

WS02-ET5GB: 7th International Workshop on Emerging Technologies for 5G and Beyond Wireless and Mobile Networks – Panel Statement “Beyond 5G”

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Active Research Topics and Collaborators on Wireless Systems

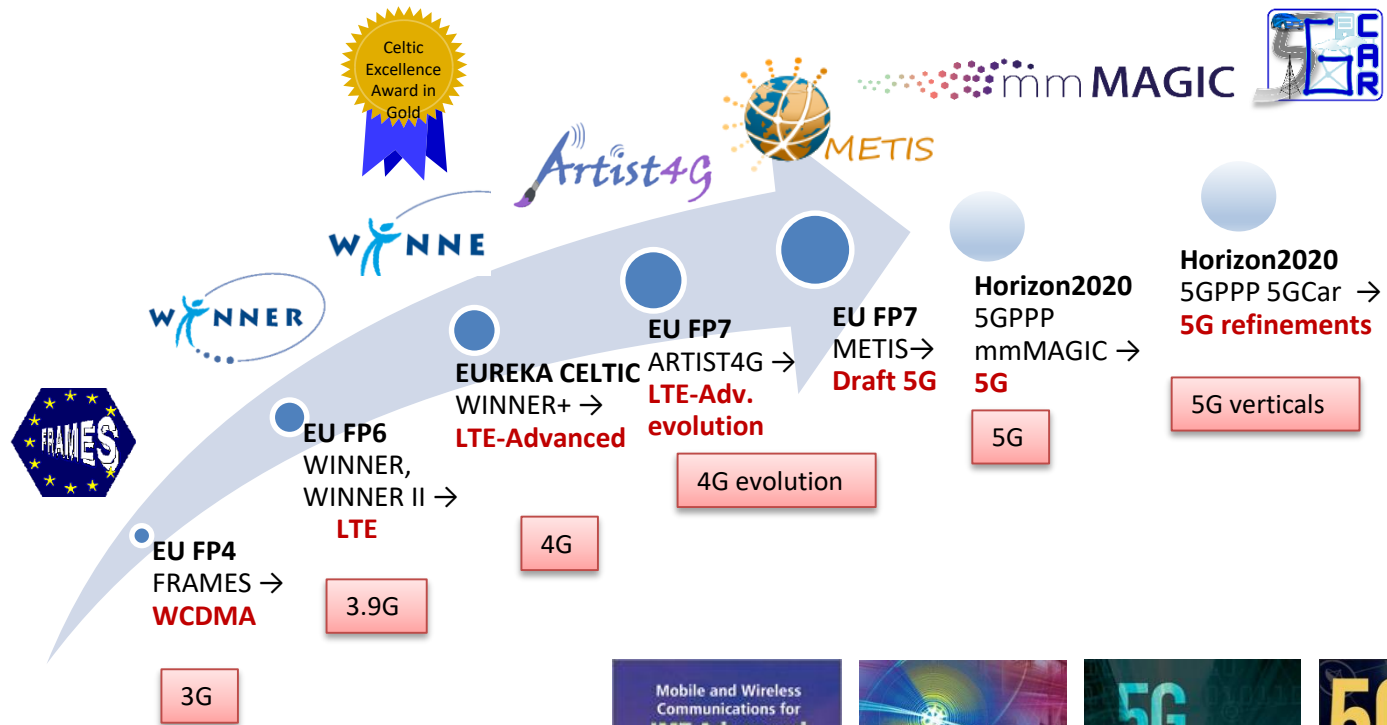


- Cooperative communications
 - CoMP with HARQ, HetNets, Relaying
 - Massive MIMO
 - D2D, Finite block length
- Ultra-dense wireless networks
 - Cooperative hybrid beamforming
 - Initial access
 - mm-wave based integrated access, backhaul and fronthaul
 - Hybrid RF-FSO
 - THz
- Cellular-V2X
 - Moving backhaul (V2I) links
 - Interference coordination
 - Moving BSs
 - Pro-active resource allocation
 - Integrated moving networks
 - Secure communications
- Internet of Things (IoT)
 - Waveforms
 - Energy harvesting networks
 - Architecture
- Satellite communications
 - Interference coordination for multi-user return links
- Networking
 - Energy efficiency
 - Joint fiber-wireless
 - *Network slicing enablers*
 - *Cloud-RANs*



Communications Systems group at Chalmers University of Technology

Impacts Wireless Standards: 3G, 4G, 5G, and counting...



