

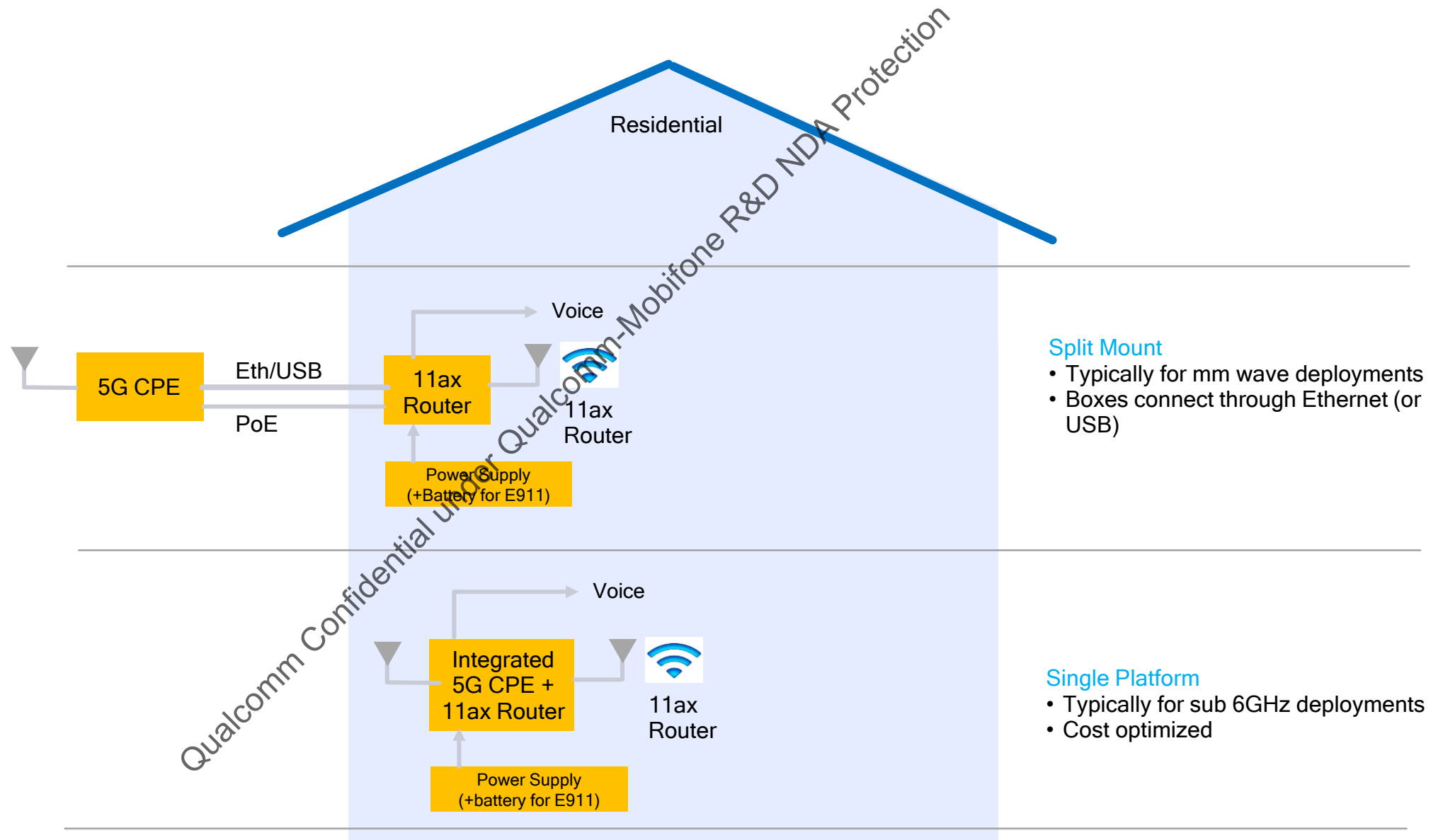
July 2020

Qualcomm

# 5G MiFi/CPE Introduction

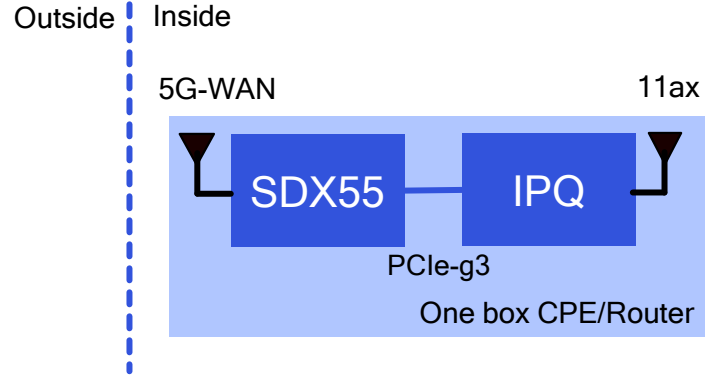
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# Possible configurations for 5G CPE - Wi-Fi 6 Converged



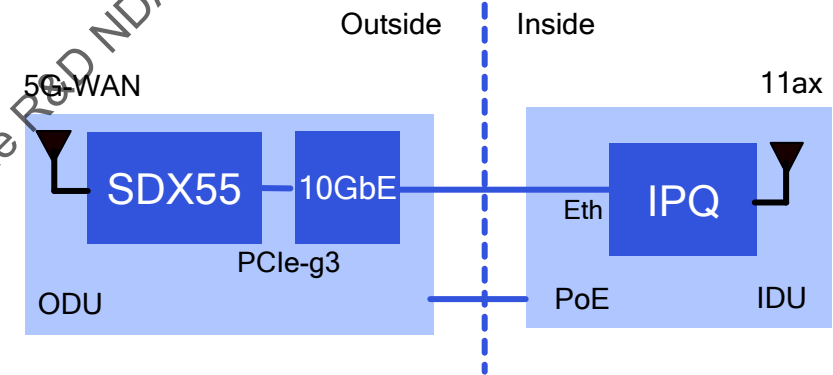
# 5G FWA CPE Solutions

## Single Platform



- ✓ 5G-CPE indoor configuration
- ✓ Single-box w/ integrated Home Router
- ✓ Ideal for sub-6 5GHz
- ✓ mmW is also an option

## Split Mount



- ✓ 5G-CPE outdoor configuration
- ✓ 40+dBm EIRP
- ✓ Peak NSA Throughput of 7 Gbps
- ✓ Multi-gigabit Ethernet via AQC107

