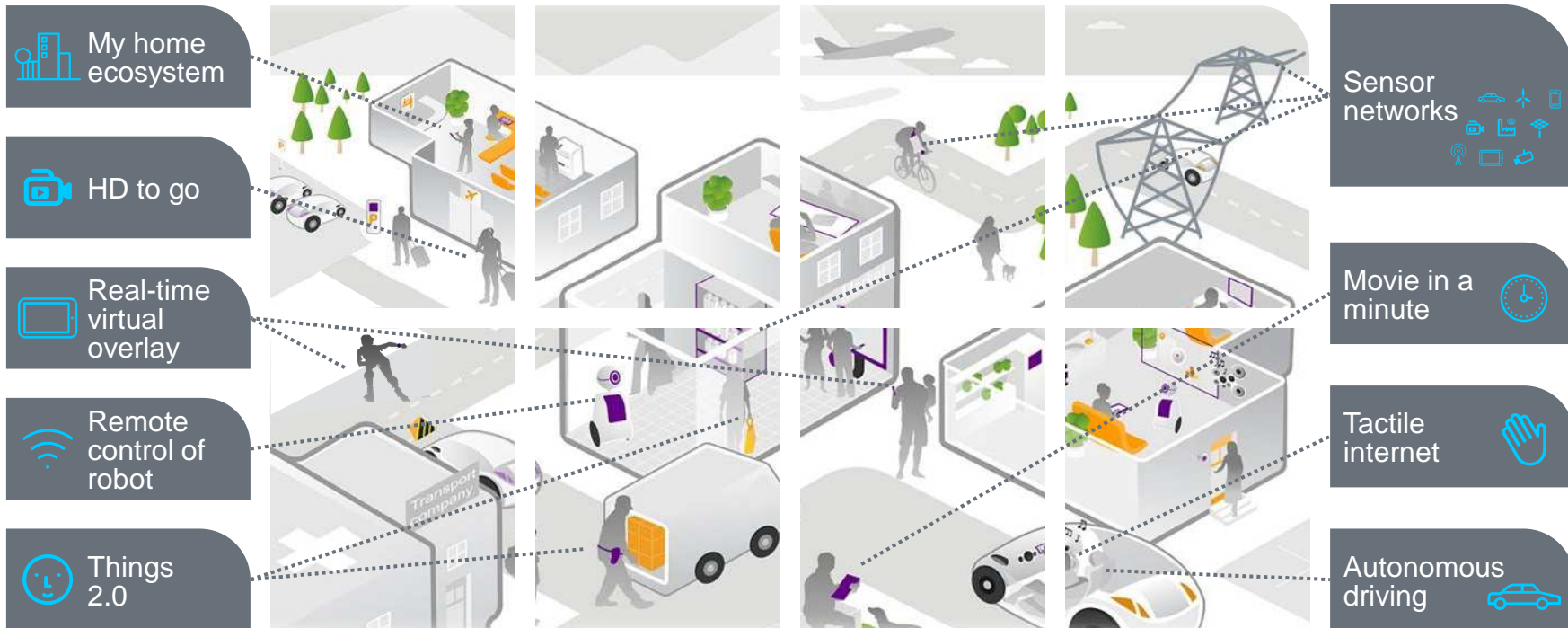


How 5G will contribute to the Future Internet

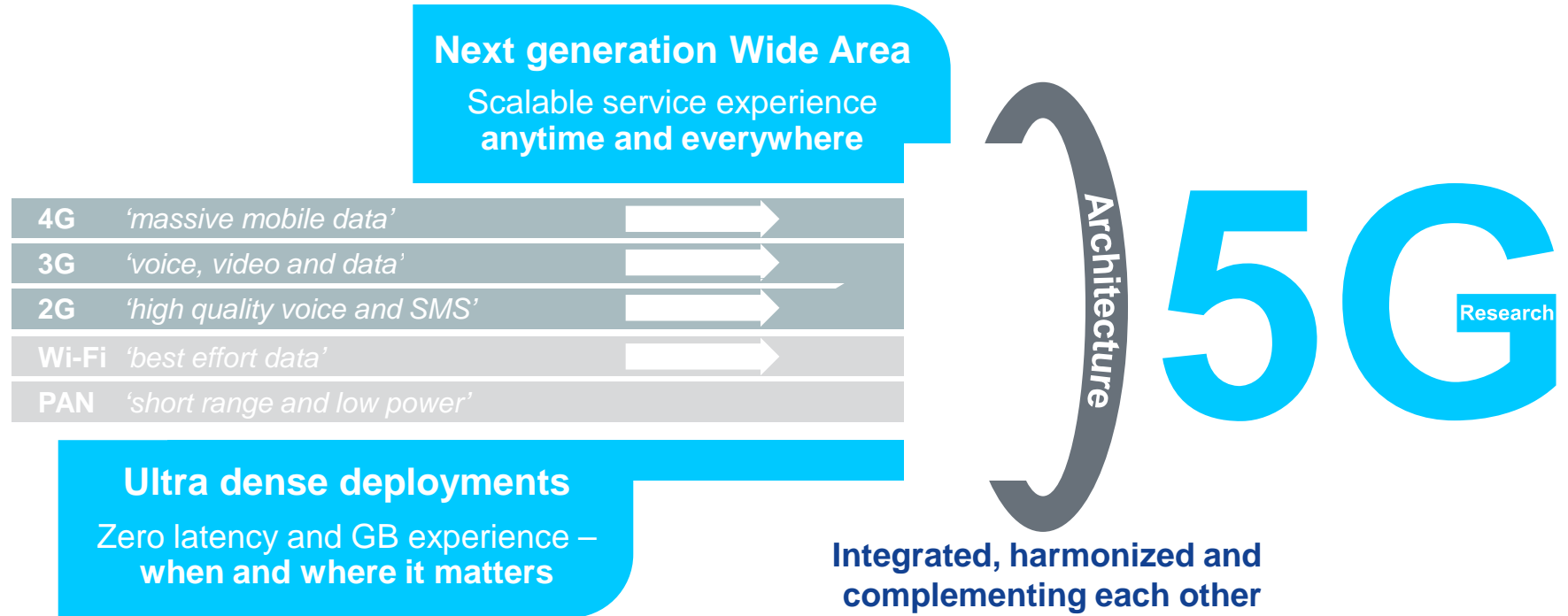
Werner Mohr, Nokia, Munich, Germany and
Chair of the Board of the 5G Infrastructure Association



