



**ISTITUTO SUPERIORE  
MARIO BOELLA**

# EXPRESSION OF INTEREST TO 5G PPP

*STRAND 1: RADIO NETWORK ARCHITECTURE AND  
TECHNOLOGIES*

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*M. Boella*  
**I S M B**

Istituto Superiore Mario Boella

**60**  
SECONDS



**TO PRESENT**  
**ISMB**

**135**

RESEARCHERS & STAFF



ONGOING PROJECTS

**19** EU FUNDED  
(FP7)

**36** INDUSTRIAL  
R&D

**18** NATIONAL AND  
REGIONAL



**7** RESEARCH AREAS

**4** FUNCTIONS

**3** STRATEGIC PROGRAMS

PUBLICATIONS

**960** TOTAL

**167** IN 2013

WORKFORCE COMPOSITION

**80%** MASTER DEGREE

**70%** ENGINEERS

**30%** PhD



OVERALL TURNOVER (IN 2013)

**10,5** MLN €

**5** MLN €  
CdSP FUNDING

**5,5** MLN €  
COMPETITIVE BUDGET

# STRAND 1: RADIO NETWORK ARCHITECTURE AND TECHNOLOGIES

- **P1: 5G Wireless System Design**

- **Multi-RAT systems for smart IoT objects** with **service-oriented cognitive** features
  - Cognitive features to avoid interference and optimize spectrum management while addressing specific requirements (QoS, medium efficiency, energy consumption, etc.)
- 5G systems integrating **multiple and new RATs** (White-space communications, IEEE 802.11ax, Light-Fi, etc.), **for RAN off-load**
  - **Cross-authentication** among heterogeneous RATs
  - **Cognitive coexistence** among **competing** RATs (e.g. IEEE 802.19)
  - **Service-oriented QoS/QoE** for *multimedia* and *cloud* services
- Innovative **spectrum management and interference treatment techniques** (e.g. antennas)

- **P2: Air Interface and Multi-Antenna, Multi-Service Air Interface below xx GHz**

- Energy-efficient radio technologies (including **antennas**) with **MIMO** capabilities
  - Spectral efficiency, interference mitigation, **adaptability in spectrum and space**

- **P4: 5G mm-Wave Air Interface**

- Fast reconfigurable multi-antenna systems in **mmW frequencies**
  - Flexible coverage, mobility and multi-user support

# STRAND 1: RADIO NETWORK ARCHITECTURE AND TECHNOLOGIES

- **P3: 5G MTC for Consumers and Professional Communications**
  - **Service architectures:** content adaptation, **context** awareness, **content-centric networks**
    - **Navigation, Location Based Services and GIS** in scenarios always connected and in scenarios with on-board cartography
  - Use cases design and **requirements elicitation** for services and applications focusing on **mobility, vehicles and users**
    - e-health, energy, tourism, emergency scenarios (both for professionals and consumers)
- **P5: 5G HW/SW Platforms**
  - Seamless interoperability among **smart IoT objects leveraging on multiple RANs**
    - Feasibility, flexibility, scalability, modularity, reconfigurability, and latency
- **P7: Backhaul/Fronthaul Integration**
  - PON signaling for a **unified backhaul/fronthaul control plane**
    - Front-hauling with **FDM / FDMA Passive Optical Network (PON)** with innovative Optical Network Units in silicon photonics
  - Hybrid architectures integrating **multi-RATs and Plastic optical Fiber (PoF)** for front-hauling – including Fiber-Wireless (Fi-Wi) and Radio over Fiber (RoF)

# CONTACTS

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