

Qualcomm

@Dev Singh

Qualcomm Robotics

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Qualcomm Technologies, Inc.

5G



The R&D Engine

Inventing
breakthrough
technologies that
fuel innovation

\$71+ billion

in cumulative R&D

140,000+

Granted patents / pending applications

Leading mobile innovation for over 30 years



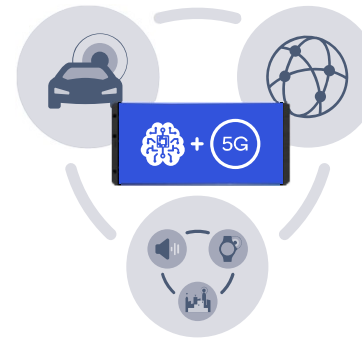
Digitized mobile communications

Analog
to digital



Redefined computing

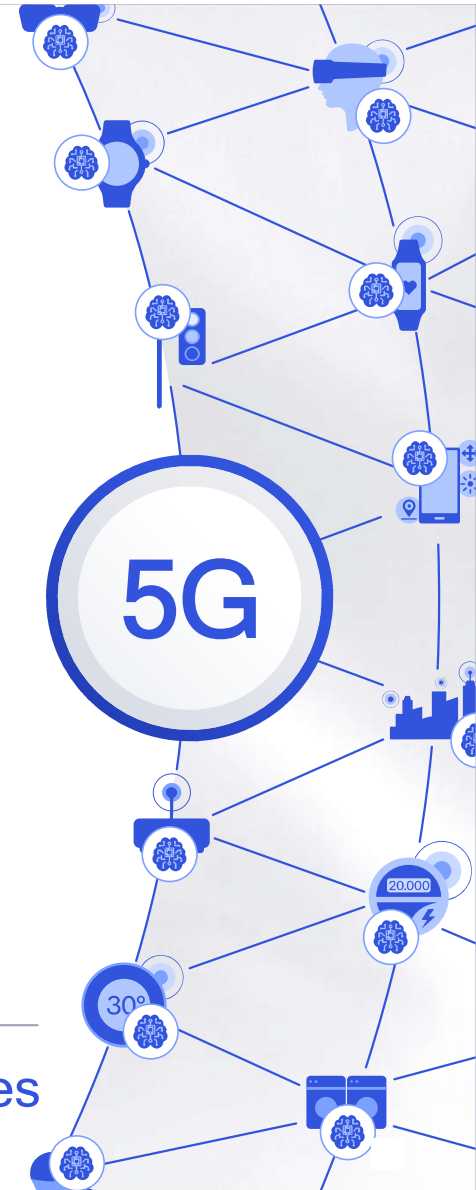
Desktop to
smartphones



Transforming industries

Connecting virtually everything
at the wireless edge

Transforming how the world connects, computes and communicates



Market segments of robotics and drones

Consumer Segment



Vacuum cleaners

Home & security



Educational



Social



Toy



Wearable



Selfie drone



Personal

Enterprise Segment



Professional & personal service



Retail

Cleaning

Drone controller



AMR

Delivery



Urban Air Mobility (UAM)

Industrial Segment



Industrial

Cobots



Edge robot controller

Automation



HMI for robots

Wearable

Agriculture



Inspection

Defense

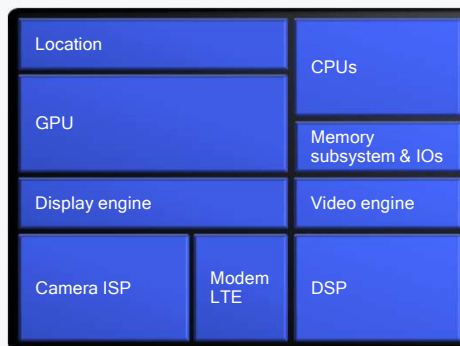
Qualcomm addressing diverse robotic segments

Alibaba	Attabotics	AWS Robomaker	Brain Corp	Baiwang	Clearpath	CloudMinds
Ecovacs	FLIR	Gotting	Hitachi	Intuition Robotics	iRobot	JD.com
JPL	Kinova Robotics	LG	Misty Robotics	NASA	Naver	Nilfisk
						Nuro

