
Qualcomm
snapdragon
Qualcomm® Snapdragon™
Tech Summit 2018
#SnapdragonSummit

Qualcomm December 4, 2018 Maui, Hawaii @cristianoamon

Building the 5G future

Cristiano Amon
President, Qualcomm Incorporated

A new technology phase has begun

Virtually everything becoming connected and intelligent

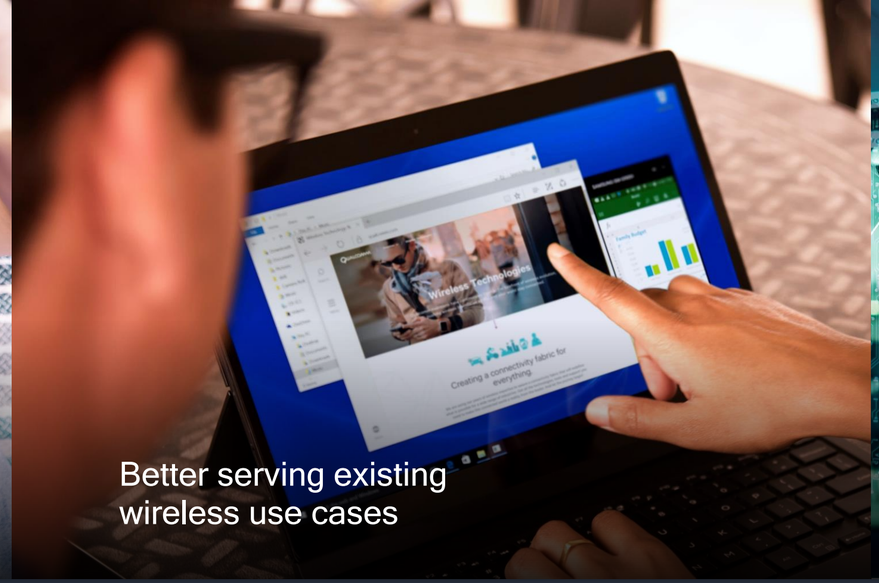

5G will be bigger than 3G and 4G
The foundation for what's next
5G
Hotel
Ratings
4.5
Map
Rooms
Tour
Occupancy (%)
450
Transfering power

David Ige

Governor of Hawaii

Facebook.com/GovernorDavidIge
Twitter.com/GovHawaii
Instagram.com/GovHawaii

Vastly improving cellular user experiences



Better serving existing wireless use cases

Creating new wireless service opportunities

Ushering in a new era of wireless communications

5G will power new capabilities, services and experiences


Energy
Smart cities
Manufacturing
Industrial
5G
is here
Transferring data
Media and entertainment
Computing
Retail
Automotive

5G is here

Qualcomm® 5G NR reference design

Qualcomm 5G NR reference design is offered by Qualcomm Technologies, Inc. and/or its subsidiaries.

5G will be a reality across regions starting in 2019

North America
Sub-6 and mmWave

Europe
Sub-6 and mmWave
(mmW in 2H19)

China
Sub-6

Japan
Sub-6 and mmWave

South Korea
Sub-6 and mmWave
(mmW in 2H19)

Australia/SEA
Sub-6

See Appendix

AT&T
"We plan to bring mobile 5G to 12 cities this year, reaching at least 19 cities in early 2019."

Sprint
"In the first half of 2019 we plan to launch mobile 5G in nine markets..."

T-Mobile
"T-Mobile is building out 5G in six of the Top 10 markets... and 100's of cities across the U.S. in 2018."

Verizon
"Verizon 5G mobility service will go live in early 2019 and expand rapidly."

5G will be a reality across regions starting in 2019

See Appendix

Deutsche Telekom

"We're continuing on our strong preparation course for the rollout of 5G in 2020."

EE

"We're launching 5G in 16 UK cities in 2019... And that's just the start."

Swisscom

"We plan to bring 5G to 60 towns by the end of 2019."

