

41st Meeting of the WWRF Closing Session

WIRELESS WORLD
RESEARCH FORUM®

Wireless World Research Forum Meeting 41
30 October - 1 November 2018 in Herning, Denmark



WORKING GROUPS

WGA/B

User Needs & Requirements; Services, and Devices, in a Wireless World.

Promoting a secure communications environment across multiple Socio-Economic settings based on user needs and requirements.

WG HF

High Frequencies (mmWAVE and THz) Radio Communications Technologies

Higher frequency radio communication technologies are expected to enable the vision of wireless transmissions towards the region of 1 Tbit/s. Improved channel modelling and the design of appropriate waveforms, baseband processing, medium access control (MAC) schemes and antenna array configurations are addressed.

VIP Water

Vertical Industry Platform - 5G for smart water management

A discussion platform about water management and study of the communication requirements, to assess whether 5G can take us faster and further than existing ICTs.

VIP RAIL

Track-to-Train communications

The focus identifying the potential benefits and hurdles for the future adoption of what today is known as 5G by rail transport systems worldwide. Security, reliability, IoT and dependability are playing a focal role in future radio communication systems for efficient train operations and safety.

WGC

New directions in communication architectures and Technologies

Guiding the mobile industry in the use of software, virtualization and cloud computing in future networks (both wireless and wired) by developing end-to-end network architectures, identifying the specific requirements and issues and addressing them by providing solutions that are practical and business driven.

WGD

Radio Communication Technologies

Advanced radio technologies and spectrum issues are investigated, to optimise the design of the air interface, medium access and heterogeneous multi-user, multi-RAT systems and identify trends and impact the wireless evolution towards 5g and beyond.

WG WAI

AI for Wireless Communications

Artificial Intelligence applied to the wireless communications domain is referred to as Wireless Intelligence (WI). This will be in all sub-systems within the wireless ecosystem. WI is expected by the market to not only reduce operational expenditures (OPEX), but also to increase user quality of experience (QoE) as well as help the introduction of new value chains in an increasingly competitive and complex business environment.

VIP CV

Connected vehicles

Focuses on research that looks five to ten years ahead in order to meet the requirements of the automotive and transport industries based on the next generation wireless technology.

VIP EMW

Ehealth, mobile health and wearables

Developing an e/m-Health and wearables vertical industry paradigm to expose the requirements of such systems to be 5G-enabled



WWRF41 WGA/ B Report

Knud Erik Skouby



9 presentations – focus on business models

Calls for participation in

A new VIP on 5G Business Models

Chaired by Knud Erik Skouby/ Peter Lindgren

WP on *Security in 5G Verticals*

Vol II of Developing Countries book (focus on new technologies', AI, blockchains..)

Interested in contributing, pls contact: skouby@cmi.aau.dk

- WP: ‘Security ion 5G Verticals’
 - Draft circulated Feb 2019; Final draft WWRF42
 - Contributions welcome
- VIP on ‘5G Business Models’ launch session at WWRF40
 - Ideas welcome
- Mobile in Developing Countries - a handbook, vol 2
 - Deadline for contributions 31, December 2018
- HICSS, January 8-11 2019, Hawaii
 - WWRF workshop ‘ User controlled privacy in Next generation mobile (5G)’
 - Minitrack: *Privacy and Economics*



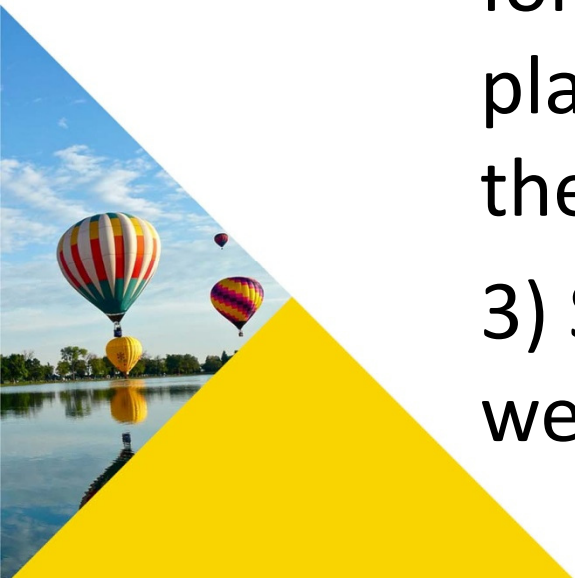
WWRF41 WGC Report

Sudhir Dixit,
WGC Chair



Working Group C (Chair – Sudhir Dixit)

- 1) There were no contributions to WGC and the group did not meet. However, a plenary session, called **Smart Networks** was organized and held on the opening day of the meeting
- 2) The draft of the Networking Slicing white paper is about 75% ready and will be available for comments by the end of November. The planned date of the release is to coincide with the next wwrf meeting in Tokyo Japan.
- 3) Suggestions to start a new white paper are welcome.



