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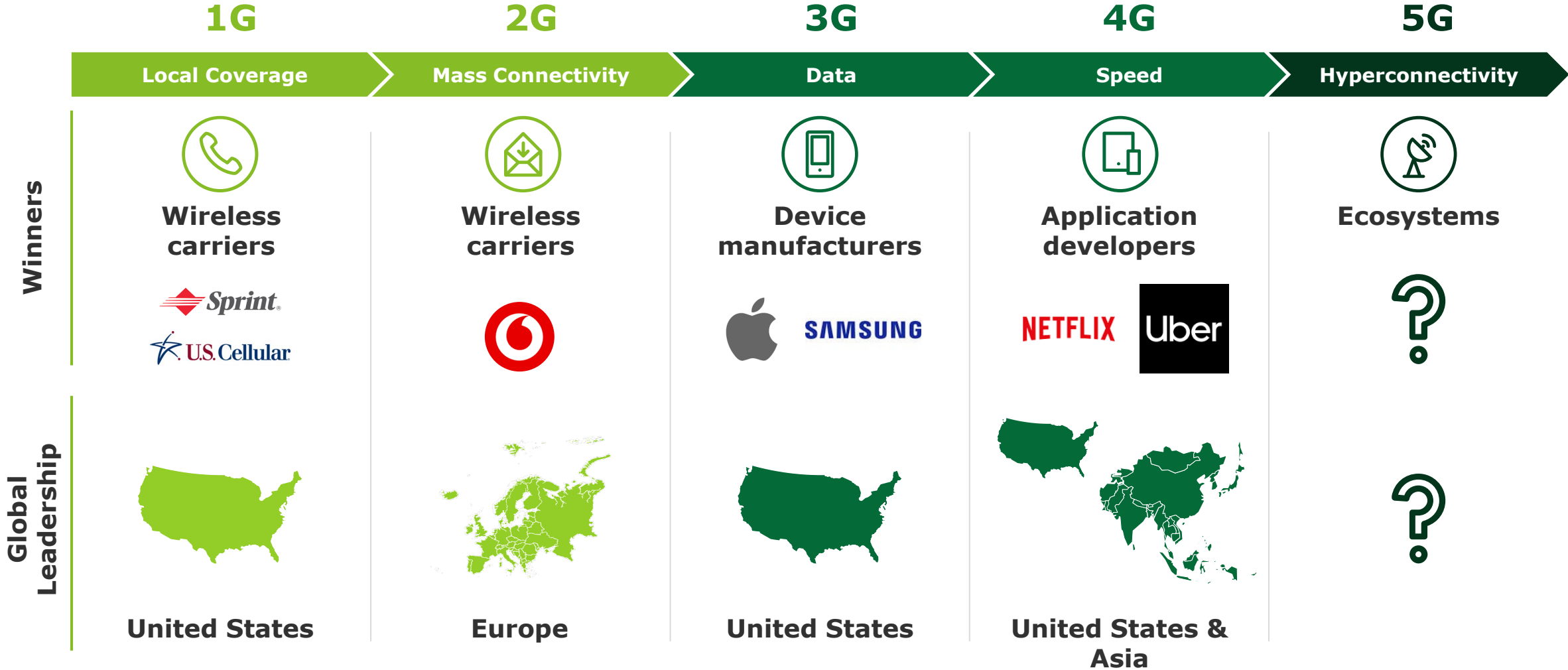
