Wireless System Communication & Partnership

Carrier Engineering Services

LTE Device Customization For Operators

GCF China Workshop 2017

MEDIATEK

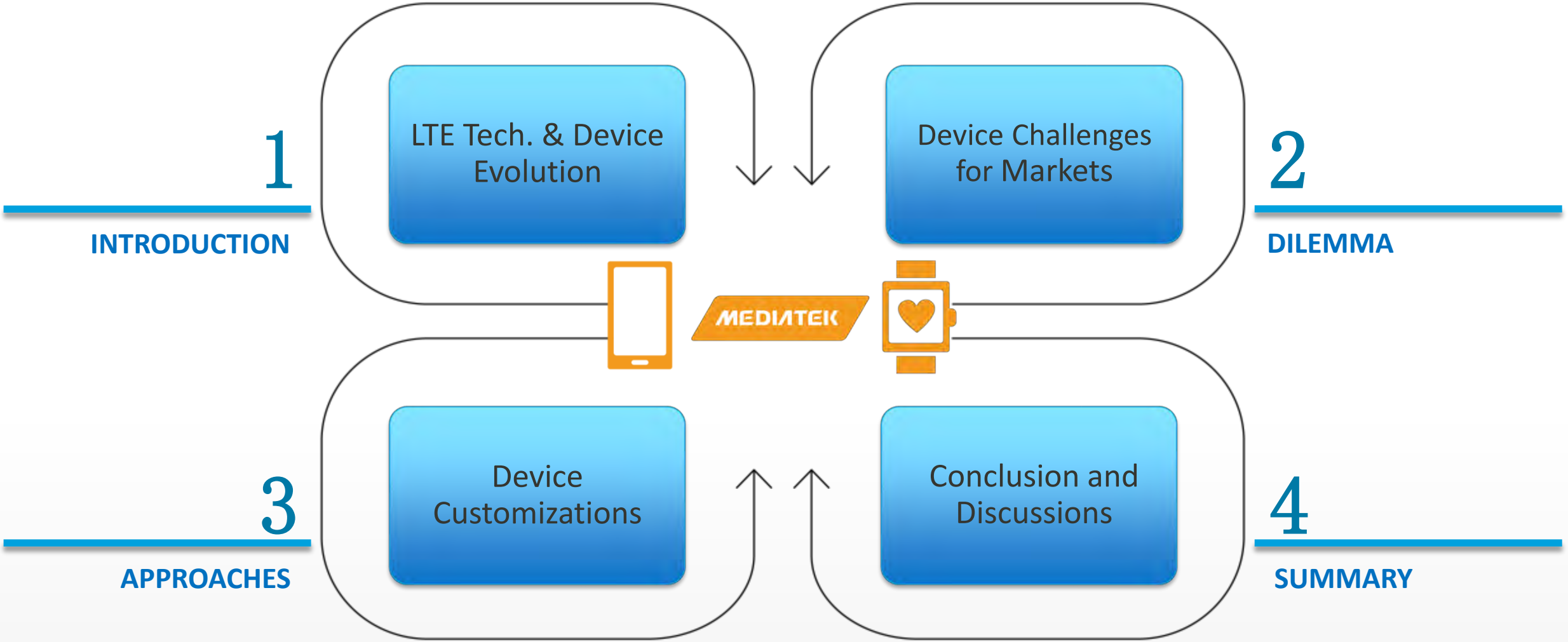
20 1997 2017

CONNECTING the next billion

LTE Device Customization For Operators

GCF Workshop, China

September, 2017


1
INTRODUCTION
LTE Tech. & Device Evolution
Device Challenges for Markets
2
DILEMMA
MEDIATEK
3
APPROACHES
Device Customizations
Conclusion and Discussions
4
SUMMARY

