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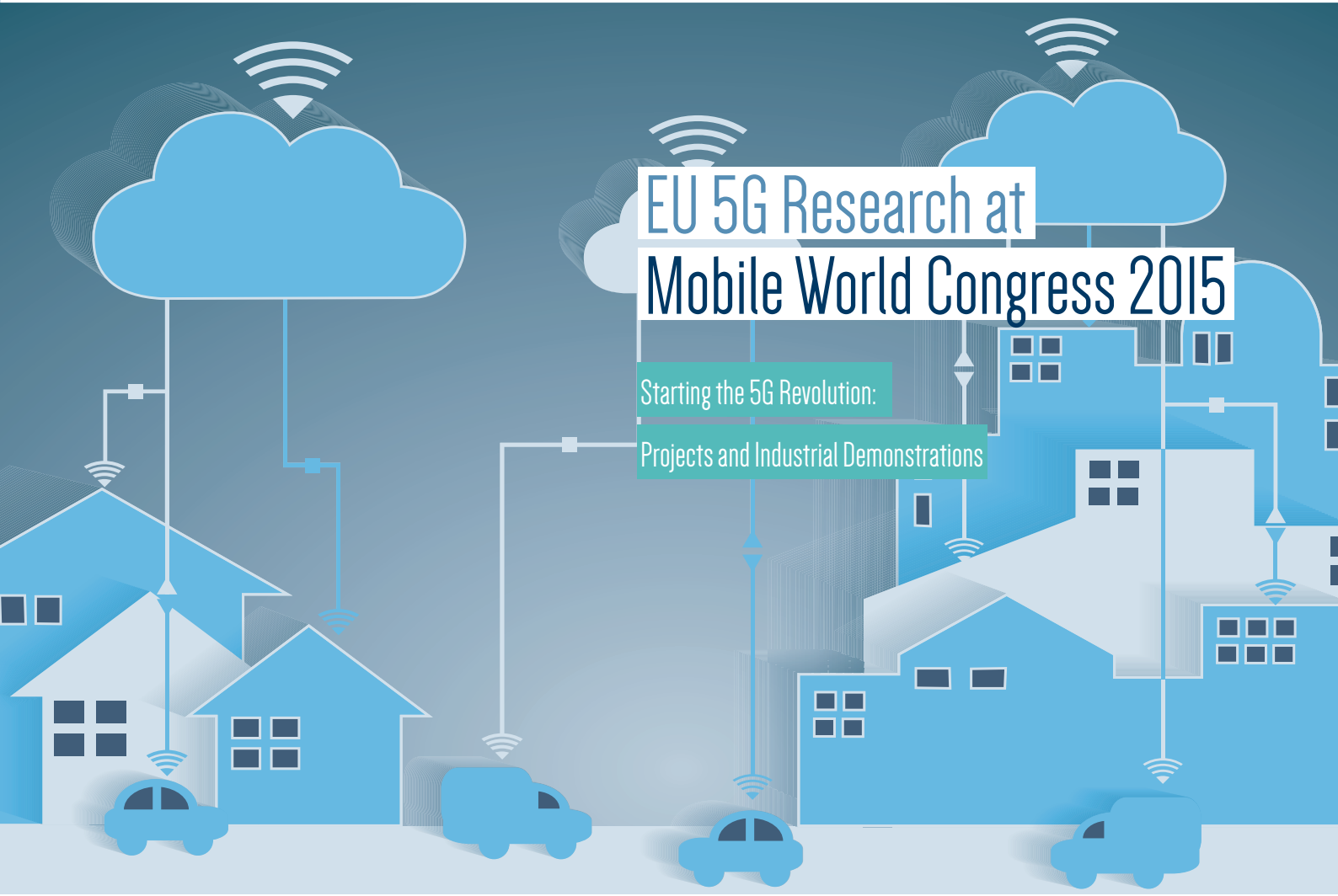
5G PPP



EU 5G Research at Mobile World Congress 2015

Starting the 5G Revolution:

Projects and Industrial Demonstrations

www.5g-ppp.eu

New Dimension of Communications and Services through Establishment of 5G Network Infrastructure for Internet of the Future

The European Commission together with Member States, European Industry and Research Community is launching The 5G Infrastructure Public Private Partnership (5G PPP) Programme for research and innovation actions towards design and implementation of the 5G network infrastructure until 2020. Wireless and wireline networking technologies, including satellite communications and broadcasting, are for the first time developed as a single multidimensional network allowing creation of a fully new horizon of applications and business models for benefits of European citizens and its economic growth.

