

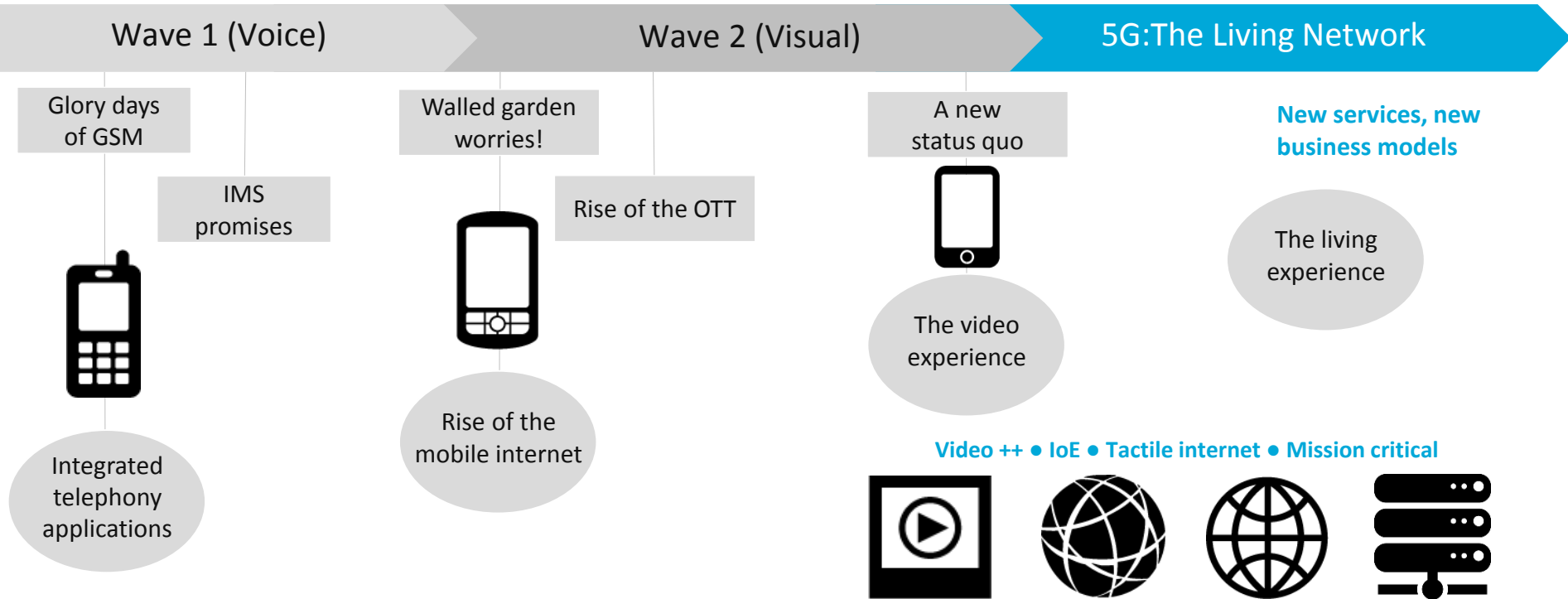
Advanced Services

Enabled by 5G Networks

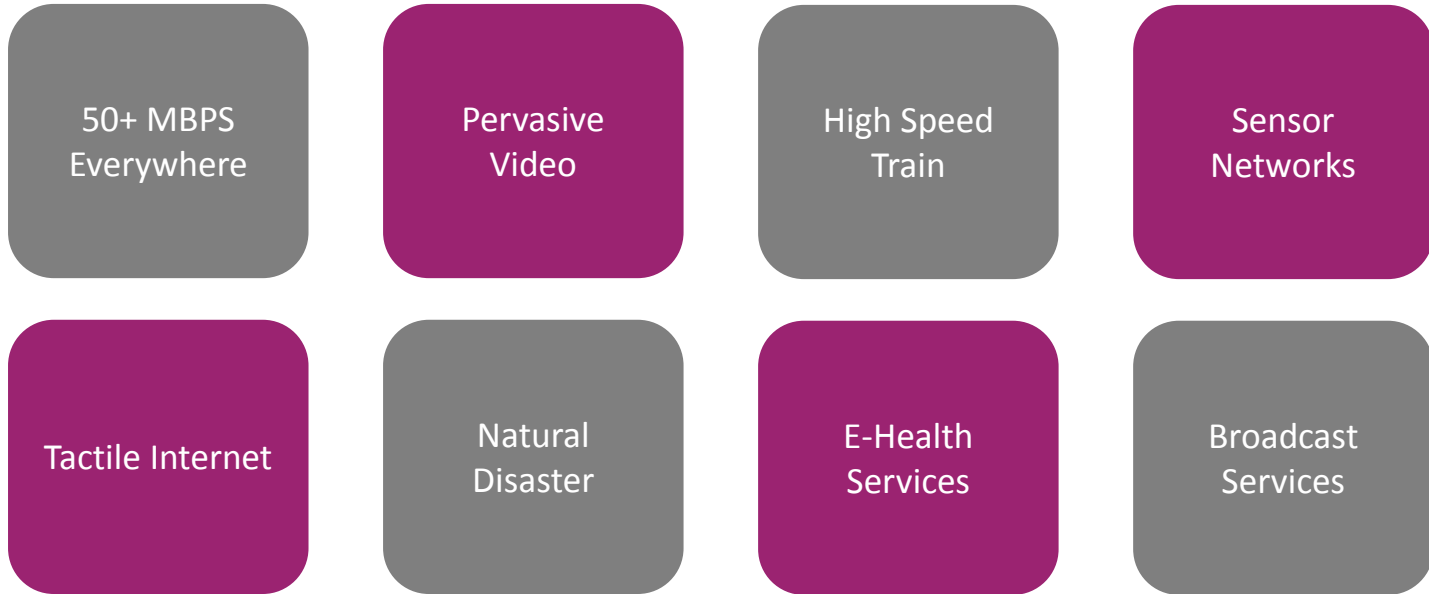
Mobile World Congress 2015

Services: the evolution to the smarter, living network

5G will deliver next level of experience and enabling business models



Emerging and New Use Cases Drive 5G Requirements



Source: NGMN Alliance, 5G White Paper – Executive Version, Dec. 2014

E-Health Services



mHealth will Emerge as One of the Biggest Applications of 5G

As wearable device use increases, it will lead to new types of “sentient” health devices that are aware of real-time changes in your health — and capable of relaying that information to health providers and loved ones.

Source: Neelie Kroes, Vice President of the EU Commission, MWC 2014

Healthcare would essentially become mobile, rather than being tethered to fixed spaces such as hospitals and clinics.

50 billion connected
devices by 2020



Some Stats

32 million health &
fitness wearables shipped
in 2013 (ABI Research)



67% reduction
in hospitalizations as
a result of the use of
telehealth reducing costs
by more than as much.

140% Greater Survival
Rate with PaceMaker
+ Remote Monitoring

Each year 350,000
Americans fall and break
a hip. 40% end up in
nursing home, and 20%
never walk again
[Gawande]

Our Mission: Use Technology to Extend the Period of Independent Living for Older People

Home Assisted Living (HAL) A Better Alternative to Nursing Homes

- Aging in Place (AiP): "the ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level."
- AiP typically requires onsite caregivers (relatives or visiting nurse services)
- Our goal is to develop technology that will be a substantial enabler of AiP