<https://5g-ppp.eu/5gcar>

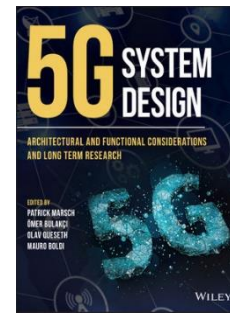
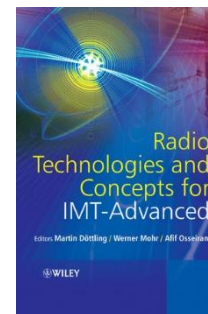
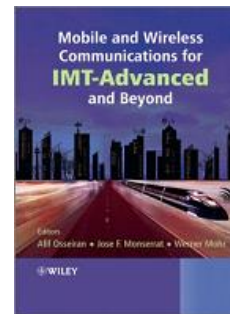
<https://5g-mmmagic.eu>

<https://www.metis2020.eu>

<https://ict-artist4g.eu>

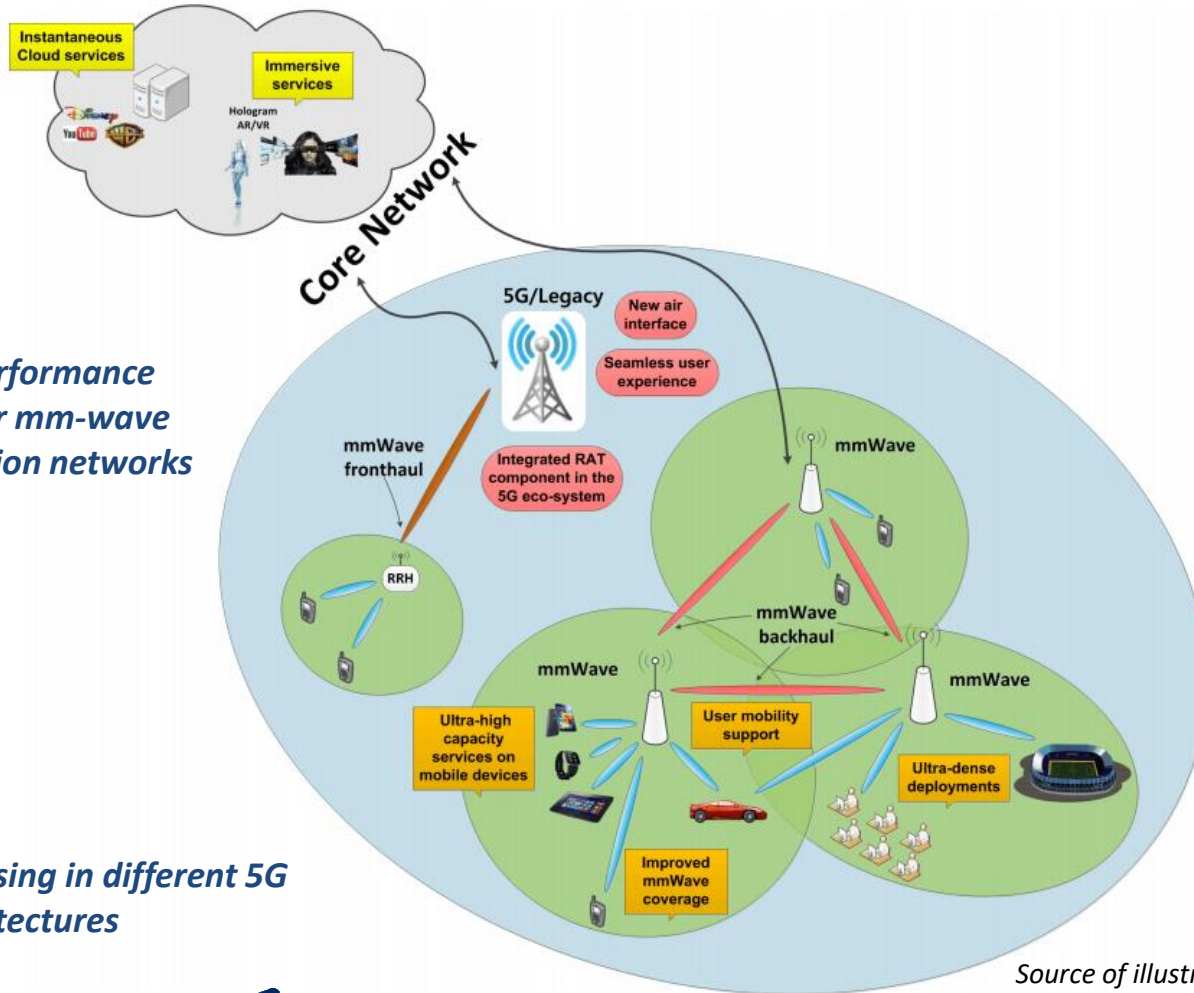
<http://projects.celtic-initiative.org/winner+>