Advanced Connectivity – 5G and WiFi 6
October 2020
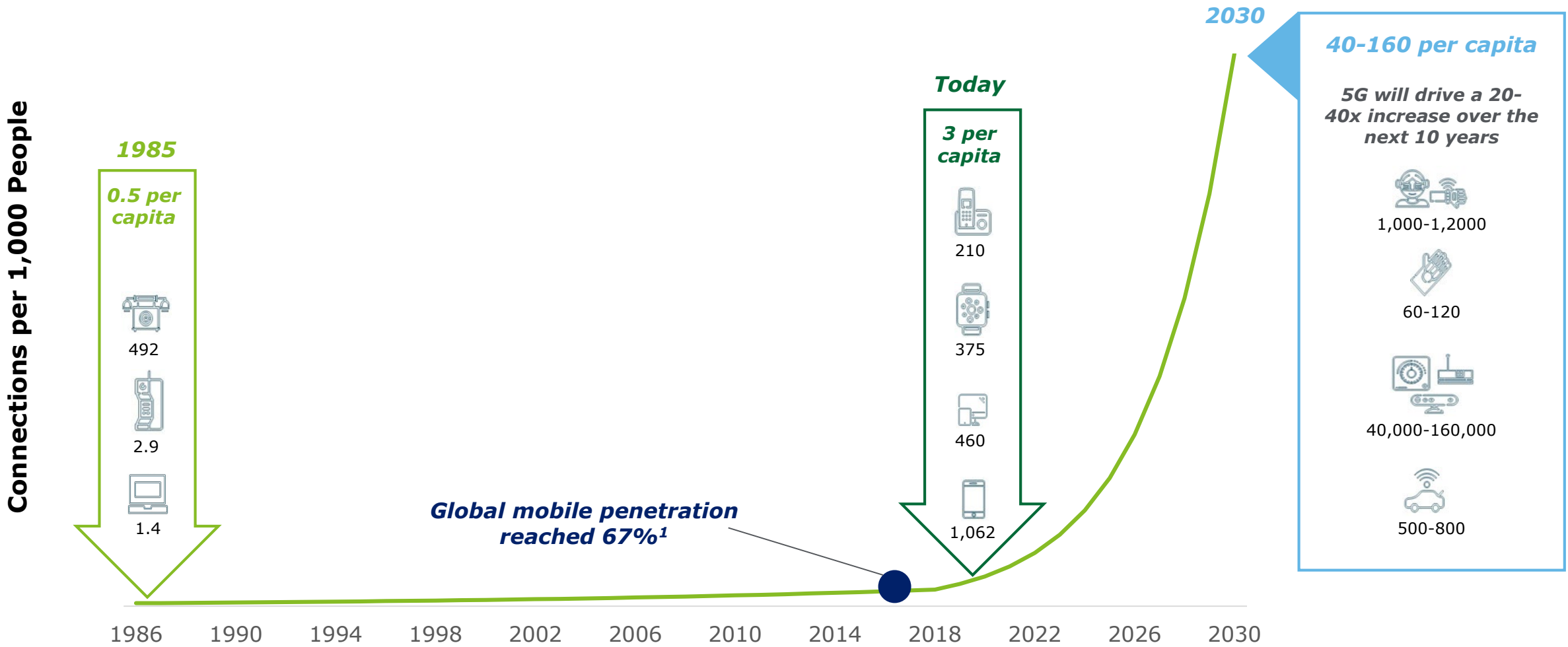
Opportunities and shifts with 5G