# MDM Platforms

Controlled Distribution - DO NOT COPY

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Qualcomm  
snapdragon

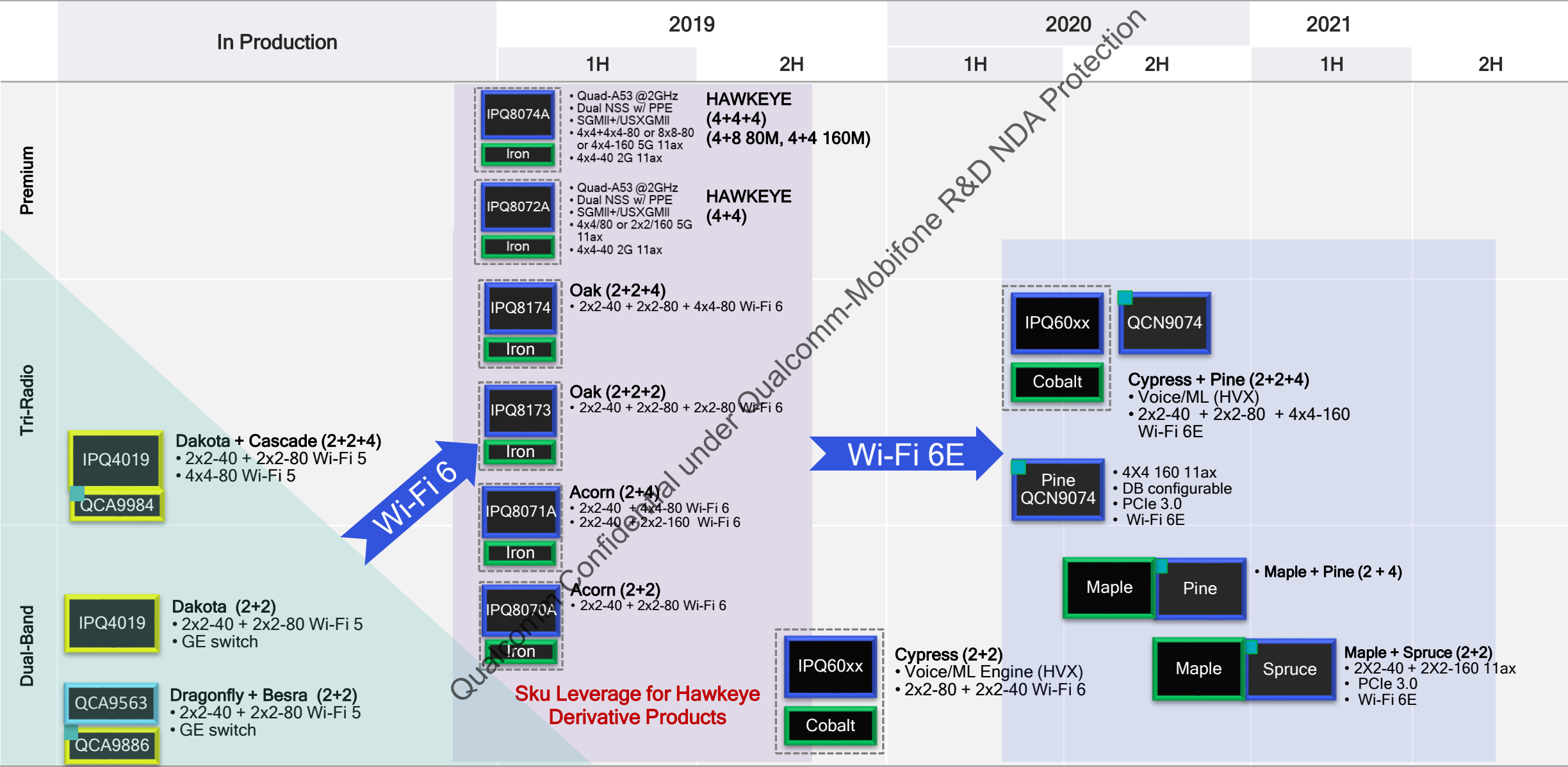


Tier	In Production	2019						
		Q2	Q3	Q4				
Pre /High	<div><div><div>9x15, 9310, 8215 28nm</div><div>2nd Gen LTE Cat3 DC-HSPA</div></div><div><div>9x25, 9320, 8225 28nm</div><div>3rd Gen LTE Cat4 DC-HSUPA</div></div></div> <td><div><div><div>9x35M 9x30 20nmSOC 9.8x8.6</div><div>X7 LTE Rel 10 LTE-FDD/TDD 40 MHz CA LTE Cat 6 D/U: 300/50 Mbps DC-HSPA+ 42Mbps TD-SCDMA DOrB (9635/9630 only)</div><div>9330 20nmSOC 9.8x8.6</div><div>X7 LTE Rel 10 LTE-FDD/TDD 40 MHz CA Cat 6 D/U: 300/50 Mbps</div><div>Same HW &amp;SW Architec. 4th gen of MM-LTE (Cat6) Full 3G/4G RF band Int.AP(A7)+OS(Lin)</div></div><div><div><div>9x40 20nmSOC 9.8x8.6</div><div>X12 LTE Rel 11 LTE-FDD/TDD 60 MHz CA LTE Cat 12/13 40MHz UL CA D/U: 600/150 Mbps DC-HSPA+ 42Mbps TD-SCDMA DOrA (9645/9640 only)</div><div>9340 20nmSOC 9.8x8.6</div><div>X12 LTE Rel 11 LTE-FDD/TDD 60 MHz CA LTE Cat 12/13 40MHz UL CA D/U: 600/150Mbps</div><div>Same HW &amp;SW Architec. 5th gen of MM-LTE (Cat9/10) Full 3G/4G RF . Int. 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	Value	<div><div><div>6200, 6600 (45 nm) 6270 65nm</div><div>3rd Gen LTE Cat4 DC-HSDPA HSUPA (not for 6270)</div></div><div><div><div>9x07 28nmLP 7.8x6.9</div><div>X5 LTE Rel 10 LTE Cat4 D/U: 150/50Mbps DC-HSPA+ 42 Mbps TD-SCDMA 1xAdv/DO</div></div><div><div>Full 3G/4G RF band cover. Int. AP (A7)+OS(Linux)</div></div></div><td><div><div><div>9206 28nmLP</div><div>LTE Cat.M1, LTE Cat.NB1, and GPRS). ThreadX OS</div></div><div><div>LTE Cat.M1, LTE Cat.NB1, and GPRS D/U: 1.0/1.0Mbps</div></div></div></td><td></td><td></td><td></td></div>	<div><div><div>9206 28nmLP</div><div>LTE Cat.M1, LTE Cat.NB1, and GPRS). ThreadX OS</div></div><div><div>LTE Cat.M1, LTE Cat.NB1, and GPRS D/U: 1.0/1.0Mbps</div></div></div>					