Vodafone

"In 2019 we will be ready for launch across [60 5G sites] by the middle of the year... By 2020 we will scale well past 1,000 sites..."

5G will be a reality across regions starting in 2019

See Appendix

China Mobile

"With the goal of 5G pre-commercialization by 2019 and official commercialization by 2020, we are fully promoting 5G commercialization..."

China Telecom

"We will build 5G demonstration projects and conduct scale trials of 5G applications in 17 cities... launching commercial 5G services in 2020."

China Unicom

"We are... conducting 5G application demonstrations and pre-commercialization in 2019, and plan to officially launch 5G by 2020"

5G will be a reality across regions starting in 2019

See Appendix

Korea Telecom

"[December 1] 5G frequency transmission means 5G is on stage. KT will build up nationwide 5G network coverage and provide high-quality 5G service..."

LG U+

"5G service begins here [December 1] and it will be the Company's growth engine the next 10 years."

SK Telecom

"At midnight [on December 1], the 5G network switch was turned on and marked the beginning of the new ICT era."

5G will be a reality across regions starting in 2019

See Appendix

KDDI

"KDDI will continue our collaboration with various business partners and prepare for commercial 5G service launch in 2020."

NTT DoCoMo

"In September [2019], we will start [5G] precommercial service, and in the spring of 2020, the commercial launch will be scheduled."

Optus (Singtel)

"...Optus is confident in its ability to deliver commercial 5G services in January 2019"

Telstra

"...[we] have been investing in our network to lay the groundwork for 5G. We expect to be offering 5G services in 2019."


Inventing technologies that fuel innovation
Transforming how the world connects, computes and communicates
On-device intelligence
3,132 °C
Temperature
Completion
Serial: AZ71238109379ZD12H
Model: AH213
Shipping to: Detroit, MI
Ultra reliable, low-latency wireless connection
Dynamic factory reconfigurability
Weld strength
98.2%
5G NR
Private network
Real-time supply chain and progress updates

Key milestones to commercialize 5G NR

1990+

Foundational research on mmWave, MIMO, advanced RF, more

Qualcomm

Feb 2016

Qualcomm snapdragon X16 LTE modem

Nov 2015

5G mmWave design demo

Jun 2016

Qualcomm snapdragon X50 5G modem

Oct 2016

5G NR sub-6 prototype system

2016

Feb 2017

Small group proposes 5G NR timeline acceleration

First 5G NR connection

Sep 2017

5G NR mmWave prototype

2017

Oct 2017

5G NR smartphone reference design

5G data connection

Nov 2017

5G NR IoDT with ZTE, China Mobile

Dec 2017

5G NR standard completed

5G NR mmWave connection with Ericsson

Key milestones to commercialize 5G NR

2018

Feb 2018

5G NR IoDT with multiple infra vendors

Network simulations show significant UX, capacity gains

Jun 2018

5G NR standalone (SA) mode specification

5G NR interoperability testing with Datang

5G Non-Standalone

Jul 2018

5G NR RF module for mobile devices

Aug 2018

Moto Z3 smartphone – world's first announced 5G NR upgradable device and 5G moto mod

