

Our 5G Journey

Verizon

2019 & Beyond

Stephen Breen

Director - Roaming Marketing

October 28th 2019

verizon[✓]



5G & VoLTE - Setting the scene



Mission Statement

Together, we inspire, explore, and build a 5G powered future.

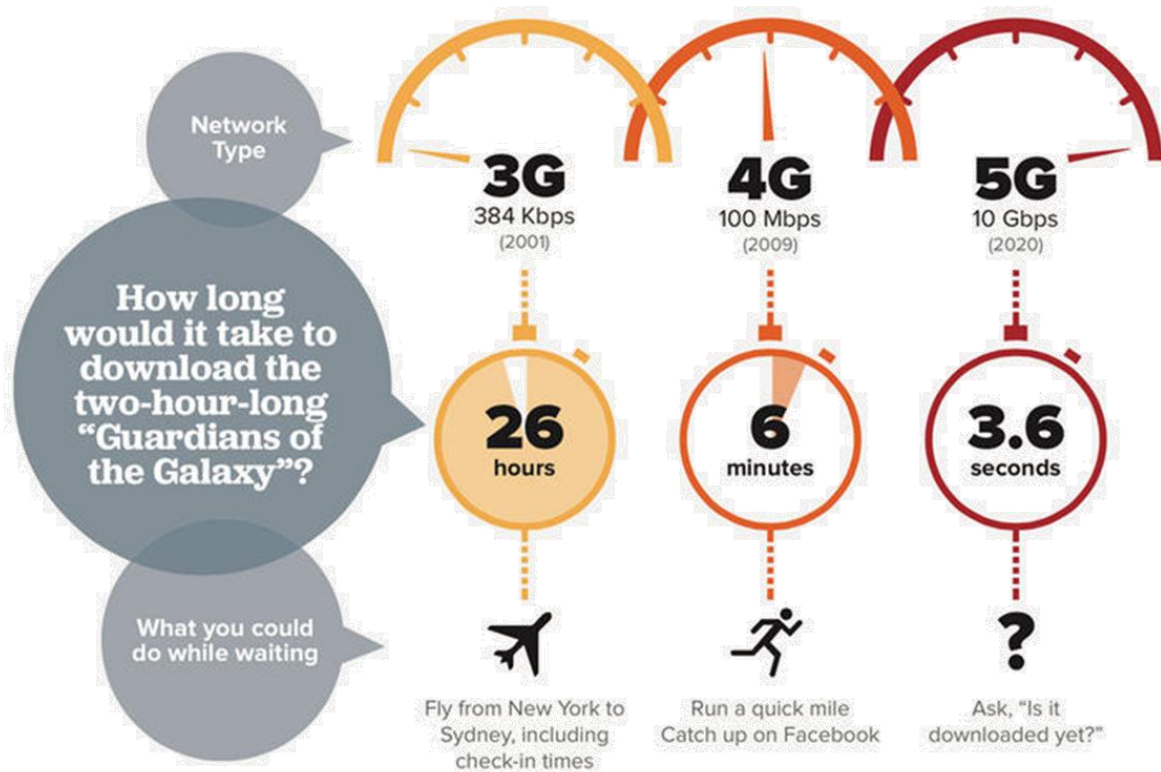
Together with innovators from enterprises, startups, carriers, and leading universities

Inspire through evangelism programs at 5G Lab locations, customer sites, and showcase events

Explore by assessing new technologies with external partners via sourcing and innovation activities

Build proof of concepts and execute trials for potential new products using an efficient 5G/MEC platform

5G - What Can It Do?



5G Currencies

Energy Efficiency



Intelligent Beam Forming/ Steering



Long Life, Low Maintenance Sensors

Connected Devices



Connected Wearables



IoT Sensors

Data Volume



Smart Stadiums



HD 3D Mapping



Intelligent Video & localized AI/ML for retail

Throughput



AR/ VR/ 4K immersive content streaming

Latency



Gaming



Virtual Desktop

Reliability



Autonomous Vehicles



Secure Customer Driven Network

Service Deployment



Real-time face recognition/ language translation



Unified comms & security offerings



Mobility



In-vehicle connectivity



Drones & AGVs/ connected robots



IoT solutions via ThingSpace



5G Home & Mobility - 2019 & Beyond

Phase 1

2018 5G Home



Home
Broadband



Business
Broadband

- In 4 Markets on October 1st, 2018
- Continued expansion through 2019 and into 2020

Phase 2

2019 Mobility



Tablets &
Hotspots



Smartphones

- In two cities on April 3rd, 2019
- Up to 30 cities by end of 2019

Phase 3

2019/2020

Massive Connected Products, Applications, & Services



Cloud
AR/VR



Autonomous
Vehicles



Remote
Medical
Diagnostics



Industrial
Automation



Video
Surveillance



Smart Cities



Logistics &
Supply Chain



Intelligent
Energy

The Verizon VoLTE logo features a red signal icon above the word "VoLTE" in a bold, black, sans-serif font. The "V" and "L" are significantly larger than the other letters.