WGD, WG-HF and WG-EVAL

WWRF41 mtg report

Angeliki Alexiou

WGD/HF/EVAL Chair



B5G Workshop

WWRF41, Herning

30 October 2018

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Special Sessions on Next Generation of Wireless Systems	
Special Session 1 - Key Innovations Beyond 5G	
Session Chair: Angeliki Alexiou	
B5G Workshop : Key Innovations Beyond 5G	Angeliki Alexiou, Chair WWRF Working Group D, University of Piraeus, Greece
Molecular Communications	Yansha Deng, Kings College, University of London, UK
THz Communications: the new wireless frontier for systems B5G	Angeliki Alexiou, University of Piraeus, Greece
Improving 5G operation with UAV-Assisted links	Yevgeni Koucheryavy, Tampere University of Technology, Finland
Nokia Bell Labs' Views on B5G	Mikko Uusitalo, Nokia Bell Labs, Finland
Enabling Technologies for Large-scale Communication Systems	Constantinos Papadias, AIT, Greece



B5G Workshop

WWRF41, Herning

Key Take-aways

B5G Workshop objective: Identify the major technology challenges and relevant application and usage scenarios for systems B5G

1) Technology enablers/new air interface

- Molecular Communications
- THz Communications
- Large/massive antenna processing
- ??

2) New architectures/system concepts: machine learning, AI, ..

3) New deployment concepts (e.g. islands of BB, ..)

4) New apps/use cases (virtual reality, ..)

5) New / Critical challenges : Health concerns, 'endless' battery life, cost of new technologies,..

Next Steps

Follow up workshop/brainstorming session at next WWRF mtg, Special Issue CfP



WGD/HF/ITU EVAL session

WWRF41, Herning

31 October 2018

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WGD/WG HF/EVAL
WG Chair: Angeliki Alexiou
Extreme Eigenvalue Based Detection for Spectrum Sensing in Cognitive Radio under Impact of Noise and Interference Uncertainty - Albena Mihovska, Aarhus University, Denmark
5G Beyond till 6G: an update of the vision with a perspective from Hermes - Klaus David, Kassel University, Germany
International Telecommunications Union (ITU) Recommendations and challenges for Future Wireless Technologies in mm and THz Waves - Ashok Chandra
IMT 2020 Evaluation Group Activities, ITRI, Taiwan
Discussion and planning of WWRF IMT 2020 Evaluation Group Activities



- Session chaired by Wangzhixi (Huawei)
- Presentation: WAIA Introduction
 - Goal, WGs, targets and milestones
 - Collaboration with other organizations
 - TR on use cases and requirements
- White paper on AI
 - Skeleton was presented
 - Section 2: Wireless challenges
 - Section 3: Adoption of artificial intelligence in the wireless infrastructure
 - Section 4: Use case: Health



CV VIP wrap up

Sesh Mohan
VIP CV Chair



Summary of VIP CC Activities

- VIP CC White Paper Draft
 - The Chair briefly discussed the contents
 - Seven contributors have volunteered
 - Additional contributors are solicited
- Six papers were presented
 - Topics covered include pedestrian safety, AI and IoT-based smart transportation, localization, Machine learning-based driver drowsiness detection, blockchain-based privacy and security
- Sesh Mohan and Nigel Jefferies held a short meeting with Mikko Presser, Vice Chairman of IoT Week to be held in Aarhus in June 2019 to explore participation of WWRF. A couple of possibilities were discussed.