Do not miss at Mobile World Congress

Tuesday 3 March 2015

The European Commissioner for Digital Economy and Society Günther H. Oettinger will speak at the second keynote panel, together with CEOs of major global telecommunications players.

Tuesday 3 March 2015
13:00-15:00
PRESS CONFERENCE
ROOM I CC4, MEDIA VILLAGE

5G PPP Press Event with participation of the Commissioner Oettinger and CTOs from Alcatel-Lucent, Ericsson, Nokia, Orange, SES, Intel, Huawei, DoCoMo, and Samsung.

Presentation of ongoing research on 5G in Europe

HALL 8 STAND 0BI7	Five demonstrations at the booth of the EU 5G Initiative

Additional demonstrations at MWC:

HALL 2	ERICSSON Device-to-device communication with interference cancellation, METIS Project
HALL I STAND IJ50	HUAWEI New Waveform Supporting Spectrum Flexibility, and Low Air Interface Latency, METIS Project
HALL 3 STAND 3KI0	ALCATEL LUCENT BELL LABS Blended traffic demo: 5G for broadband and M2M communication, 5GNOW Project
HALL 3 STAND 3BI0	NOKIA Real time bidirectional mmWave system for 5G, MiWaveS Project
HALL 6 STAND 6EI0	NATIONAL INSTRUMENTS 5G New Waveform Prototyping with LabVIEW Communicati ons on NI's SDR platform, 5GNOW Project
CONGRESS SQUARE CATALAN PAVILION BOOTH #22	In addition the STRAUSS Project will be demonstrated at the CTTC booth.

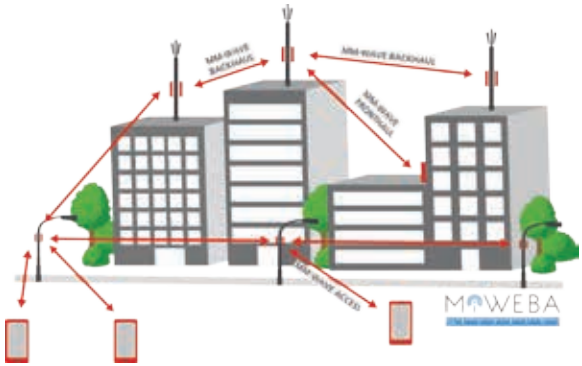
MIWEBA Project

Millimeter-wave small cell backhaul link

MiWEBA demonstrates a broadband small cell backhaul link at 60 GHz. Such wireless links are an essential building block for enhancing current mobile radio networks with additional small cell base stations, where wired backhaul is not available. MiWEBA also investigates how these small cells can utilize the millimeter-wave band to implement an overlay access network, largely improving the user connectivity.

MiWEBA: Evolve the networks backhaul, fronthaul and access links with millimeter-wave technology.

Contribution to 5G: capacity increase, network densification, small cell deployment.