<http://cordis.europa.eu/infowin/acts/rus/projects/ac090.htm>



+51 EU project deliverables (sofar)

MANTUA: Converged mmWave Access-Backhaul/Fronthaul Network



WP0: Key performance indicators for mm-wave communication networks

WP2: Cooperation and resource allocation in dense heterogeneous mm-wave networks

WP1: Processing in different 5G system architectures

WP3: Demonstration activities

Source of illustration: EU H2020 5GPPP mmMAGIC



5G and Beyond: A New Era Begins

Internet -> Mobile Internet -> ...

-> Wireless => Internet of Things



Source: <https://www.aeteurope.com/news/technologies-secure-internet-things/>

-> Robustness, Low latency => Internet of Skills!



Source: <https://www.ericsson.com/thinkingahead/the-networked-society-blog/2017/02/14/virtual-reality-comes-age-internet-skills/>

Looking ahead: Enabling Smart Society

- Internet of Skills
- Massive automation and AI
- Augmented reality

Sustainable and secure networking.

Enabling Technologies

- Access-Backhaul-Fronthaul/Core network convergence
 - Structured -> Unstructured networks
 - Cells -> Beams => tight design with antenna systems
 - Ultra-dense cooperative mesh networks
 - Generalized resource allocation and integrated mobility
- Vertical convergence => 3D networks
 - Vertical cells/beams, Satellite networks, Drones
- Ad-hoc network elements => Hybrid networks
 - Moving base stations => "Integrated Moving Networks"
 - Self-deployed network elements
- Context information for pro-active resource allocation
 - Out-of-system measurements, Big data aided
- Hybrid machine-learning/deterministic algorithms for complex reliable networks
- THz communications vs Free space optical communications
- Hybrid wireless/photonic networks
- Joint communications <-> sensing
- Holistic research on communications <-> computing
- Deeply integrated security
- Agile networks – "Network slicing"
 - Dynamic centralization/decentralization architecture
 - Adapt to instantaneous performance metric: throughput, latency, reliability, energy efficiency, security, ...
 - Utilize locality

Is coverage a business case?

Pioneering THz Frequency: THz Flagship

Mission: To catalyse the **revolution** of THz science and technology (S&T) and **transform** business of all the industries in the THz value chain in the next 10 years.