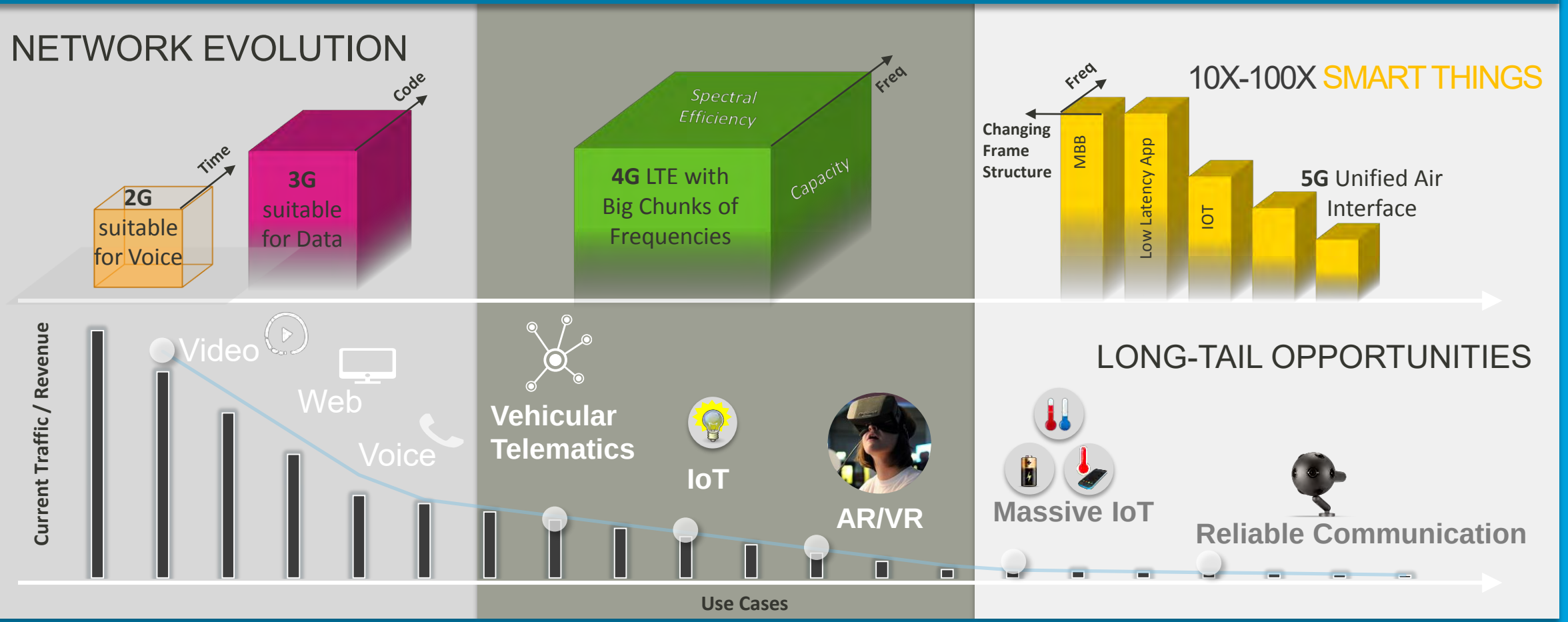
1 LTE TECH. & DEVICE EVOLUTION

Technology Evolutions for Users & Services

Multiple Radios
Voice + Mobile Broadband (MBB)

One Efficient Network
IP Voice Services + MBB + Some Things

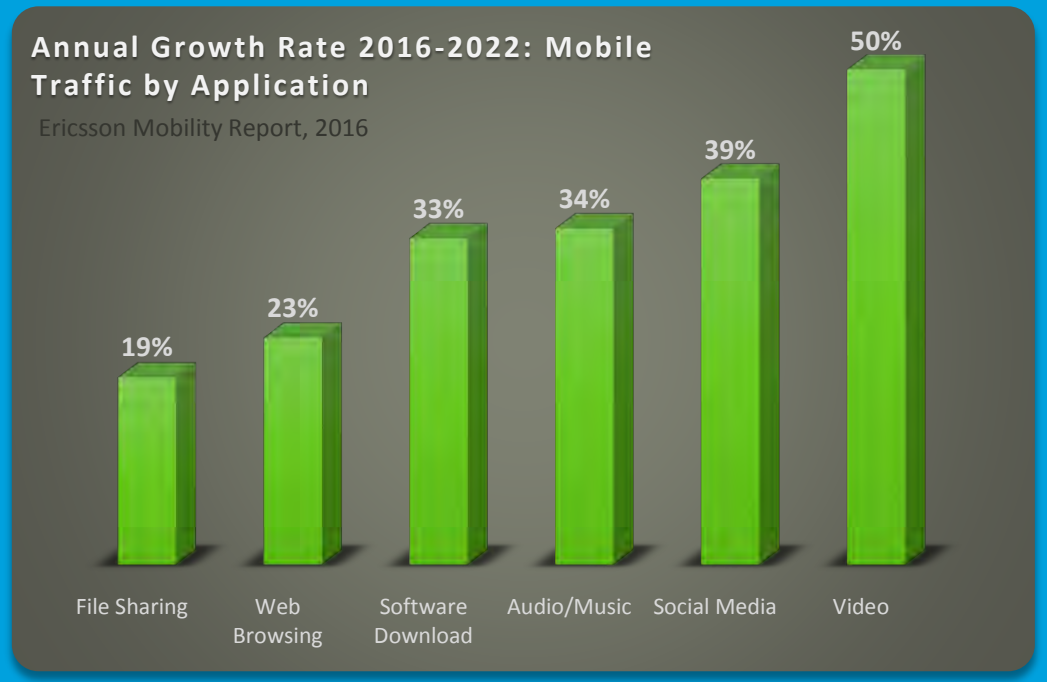
Clustered Network
eMBB + More Things + Moving Nodes + Slicing + Verticals