MIWEBA

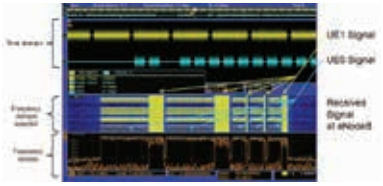
www.miweba.eu

Thomas Haustein
Kei Sakaguchi
info@miweba.eu

5GNOW Project

Fragmented spectrum and asynchronous multiuser for 5G systems – filter bank multi-carrier physical layer

5GNOW presents a reconfigurable FPGA/ARM digital baseband real-time hardware platform implementing fragmented spectrum usage for both transmitter and receiver based on FBMC modulation. This platform aims at demonstrating the FBMC built-in filtering feature that is well adapted to dynamic spectrum access notably in the fragmented case and well suited to asynchronous multiuser usage. The objective of the demonstration is thus to prove the feasibility of FBMC multiuser access (FBMC-MA) in a fragmented asynchronous environment based on an frequency domain processing architecture that allows for more efficient multiuser asynchronous reception compared to OFDM. The setup is composed of two non-synchronized user equipment transmitters and one base station receiver. Real time transmission will be done through RF front ends at 2.7GHz via National Instrument NI PXIe-1062 equipment. The application running on top of the physical layer is made of an uplink video conference service for the first user and web browsing for the second user.



This work is part of the European 5GNOW project (www.5gnow.eu), which is questioning the design targets of LTE and LTE-Advanced and the obedience to strict synchronism and orthogonality.

5GNOW

www.5gnow.eu

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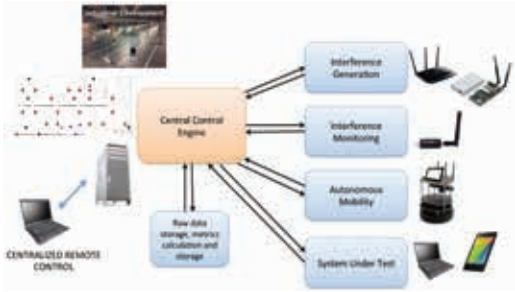
CREW/EVARILOS Project

Remote evaluation of RF-based indoor localization

Many indoor localization solutions seriously underperform in real-world deployments. Performance of wireless solutions is strongly influenced by the wireless environment, in particular the wireless propagation characteristics (that heavily depend on the type of building), and the presence of interference (caused by other devices transmitting in the same spectral band). In the CREW/EVARILOS demo, we show a benchmarking framework that measures the performance of a specific indoor localization solution in different physical wireless environments (office versus industrial environment) and under different interference conditions (ranging from no interference to heavy interference). The benchmarking framework allows fair performance evaluation of and fair comparison between indoor localization solutions operating under replicable conditions. The benchmarking process is further fully automated by using a robotic platform and can be controlled remotely. In the demo we will show the real-life benchmarking of a WiFi fingerprinting solution running in 2 open, large-scale wireless testbeds (an office environment at TU Berlin and an industrial environment at iMinds).



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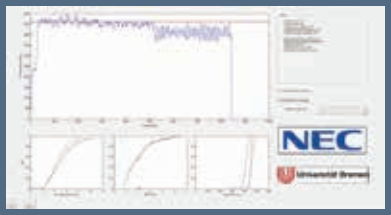
IJOIN Project

Novel system architecture thanks to mobile network intelligence centralization

iJOIN explores a novel system architecture where a major part of the mobile network intelligence is centralized and build on flexible, replaceable software. The iJOIN demo consists of the following two steps:

1. Cloud-RAN Implementation on commodity hardware: the demo runs commodity HW and implements a standard compliant 3GPPP LTE uplink decoding process.
2. SDN-based mobility: the demo relies on the SDN-based mobility solution proposed by iJOIN for load-balancing across Cloud-RAN data centers.

The flexibility and programmability provided by iJOIN allows for quick service time creation and can be applied to the emergence of an ecosystem of high-tech SMEs providing software for networks.



Live-Demo of CPU Load in Cloud-RAN

Live-Demo of SDN configured Mobile Network

iJOIN

www.ict-ijoin.eu

Peter Rost - NEC, Technical Manager
Albert Banchs - IMDEA Networks
Project Coordinator

METIS Project

Nomadic nodes for capacity increase

Future 5G systems envision a more dynamic network deployment capable to follow the user demands across the service area and provide connectivity there where it is needed. In this context, stationary vehicles can temporarily adopt the role of nomadic nodes and become part of the network infrastructure in order to increase the capacity, coverage and energy efficiency of the network. The video demonstrates the operation and potential gains that nomadic nodes can achieve in a realistic scenario.