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# Qualcomm Wi-Fi 6 AP Roadmap

PCIe



# Qualcomm Technologies Wi-Fi Leadership



#1

Global Wi-Fi  
Market Share

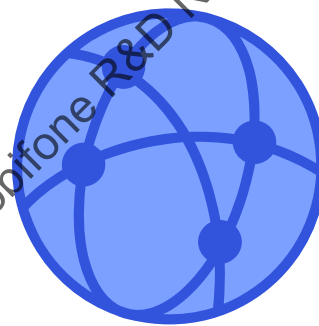
Qualcomm, the #1 global share leader in Wi-Fi for Q2 2018, most recent reporting (Source: ABI Research)



#1

Enterprise/Home/Venue  
Market Share

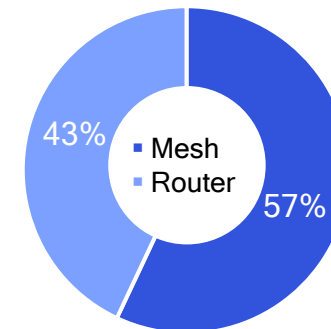
Source: Qualcomm SAM Analysis



#1

Mesh Networking  
Market Share

Source - Qualcomm SAM Analysis

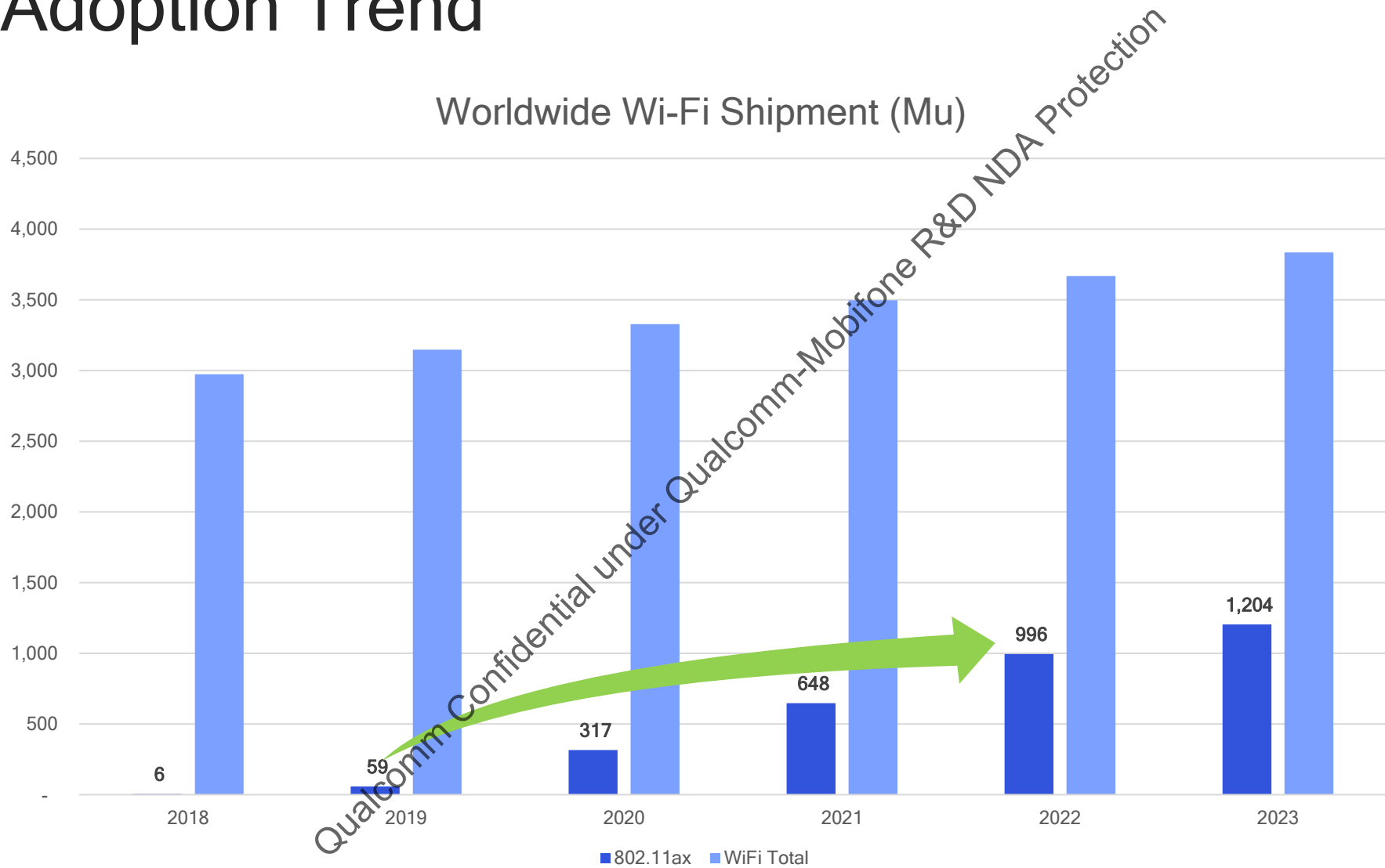


57%

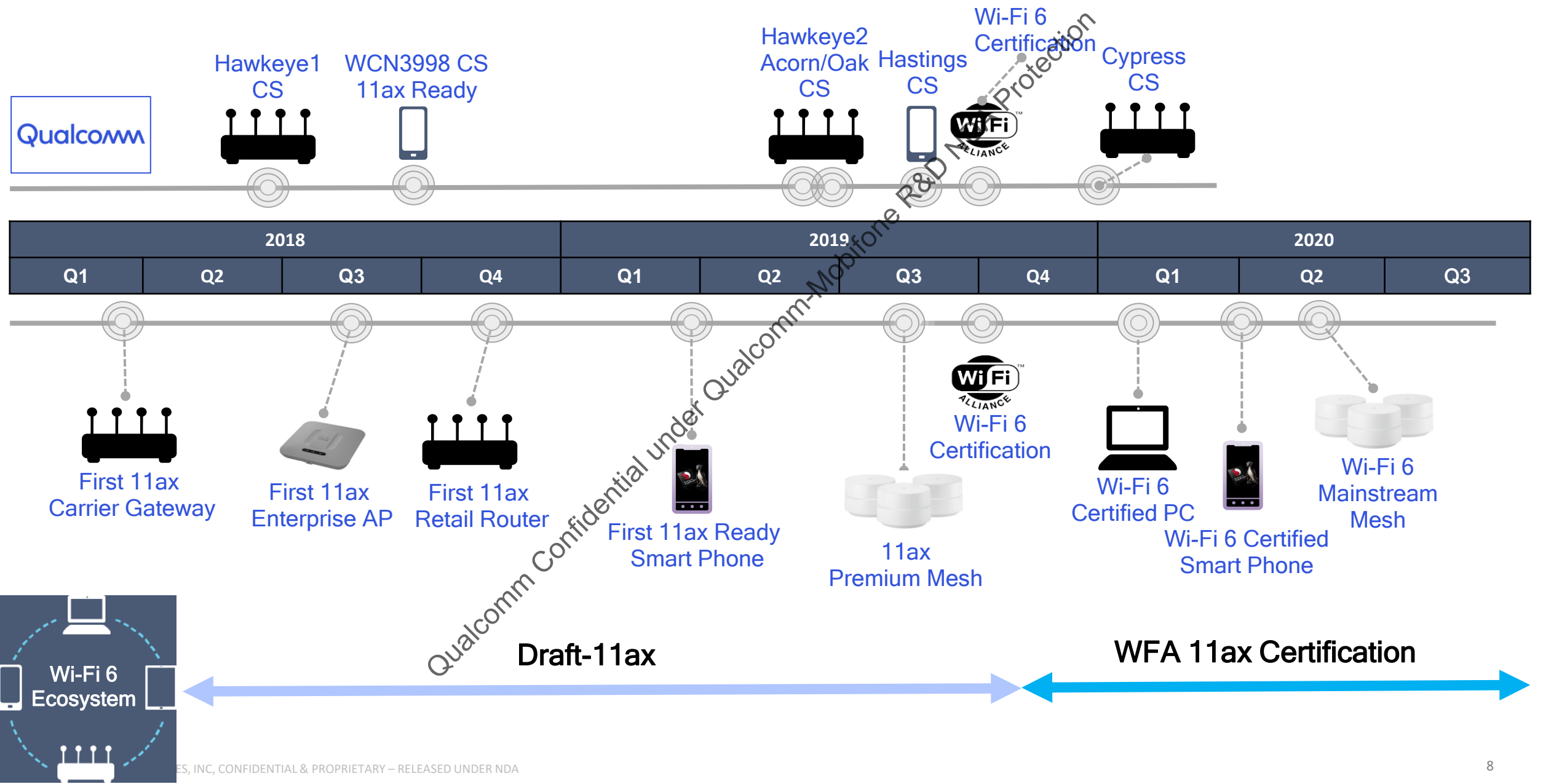
of US Retail  
Home Wi-Fi  
Market is Mesh

