



5G - Towards Deployment

Dr. Rao Yallapragada,
Director, Advanced Technologies
Intel's Communications and Devices Group

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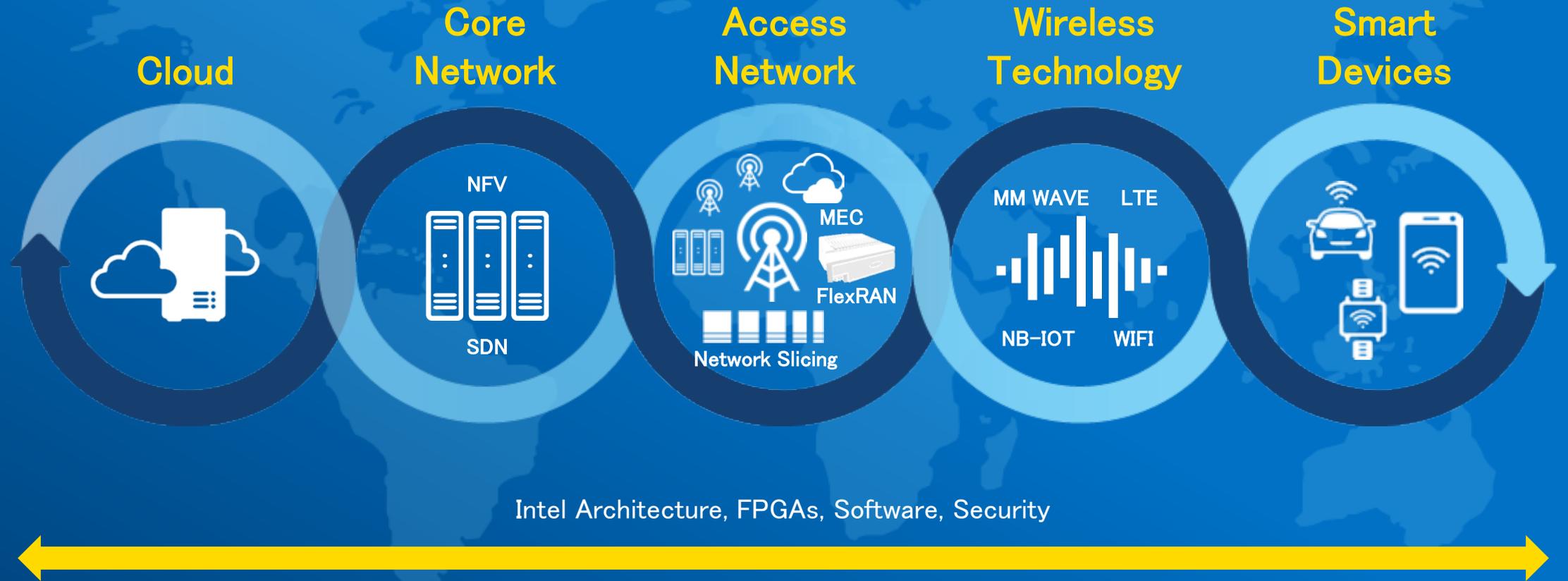
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Intel powers 5g end-to-end

