Building Collaborative Relationship with Business Partners

The 3rd Global 5G Event, May 25th 2017

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5G and New Biz Opportunities

Representative 5G Services

From the very beginning, 5G is designed to embrace services from other industry domains

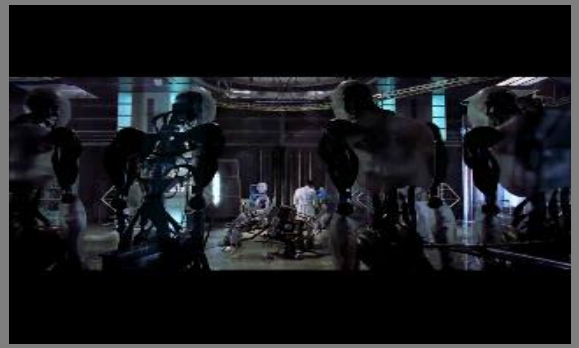
New and Unlimited Experience Anywhere, Anytime

- Immersive Tele-presence
- Super Multi-view Display
- AR/VR based Interaction

Iron Man 2 (YouTube)

Massive Internet-of-Things (IoT)

- Smart Metering
- Smart Environment Mgmt.
- Personal Wearable Sensors



iRobot (YouTube)

Mission-Critical Internet-of-Things (IoT)

- Vehicle to Anything
- Assisted & Autonomous Driving
- Remote Controlled Machines

Minority Report (YouTube)

References for Initial 5G System Design

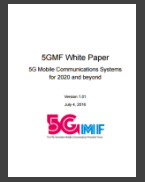
The decoupling between traffic and revenue has long begun, and mobile communications industry strives to create new business opportunities.

2015.2:
NGMN Whitepaper

The word "vertical" appears 125 times.

e.g., "The definition of the customer is not limited to the consumers and the enterprises as in today's environment but also expand to include verticals and other partnerships."

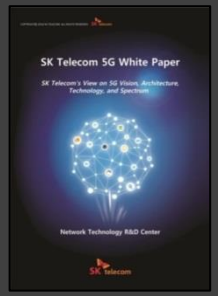
5G Forum



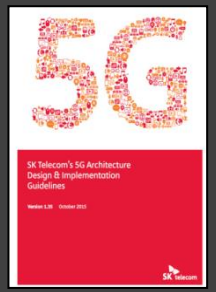
5G MF

5G IA

5G Americas

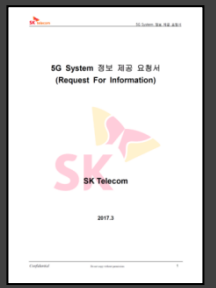


2014.10:
5G Whitepaper



2015.10:
5G Arch. Design & Implementation Guidelines

2016.7:
ATSCALE & COSMOS Arch. Whitepaper



2017.3:
5G System RFI

All technical documents are publically available to download at *https://developers.sktelecom.com/resource/document/*

Initial Reach-out from Mobile Communications Industry

Initial Reach-out to External Industry Domains

SK telecom

As part of efforts towards reaching out to potential biz partners in other industry domains, SK Telecom worked with other mobile operators (e.g., in NGMN) as a whole. NGMN put lots of efforts.

ngmn
the engine of broadband wireless innovation

Perspectives on Vertical Industries and Implications for 5G

by NGMN Alliance

Version:	**1.0**
Date:	**10-06-2016**
Document Type:	**Final Deliverable (approved)**
Confidentiality Class:	**P - Public**
Authorised Recipients: (for CR documents only)	

Project:	**NGMN P1 WS#2 Verticals**
Editor / Submitter:	**WS2 Editorial Team**

From these analyses, at least the following four opportunities for 5G could be foreseen:

- V2N for mid/ long-term environment modelling (dynamic high-definition digital map update)
- V2X for short-term environment modelling (sensor sharing)
- V2X for cooperation (coordinated control)
- V2N for remote vehicle operation[3]
- Mobile wireless backhaul (addressed as part of eMBB)

2.5 Required capabilities

Table 2 lists the required capabilities to support the potential opportunities for 5G identified in the automotive industry.