Capabilities

Monitoring Activities of Daily Living

Fall Risk Assessment and Intervention

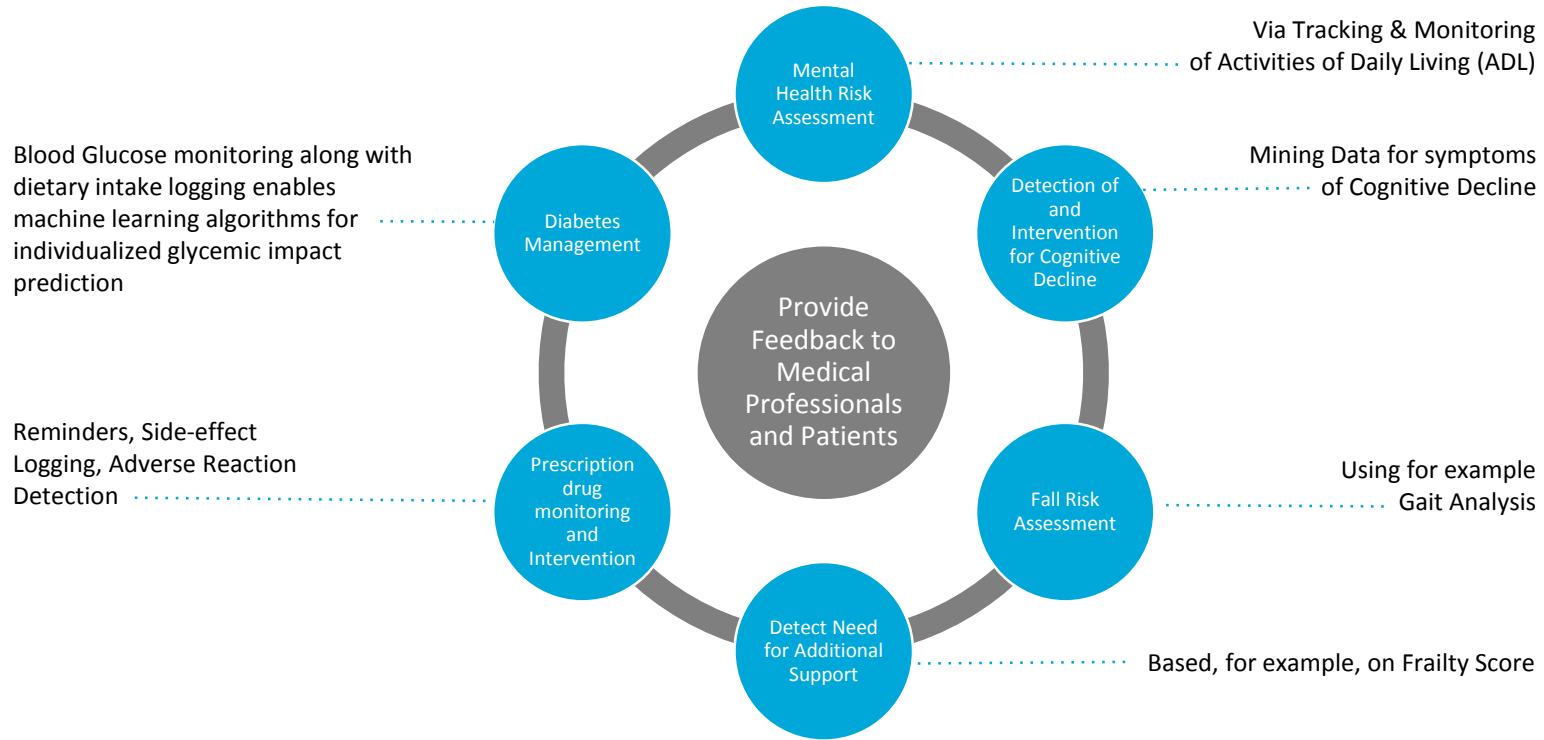
Cognitive Assessment and Intervention

Tracking/Guiding in Prescription Drug Therapies

Prediction and Intervention for Acute and/or Chronic Illnesses

Providing medical care for patients who cannot travel to the doctor's office: tele-health/tele-medicine