Intel's Scale Meets 5G Scope



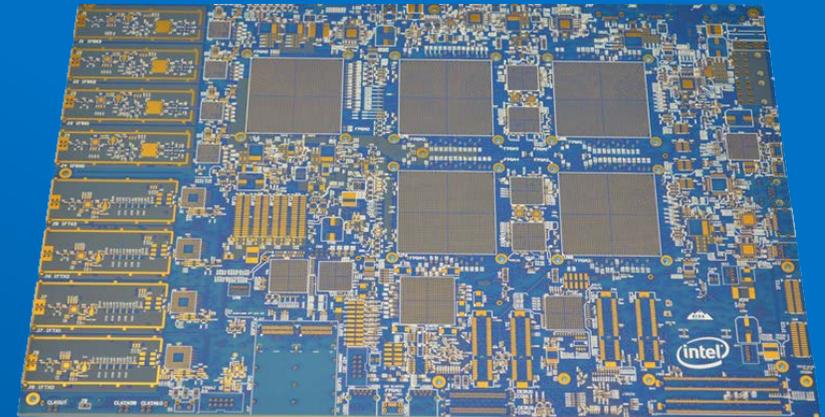
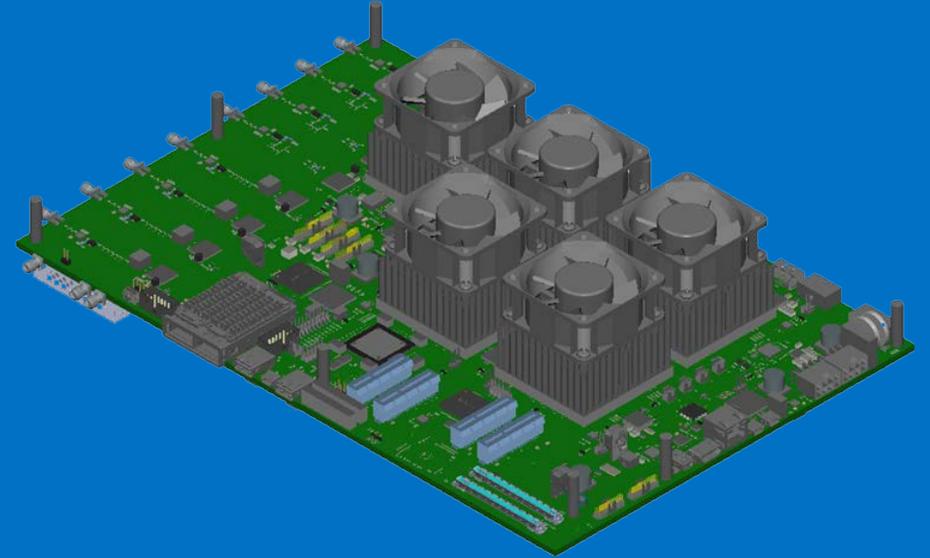
Intel's 5G Mobile Trial Platform Breaking New Ground

Fully-capable, small form factor mobile solution for fast 5G end-to-end field and interoperability testing

- Ultra-high performance 5G architecture
- Based on state-of-art Intel® Stratix® 10 FPGA's
- 2x Processing Capability vs. 2nd-Gen. 5G MTP
- Up to 10Gbps throughput

■ 5G Advanced Feature Support

- Band support: 600-900MHz, 3.3-4.2GHz, 4.4-4.9GHz, 5.1-5.9GHz
- 28GHz, 39GHz
- 5G NR ASIC RTL validation and change validation
- 3GPP NR early interoperability (Q4' 17)



Operational: 2H' 17



Intel® 5G RFIC† – 5G Transceiver sub-6GHz and MM-Wave Support

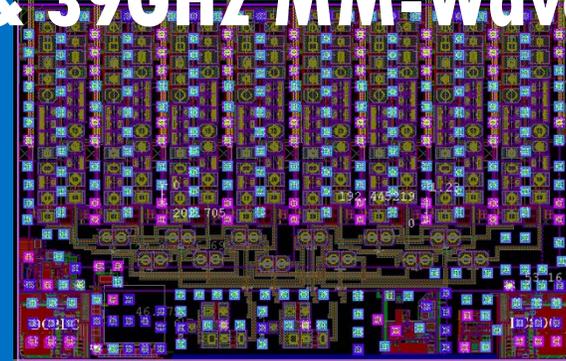


- World's first 5G RFIC to support both sub-6GHz and mm-wave 5G modes
- Flexible ultra-wideband operation up to 800MHz operational bandwidth
- Supports Massive MIMO and dual-polarization
- One SKU to support initial 5G spectrum worldwide:
 - 3.3–4.2GHz – China, Europe, Korea, Japan
 - 28GHz – US, Korea and Japan¹ transceivers