Sep 2018

5G NR mmWave OTA call with mobile form factor device

Oct 2018

5G NR sub-6 OTA call with mobile form factor device

5G

Meeting the 5G network challenge

5G network diversity

Driving tremendous complexity

Diverse spectrum

Sub-6GHz to mmWave

Licensed, shared and unlicensed

FDD, TDD

Advanced wireless technologies

Scalable, flexible platform

Massive MIMO

mmWave beamforming and beam steering

Diverse deployments

NSA, SA

Wide area to small cells

Private networks

Broad ecosystem

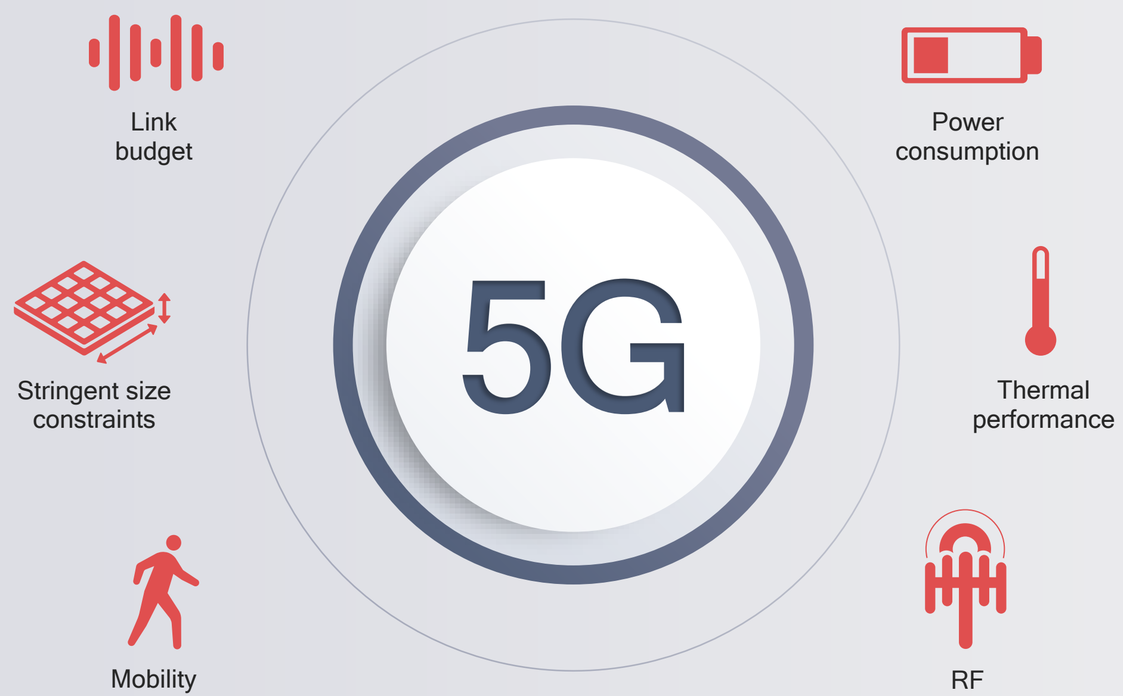
Band combinations

Gigabit LTE

Multi-connectivity

Robust compatibility

Meeting the 5G smartphone challenge



5G smartphone

Design complexity increasing exponentially

Uniquely positioned to make 5G smartphones a commercial reality

2015

They said,

“mmWave won’t work.”

We showed them:

mmWave with beam steering

Feb 2017

They said,

“mmWave needs line-of-sight.”

We showed them:

Non-line-of-sight van mobility

Oct 2017

They said,

“Mobility mmWave is not possible.”

We showed them:

mmWave smartphone reference design and antenna modules

Sep 2018

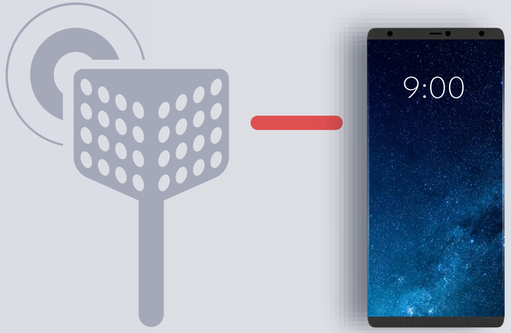
They said,

“The device looks too big”

We showed them:

Mobile form-factor test platform

Making the impossible, inevitable



Path loss

With analog beamforming

Blockage

With adaptive beam steering, switching

Size/power constraints

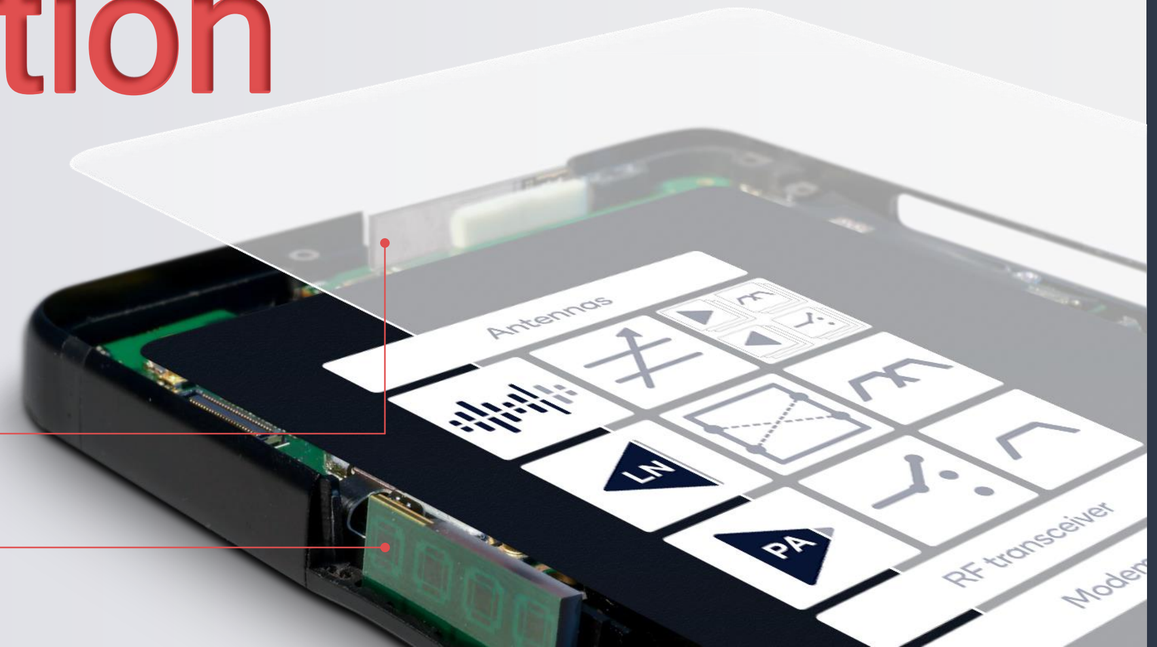
With different antenna configurations

Overcoming numerous challenges to mobilize mmWave

5G leadership requires

RF innovation

End-to-end system capability, integration needed to address 5G complexity



The only company

With tunable front end for 4G/5G

5G is here

Qualcomm