Service Evolution *vs.* Users Demand

CONTENTS AWARENESS

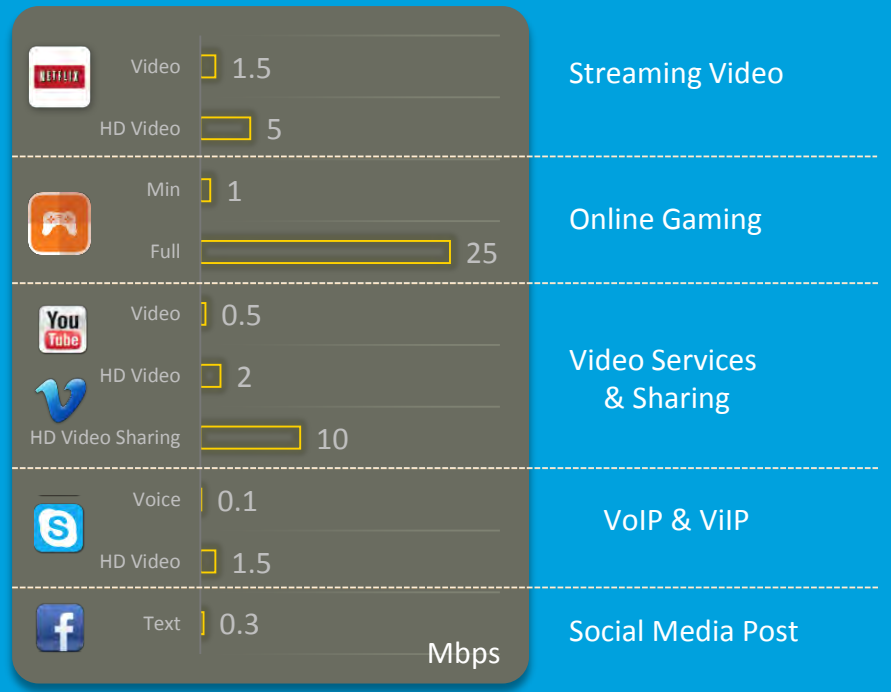
» Growth for the mobile ecosystem is now being driven by the Contents & Services