Source: The NPD Group, Inc.,  
Retail Tracking Service, U.S., 12/18

# 11ax Adoption Trend

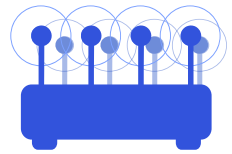


# Wi-Fi 6 Ecosystem Rollout Schedule

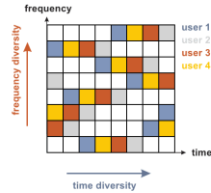




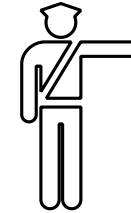
# Technology building blocks of 11ax



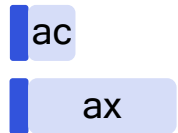
8x8  
MU-MIMO  
DL/UL



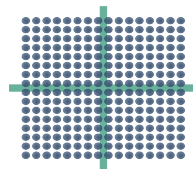
OFDMA  
DL/UL



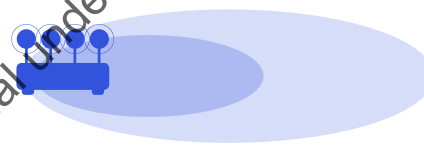
Up link resource  
scheduling



Long OFDM  
symbol



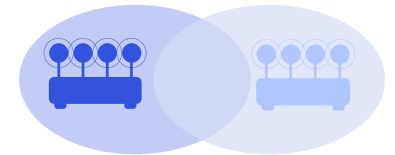
1024 QAM



Extended range



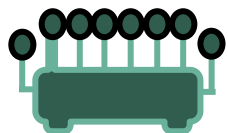
More spatial  
streams



BSS color

11ax provides a factor 4 higher throughput in dense environments

# IEEE 802.11ax - Wi-Fi 6 Key Benefits to Carriers



## 8x8 AP

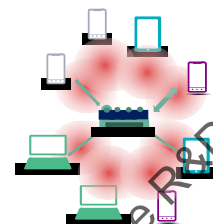
- Significant capacity boost
- Greater coverage due to increased sensitivity

## 37 users DL/UL OFDMA

- Greater coverage
- Improved Wi-Fi performance, particularly in high density, high throughput environments
- More efficient IoT support

## 1024QAM

- Support of new use cases such as UHD Video and AR/VR



## 8x8 DL/UL MU-MIMO

- Better real time performance
- Significant capacity boost

## BSS Color

- Improved operation in multi-dwelling units



## 6GHz Operation

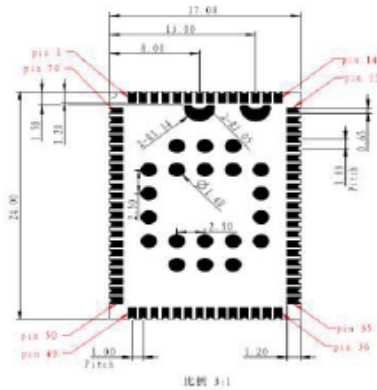
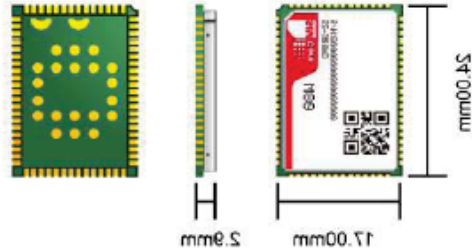
- Improved performance with new bandwidth available