The 2020+ experience

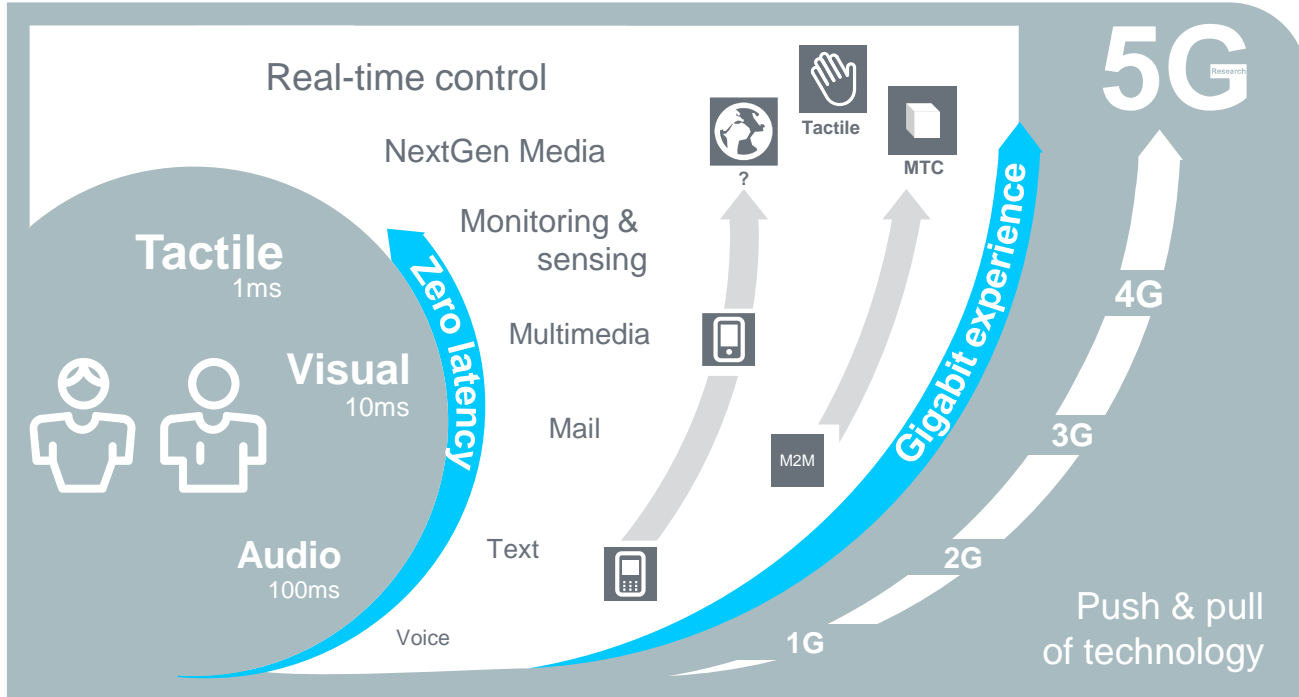


A symbiotic integration of novel and existing access technologies



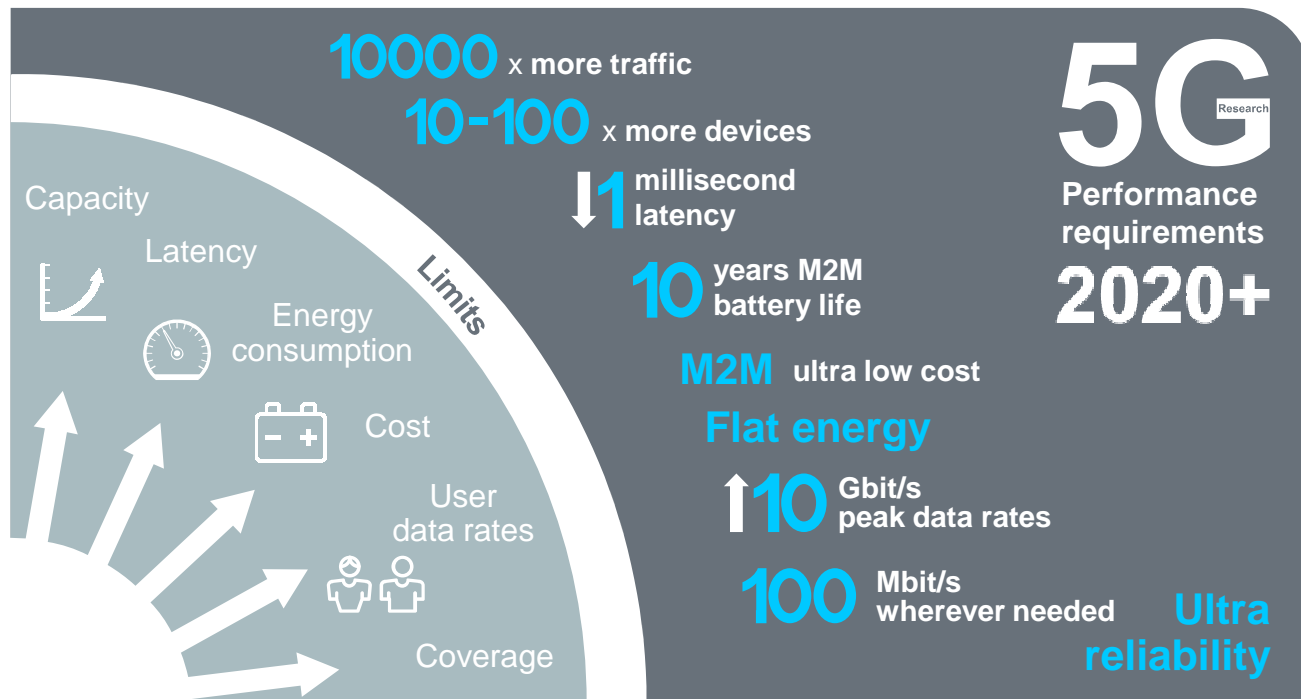
What we know about 5G demands

Higher capacity, lowest latency and more consistent experience



Flexibility for the today unknowns

Stretching performance targets for 5G



The exploration phase for a high performance 5G has started!