Limited efficiency leads to limited content awareness

DEMAND EVOLUTION

6.1 Mbps is the global average connection speed [Akamai's 4Q'16]

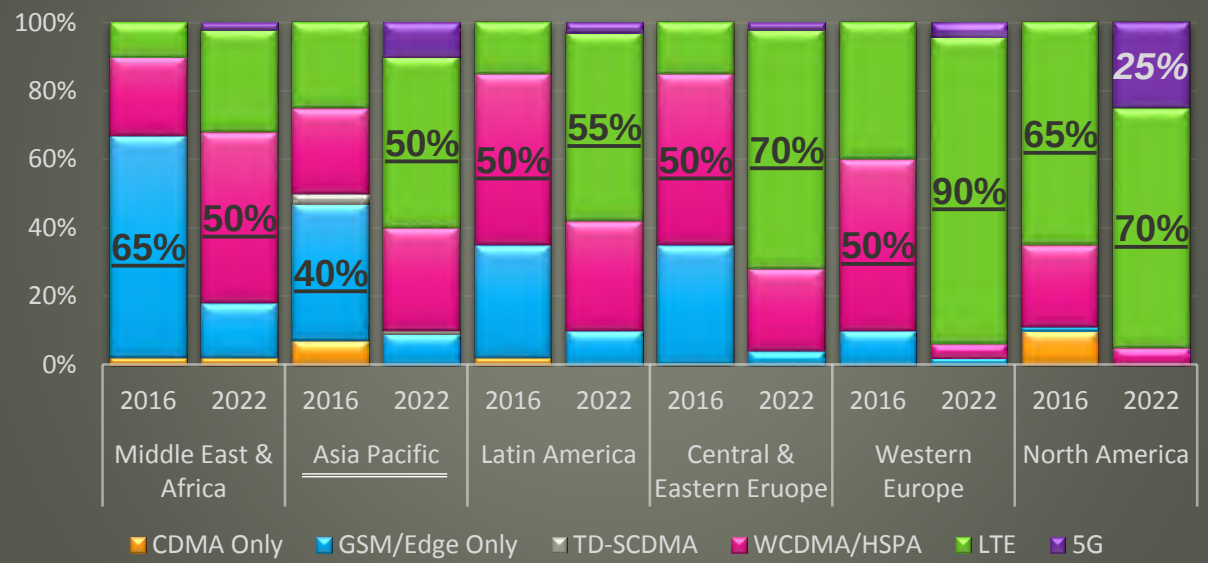


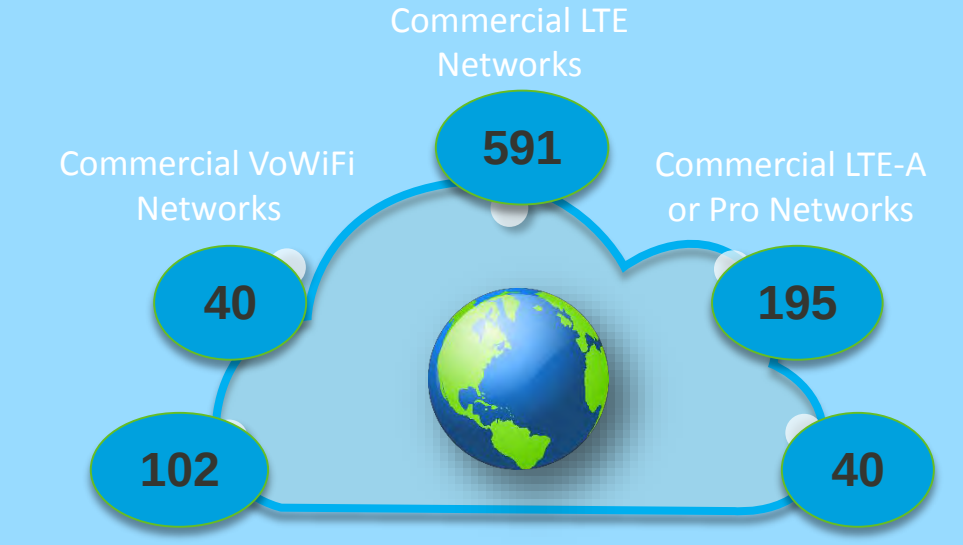
Technology Trends in Different Markets

LTE & IoT STANDARDS

LTE	LTE-A	LTE-A Pro
CSFB & VoLTE	Carrier Aggregation	More CA & More MIMO	eMTC & NB-IOT
MIMO & 64QAM	256QAM & Interf. Canc.	Unlicensed Band CA	Shorter TTI & Low Latency

Mobile Subscription per Region/Technology
[Ericsson Mobility Report - 2016]





GSA Report, April 2017

Timeline for IMT-2020 (5G) Development

1 Spectrum

2 Technology

5G

Coverage

Capacity

ITU WRC-15

Leverage Existing sub-6 bands

ITU WRC-19

Define New Bands (e.g. mmWave)

