



# B5G/6G Wireless Connectivity: Technologies, Challenges and Applications

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# Institute work



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**Rainer Leupers**  
Professor



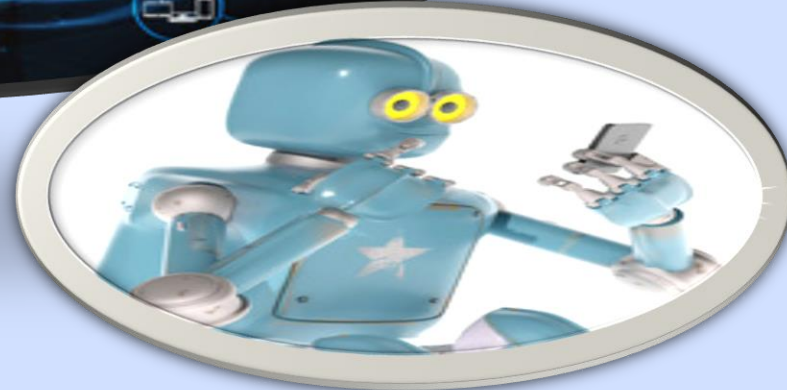
**Haris Gačanin**  
Professor

- ICE composed of two comprehensive chairs:
  - Chair for Software for Systems on Silicon (SSS)
  - Chair for Distributed Signal Processing (DSP)
- ~25 researchers
- ~10 non-academic staff



# Future is about experience-rich services

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# Connected intelligence through learning

The technological leap in an infrastructure that becomes self-aware and able to search for its own evolution path

Ubiquitous  
connectivity



Flexible and hyper-dense connectivity of everything

Communication  
sensing



Perceive and understand surroundings through ambient intelligence

Computing  
communications



Ultra-low cost and high energy efficiency of soft-radio with edge

# Requirements of radio applications

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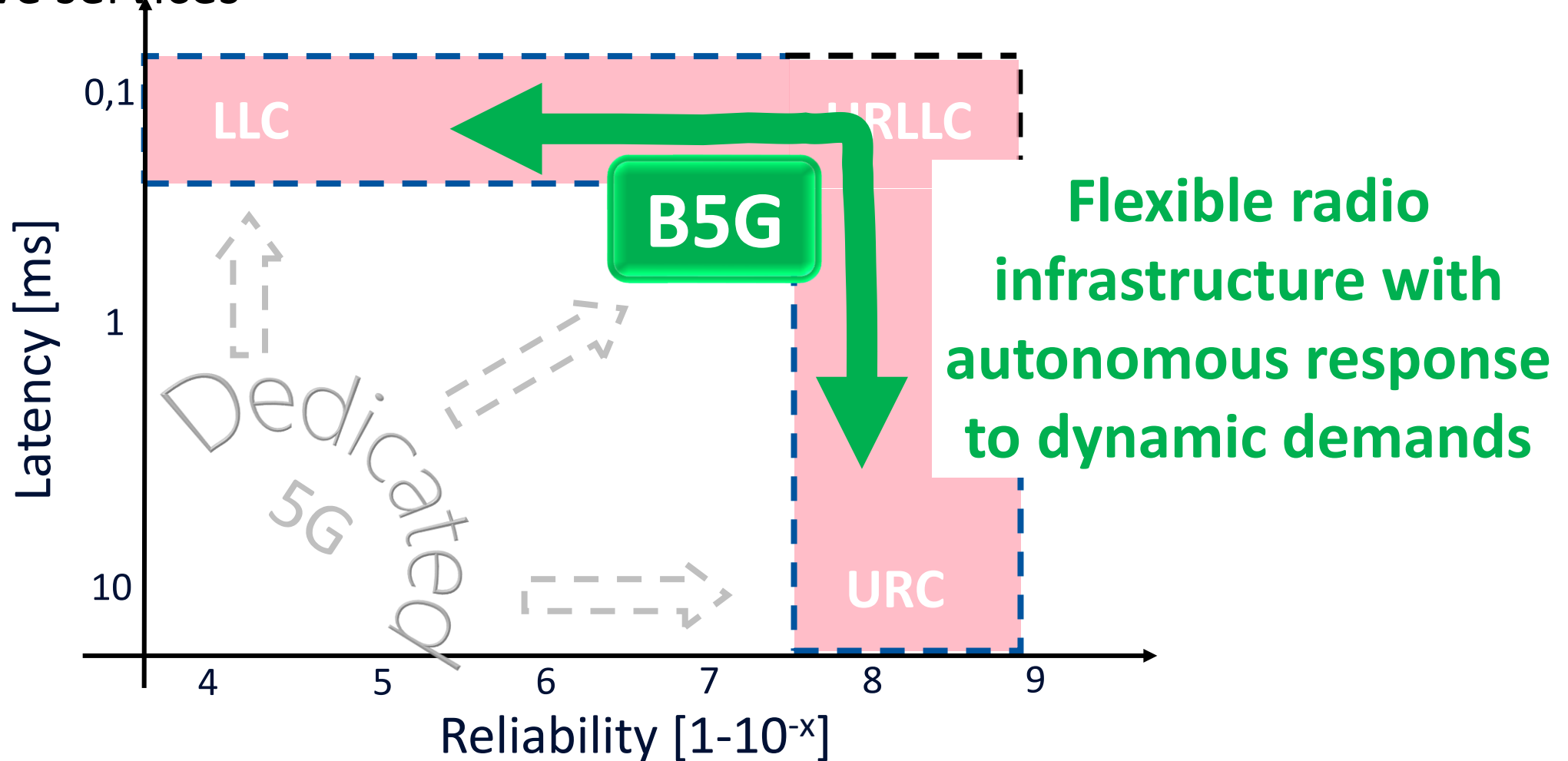
**Online radio operation in real-time with continuous transmission**