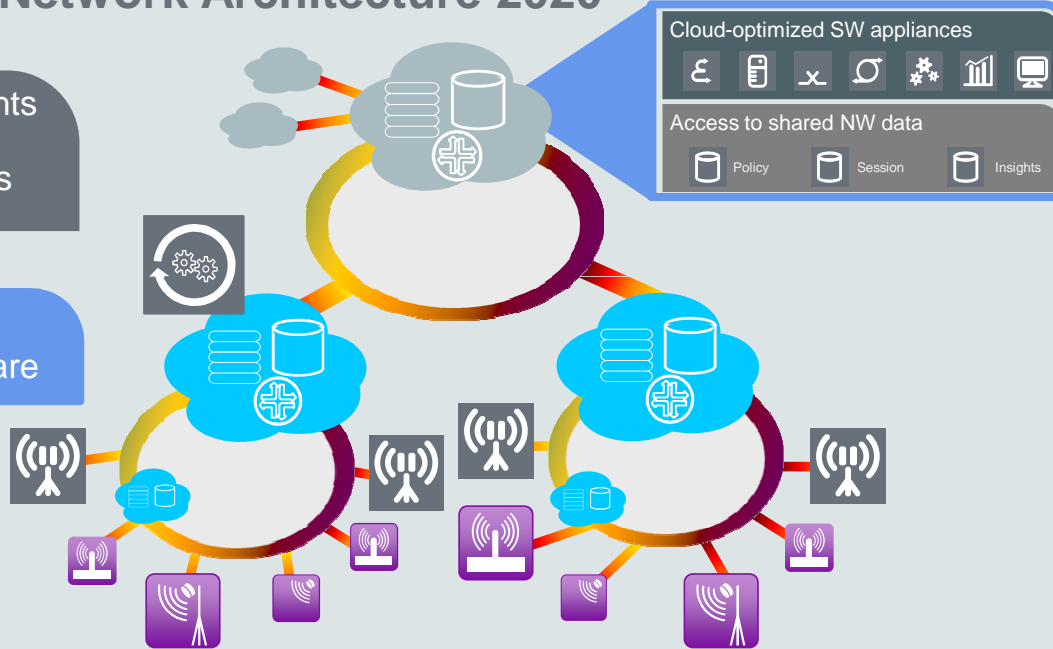
5G will not be a completely new wide area radio technology, but an integration of both novel and existing access technologies such as LTE-A and Wi-Fi.

Networks will undergo a fundamental transformation

Network Architecture 2020

Real-time insights and automated adaptive actions

Content and application aware



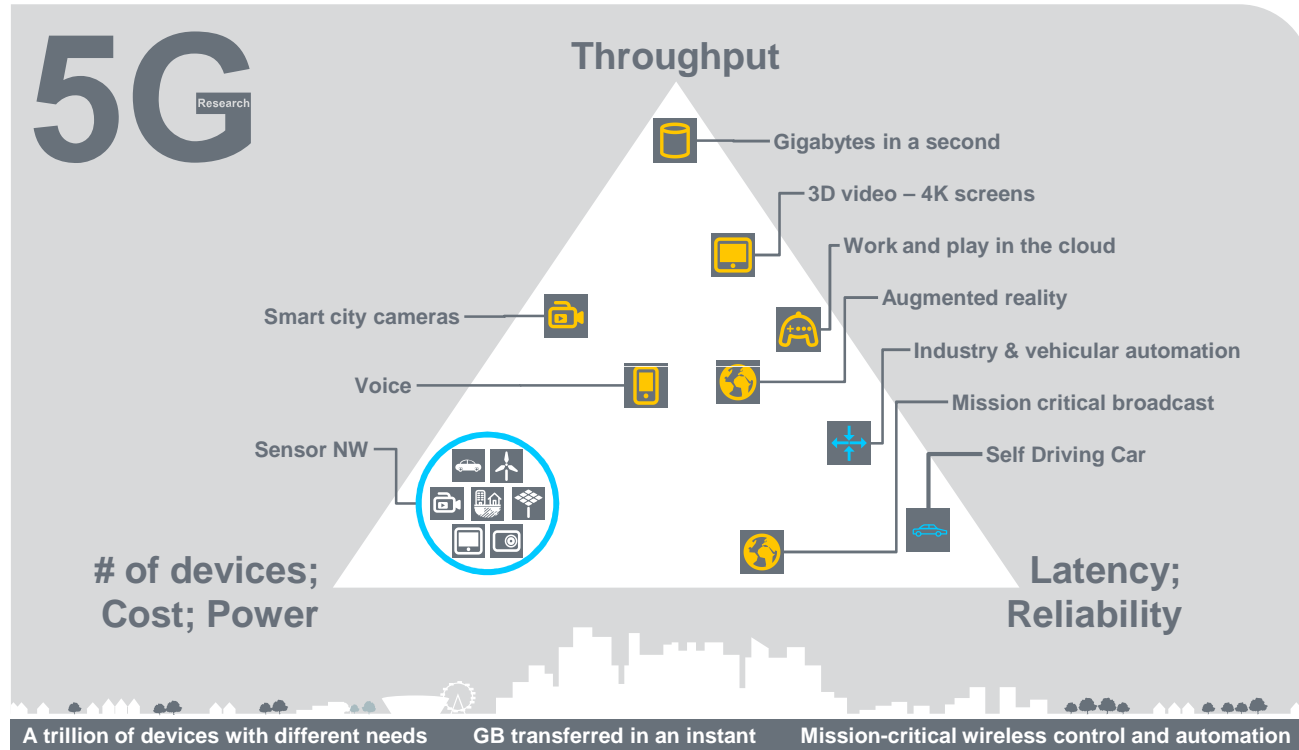
Flexibility & efficiency through virtualization and automation