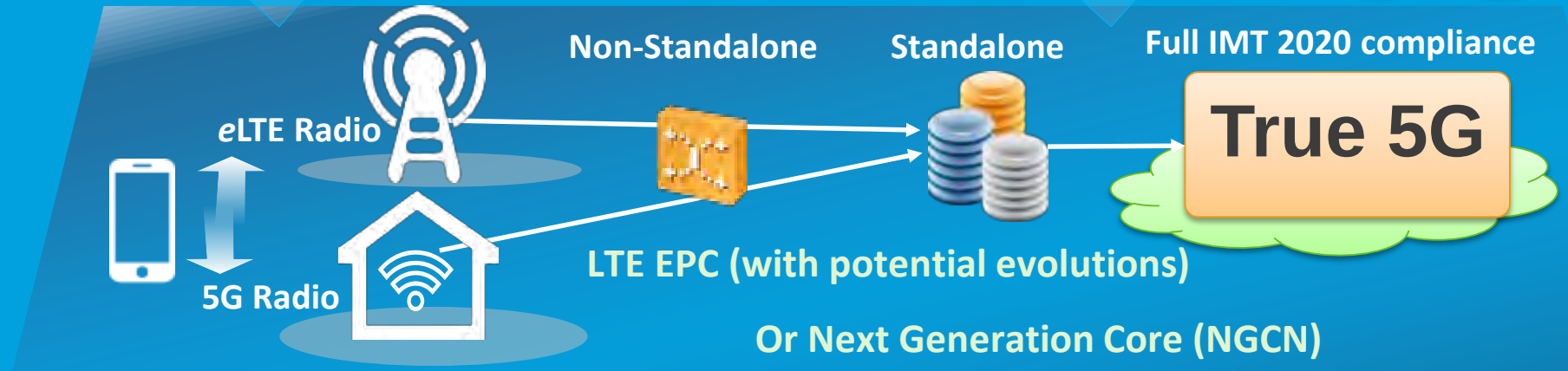
All Types

Cellular Bands Higher Freq.

20 Gbps Peak Rate

1mil/Km² Traffic Density

1ms Latency



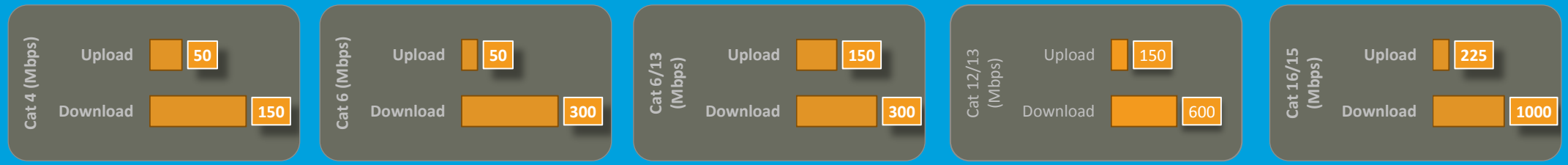
5G preparation & LTE-A Pro Evolution	3GPP 2017	2018	2019	2020	BEYOND