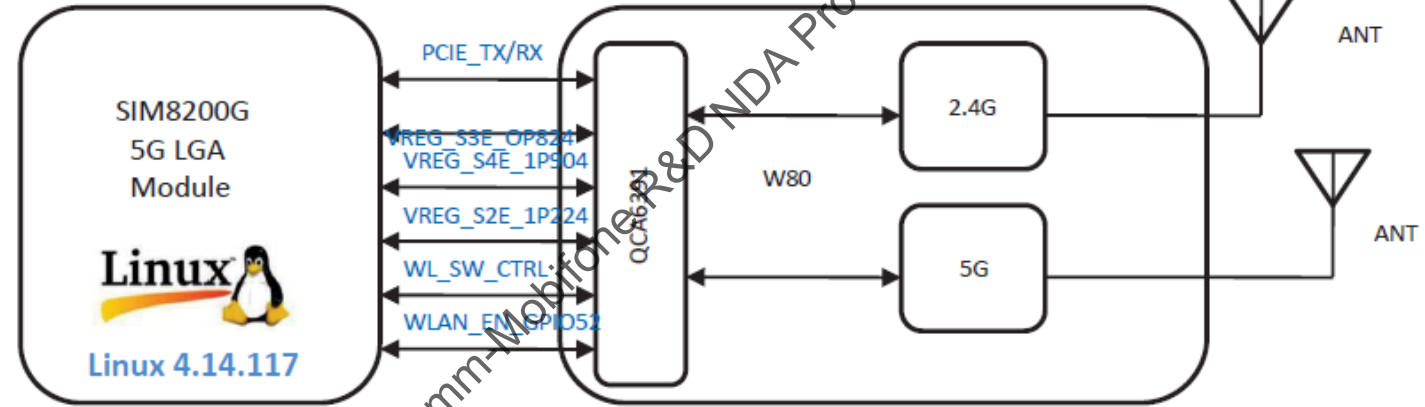
# 5G CPE vs. 5G MiFi

	Features	QC Wi-Fi 6 5G CPE	QC Wi-Fi 5 5G CPE	SDX55+QCA6390 (Linux)
Basic Wi-Fi AP Features	2.4G/5G 11ax, 1024 QAM, SU Beamformer		y	y
	WPA3 SAE, WPA2 PSK security modes, WMM & WPS2.0	y	y	y
	DFS Master Mode	y	y	y
AP Features Carriers need	Number of clients supported	512 for each band	512 for each band	32
	Wi-Fi Mesh/Band steering/AP Steering/ATF	y	y	x
	SSIDs	16	16	3
	MU-MIMO and Multi-User Beamformer	y	y	x
	Stability in complex environment (a lot of interferences, >10 or more STAs connected, heavy traffic with long duration)	Excellent	Excellent	Acceptable(depends on carrier's test spec)
Advanced WiFi 6 features	UL/DL-OFDMA	y	x	x
	BSS Color	y	x	x
	TWT	y	x	x
BOM Cost	Total BOM cost	Mid	Low	Lowest
	PCB stackup	4 - 6, double side	4, double side	10-12, double sided

# 5G MiFi Solution



W80 Wi-Fi Module



Key highlights :

- W80 Module-compliant with IEEE 802.11a/b/g/n/ac/ax, 2x2 MIMO
- Use 5G module itself CPU resource to run W80 module driver as SoftAP
- Considering limitation of 5G module's CPU capacity ,it is only suitable for Portable MIFI solution or Lite version router solution
- Target Application : Portable MIFI



# QCA6391

- Full featured 11ax based draft 3.0 standard



- Key benefits and KPI's

- Support all WFA mandatory 11ax features
- Support many key optional 11ax features
- Target Wi-Fi 6 (11ax) certified
- 1.775 Gbps DBS speed ( $2 \times 2$  11ax 2 GHz +  $2 \times 2$  11ax 5 GHz)
- Best in class Bluetooth/LE functionality and performance, 8x power reduction, 4x range

# 5G CPE Solution

5G

## 5G WAN

- Sub 6GHz for indoor deployment
- Mm Wave for outdoor deployment



## Connectivity

- 12 chains 11ax radios with flexible configuration (AX6200)
- BT / BLE / 15.4 companion chip



## CPU

- Quad 64bit A53 @ 2.2GHz (20k DMIPS)