Numerous robotics products launched

NXT	Nuwa Robotics	Orion	Panasonic	Parrot	Phoenix Contact	Preferred Networks
Pudu	Rexroth	Robotis	Roborock	Samsung	Sharp	Siasun
						Siemens
Skydio	Softbank Robotics	Sony	UBTech	Weidmüller	Yasikawa	ZeroZero

Comprehensive Qualcomm Technologies for Robotics



High performance / integrated SOC

Optimized heterogeneous computing platform, at low power and small form-factors



Security

Authentication and execution



Camera

Computer vision



HLOS

Linux, ROS



AI / Machine learning

Detection, classification, navigation and engagement



On-board intelligence

Hard real-time control for autonomous navigation
High-fidelity sensor processing
Precise localization



Connectivity

Wi-Fi, LTE/5G, CBRS





5G

+



Intelligent Wireless Edge is critical to the IoT expansion

Diverse system requirements
Scaling to more devices
New service values

Realize low latency

Privacy

Scalability

Immediacy

Customization

Efficiency

Robustness

Reliability

Content closer to user

Personalization

Edge cloud

On-device

Efficiently expanding the IoT requires a new distributed intelligence paradigm

Current

Cloud-centric intelligence

IoT services depends on the central cloud to extract value

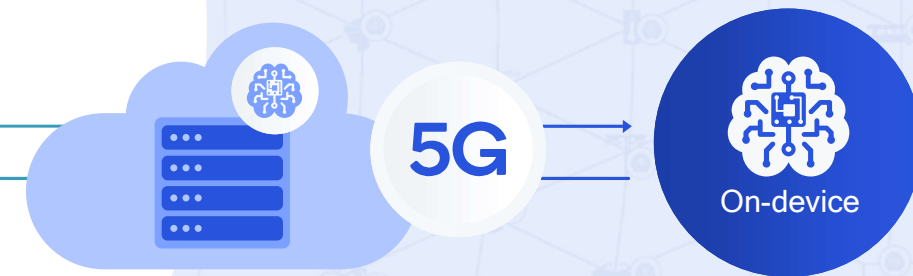


Latency could be over 100s ms today

Future

Distributed intelligence

Based on economic and performance tradeoffs for IoT use cases

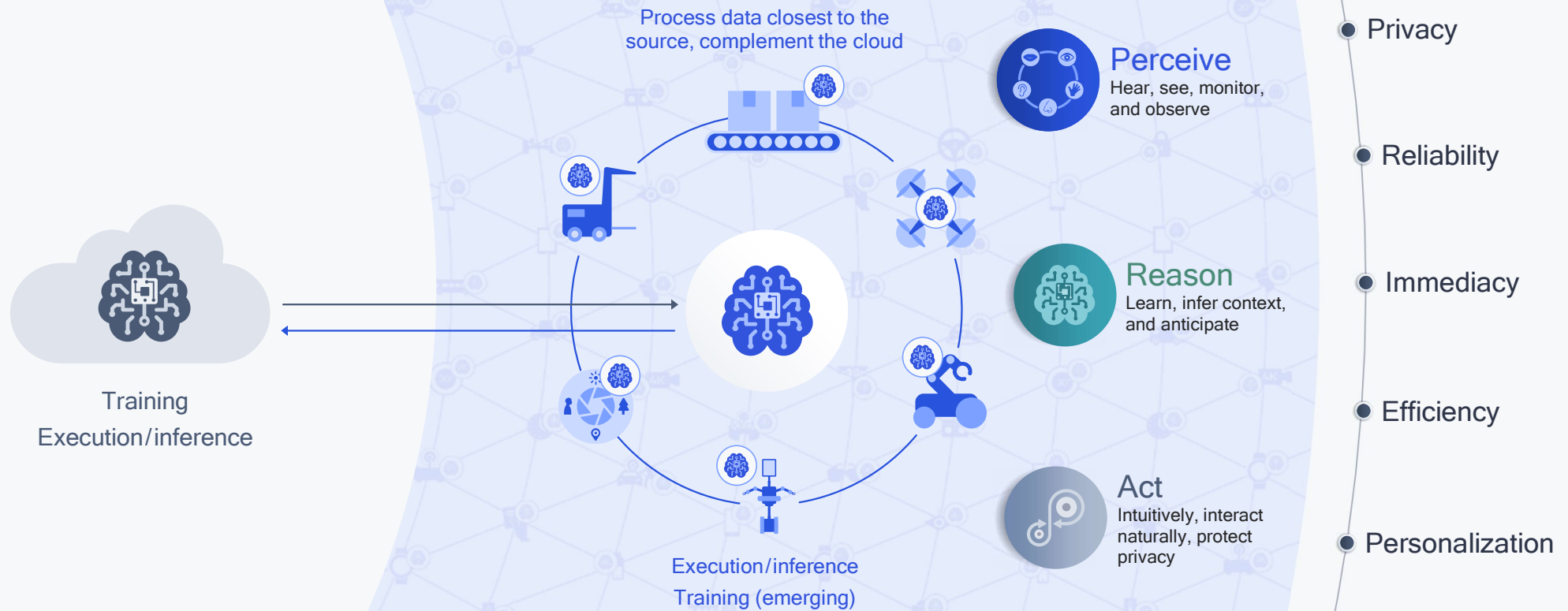


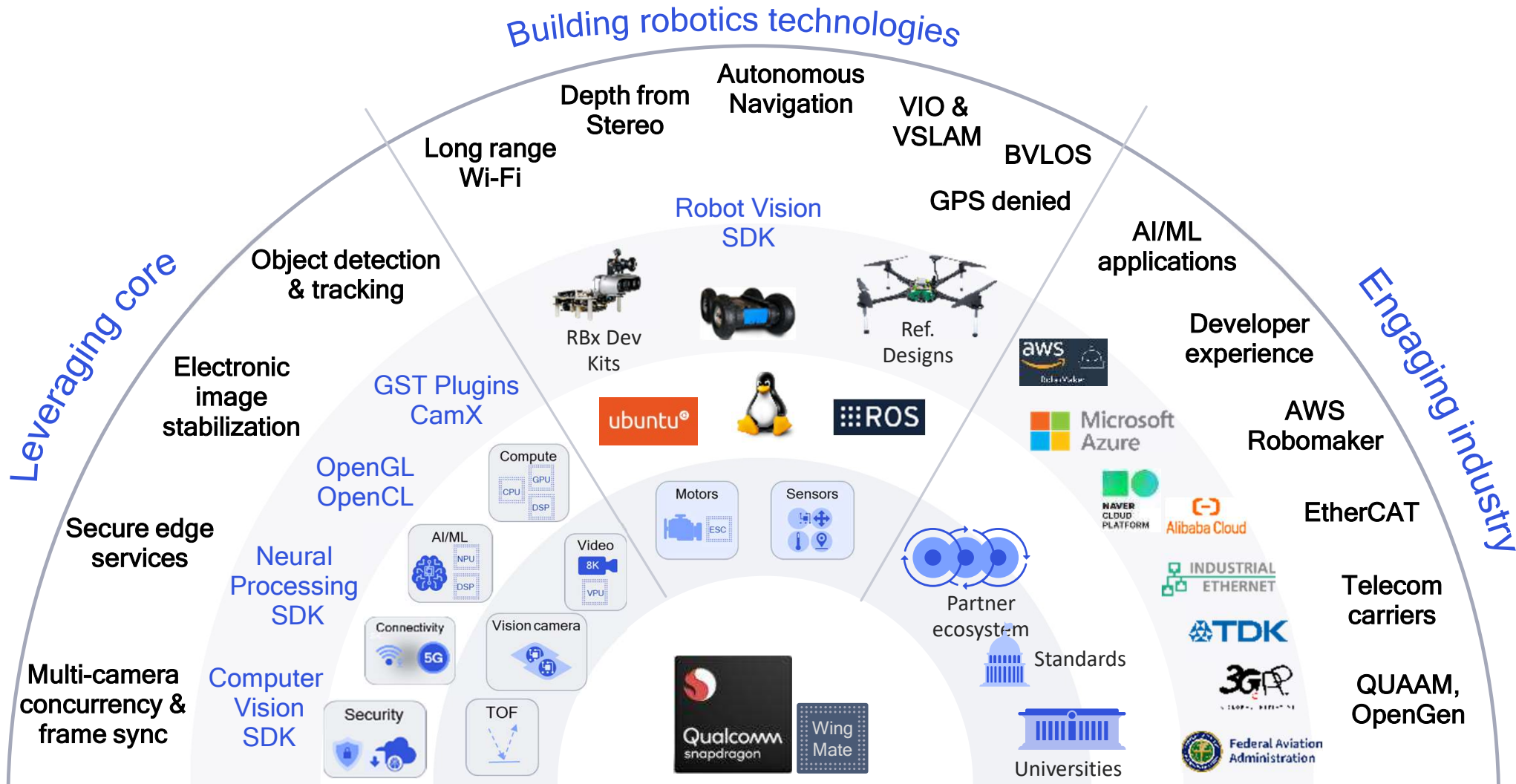
Distribute functions to meet diverse system requirements, e.g., latency, privacy