WWRF41 Meeting

Summary of Session 4: 5G for Water Industry

Miquel Payaró (miquel.payaro@cttc.es)

WWRF SB member

Chair of the VIP group “5G for smart water management”



Program of the session

- Official launch of the VIP group
- 4 talks:
 - Introduction, Goal of VIP Group, and water related activities at CTTC. Miquel (CTTC)
 - IoT-based precision irrigation and water management pilots. Dr. Soininen (VTT, SWAMP project)
 - Emergent water technologies for enabling newer digital water services. Mr. Corchero (EURECAT)
 - Cataract: A platform for the proactive management of water and utilities. Dr. Bantouna (WINGS ICT-Solutions)



Main highlights

- Water is one of the most critical resources on Earth and is currently under many threats
 - Increase of population, climate change, pollution
- Water management is very broad and can cover very different use cases:
 - Irrigation systems (agriculture, cities, etc.)
 - Pipe breaks and leakages
 - Water pollution
 - Emergency situations (e.g., floods)
- Thus, it can represent an opportunity for various stakeholders to innovate
 - Telco operators (on-demand topology and coverage)
 - ICT solutions companies (predictive analytics)
 - Equipment vendors (autonomous and self-deployable base stations)
 - Sensor manufacturers (low cost, disposable, environmentally friendly, ...)
 - Water supply and sanitation companies (holistic management of water cycle)



Main highlights

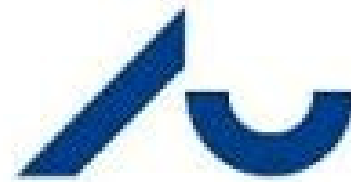
- There are many challenges that need to be addressed by ICTs for water management:
 - Number of sensors. Work needed to collect data (USB download in some cases). Cost.
 - Availability of power for communication infrastructures (autonomy is needed)
 - Coverage in remote areas
 - Amount of data to be transferred (hyperspectral vs. single value)
 - Scalability aspects (e.g., number of farms in water management area for irrigation in agriculture)
- 5G has the potential to address all these challenges, via:
 - 5G flavor of Internet of Things (IoT)
 - Multi-Access Edge Computing (MEC) and Cloud computing
 - 5G Built-in big data analytics, artificial intelligence/machine learning, and blockchain
 - Network virtualization and slicing
 - On demand infrastructure and variable topology
 - (...)
- Further analysis is needed!



Thanks to

Our Hosts

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HUAWEI

NOKIA



Special issue of VT Magazine

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- Deadline end of this week!
- Submit full papers to WG chair (or me)
- WG chairs will nominate suitable papers for review



Presentations from this event

- Username: wwrf-41
- Password: 18Herning=

At

- <https://www.wwrf41.ch/presentations-wwrf39.html>



WWRF meetings

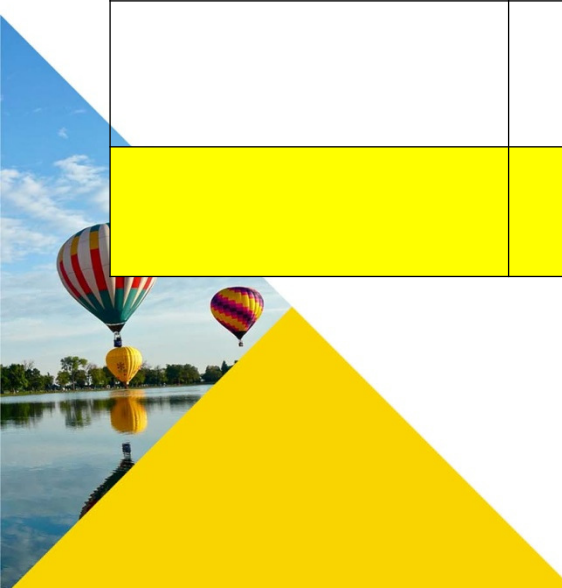
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- 5G Huddle, Tokyo, Japan, 14 May 2019
- WWRF42, Tokyo, Japan, 15-16 May 2019
- WWRF43, Thessaloniki, Greece, 9-11 October 2019
- 2020 meeting open for proposals



Other WWRF and related events

November 6th - 8th	NGMN https://ice2018.ngmn.org/	Vancouver, Canada	Full realisation of 5G vision to beyond 5G
8th -11th Jan 2019	HICSS	Hawaii, USA	User Controlled Privacy in Next Generation Mobile (5G) Mini Workshop: Privacy & Economics



Thank You and Goodbye!

