to be able to economically complement terrestrial networks in the medium and long term? Are there new applications which can boost the exploitation of broadband satellite networks?

In practice, the key points are: the evaluation of the social impact of satellite communications; the convergence of the technological choices of the enterprises through the standardization issue; the evaluation of new technologies that can provide improved quality at reasonable costs and the analysis of the applications that can be either used only via satellite or whose added value is particularly meaningful if transported via satellite.

Concerning the digital divide it is interesting to highlight that, in Europe, the enlargement of the community to 25 countries have increased the challenge: recent estimations indicate that, being Europe composed of 25 countries, more than one

million residential people and one hundred thousand institutions are not covered by terrestrial broadband access. The nature itself of satellites joined to new technical solutions allows offering an immediate coverage at high speed. The challenge is if satellite technology can fill the digital divide at service cost, reliability and quality comparable to terrestrial solutions. Great challenges concerning digital divide are also evident in Africa, Asia and South America and satellites have a real chance to play a key role. Also in the U.S. "...The lack of economical access to wired broadband resources at a significant number of facilities will pose a critical hindrance to business operations....Satellites will be essential to enable comprehensive broadband services with the performance required to support the mission-critical applications needed by corporate, SME, and SOHO markets" (R. Campitelli from Frost and Sullivan, February 2004).

Concerning the technological issues, the principle of standardization is topical to help integration among networks of different providers. Standardized products will help reduce the costs lowering the industrial risks and the competition and driving up the mass production. New promising standards are: IPoS, DVB-RCS and DVB-S2. IPoS means IP over Satellite and incorporates the new SI-SAP (Satellite Independent - Service Access Point) interface whose definition is in progress within the SES BSM (Satellite Earth Station - Broadband Satellite Multimedia) ETSI group. SI-SAP isolates the physical layers (i.e. satellite physical, MAC and

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Link Control, strictly Satellite Dependent) from the Satellite Independent layers (i.e. IPv4 or IPv6) and offers specific QoS to IP and the upper layers.

DVB-S2 for the forward link is suitable for interactive satellite broadband networks, allows high physical layer performance, a wide range of spectral efficiencies and ACM (Adaptive Coding and Modulation) profiles for interactive applications. DVB-RCS for the reverse link is flexible and subject to further improvement. It is becoming accepted worldwide.

The success of satellites is strictly linked to new technological solutions. In this view key points concern: power and bandwidth efficient modulations, ACM for uplinks and downlinks, frequency reuse, improved access techniques for bursty traffic, resource reservation algorithms, on-board switching, high performance transport layers, Performance Enhancing Proxies (PEPs), low cost terminals, multicast and caching, portable and mobile terminals, network integration. The latter deserves a particular

attention: satellite networks need to be integrated with existing wireless and cable solutions and, in this perspective, an integrated QoS-oriented proposal is essential for the commercial success. The key words are: heterogeneous architectures; traffic modeling; cross-layer approaches and QoS mapping.

What about applications that can have full benefit from satellite environments or where satellite links are essential? A possible broad classification is: service provision in remote and low dense areas, aeronautical services, interplanetary communications. Interesting applications are in the field of navigation and localization, disaster prediction, safety for critical users, search and rescue, internet connection and data transmission for maritime environment, aviation and trains.

*Dr. Mario Marchese, Vice-Chair
Satellite and Space Communications
Technical Committee*

FORTHCOMING GLOBECOM AND ICC CONFERENCES

ICC 2005

May 16 – 20, 2005,
Seoul, Korea

Today, the major trend of telecommunication networks and services is ‘convergence’ and ‘seamless provision.’ Reflecting this trend, the executive committee chose ‘towards the era of ubiquitous networks’ as the theme of ICC 2005. Under this theme, ICC 2005 will feature the latest developments in telecommunications from a technical perspective and discuss likely trends with leading technical specialists from all over the world. At the same time, influential business figures will be invited to add business flavor to ICC 2005.

MILCOM 2005

October 17-21, 2005,
Atlantic City, NJ, USA

The theme for MILCOM 2005 is “Innovation...Fueling the Transformation”. The technical sessions and exhibits will focus on information relevant to communication and information systems capabilities that address the 21st century challenges of National Defense and Homeland Security.