## Networking

- Dual Core Multi-Threaded Network Accelerator
- Advanced classification, policing, queuing at wire speed (PPE)
- 25Gbps Acceleration



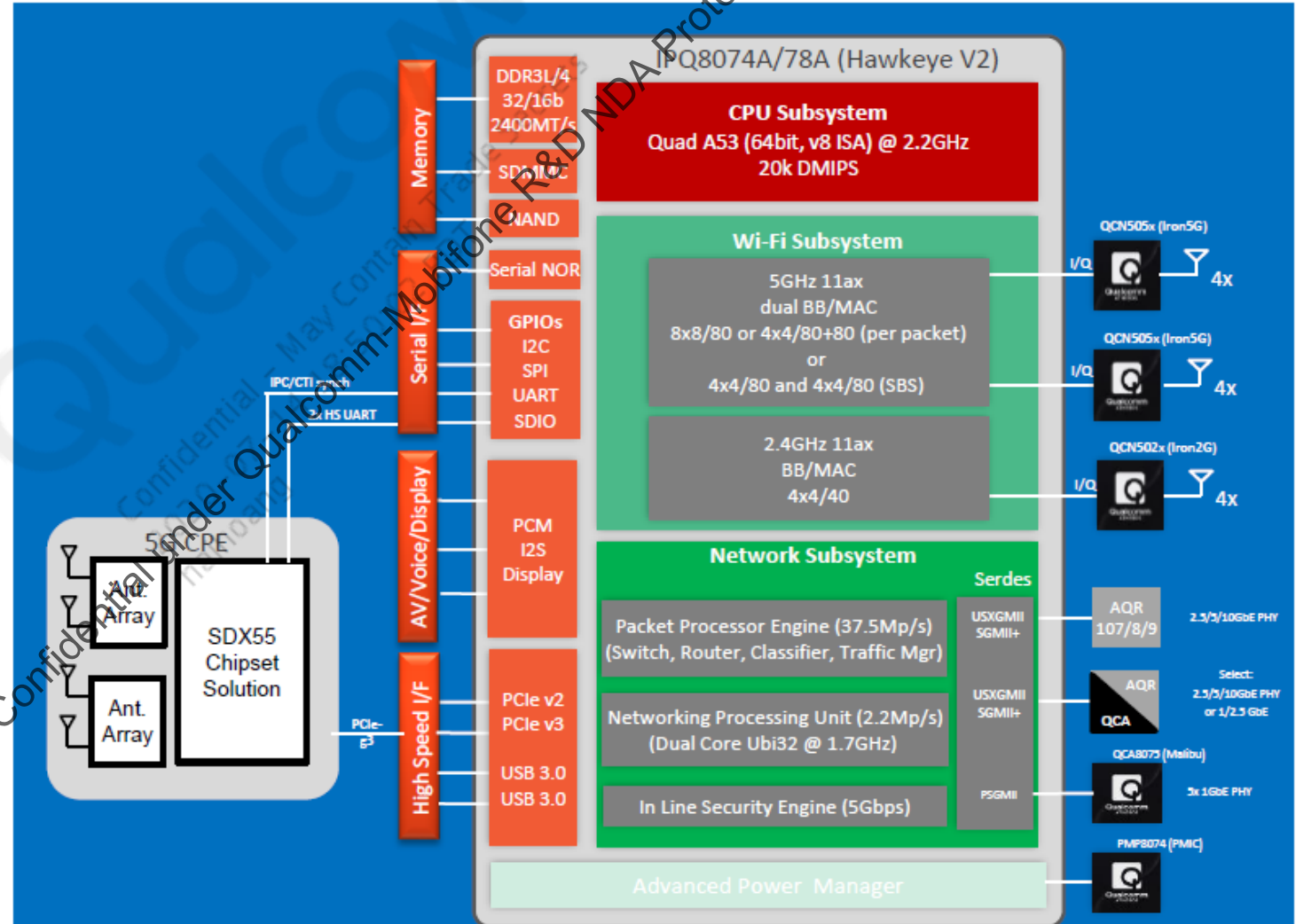
## Integration

- Highest Integration in the industry
- 14FF for lowest form factor and best in class power consumption



## Platform Differentiation

- Best in Class 5G Modem integrated with best in class 11ax Wi-Fi 6 router
- System performance optimization
- Free CPU cycles for OEM-specific apps thanks to full offload Wi-Fi driver





# Thank you

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