VoLTE™



verizon^v

Verizon confidential and proprietary. Unauthorized disclosure, reproduction or other use prohibited.

VoLTE Adoption – The Opportunities

DRIVERS

Business

Compelling Pricing

- Not restricted by other agreements

Compelling customer experience

Change wholesale charging model

- Change from MOU to MB charging of Voice traffic

Resources & Internal Prioritization

Regulatory

Operational

Band Capable Devices

Steering

- LTE steering capabilities
- Steering by device type

Device Testing

- VoLTE capable & legacy

Agreement on Network Quality of Service values

Technical

VoLTE supported

- Base of customers migrated to VoLTE

Emergency IMS APN Support

IT & Billing Development

- Change from CDRs to home generated records

Support of S8 HR roaming model

- Competing LBO model still creating partner confusion

Rollout

5G^v



verizon^v

Verizon confidential and proprietary. Unauthorized disclosure, reproduction or other use prohibited.

Our US 5G Rollout - Nationwide

- Many metropolitan locations launched in 2019
- Primary US cities
- 13 NFL Stadiums Covered



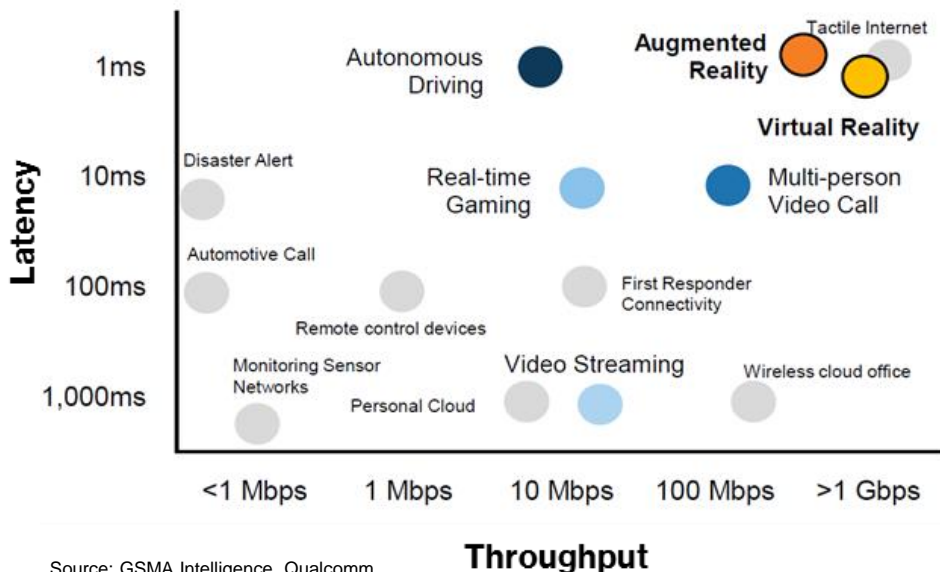
Use Cases

5G[✓]



Use cases create Consumer excitement for 5G

5G Use Cases



Source: GSMA Intelligence, Qualcomm

High Quality Video

- Live streaming, multi-party video chat, UHD video, and 360 video raise the requirements for bandwidth / latency

latency	bandwidth	data usage
40ms	10Mbps+	4GB per hr

Real-time gaming

- Cloud and/or multiplayer gaming emphasize the need for low latency, low jitter, and minimal packet loss

latency	bandwidth	data usage
20-40ms	35Mbps+	10GB per hr

AR / VR

- 5G reduces burden on end-user devices, extends battery life and improves the user experience

latency	bandwidth	data usage
20ms	90Mbps+	40GB per hr

**Optimal requirements for current applications*

A Broad Array of B2B Use Cases will be Unlocked



Retail: Store Operations

Machine vision tracks customer movements in store to inform personalized ads delivered AR



Public Sector: Disaster Relief

Connected emergency response assets, incl. 5G video w/ machine vision, enable 'God's eye' view to inform disaster relief efforts



CPG (Mfr): Marketing

5G miniature sensors securely transmit data to edge to reveal majority of consumers eat cereal as snack; mfr adjusts marketing



CPG (Mfr): Consumer Insights

5G miniature sensors securely transmit juice's temp./ date/ time at consumption to edge compute to generate consumer insights