Latency as low as 1 ms



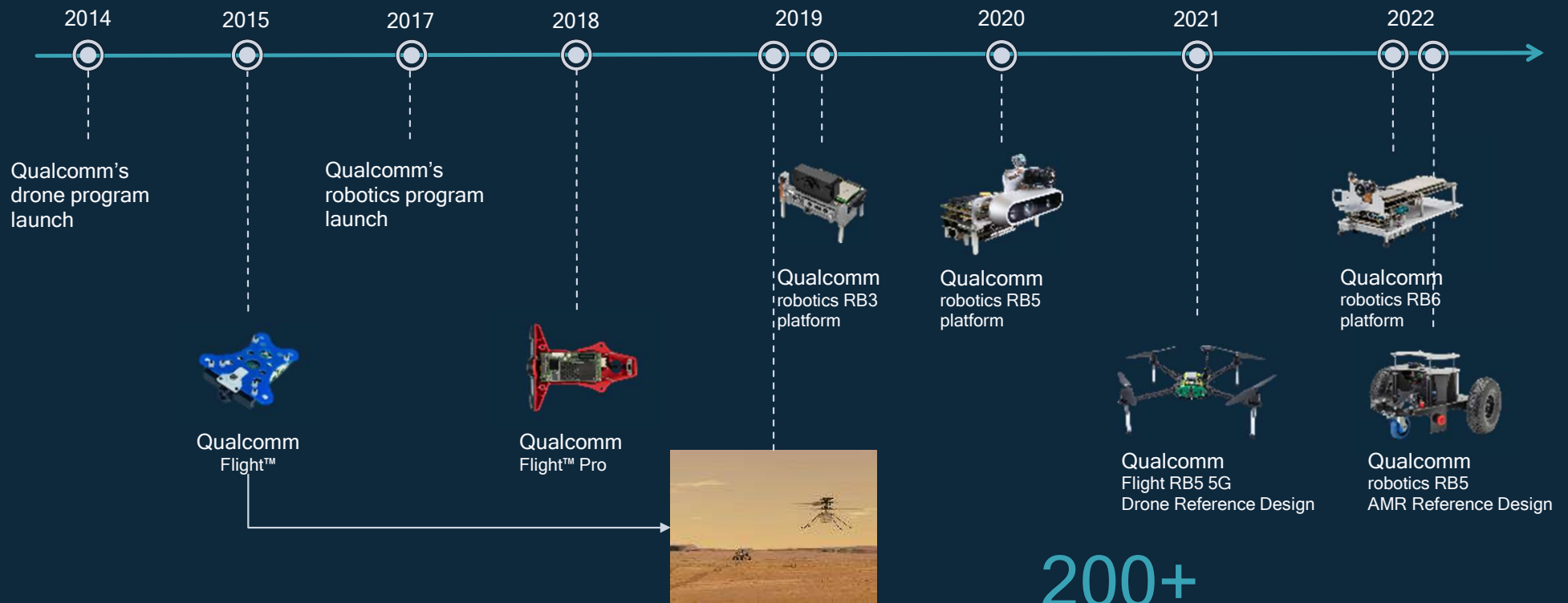
On-device intelligence is paramount for Autonomy