Table 2: Capabilities required for relevant automotive use cases

Use case attribute	V2N for mid/ long-term environment modelling (dynamic high-definition digital map update)	V2X for short term environment modelling (sensor sharing)	V2X for cooperation (coordinated control)
Description	- Uploading of sensed data to servers for dynamic digital map update - Downloading of the latest digital map information	Expand detectable range beyond on board sensor capability by sharing views (e.g., raw sensor data) or detected objects (e.g., abstract object information) among traffic participants by V2X	- Coordinate trajectories among vehicles by negotiating over V2X (distributed control via V2V or centralized control via V2N/ V2I), e.g., for collision avoidance, overtaking, platooning, merging - For example, at intersections, it may be the traffic signal that collects information, makes coordinated decision, and commands control - Another example is to share detailed planned trajectory via V2X for collaborative driving - Another example is to share coarse driving intention (e.g., changing lanes or moving/ stopping/ parking in T sec at [x,y,z]) for changing lanes, merging at highway and roundabout, crossing at 4-way stop and have consensus among all involved vehicles via V2X
Need for 5G	5G	5G	5G

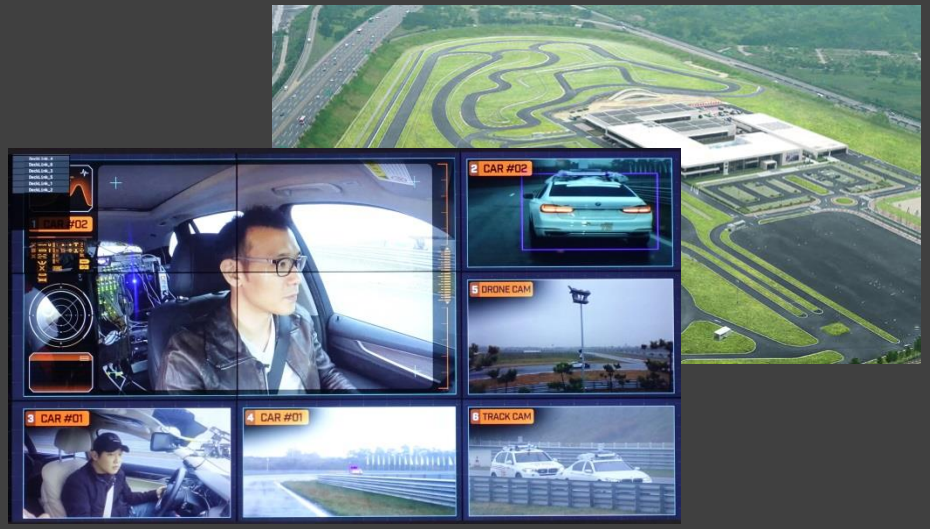
[3] The requirements for this are still under discussion in NGMN and will appear in the subsequent deliverable

The above NGMN document is publically available to download at
https://www.ngmn.org/publications/all-downloads/article/ngmn-perspectives-on-vertical-industries-and-implications-for05g.html

5G Connected Car (‘16.11.15) W

In collaboration with BMW and Ericsson, SK Telecom set up the world’s largest 28GHz 5G testbed at BMW Driving Center and demonstrated the world’s 1st 5G connected car and services

World First
5G Connected Car



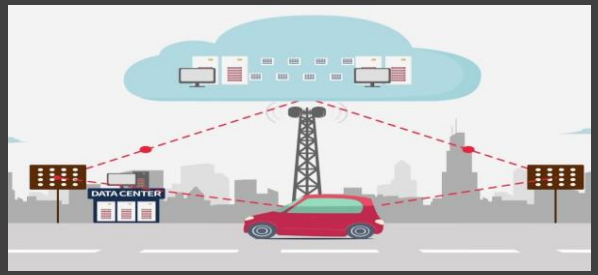
Various Services for
Connected Car

W World 1st

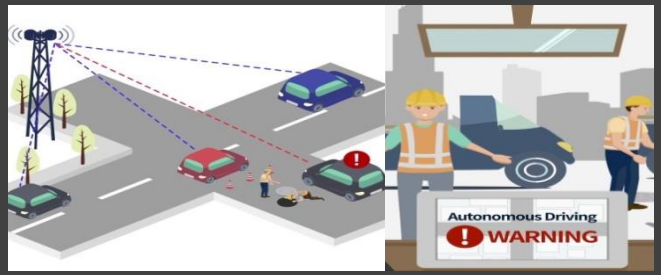
Telecom ASIA Award 2017 - ‘The Most Innovative Partnership Strategy’ Award Recipient

Infra & Services for 5G Connected Car

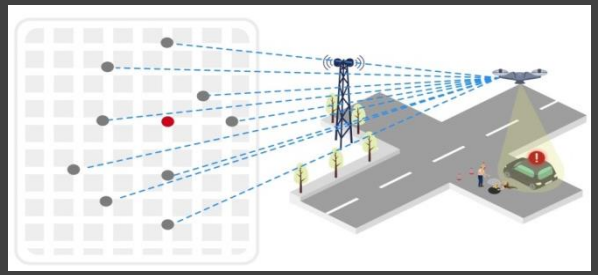
Infrastructure and services for 5G connected car includes video recognition based safety features, high-quality live streaming, and 5G experience bus