Every change in wireless technology has created new winners and shifted global business performance

	1G	2G	3G	4G	5G
	Local Coverage	Mass Connectivity	Data	Speed	Hyperconnectivity
Winners	Wireless carriers	Wireless carriers	Device manufacturers	Application developers	Ecosystems
	Sprint	Vodafone	Apple SAMSUNG	NETFLIX Uber	?
Global Leadership	United States	Europe	United States	United States & Asia	?

What happens next? Everything gets connected!

Current forecast suggest we will go to between 40 and 160 connections per capita by 2030

2030

40-160 per capita

5G will drive a 20-40x increase over the next 10 years

Today

1985

0.5 per capita

3 per capita

Connections per 1,000 People

492

2.9

1.4

210

375

460

1,062

1,000-1,2000

60-120

40,000-160,000

500-800

Global mobile penetration reached 67%[1]

1986   1990   1994   1998   2002   2006   2010   2014   2018   2022   2026   2030

5G Functionality

The changes of 5G are profound; analogous to how cloud changed compute and data storage

IMPACT **USE CASES**

Consumer Driven

Enhanced Mobile Broadband

eMBB

- *Support for higher bandwidth applications at lower cost per bit*
- *Broad deployment*

Smartphones

- *Fixed Wireless*
- *ARVR to mobile phones*
- *Headsets*
- *3D gaming*

….however, enterprises seek greater functionality

Enterprise Driven

Massive Machine Type Communications

mMTC

- *Narrowband IoT focus*
- *Device and data management paramount*

IoT

- *IoT*
- *Environmental monitoring*
- *Connected home*

Ultra-reliable and Low-latency Communications

uRLLC

- *Higher cost per bit (QoS)*
- *Deployed in select areas, primarily focused on enterprises*

Enterprise

- *Autonomous vehicles*
- *Industrial facility or port*

Motivations for advanced connectivity

Organizations are adopting advanced wireless to unlock innovation and competitive advantage

57%

Believe their company's **current networking infrastructure prevents** them from addressing the **innovative use cases** they want to target
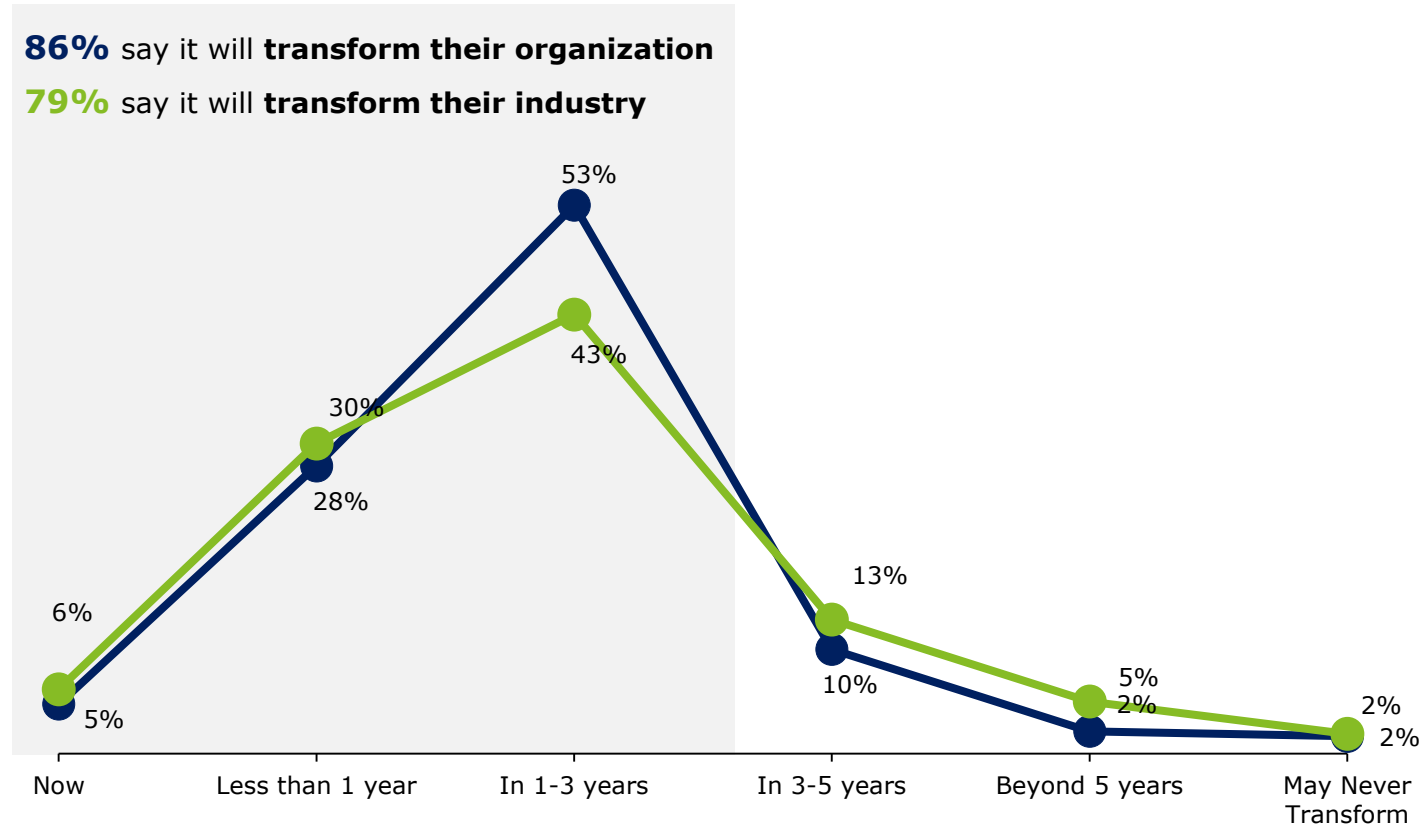
87%