QC offering end-to-end solutions to all segments

Qualcomm Technologies driving transformation for industries



200+
drone and robotics
ecosystem members

Qualcomm robotics chipset roadmap

Disclaimer: The chipset names in roadmap/planning are subject to change

Tier	2020 (shipping)	2021 (shipping)	2022 (shipping)	2023 (roadmap)	2024~2025 (planning)
Premium			AIC100 RB6 70TOPS/200TOPS	QRB9xxx - SIL2 - CPU: 8xA78 50+ TOPS	QRB91xx - SIL2 - CPU: 8xA78 100+ TOPS Functional Safety enabled
High	QRB5165 • PoP LPDDR • CPU: 8x Kryo 585 • Camera: 64MP, dual ISP • Video: 4K240/8K60 decode 4K120/8K30 encode • GPU: Adreno 650 • cDSP: 4xHVX • NPU 230:2xHTA • WLAN&BT: 2x2 11ax, BT:5.1 RB5	QRB5165N - Industrial SKU • Non-PoP LPDDR • -40C ~ +115C junction	QRB3165 • CPU: 6x Kryo 585 • Camera: 64MP, dual ISP • Video: 4K60 decode 4K60 encode • GPU: Adreno 650 • cDSP: 2xHVX • NPU: 1xHTA • WLAN&BT: 2x2 11ax, BT:5.1	QCS8550 Pin To Pin	
Mid	QCS610 • Camera: 24MP • Video Enc/Dec: 4K30 HEVC • CPU: 2xA76+6xA55 (QCS610) • GPU: Adreno 612@845MHz • cDSP: 2xHVX@1GHz • WLAN: 1x1 11ac, BT: 5.0 QCS 410		QRB4210 RB2 • CPU: 4xA73+4xA53 2.2GHz/1.8GHz • GPU: Adreno 610 @950MHz • DSP: dual HVX @1GHz • 25+25MP, 13+13+5MP • WLAN: 1x1 11ac/ax, BT: 5.1	QCS6xxx QCS4xxx Pin To Pin • CPU: 2xA78+6xA55 • GPU: Adreno A619 • 1080p/60fps enc/dec • Camera: 3xISP: 13+13+13MP 32MP • DSP: dual HVX @1.2GHz • CPU: 6xA55 • GPU: Adreno A619 • 1080p/60fps enc/dec • Camera: 3xISP: 13+13+13MP 32MP • DSP: dual HVX @1.2GHz	
Entry	QCS405 QCS404 • CPU: 4xA53 1.4GHz • GPU: Adreno 306 600MHz (QCS405) • cDSP: 2xHVX@600MHz		QRB2210 RB1 • CPU: 4xA53 2.0GHz • GPU: Adreno 702 @845MHz • 1080p30 enc/dec • 13+13MP • WLAN: 1x1 11ac, BT: 5.0		QRB2xxx • CS in 2025 • Spec to be defined



5G and Edge
AI robotics for
smarter and
safer
autonomous
robots



Qualcomm
robotics RB3
platform



Qualcomm
robotics RB5
platform



Qualcomm
robotics RB6
platform



2019
High-tier



2020
Premium tier



2021



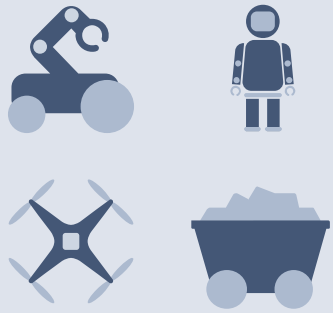
2022
Premium tier



Qualcomm Flight™ RB5
Drone Reference Design



Qualcomm® Robotics RB5
AMR Reference Design



RBx Platforms

Dedicated robotic platforms to address needs of all robotic segments and solutions

RB1



RB2



RB3



RB5



RB6



First mile

Autonomous forklifts

Autonomous yard robots

Warehouse

Pick-n-place AMRs

Picker robots

Tug AMRs

End-to-end Qualcomm robotics solutions for retail and logistics industry

Delivery dog

Delivery robot

Delivery robot

Assistants

Indoor delivery

Floor cleaning AMR

Shelf scanning

Vision Mezzanine

12MP Main camera, IMX577
Tracking camera, OV9282
Depth camera, Intel RealSense D435i
Time-of-Flight (TOF) camera,
Panasonic V4T
GMSL2 camera, LI-AR0231