LTE Modem Technology Variations

TECHNOLOGY ADVANCEMENT HAS IMPLICATION ON DESIGN AND COST

Entry Segments — Mid Tier Segments — High End & Flagships

Broadband



Services

- VoLTE/SRVCC
- VoWiFi
- L+G DSDS
- ViLTE/RCS
- eMBMS
- EVS (NB/WB)
- L+W/C DSDS
- EVS (NB/WB/SWB/FB)
- L+L Dual IMS

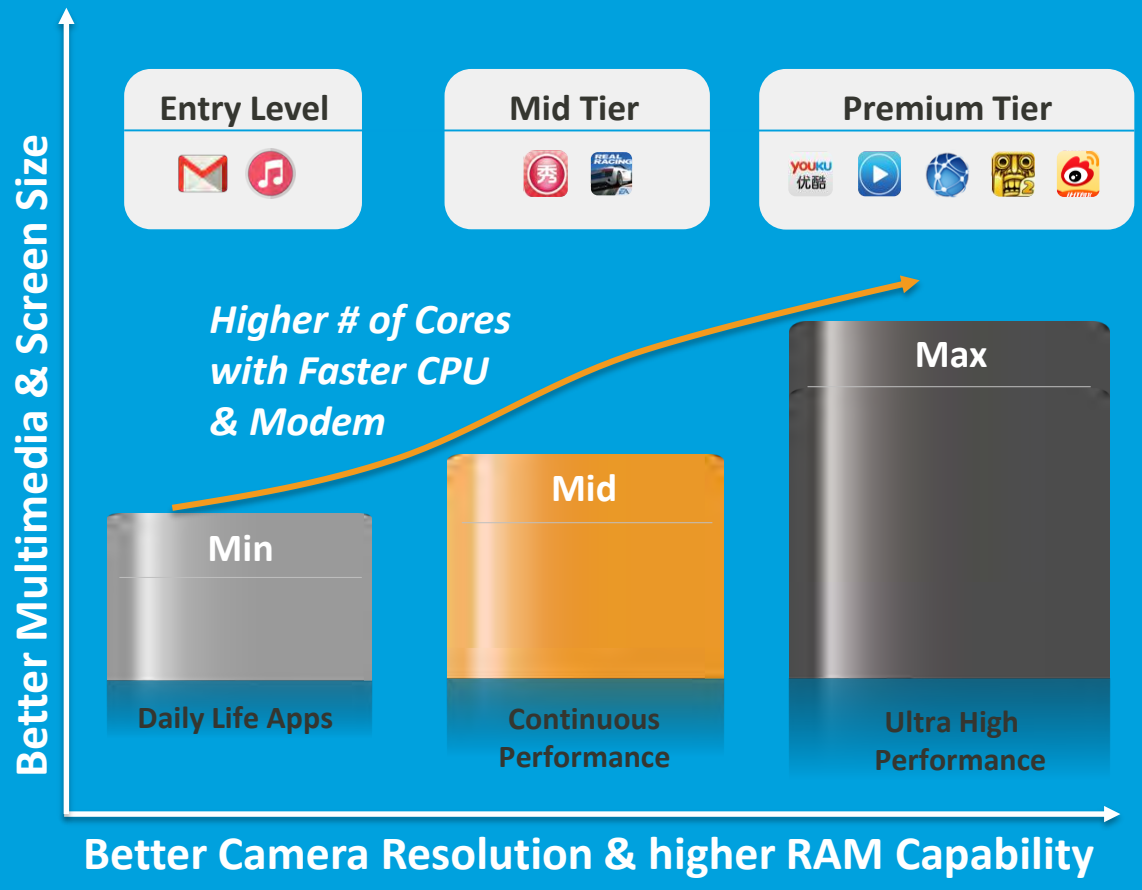
NB-IOT
eMTC
Other IOT

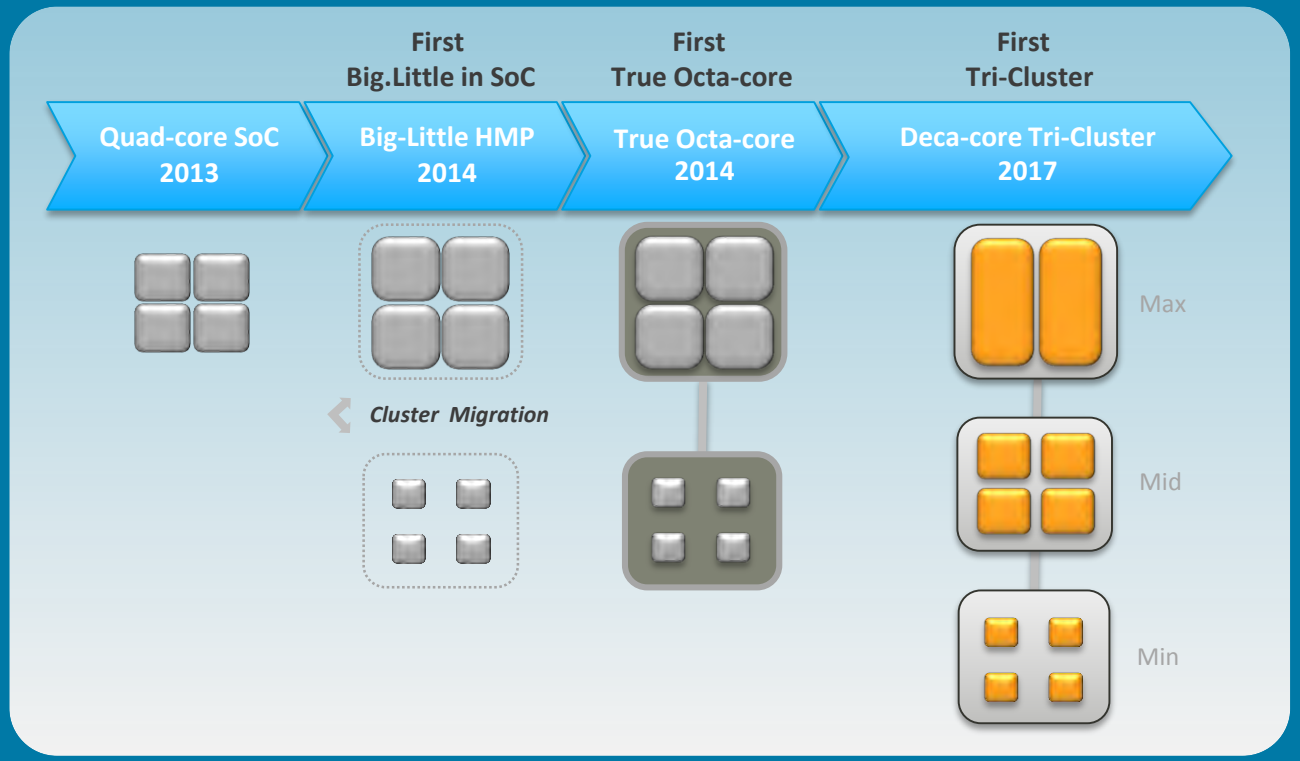
Network

- LTE TDD, FDD
- 3G, 2G, CDMA
- LTE 4x2 MIMO
- DL 2xCC
- LWA
- UL 64QAM
- HPUE for TDD
- DL 3xCC & UL 2xCC
- TDD+FDD CA
- DL 256QAM
- 4x4 MIMO