mmWave Radio
Mobile Edge Computing



RemotEye(V2X)
Video Recognition



Drone Helper

True Live Streaming / 4K 360 Live VR

UHD Live Conference

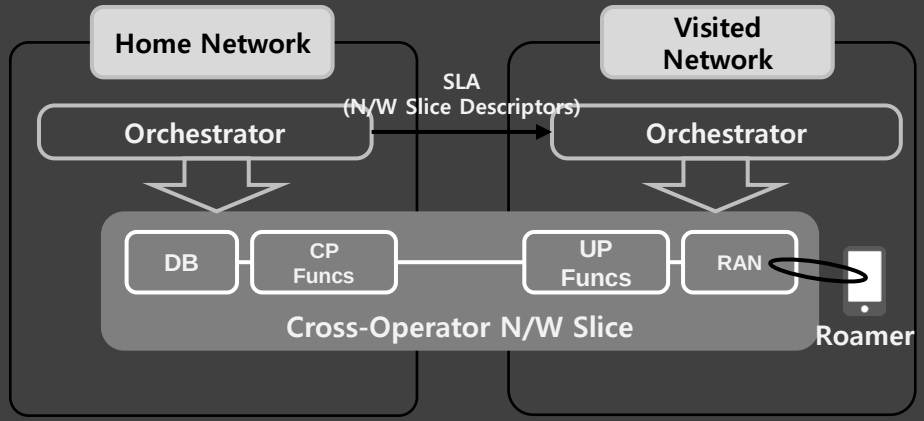
5G Experience Bus

Federated Network Slicing

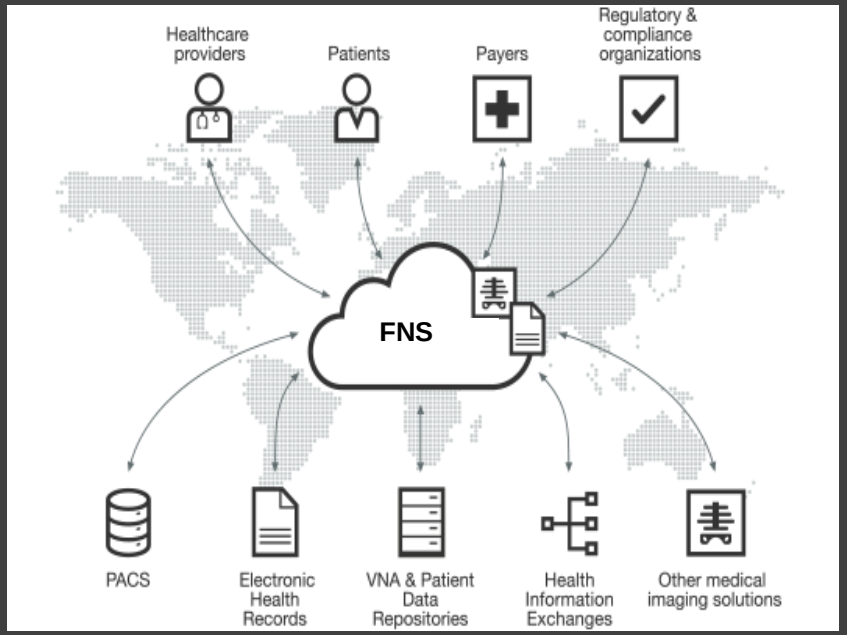
Federated Network Slicing (w/ DT and Ericsson)

Extend the concept of 5G network slicing to a global scale where a network slice is deployed across more than one operator. This enables operators to optimize user experience even when the user roams

(3GPP TR 22.891 v14.0.0 – SMARTER)



Example of Federated N/W Slice

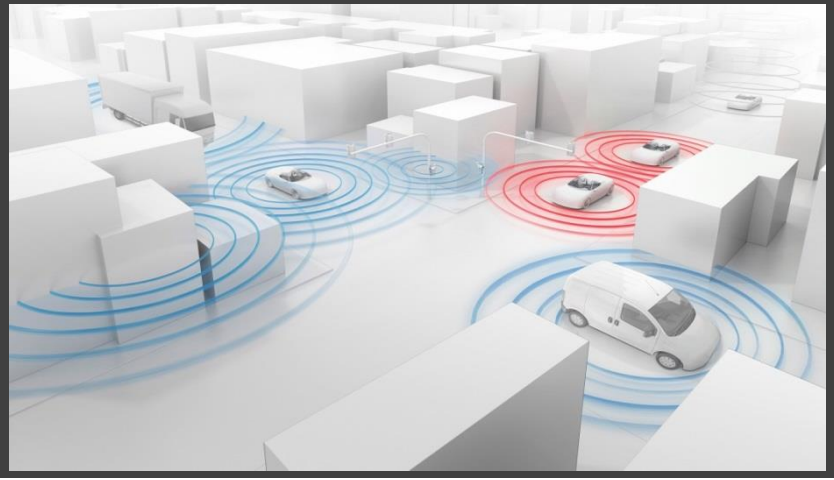


World 1st

Way Forward

Mobility Industry publically meets Automotive

SK Telecom joins BMW, Mercedes, Audi, and Mobile Network Operators and Manufacturers for initial studies on 5G based connected / autonomous car