Central data centers for efficient network control and XaaS offerings

Local data centers hosting multiple intelligent network applications

Heterogeneous access combining multiple technologies and cell sizes

Diversity of services, use cases and (extreme) requirements



Building a scalable service experience

International activities on 5G getting momentum – Examples



EU

- Framework Program 7, e.g. METIS and 5GNow projects
- 5G PPP in Horizon 2020



UK – 5G Innovation Centre (5GIC) at University of Surrey



US

- Intel Strategic Research Alliance (ISRA)
- NYU Wireless Research Center
- 4G Americas



China

- 863 Research Program
- Future Forum
- IMT-2020 (5G) Promotion Group



Japan – 2020 and Beyond Ad-Hoc Group under ARIB's Advanced Wireless Communications Study Committee



Korea – 5G Forum



Taiwan – Ministry of Economic Affairs, National Science Council



Russia – 5GRUS by Russia's Icom-Invest

CJK – White paper 5G requirements



NGMN – White paper on future requirements



Company internal research

Source: 5G Infrastructure Association.

Major milestones towards the 5G PPP implementation



- 5G PPP is a new instrument in Horizon 2020
- First Call for Proposals published on December 11, 2013
- Contractual Arrangement on 5G PPP signed between EU Commission and private side on December 17, 2013
- Budget for 2014 – 2020 time frame
 - 700 million € public funding
 - Matched by about 700 million € from private side
 - Including leveraging factor 5 of additional private investment value about 3.5 billion €
- 5G PPP industry launch at Mobile World Congress on February 24, 2014
- Submission deadline of proposals on November 25, 2014
- Project start first half of 2015



Proposed research program in 5G PPP



- Faster, More Powerful and More Energy Efficient Solutions for integrated High Capacity Access and Core Networks for a Wider Range of Services
 - Wireless Networks
 - Optical Networks
 - Automated Network Organisation - Network Management and Automation
 - Implementing Convergence Beyond the Access Last Mile
- Re-Designing the Network
 - Information Centric Networks
 - Network Function Virtualisation
 - Software Defined Networking
 - Networks of Clouds
- Ensuring availability, robustness and security
- Ensuring efficient hardware implementations

Summary



Demand for advanced data services and support of vertical sectors is increasing with challenging requirements on throughput, latency and user experience.

5G will be a combination of existing and evolving systems, like LTE-Advanced and Wi-Fi, coupled with new, revolutionary technologies designed to meet new requirements, such as virtually zero latency to support tactile Internet, machine control or augmented reality.

5G research is getting momentum globally.

In Europe 5G PPP launched in December 2013.

5G PPP Workshop at EuCNC 2014 “The 5G PPP: Vision and Opportunities”

- Bologna, Italy
- June 26, 2014
- <http://eucnc.eu/>



Acknowledgement: The author would like to thank his colleagues for their contributions.

NOKIA