Believe their company can **create a significant competitive advantage** by leveraging advanced connectivity technologies
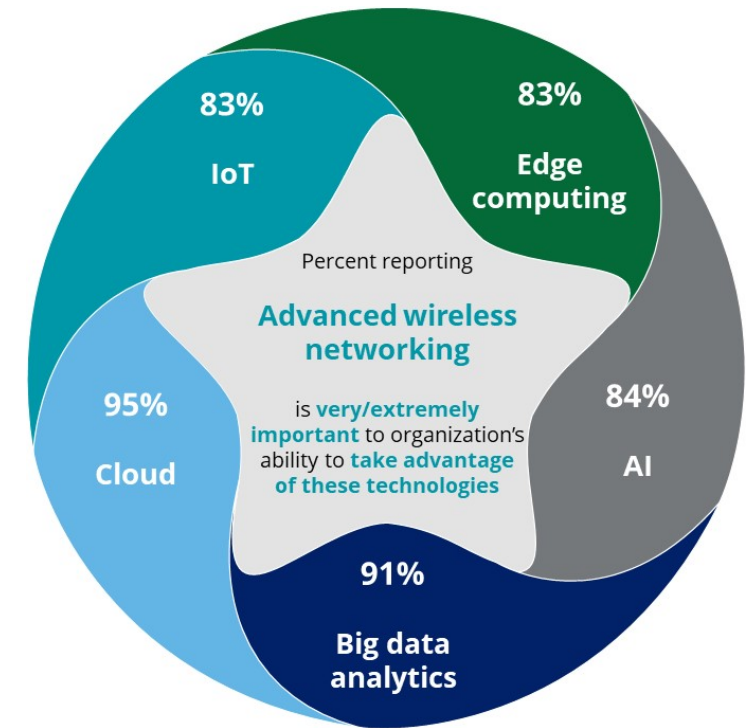
Voice of enterprises

Executives overwhelmingly believe advanced wireless technologies will transform their organizations

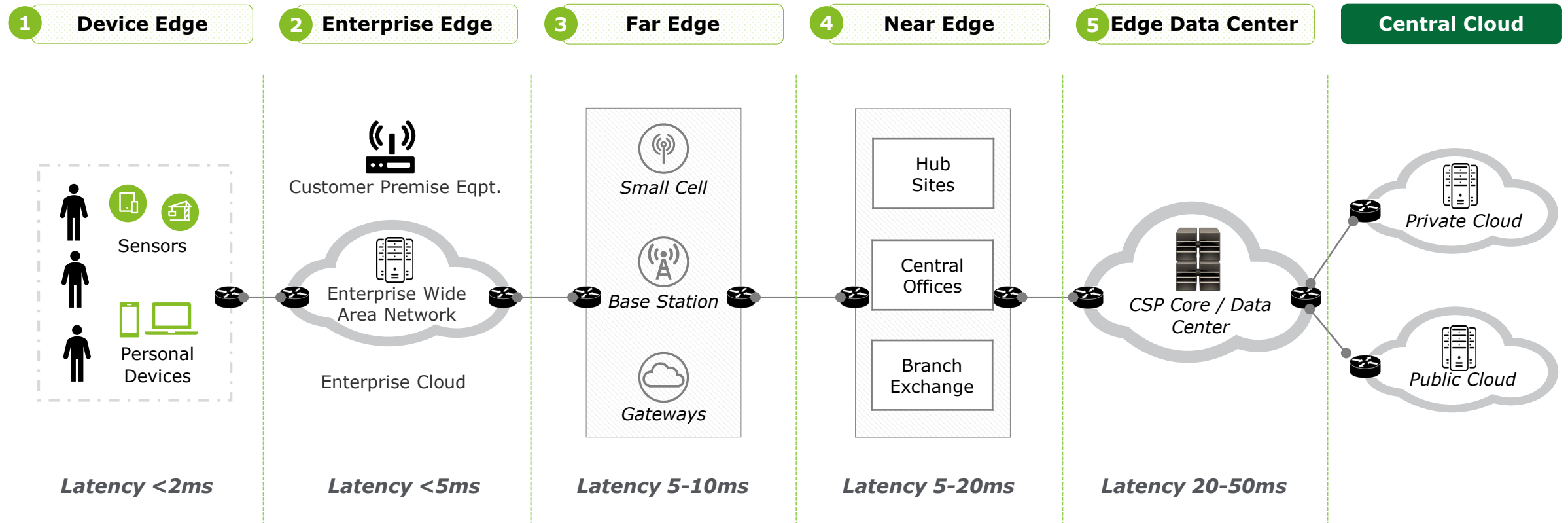### Enterprises anticipate substantial transformation within 3 years