COSPONSORING / RELATED CONFERENCES AND WORKSHOPS

Globecom 2005

November 28 – December 2, 2005,

GLOBECOM 2005 is held in St. Louis, Missouri, USA to celebrate discoveries in communications: past, present, and future. It will feature three keynote presentations, 8 technical symposia, tutorials and workshops, design & developers forum, application sessions, and a student program. Papers will be refereed and published in the conference record.

ICSSC 2005

September 26 - 30, 2005,
Rome, Italy.

ICSSC is a premier technical conference covering all aspects of satellite communication. It is a forum for satellite systems developers, spacecraft and launch vehicle specialists, component and equipment designers, communications experts, network planners, satellite operators and telecom service providers. Presentations and papers cover advances in communications techniques, technologies and systems architectures, as well as their impacts on applications and services (including fixed, broadcast, mobile and personal communications).

CONFERENCE CALENDAR

CONFERENCE	LOCATION	INFORMATION
ICC 2005 Int. Conf. on Communications	May 16 - 20, 2005, Seoul, Korea	http://www.icc05.org/
VTC 2005 Spring IEEE Vehicular Technology Conference Spring 2005	May 29 – June 1 2005 Stockholm, Sweden	http://vtc2005spring.org/
INFOCOM 2005 The IEEE Conference on Computer Communications	March 13-17, 2005 Miami, FL, USA	http://www.ieee-infocom.org/2005/
WCNC 2005 IEEE Wireless Comms & Networking Conference	March 13-17, 2005 New Orleans, LA, USA	http://www.ieee-wcnc.org/
SPECTS 2005 Int. Symp. on Performance Evaluation of Computer & Telecommunication Systems	July 23-28, 2005 Philadelphia, PA, USA	http://www.scs.org/
ICSSC 2005 23 rd AIAA International Communications Satellite Systems Conference	September 26 - 30, 2005, Rome, Italy	www.aiaa-icssc.org
MILCOM 2005 IEEE/AFCEA Military Communications Conference	October 17-21, 2005, Atlantic City, NJ, USA	http://www.milcom.org/2005/
PIRMC 2005 16th IEEE Int. Symp. on Personal, Indoor & Mobile Radio Communications	September 11-14, 2005 Berlin, Germany	http://www.vde.com/Conferences_en/Pimrc2005/
VTC Fall 2005 IEEE Vehicular Technology Conference Fall 2005	September 26-29, 2005 Dallas, TX, USA	http://ewh.ieee.org/soc/vts/conf/temp/Dallas_VTC.pdf
GLOBECOM 2005 IEEE Global Communications Conference	November 28 – December 2, 2005, St. Louis, MO, USA	http://www.ieee-globecom.org/2005/

To all SSC members: If your postal address, telephone or fax numbers have changed, please update them with the committee secretary. You can review our current records on our web page at <http://www.comsoc.org/~ssc/>.

If you like to join SSC Mailing List, the indications how to subscribe/unsubscribe are reported at <http://cassius.ee.usyd.edu.au/mailman/listinfo/ssc>.

SatNEx – A Network of Excellence in Satellite Communications

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Introduction

Satellite communications represents a specialized area of telecommunications. While the development of satellite technology is relatively slow in comparison to wireless networks evolution, due to the need for high reliability, the services that satellites are able to offer are evolving at much the same pace as their terrestrial counterparts. It is within this context that the Satellite Communications Network of Excellence (SatNEx) has evolved its initiative, the aim being to serve the engineering community with the latest technological trends, while also providing a solid grounding in the fundamentals for those new to the subject area.

SatNEx: A Long-Term Research Vision

The SatNEx consortium forms a pan-European network of research organizations and higher education institutions, see Table 1. European research in satellite communications requires a long-term vision from which to develop a technology and service roadmap that will drive the longer-term research programme. SatNEx aims to produce this vision, in collaboration with industry. In developing the satellite vision, it is intended to work closely with the Advanced Satellite Mobile Systems Task Force (ASMS-TF) for fixed broadband, mobile, broadcast and navigation/positioning areas.