**Real-time learning at the speed of the target radio application**

**Sub-ms cross-device decision making**

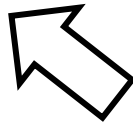
# Transition from dedicated to flexible connectivity

Delay sensitive services

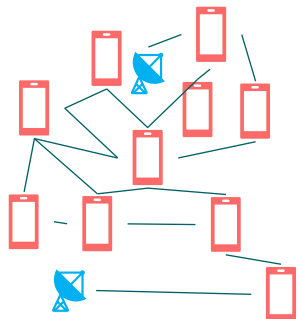


# Research topics @ ICE

Soft-radio  
infrastructure



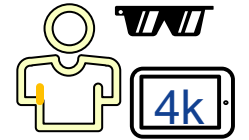
Extreme flexibility



Communications  
computing



Immersive sensing  
and communication





# Home example

<30ms computing delay for real time xR

Flexible computing design

Critical computing

Home network with xR

Edge cloud

High-end computing

Local cloud

Distributed processing

Cyber-physical interface

Network access control

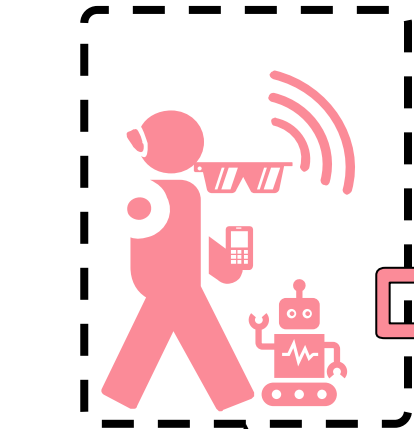
Autonomous network operations

Interference management  
Cyber-physical control  
Automated deployments  
Dynamic computing  
Flexible coverage

Home network APIs (PHY/MAC)

Flexible network

ca. 1ms network delay for real time xR experience



Customer space



The background is a vibrant blue with various abstract, wavy shapes in yellow, orange, red, green, and purple. A stylized rainbow logo, consisting of two concentric semi-circles in red, green, and blue, is positioned above and below the text. The text is white and centered.

True Radio Experience  
= @ ICE, RWTH Aachen =