snapdragon
X50 5G modem

Snapdragon™ X50
5G modem family

Qualcomm®
QTM052 mmWave
antenna modules

Qualcomm®
5G NR Qualcomm®
reference design

Ongoing collaborations

With mobile operators on 5G commercial readiness

Continued collaborations

With OEMs on 5G devices

Nicki Palmer

Chief Network Engineering Officer and
Head of Wireless Networks

Powering next-generation mobile experiences

Enriching lives

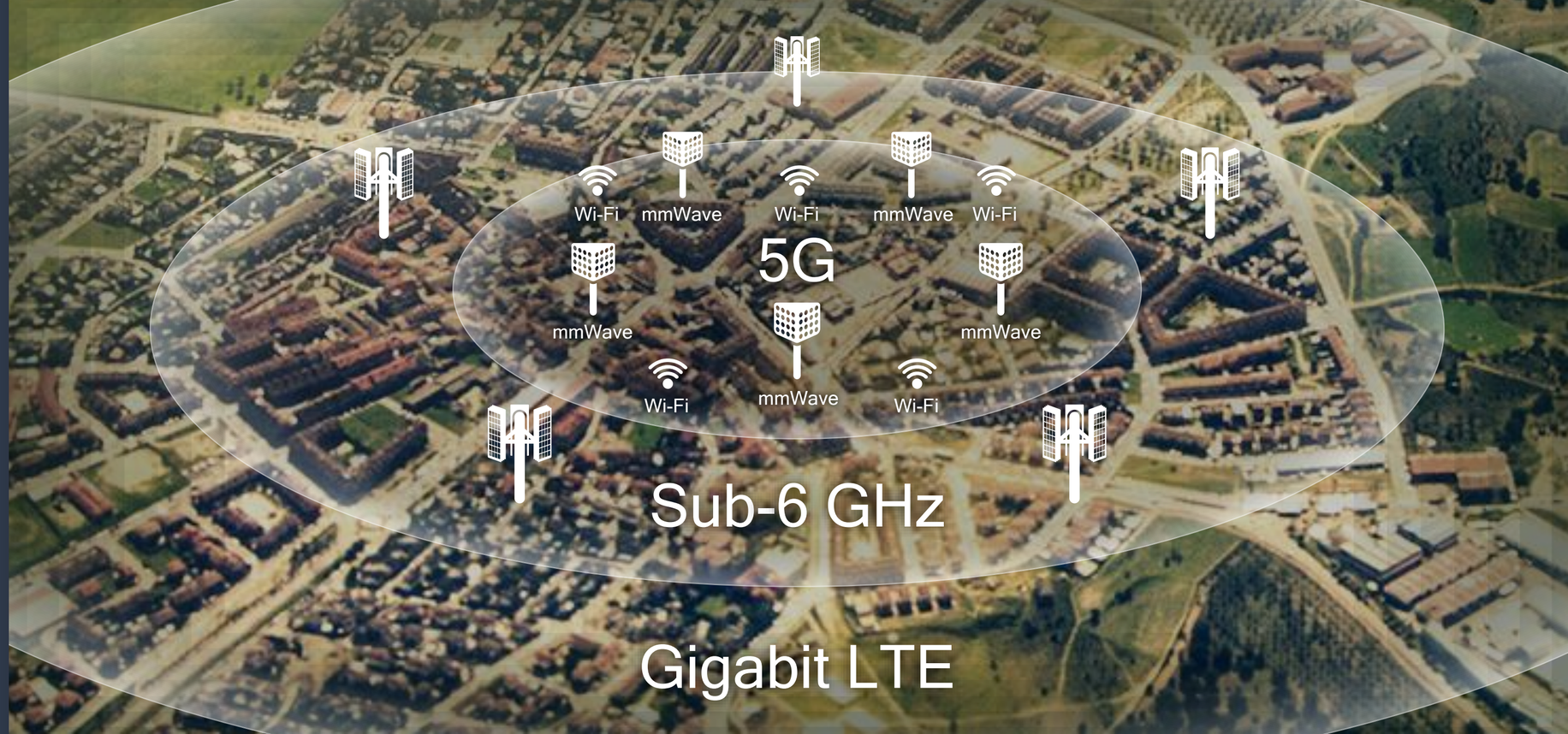
By turning the ordinary into the extraordinary