A major aim of SatNEx is to rectify the fragmentation in satellite communications research by bringing together leading European academic research organizations in a durable way. The creation of the Network aims to establish critical mass and allow access to a range of expertise currently distributed across Europe. In this respect, mobility is an important aspect of SatNEx's work, with academic staff and research students being

encouraged to move between institutions to allow access to specialized research equipment and to facilitate research integration. Another key goal of SatNEx is the establishment of a common communications platform that will also exploit satellite communications technology to link all partners' sites. This platform will provide SatNEx partners with a range of opportunities for day-to-day communications, research and training. The ability to deliver interactive satellite communications lectures over a satellite link is a feature of SatNEx that is likely to be developed over the coming years. Particularly, the higher education institutions have as their mandate the production of new knowledge and the transfer of this knowledge to industry and to society at large. Within the SatNEx work programme, this is termed 'Spreading of Excellence', and encompasses activities dedicated to training, dissemination and standardization.

Work Organization: Joint Programme of Activities (JPA)

Figure 1 shows the workpackage (WP) breakdown structure of the Joint Programme of Activities.

- ✓ The Integrating Activities (WP 1000), led by DLR, support the jointly executed research (JER) (WP 2000) by:
 - coordinating the participants' research (WP 1100) and integrating research tools and testbeds (WP 1200);
 - providing a communication and collaboration platform based on satellite communications technology (WP 1300);

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- organizing the exchange of students and personnel between SatNEx partners (WP 1400);
- performing integrated management of knowledge and intellectual property (WP 1500).
- ✓ The Jointly Executed Research (JER) activities (WP 2000), led by University of Bologna, produce new knowledge and support WPs 1000 and 3000 by:
 - providing new knowledge and expertise;
 - producing scientific papers, along with papers of a tutorial nature;
 - developing common research tools and testbeds;
 - proposing suitable cases for personnel exchange.
- ✓ Finally, WP 3000, led by University of Bradford, primarily aims at the spreading of excellence to Europe and beyond. This activity:
 - provides training opportunities for students and researchers from organizations that are not members of the Network and for practicing engineers (WP3100);
 - disseminates information and transfers knowledge through the generation of publications and supporting literature and media, including the webpage (WP 3200);
 - influences standardization and regulation, and enhances public awareness of the benefits of satellite communications (WP 3300).

The Management of the Network (WP 4000) is the responsibility of the Network Coordinator, DLR, with input from the leaders of WPs 2000 and 3000.

Whereas the WP structure (see Figure 1) is the organizational framework of SatNEx, setting out the scope of and also the responsibilities within the project, the Joint Activities (JAs) are the fundamental unit in the implementation of the SatNEx Joint Programme of Activities (JPA). A SatNEx JA is defined by a set of coherent activities, cost elements and procedures that are required to achieve a specified objective within an associated time frame. A team of SatNEx partners, termed a Joint Activity Team, jointly performs a JA. Each JA is focused on a relevant part of the JPA. The JAs are the new methods of putting the SatNEx objectives into practice – they are the elements that specify how the work is performed. Table 2 provides a list of the current JAs performed by SatNEx.

Conclusion

The SatNEx project has brought together twenty-one partner organizations from across the European Union with the aim of establishing strategic leadership in the area of satellite communications. This will be achieved through the performance of a joint programme of activities, which include integrating activities, jointly executed research and spreading of excellence. Details of the SatNEx activities can be found at the SatNEx website: <http://www.satnex.org>.

Acknowledgement

The EC funds SatNEx under the FP6 IST Programme.

<i>Partner</i>	<i>Country</i>
<i>German Aerospace Center (DLR)</i>	Germany
<i>Aristotle University of Thessaloniki</i>	Greece
<i>University of Bradford</i>	UK
<i>Budapest University of Technology and Economics</i>	Hungary
<i>Centre National d'Etudes Spatiales</i>	France
<i>Consorzio Nazionale Interuniversitario per le Telecomunicazioni</i>	Italy
<i>Fraunhofer Gesellschaft zur Förderung der Angewandten Forschung e.V.</i>	Germany
<i>Groupe des Ecoles des Télécommunications</i>	France
<i>Institute of Communication and Computer Systems of NTUA</i>	Greece
<i>National Observatory of Athens</i>	Greece
<i>Istituto di Scienze e Tecnologia dell'Informazione "Alessandro Faedo"</i>	Italy
<i>Jožef Stefan Institute</i>	Slovenia
<i>Rheinisch-Westfälische Technische Hochschule Aachen</i>	Germany
<i>Office National d'Etudes et de Recherches Aérospatiales / TeSA / SUPAERO</i>	France
<i>Institut für Kommunikationsnetze und Satellitenkommunikation, TU Graz</i>	Austria
<i>Universidad Carlos III de Madrid</i>	Spain
<i>The University of Surrey</i>	UK
<i>The University Court of the University of Aberdeen</i>	UK
<i>University of Bologna</i>	Italy
<i>Università Degli Studi Di Roma "Tor Vergata"</i>	Italy
<i>Universidad De Vigo</i>	Spain