- DL 4xCC, 5xCC
- eLAA

Platforms Versatility

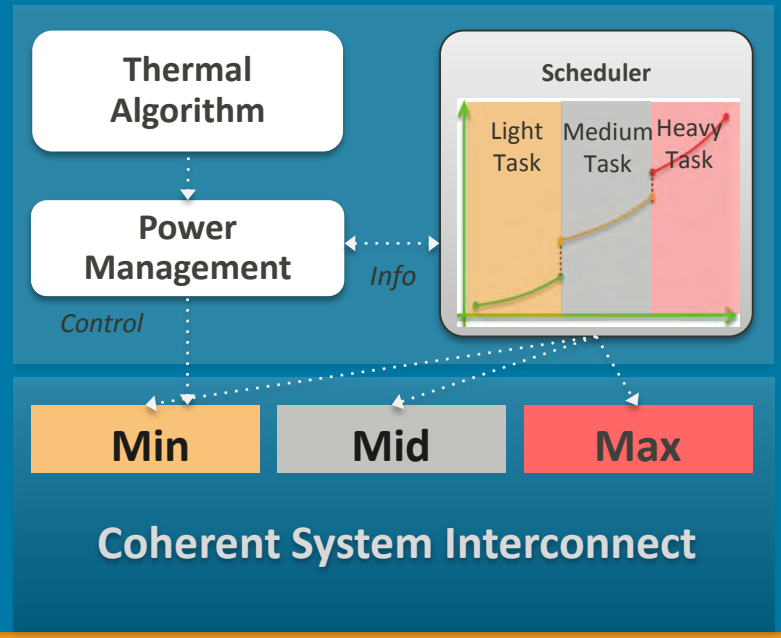
Platform segmentations go inline with Usage requirements





Higher System Performance
CPU & GPU

More power-efficient
Less power consumption & Longer Battery Life



2 DEVICE CHALLENGES FOR MARKETS

Band Complexity – Harmonized globally, but Devices ?

ODM may create different SKUs to address the hardware impact, and support as many bands needed

Form Factor and Device Components

- Call quality impact?
- LTE Throughput impact?
- Power Consumption impact?