Kevin Petersen

SVP, Wireless Product Marketing

5G network architecture

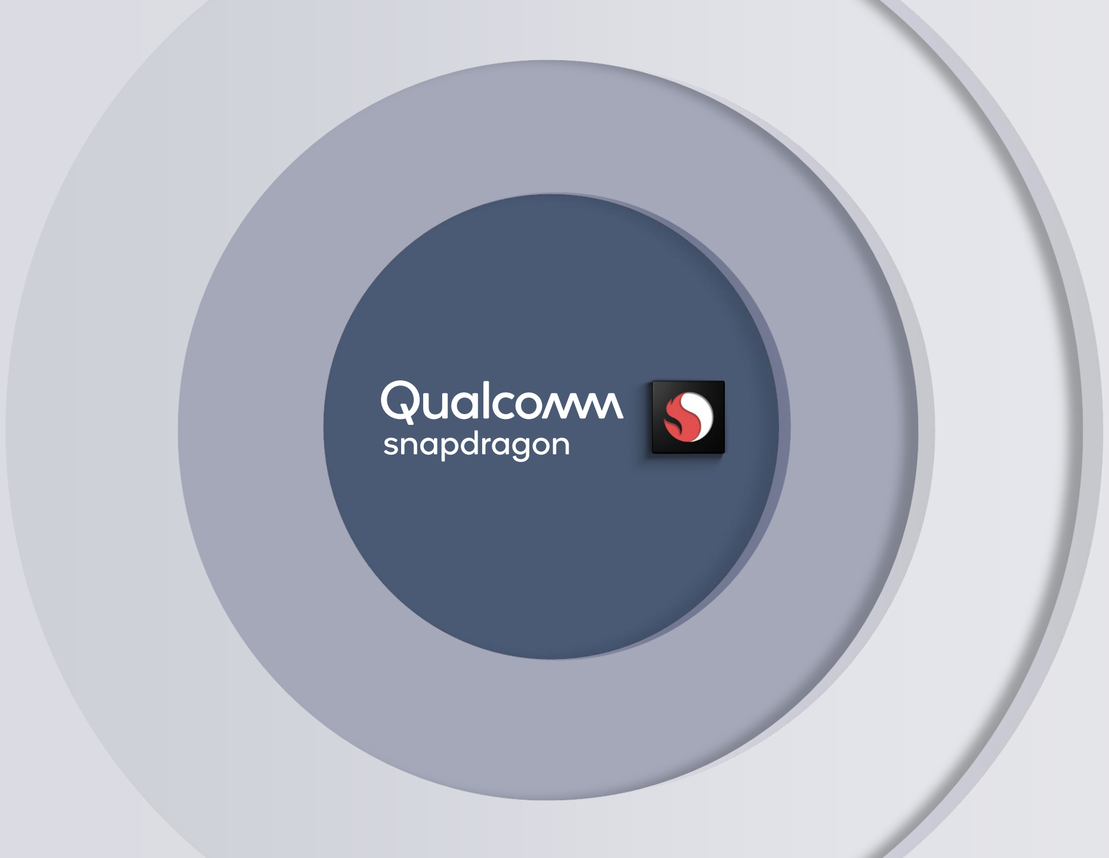
Includes multiple technologies



Fotis Karonis

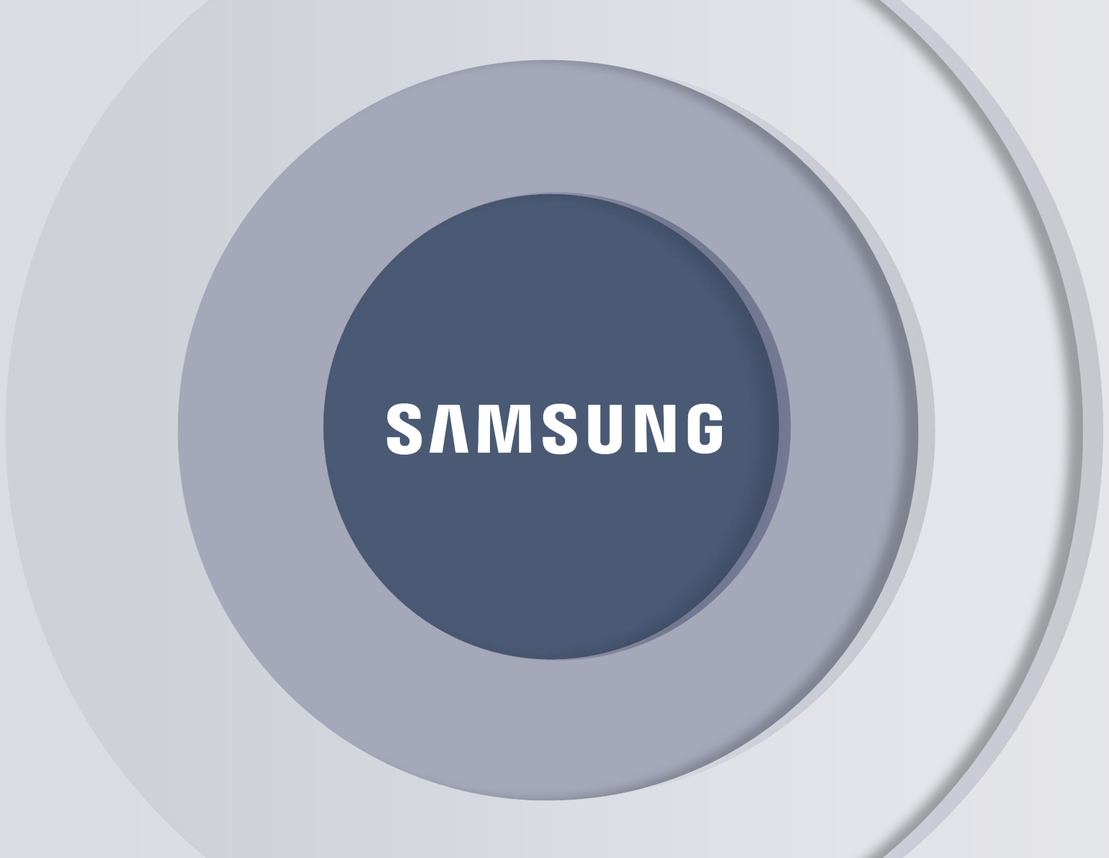
BT / EE Group Executive Advisor for 5G

The smartphone remains the essential device



Alex Katouzian

SVP and GM, Mobile,
Qualcomm Technologies, Inc.



Justin Denison

SVP of Mobile Product Strategy and Marketing,
Samsung Electronics America


5G


5G
What we have now is
only the tip of the iceberg


5G
Qualcomm
Leading the world to 5G
Golf greens
1.90
1.80
Resort
4.5

Qualcomm

Thank you

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Appendix

North America

AT&T
https://about.att.com/newsroom/2018/5g_evolution_market_update.html

Sprint
http://investors.sprint.com/news-and-events/press-releases/press-release-details/2018/Sprints-Next-Gen-Network-Build-Gains-Momentum/default.aspx

T-Mobile
https://www.t-mobile.com/news/best-financials-ever-q3-2018

Verizon
https://www.verizon.com/about/news/verizon-and-samsung-release-5g-smartphone-us-first-half-2019

Europe

Deutsche Telecom
https://www.telekom.com/en/media/media-information/archive/5g-rollout-in-germany-523636

