Evolving Devices for 5G Adoption

Presentation Slides

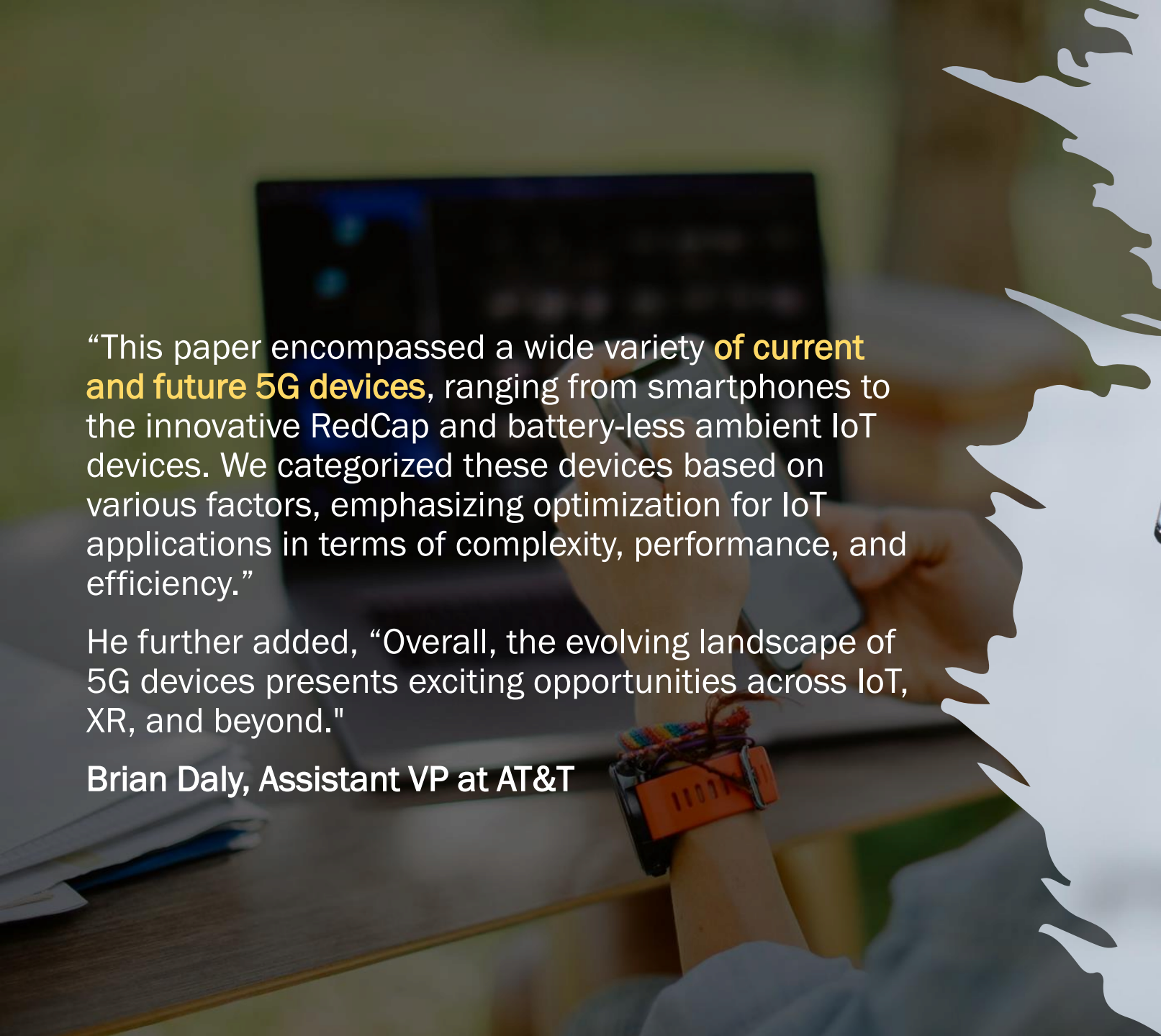Permission to use with attribution to '5G Americas' is granted

"The evolution of 5G devices signifies a dynamic shift in connectivity, transforming industries and empowering individuals. From the power of smartphones to the promise of Ambient IoT, this 5G Americas' briefing paper unveils the future diversity of 5G devices."

Chris Pearson, President, 5G Americas

"This paper encompassed a wide variety **of current and future 5G devices**, ranging from smartphones to the innovative RedCap and battery-less ambient IoT devices. We categorized these devices based on various factors, emphasizing optimization for IoT applications in terms of complexity, performance, and efficiency."

