



IAP Project 7/23 : BESTCOM

*BElgian network on STochastic modelling, analysis,
design and optimization of COMmunication
systems*



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design and optimization of COMmunication
systems*

- October 2012 – September 2017
- Partners:
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 - Herwig Bruneel, UGent, P2
 - Hendrik Rogier, UGent, P3
 - Marc Moonen, KULeuven, P4
 - Merouane Debbah, Supelec, Paris, INT1
 - Anton Tjhuis, TUEindhoven, INT2
 - Onno Boxma, TUEindhoven, INT3

Summary

The DOMAIN covered by the proposal is that of
« **wired and wireless digital communication links
and networks** »,

- and in particular consists of the following areas:
 - traffic modelling and analysis,
 - communication channels modelling and shaping,
 - optimized algorithm design for transmission, reception, resource allocation, buffering and scheduling

Objectives

- To produce **fundamental research results** which are innovative at international level in the different areas of expertise of the network, and to generate **novel multi-disciplinary research** results by exploiting synergy between the diverse research teams;
- To organize the rapid **dissemination** of the new results generated by the partners, inside and outside the network;
- To offer excellent **workshops, summer schools and supporting material for PhD students and postdocs of the network**; to offer **training sessions** to the PhD students for **writing and reviewing** papers and making scientific presentations;

Objectives

- To make **available**, to the whole network, **research infrastructures** acquired by the partners (such as channel sounder and software radio interface);
- To take a leading role in the **organization** of a number of well selected major **scientific events** (such as IEEE SPAWC, IEEE PIMRC, MCQT, VALUETOOLS) and to organize an international BESTCOM conference;
- To interact and coordinate initiatives, when appropriate, with **other IAP networks** (such as the successors of DYSCO and PHOTONICS@BE if applicable).

WPs

- WP1: **Global performance metrics and macro-models for digital communication systems**
 - Cross-layer performance metrics for centralized and for distributed strategies
 - Stochastic macro-models for communication subsystems
- WP2: **Stochastic modelling for channel and traffic**
 - Stochastic full-wave modelling of multi-Gbit/s multiconductor wired links
 - Stochastic antenna and multidimensional propagation modelling
 - Space-time traffic models

WPs

- WP3: **Channel shaping, and transceiver algorithm design**
 - Signal/spectrum coordination and network MIMO
 - Distributed MIMO and cooperative communications
 - Channel and transceiver optimization for multi-Gbit/s backplane interconnects
- WP4: **Packet buffering and scheduling**
 - Buffers with generalized source models and arrival models
 - Buffers with generalized scheduling disciplines and packet rejection rules
 - Spectrum management and opportunistic scheduling in cognitive radio networks

Boards

- **Scientific board**
 - WP leaders and chaired by the project coordinator (PC)
 - to organize the interactions between WPs, and more particularly organize the appropriate interaction and integration between WP1 on the one hand, and WPs 2 to 4 on the other hand
- **Steering committee**
 - WP leaders, one representative for each partner, and chaired by the PC
 - discussing the possible financial issues;
 - monitoring the scientific progress of the network;
 - taking decisions about, and implementing the different activities and integration instruments detailed below;
 - having strategic discussions and making decisions about the objectives and the integration instruments.

Instruments

- **Workshops and thematic days**
 - Twice per year
- **Scientific PhD courses**
 - intensive sessions of 2/3 days
 - 2 courses a year
- **Educational PhD courses**
 - Help students write papers
 - Training about reviewing
 - Paper presentation

Instruments

- **PhD cosupervision**
 - Supervision by staff members of different partners
 - Joint diplomas
- **Exchange of researchers**
 - PhD students: one month with another partner
- **Financing of sabattical leaves**
 - Colleagues from foreign universities
 - Discussion within SC
 - Invitation to organize PhD course and/or contribute to thematic day
 - Interaction with PhD students

Instruments

- Collaborative website
 - Public and private sections
 - Public: meetings, seminars, workshop, courses
 - Private: post papers as soon as ready; enables constructive feedback
 - **Note: joint publications is a key target + acknowledge BESTCOM**
- Best joint paper award
- Electronic newsletter
 - Promised as monthly/seen as too often by one reviewer/quarterly ?
 - Information about members, PhD defenses, seminars, CFP, etc
- Strategic SC meeting
- Organisation of international conference