Operational: Q1' 17

1. When deployed with Intel's 28GHz Segula Peak RFIC.
† code named Monumental Summit †† Code name: Tachyon Peak

Intel® 5G RF Front-End (RFFE)†† 28GHz & 39GHz MM-Wave Support



Intel® 5G
39GHz mmW
Layout

- Adds 39GHz to existing Intel 28GHz 5G mmW RFFE
- New distributed mm-wave architecture – supports wide-variety of form factors
- Extensible to 2x2, 4x4, 8x8, NxM Arrays
- High resolution phase-shifting network
- Ultra-wideband operation up to 800MHz
- Massive MIMO and dual-polarization support
- Support: 37.0–40.0 – USA

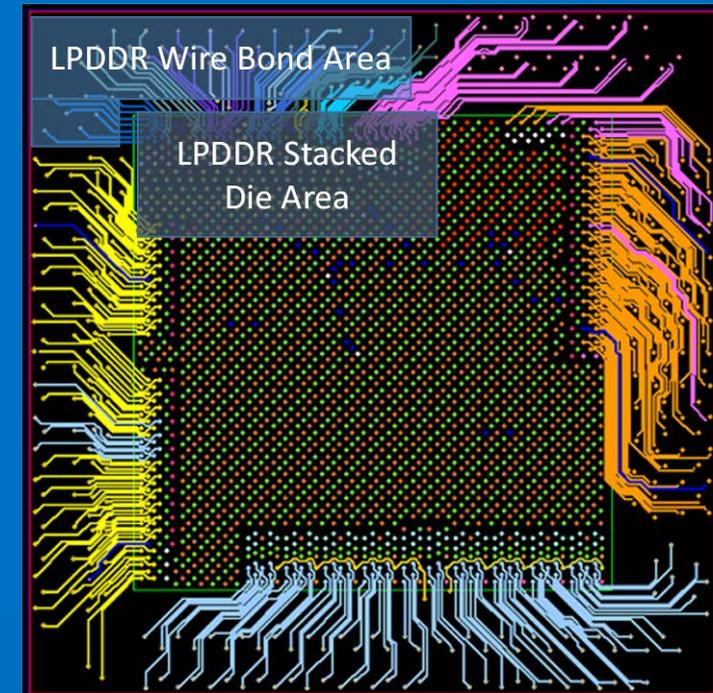
Operational: Q3' 17

Intel® 5G Modem†

5G STAND-ALONE and DUAL-connectivity

- World's first global 5G modem with ultra-high throughput wideband operation and low latency
- Pairs with Intel 5G RFIC and 5G mm-wave RFFE
- Supports both sub-6GHz bands and mm-wave spectrum with compact, low power chip kit
- Implements multiple industry forum and proprietary 5G specifications
- Key 5G NR technology – low latency frame structure, advanced channel coding, Massive MIMO, beamforming
- Pairs with Intel® XMM™ 7360 LTE modem for 4G/5G dual connectivity

Operational: 2H '17



Gold Ridge Multichip Package (MCP)

† code named Gold Ridge

Intel® GO Automotive 5G Platform

5G Sub-6GHz and 28GHz mm-wave Access

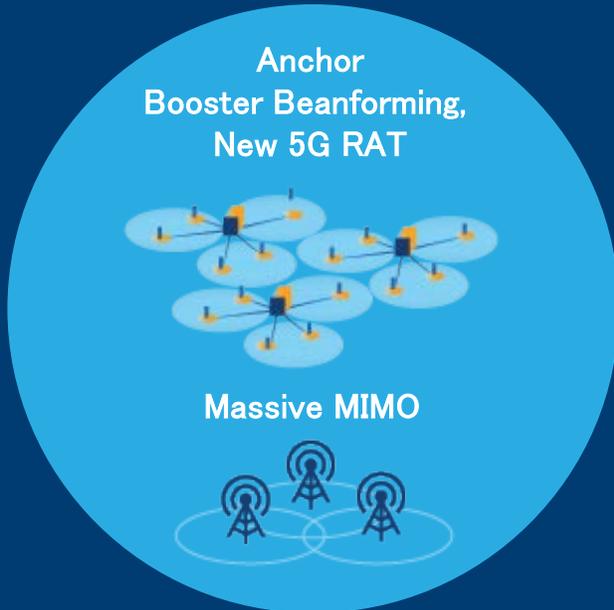
- Ultra-high performance 5G automotive solution
- Second generation mobile trial platform, supporting peak speeds up to 7gbps
- Shock-mounted vehicular operation
- Full-coverage via multi-panel 28GHz arrays
- Bandwidth: up to 800MHz
- Intel GO delivers high performance in vehicle compute, software development tools, robust data center platform, and latest advances in artificial intelligence