He further added, "Overall, the evolving landscape of 5G devices presents exciting opportunities across IoT, XR, and beyond."
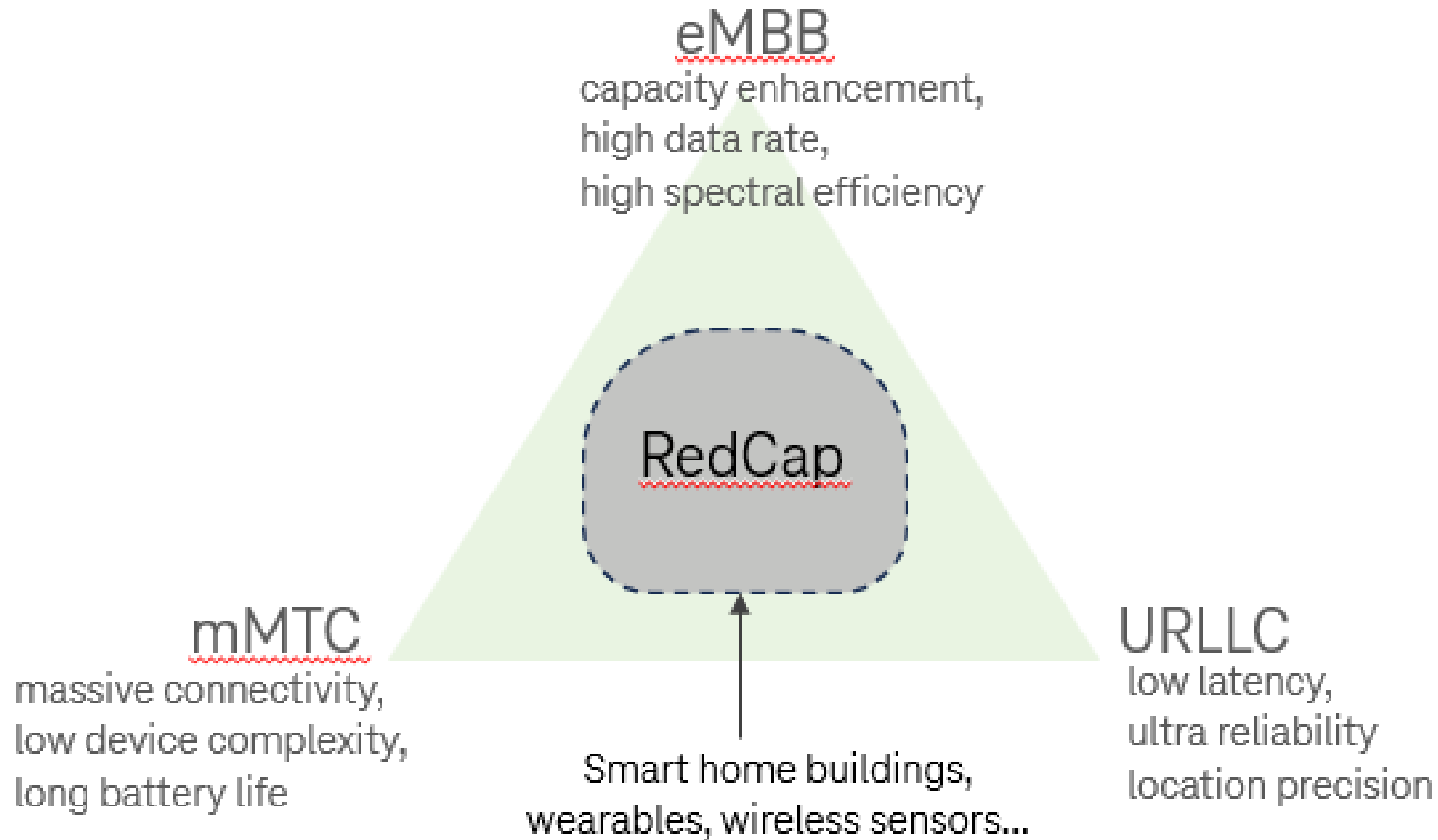
Brian Daly, Assistant VP at AT&T

"This 5G Americas paper provides a holistic view of how **5G devices are evolving** to address the diverse needs of today's interconnected world and serves as a testament to the continuing innovation driving toward new services offered by the 5G industry."

Yuchul Kim, Principal Engineer, Qualcomm Technologies, Inc.,

RedCap address the middle-zone uses cases that cannot be best served or categorized as eMBB, URLLC, and mMTC

eMBB
capacity enhancement,
high data rate,
high spectral efficiency

RedCap

mMTC
massive connectivity,
low device complexity,
long battery life

URLLC
low latency,
ultra reliability
location precision

Smart home buildings,
wearables, wireless sensors...

Comparison between LTE IoT devices and RedCap

Category of devices	Cat 4 (Rel 8)	Cat 1 (Rel 8)	Cat M1 (LTE-M)	NB-IoT (Rel 13)	REDCAP (FR1)
Downlink Peak Rate	150 Mbps	10 Mbps	~300 kbps	~30 kbps	150Mbps
Uplink Peak Rate	50 Mbps	5 Mbps	~300 kbps	~60 kbps	50Mbps
Duplex Mode	Full duplex	Full duplex	Half duplex	Half duplex	Flexible for FDD (TDD also supported)
Maximum UE Receive Bandwidth	20 MHz	20 MHz	1.4 MHz	200 kHz	20MHz (5MHz minimum)
Voice Support	Yes	Yes	Limited	No	Yes

RedCap development expected milestones.

RedCap chipset ecosystem	Early commercial RedCap devices	Mass market RedCap devices
Starting in 2023	2024	2025+

Use cases identified in 3GPP SA1 study.

Inventory	smart labeling/identification in warehouse, supply chain, airport shipping, manufacturing, supply chain, logistics, retail, etc.
Sensor	environment sensing in smart farm, smart city, smart home, smart grid, etc.
Positioning	location tracking and ranging in indoor/outdoor for assets, products, personal item tracking, etc.
Command	actuator, device activation/deactivation, electronic labeling, etc.

Basic topologies to support ambient IoT device for indoor and outdoor scenarios