Production: Smart Factory

Smart sensors use edge-based AI/ ML to regulate conveyor belt speed & reduce workflow congestion



Transport: V2V/ V2I Comms

Car & infra sensors transmit data to mobile edge for real-time signals back to vehicles to warn for crashes, traffic interruptions, bridge openings



Healthcare: Remote Patient Care

5G sensors using AI/ ML monitor child's glucose levels and administer insulin injections accordingly



Warehouse: 360° real-time view

Smart, cellular sensors on all goods (e.g. apparel) integrated w/ core systems enable real-time view of conditions, delays, & lost items



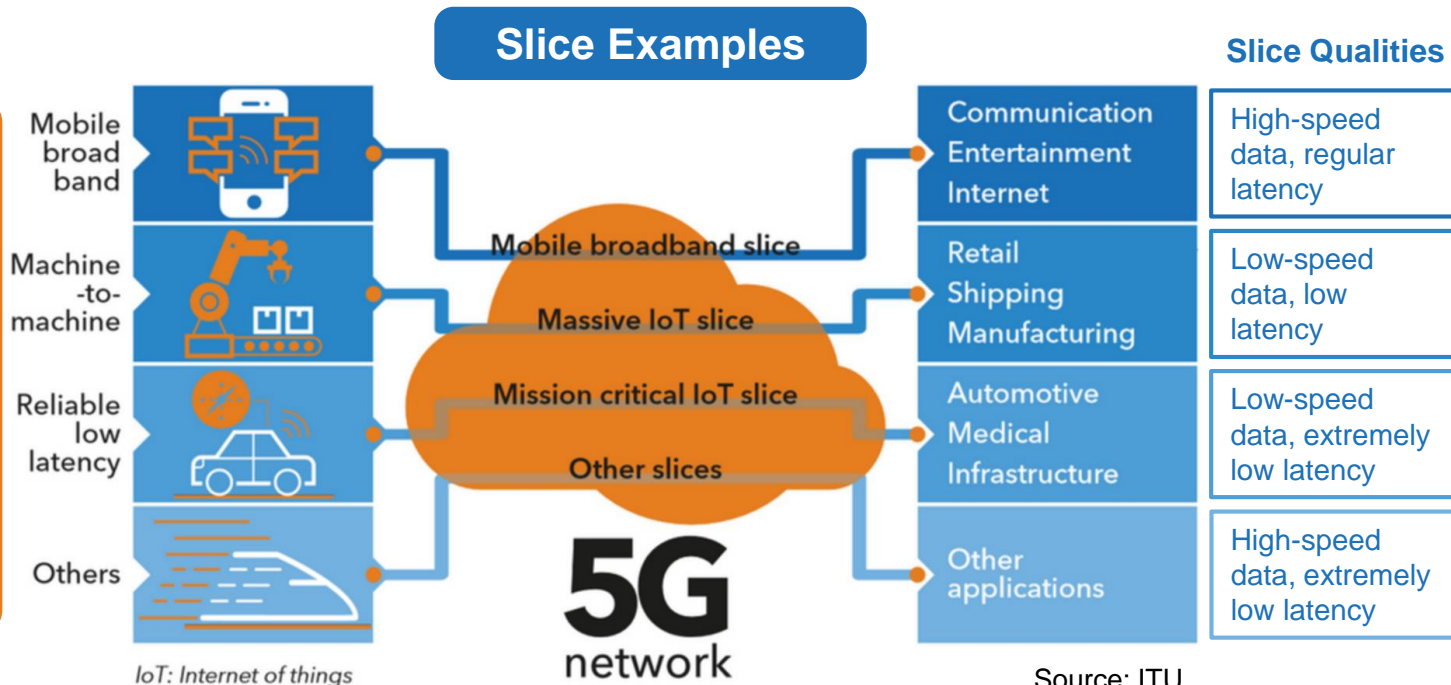
Agriculture: Quality Control

5G sensors using AI/ ML regulate fertilizer application based on weather, soil content, and crop progression

Network Slicing in 5G

Concept:

To split a single physical network into multiple virtual networks, tailored to specific application requirements



Wrap Up

Verizon – Launching 5G across the USA

- ✓ Verizon has been a strong 4G LTE & VoLTE provider in the US.
- ✓ VoLTE & 5G Use cases are compelling for Consumer & Business markets.
- ✓ Challenges have been faced and solutions found.
- ✓ Verizon was “First To Market” with 5G UWB and is deploying mmWave.
- ✓ We have a successful, ongoing 5G launch program across key metro areas.



End.