EE
https://twitter.com/EE/status/1062393714507743238

Swisscom
https://www.swisscom.ch/en/about/medien/news/60-towns-with-5G-by-end-of-2019.html

Vodafone
http://the-mobile-network.com/2018/09/vodafone-hails-5g-readiness-with-virtual-transformation/

China

China Mobile
http://news.youth.cn/gn/201811/t20181109_11780783.htm

China Telecom
http://www.c114.com.cn/news/117/a1065054.html

China Unicom
http://www.c114.com.cn/local/3884/a1062870.html

Korea

Korea Telecom
http://news.mk.co.kr/newsRead.php?year=2018&no=751452

LG U+
http://news.mk.co.kr/newsRead.php?year=2018&no=751446

SK Telecom
https://twitter.com/SKtelecom/status/1068688071355289602

Australia/Sea/Japan

KDDI
https://www.swisscom.ch/en/about/medien/news/60-towns-with-5G-by-end-of-2019.html

NTT DoCoMo
https://seekingalpha.com/article/4216778-ntt-docomos-dcmyy-ceo-kazuhiro-yoshizawa-q2-2018-results-earnings-call-transcript?part=single

Optus (Singtel)
https://www.zdnet.com/article/optus-hits-back-at-telstra-5g-claims/

Telstra
https://www.afr.com/technology/web/telstra-to-offer-5g-in-2019-as-it-aims-to-cool-optus-marketing-push-20180204-h0ta7p