PRESENTED BY

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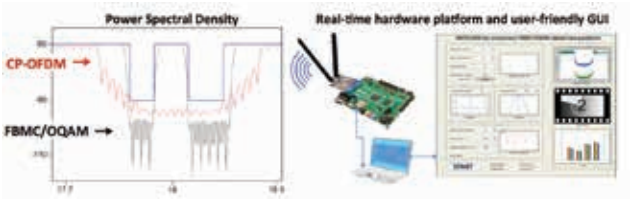
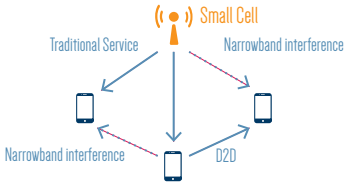
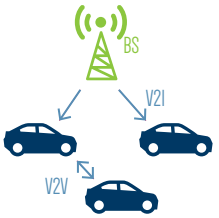
Flexible FBMC air interface for 5G

METIS project develops a 5G system concept to fulfil the requirements of the beyond-2020 connected information society and to extend today's wireless communication systems for new usage scenarios. The physical layer METIS test-bed is a real-time hardware platform providing a proof-of-concept for a flexible waveform based on Filter-Bank Multi-Carrier (FBMC) modulation. Over-the-air transmission is demonstrated using the recent Zynq-7000 All Programmable SoC (latest FPGA series with ARM Cortex-A9) paired with off-the-shelf RF modules. Multiple system parameters can be configured and Key Performance Indicators (KPIs) visualized through a user-friendly GUI.

Compared to state-of-the-art OFDM, as used in LTE, key advantages are better spectrum usage, resilience to imperfect synchronization and higher robustness to mobility (Doppler). Such advantages are key elements, with respect to 5G challenges resulting from the extension of asynchronous dense networks (including device-to-device and massive deployment of machines) and vehicular communications. Furthermore, the presented novel hardware architecture illustrates its efficiency in terms of complexity, latency, and energy consumption.







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CHALLENGES

1000 TIMES

INCREASING WIRELESS CAPACITY

20 BILLION HUMAN-CENTRIC TERMINAL

CONNECTING ALL PEOPLE

1 TRILLION

CONNECTING THINGS

90%

SAVING ENERGY

<5MS LATENCY

LOW LATENCY

99.999%

RELIABILITY

The 5G PPP will deliver solutions, architectures, technologies and standards for the ubiquitous next generation communication infrastructures of the coming decade.

The 5G PPP calls for a redesign of the architecture, services, and services capabilities and for a re-thinking of interfaces, wireless protocols and algorithms.

WHAT?

The 5G Infrastructure is not only an evolution of current generations, but also a revolution in the ICT field that will deliver highly efficient, ultra reliable, dependable, secure, privacy preserving, and delay critical services to everyone and everything. It will deliver fully immersive experience, realised as "All-as-a-Service", and it will offer connectivity to any object/service.

HOW?

The 5G calls for a redesign of the architecture, services, and services capabilities and for a re-thinking of interfaces, wireless protocols and algorithms. Several challenges- + wireless capacity x1000, connecting 7b people and 7t things, saving 90% energy, perceiving 0 downtime- still need to be addressed.

WHEN?

The requirements and challenges must be in place before 2016: intensive standardisation activities and large field test trials and testing shall take place before 2020.

WHO?

Europe can make this happen through crucial investments in 5G technologies, related measures and key initiatives such as the EU 5G Infrastructure Public Private Partnership (5G PPP).

WHERE?

All demos are shown in Hall 8 Stand 0B17 in the open area, accessible to all MWC visitors!
Additional demos are shown in other vendor booths.

This material has been designed and printed with support from the 5-Alive project and the 5G Infrastructure Association. The 5-Alive Project has received funding by the European Commission's Horizon 2020 Programme under the grant agreement number: 643973.