Our Solution



Pervasive Video and High Quality Content



Evolution of Video Recording, Delivery, and Reproduction

THE PAST

Invention of camera, still image photography, color reproduction, film, moving pictures

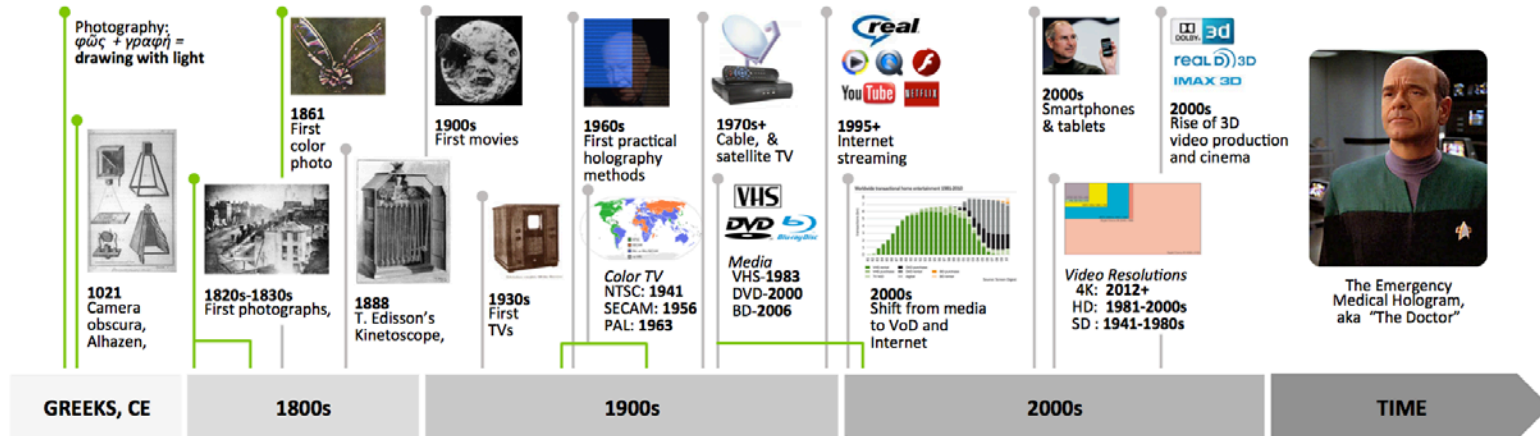
THE PRESENT/NEAR FUTURE

New delivery methods: TV, recordable media, Internet streaming, mobile

Increasing degree of realism: UHDTV, WCG, HDR, immersive video, etc.

FURTHER AHEAD

Video indistinguishable from reality



Improving Realism of Video

Ultra High Definition Television (UHDTV)

- UHDTV provides greatly improved experience over HDTV: higher resolution, wide color, increased bit-depth and frame rate
- The result is crisp, detailed images, increased field-of-view, and an immersive viewing experience
- UHDTV requires more data to be transmitted, and will rely on new network and CODEC technologies

Wide Color Gamut (WCG)

- Ability to capture, process, and display more realistic and vibrant colors
- Lack of WCG content for UHD is a challenge
- Skin-tone aware WCG mapping is needed

High Dynamic Range (HDR)

- Ability to represent extreme highlights and contrast of a realistic scene.
- Need to build a complete ecosystem for the creation, delivery and playback of HDR content
- Need in mapping legacy Low Dynamic Range (LDR) for HDR applications & the dual problem of mapping HDR to legacy displays