Table 1. The SatNEx consortium.

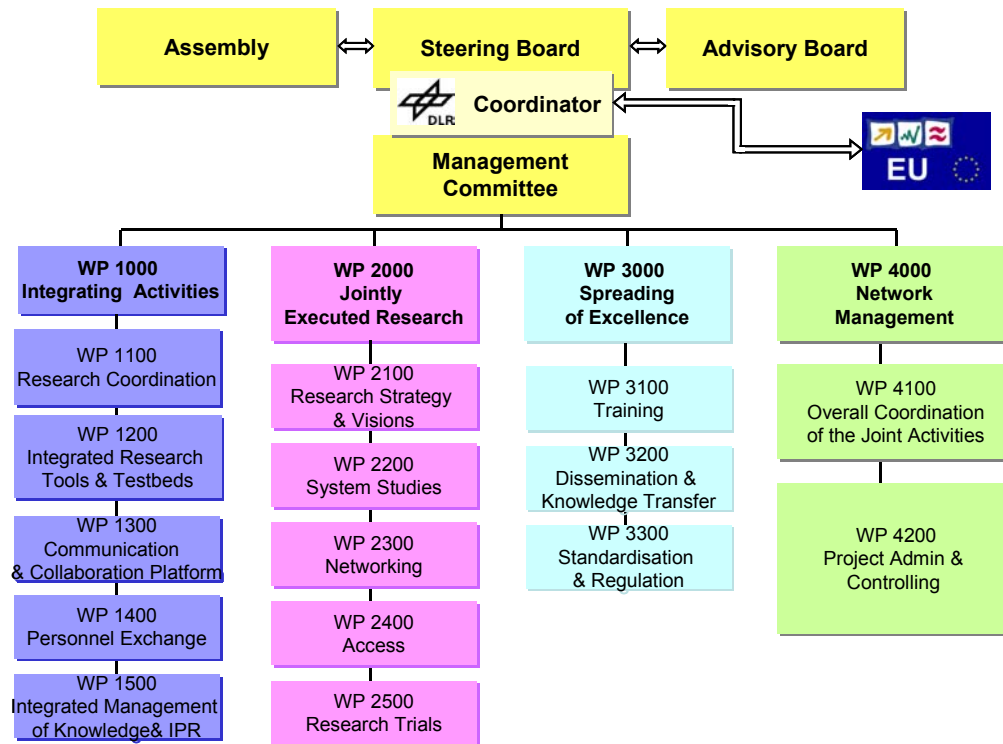


Fig. 1. The SatNEx workpackage (WP) structure.

<i>Joint Activity</i>	<i>Description</i>
<i>JA-1000</i>	Removing Barriers to Integration
<i>JA-1100</i>	Collective Research Portfolio
<i>JA-1300</i>	Networking Means for Integration and Dissemination
<i>JA-2100</i>	Research Strategy and Visions
<i>JA-2230</i>	High Altitude Platform Systems Architecture for Fixed and Mobile Communications
<i>JA-2300</i>	Network Performance and Protocols
<i>JA-2330</i>	Routing, Traffic Engineering and On-board Switching
<i>JA-2350</i>	Network Security and Network Management
<i>JA-2410</i>	Channel Modeling and Propagation Impairments Simulation
<i>JA-2420</i>	Flexible Waveforms
<i>JA-2430</i>	IP Quos and Radio Resource Management with Cross-Layer Approach
<i>JA-3200</i>	Conferences on Satellite Communications

Table 2. The SatNEx joint activities.