86% say it will **transform their organization**

79% say it will **transform their industry**

| Now | Less than 1 year | In 1-3 years | In 3-5 years | Beyond 5 years | May Never Transform |

(Line chart values — navy line: 5%, 28%, 53%, 10%, 2%, 2%; green line: 6%, 30%, 43%, 13%, 5%, 2%)

Advanced wireless is a force multiplier unlocking the potential of emerging tech.

83% IoT
83% Edge computing
84% AI
91% Big data analytics
95% Cloud

Percent reporting **Advanced wireless networking** is **very/extremely important** to organization's ability to **take advantage of these technologies**

What is Edge Compute?

Based on application needs, the compute and storage resources can reside in different parts of the network

1 Device Edge	2 Enterprise Edge	3 Far Edge	4 Near Edge	5 Edge Data Center	Central Cloud

Sensors

Personal Devices

Customer Premise Eqpt.

Enterprise Wide Area Network

Enterprise Cloud

Small Cell

Base Station

Gateways

Hub Sites

Central Offices

Branch Exchange

CSP Core / Data Center

Private Cloud

Public Cloud

Latency <2ms   **Latency <5ms**   **Latency 5-10ms**   **Latency 5-20ms**   **Latency 20-50ms**

Moving analytics and data processing to the Edge provides real-time responsiveness essential for next gen apps.

Low   *Latency and Computing Capacity*   *High*

Business Use Cases

Enterprises are targeting a range of usage scenarios with their adoption of advanced wireless technologies

	EMPLOYEE NETWORKING	MACHINE NETWORKING	CUSTOMER NETWORKING
#1	**Workplace communication** Faster & seamless upload/download of files from cloud, remote document sharing, messaging, accessing internet	**Advanced analytics** Insights on sensor-generated data, edge computing	**Advanced analytics** Insights on shopping pattern or on-floor movement, pricing, forecasting, recommendations, geofencing-based notifications
#2	**IT administration** Remote troubleshooting, managing workstations/servers/mobile devices	**Automation** Autonomous vehicles, remote-controlled robots or drones, delivery robots	**Security & fraud prevention** Biometric checks, geolocation transactions, smart contract/ blockchain
#3	**Advanced collaboration tools** Mobile videoconferences, AR/VR/3D experiences, remote workplaces	**Asset tracking** Inventory management, sensors in containers / goods / machines, geofencing, blockchain / smart contracts	**Advanced customer experiences** Cloud-based mobile apps, autonomous stores, immersive AR/VR/3D features, entertainment, video-based check-ups
#4	**Network management** Software-defined WAN, network slicing	**Machine-to-machine communications** Vehicle communications and safety systems, assembly/production line	**Asset tracking** IoT sensors, RFID tracks, geofencing, fleet management, smart contracts/blockchain
#5	**Advanced analytics** Device usage, cloud usage	**Remote monitoring / control** Video surveillance, connected assembly lines for production processes, telemedicine	**Automation** Restocking shelves, delivery robots/drones, robotics-assisted surgeries

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