3GPP Bands	
LOW BAND	12, 13, 17
	28
	29
	44
	20
	5, 6, 18, 19, 26
	8
MID BAND	11
	21
	4/66, 10
	3, 9
	2, 25
	39
	32
	34
	1
HIGH BAND	7
	30
	40
	38, 41
UHB	22, 42
	43
	46/25x

OMD Must Make Hard Choices

- How to support as many technologies, bands and CA with effective cost
- How to get operator requirements and effectively commercialize with proper test

Multi-mode Solutions

- Support all technologies with global bands needed: 2G, CDMA, TD-SCDMA, WCDMA, HSPA+, LTE, LTE-A

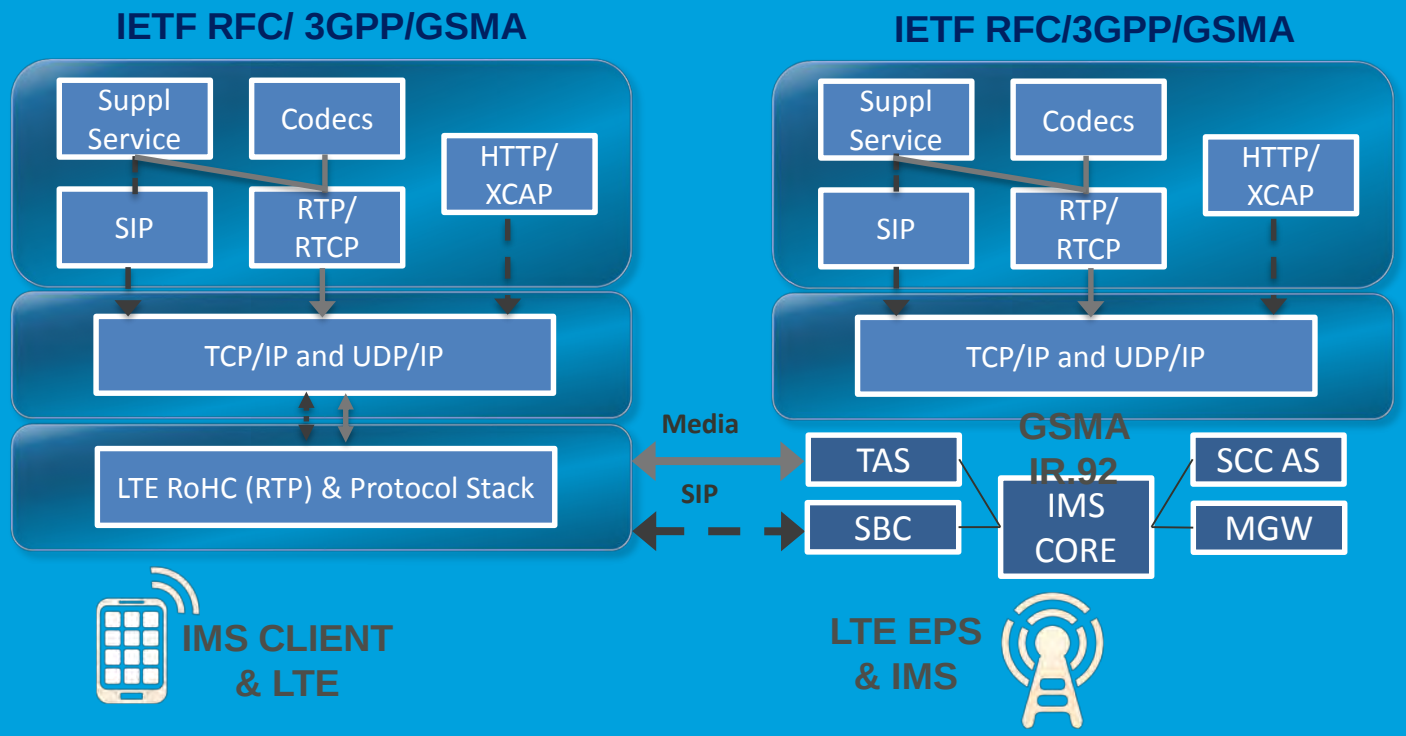
Global Solutions for LTE-A

- Support all major bands and band combinations for Carrier Aggregation
- Multi-sourcing suppliers for cost can results in conflicting band support

IMS Integration Complexity

3GPP deals with radio side, GSMA is high level requirements, and IETF may not cover all possible call flows in VoIP operating on cellular side

All interfaces are affected



Operators want more IMS-enabled devices, but risks are high without proper testing, cost to device vendor?