MEMBERS

Audi, BMW GROUP, Rolls-Royce, DAIMLER, ERICSSON, HUAWEI, intel, NOKIA, QUALCOMM, SK telecom, T, Valeo, vodafone

*** As of November 2016*

LATEST NEWS

www.5GAA.org

Deutsche Telekom, Valeo and SK Telecom join the 5G Automotive Association

5GAA (www.5gaa.org) welcomes Deutsche Telekom, Valeo and SK Telecom as new members of the association.

"We are very pleased that Deutsche Telekom, Valeo and SK Telecom have joined the association. With their important expertise, they will contribute to the definition and development of next generation connected mobility solutions", Dino Flore, Director General of 5GAA, said.

Dr. Bruno Jacobfeuerborn, CTO, Deutsche Telekom AG, said: "Getting the connected car successfully on the road requires a common worldwide standard for 5G. Fragmentation and proprietary systems are obstacles to avoid on our way. Deutsche Telekom has been actively engaged with our partners in the automotive industry to trial and advance communications solutions for intelligent mobility. We now look forward to broadening this collaboration within the cross-industry 5GAA setup".

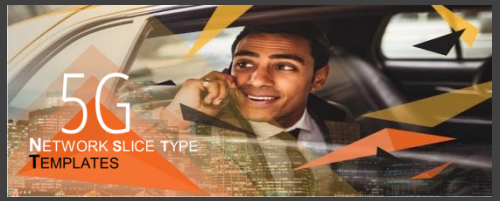
„Valeo being already a player in the autonomous driving field wants to extend this also to the connected car field. Therefore we are proud to be member of the new 5GAA Alliance to help creating new automotive standards for the 5G network and the connected car environment", Marc Vrecko, Business Group President, Valeo Comfort & Driving Assistance Systems, said.

Alex Jinsung Choi, CTO & Head of Corporate R&D Center at SK Telecom, said: "We are designing 5G to inherently support connected cars and autonomous driving. 5G brings several outstanding values to automotive industries: augmented autonomous driving, worry-free car management and rich in-car services. I believe that 5GAA will play a key role in bringing new business possibility and opportunity for both the automotive and mobile communications industries."

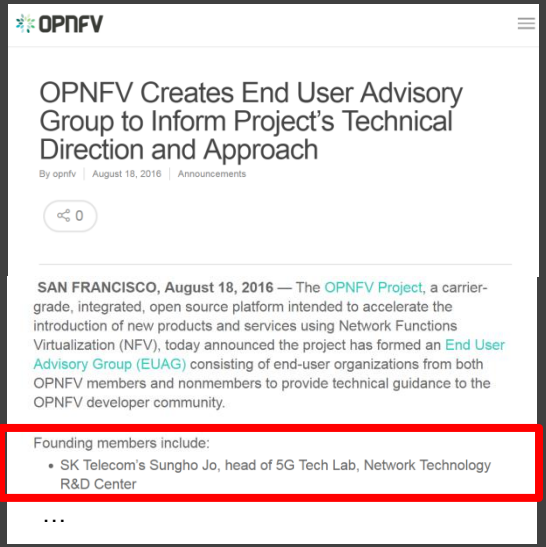
NGMN & GSMA Activities w/ Biz Partners

NGMN: Lead on Interoperability phase, 5G Trial and Testing Initiative (TTI)
GSMA: NEST Network Slice Type, 5G Broadcasting Opportunities, 5G Operators Requirements, Network Virtualization TF
OPNFV: 5G End User Advisor Group

NGMN IC&E Keynote Speech



MWC Shanghai Keynote Speech



OPNFV

OPNFV Creates End User Advisory Group to Inform Project's Technical Direction and Approach

By opnfv | August 18, 2016 | Announcements

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SAN FRANCISCO, August 18, 2016 — The OPNFV Project, a carrier-grade, integrated, open source platform intended to accelerate the introduction of new products and services using Network Functions Virtualization (NFV), today announced the project has formed an End User Advisory Group (EUAG) consisting of end-user organizations from both OPNFV members and nonmembers to provide technical guidance to the OPNFV developer community.

Founding members include:

- SK Telecom's Sungho Jo, head of 5G Tech Lab, Network Technology R&D Center

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SKT-OPNFV Collaboration

SK telecom