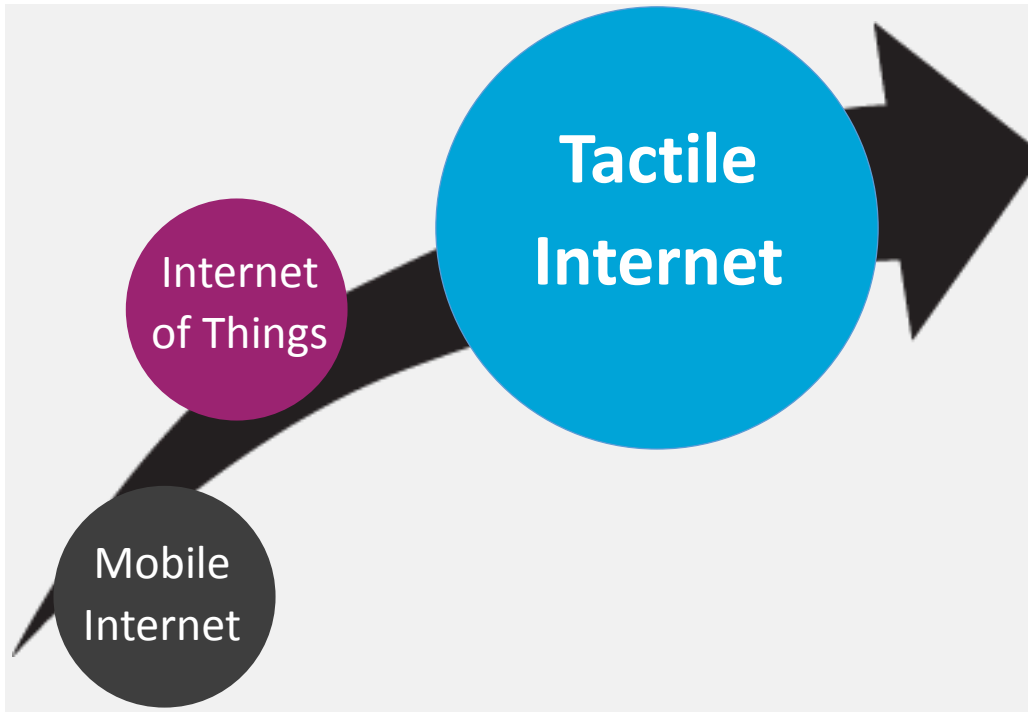
Multi-view Video

- Ability to capture and display variety of viewpoints of a scene.
- Applications include
 - Virtual and Augmented Reality
 - Head Coupled Perspective Rendering and Ultra Realistic Video

Learning about the viewer and their environment from device sensor data can improve the quality and delivery of these features as well as overcome the challenges caused by the increased volume of video traffic

Enabling Tactile Internet





Source: ITU-T Technology Watch Report, August 2014

Tactile Internet – A Revolutionary Leap

- Ultra fast reaction time
 - Round trip latency of a few milliseconds
- High Availability and Security
- Carrier Grade Reliability

Figure 3: Physical coupling of several users via a VR simulation with haptic feedback³

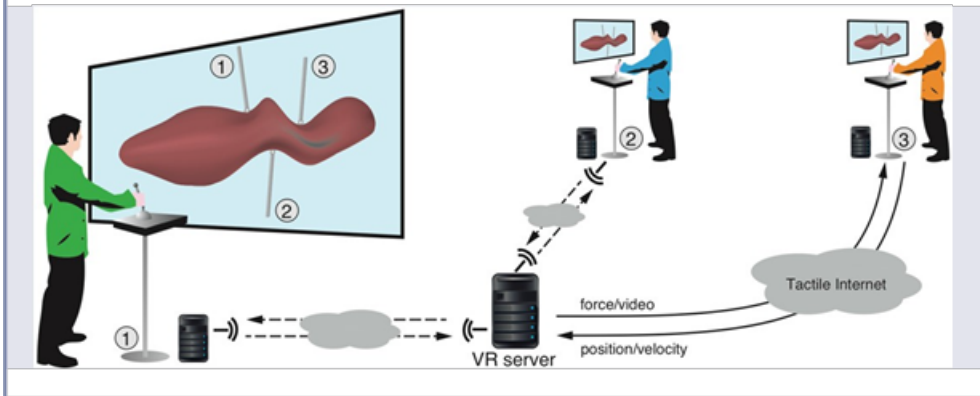


Figure 4: Driver assistance with augmentation of potentially dangerous objects and situations⁴