Operational: February 2017

Intel Powering the Virtual Network Infrastructure for 5G

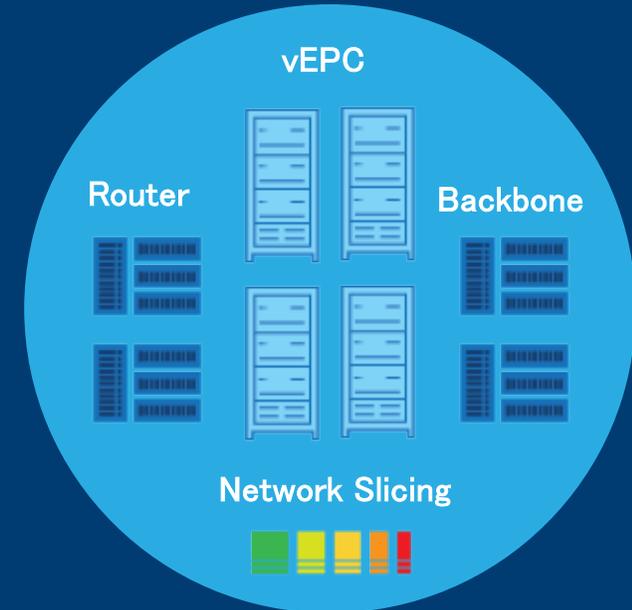
RADIO ACCESS TECHNOLOGY



ACCESS NETWORK



CORE NETWORK



NFV/SDN Foundation

5g end-to-end

portfolio

Wireless Technologies

2016

LTE-A Pro

Wi-Fi*
LTE
MM WAVE
NB-IOT

2017

Rel-14
End Q1 '17

Rel-15 NSA-NR
Q4 '17

2018

First Public
Showcase of
5G Devices

Rel-15
Q3 '18

2019

First
Commercial
Network

2020

Rel-16
Q4 '19

RF/ HW

28 GHz



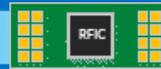
Sub 6 GHz

39 GHz



Sub 6 GHz

39 GHz



Sub 6 GHz

60 GHz follow-on



BBIC

BB 1.0

BB 2.0

BB 3.0

5G-IOT

5G-IOT

+XMM

FPGA
Mobile Trial
Platform

2nd Gen



3rd Gen



4th Gen



Continuously evolving



Smart
Devices

Massive MIMO



FlexRAN



MEC



FlexRAN



Network Slicing



Network
Infrastructure



intel – 5G ACCELERATION around the world

Intel Products

- Announced the Intel® 5G Modem is the world's first global modem to support 5G operation on both sub-6Ghz bands and mmWave spectrum.
- Intel® GO Automotive 5G Connectivity Platform announced as part of the overall Intel® GO In-Vehicle Development Platforms, delivers a 5G-ready platform for the automotive segment.
- 2nd and 3rd 5G Mobile Trial Platforms

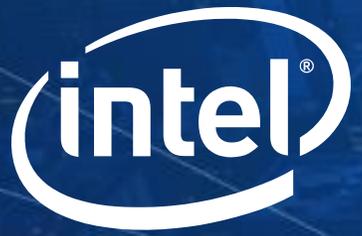
5G Trials around the world

- Global trial, test, and standards engagements with global operators & telecoms equipment manufactures



Collaboration

- 5G Network Transformation disclosures: AT&T, Verizon, and NEC
- BMW Group, Intel and Mobileye Team Up to Bring Fully Autonomous Driving to Streets by 2021
- China Mobile, Ericsson and Intel showcase the world's first application demonstration based on latest cellular IoT technology summer 2016



Thank You