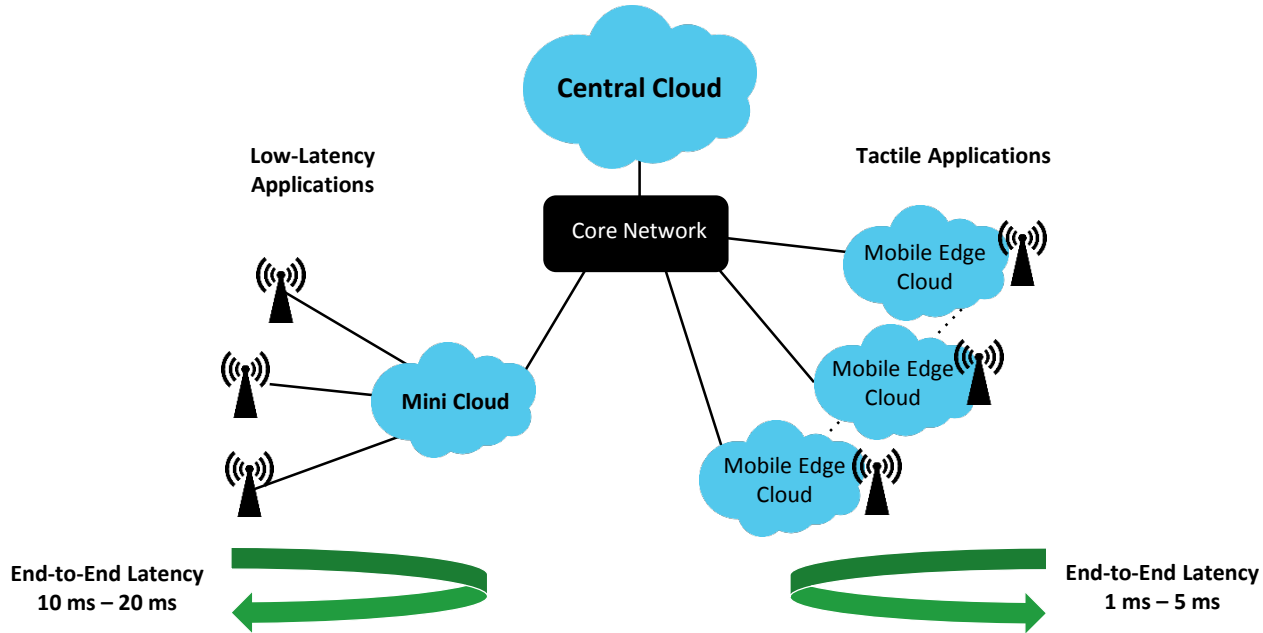


Source: ITU-T Technology Watch Report, August 2014

Novel Application Fields Addressing Societal Challenges

- Robotics and Telepresence, e.g. remote control robots for work in dangerous areas
- Virtual Reality to enable 'Shared Haptic Virtual Environment'
- Augmented Reality enabling new frontiers in assistance systems such as driver assistance, medicine and education
- Healthcare: Tele-diagnosis, tele-surgery and tele-rehabilitation
- Serious Gaming – games designed for purpose other than entertainment such as education, training, and health

ITU-T Vision of the System Architecture



Source: ITU-T Technology Watch Report, August 2014

Research Challenges and Opportunities

Low Latency

Latency driven routing and switching

Low latency application layer FEC

Low latency reliable transport layer protocol

Low latency MAC protocol

Low latency PHY

Fast Data Compression to Reduce the Amount of Data to be Stored and Transmitted

Efficient Signal Processing at the User Interfaces, in particular for Visual Interfaces

Security

Physical layer security and authentication

Reliability

Multipath transmission for high reliability

Thank You!