Sensor Mezzanine

Single and Dual IMU
Compass/Magnetometer
Pressure sensor
Temperature sensor
Chirp ultrasonic sensor
Digital PDM mic
DC/BLDC Motor drivers
Dynamixel smart motor control

Industrial Mezzanine

EtherCAT
EtherNet/IP
Modbus-TCP
PROFINET



Purpose built robotics development kit

Motor Control Mezzanine

Brushed DC motor control
Brushless DC motor control
Dynamixel smart motor control
Stepper motor control
Servo motor control
I/O expansion

Communication Mezzanine 5G, LTE, CBRS

Sub6, Quectel RM500Q-GL
Sub6 + mmWave, Quectel RM510Q-GL

Flexible commercialization choices

System-on-Module, chip-on-board,
POP/non-POP packages

QRB5165 - Integrated premium tier robotics SoC

High-performance heterogeneous computing at ultra-low power consumption

5th generation Qualcomm® Artificial Intelligence (AI) Engine (15 TOPS) for **running complex AI** and **deep learning workloads**

Dedicated Qualcomm® Hexagon™ Tensor Accelerator (HTA) delivering 8 TOPS for **accurate edge inferencing**

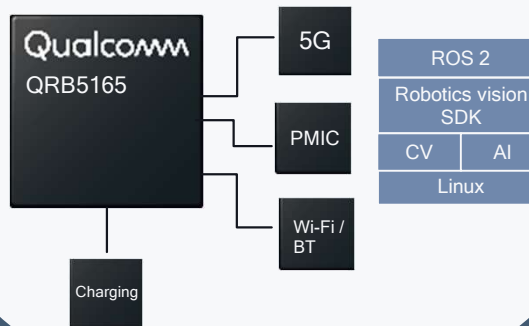
Dedicated enhanced visual analytics hardware engine enables (EVA) **computer vision apps, VIO, SLAM, DFS**

Qualcomm® Spectra 480 CV-ISP featuring 2-Gigapixel/sec ISPs & 8K video, 4K HDR, 200MP photo, & 7-camera concurrency enable **fully autonomous robots**

From crypto to DRM, the Secure processing unit for ironclad security **secures robots at every level**

Qualcomm QRB5165, Qualcomm AI Engine, Qualcomm Hexagon Tensor Accelerator, Qualcomm Spectra 480, Qualcomm Neural Processing SDK, Qualcomm Computer Vision SDK, Qualcomm Robotics Vision SDK are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

Qualcomm robotics RB5 platform



AI, CV and Software

Qualcomm® Neural Processing SDK for **advanced on-device AI**

Qualcomm® CV SDK offers **rich vision processing** functionality

Robot Vision SDK provides **localization, feature recognition** and **obstacle detection**

Linux, Ubuntu, ROS 2, AWS RoboMaker round out **end-to-end robotic application** development

Industrial Grade

Operates in **harsh industrial conditions** & temperature range of -40C to 105C T_j, and has **long lifecycle** support

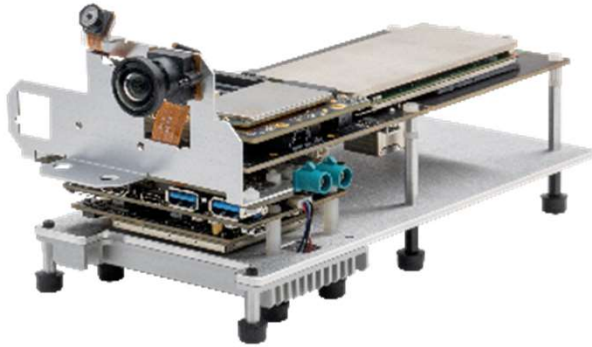
Communicates via **industrial protocols** such as EtherCAT, TSN

Connectivity options

Cellular (LTE / 5G / CBRS) and Wi-Fi for **ubiquitous connectivity**

Premium 5G and Edge AI Robotics

Supporting the creation of more productive, autonomous, and advanced robots



Powerful heterogeneous computing



Qualcomm® AI Engine
70 to 200 TOPS



Cutting edge processing
Up to 24 cameras



High bandwidth
Low latency
Sub-6GHz & mmWave



Distributed Intelligence
On-device, edge and cloud.



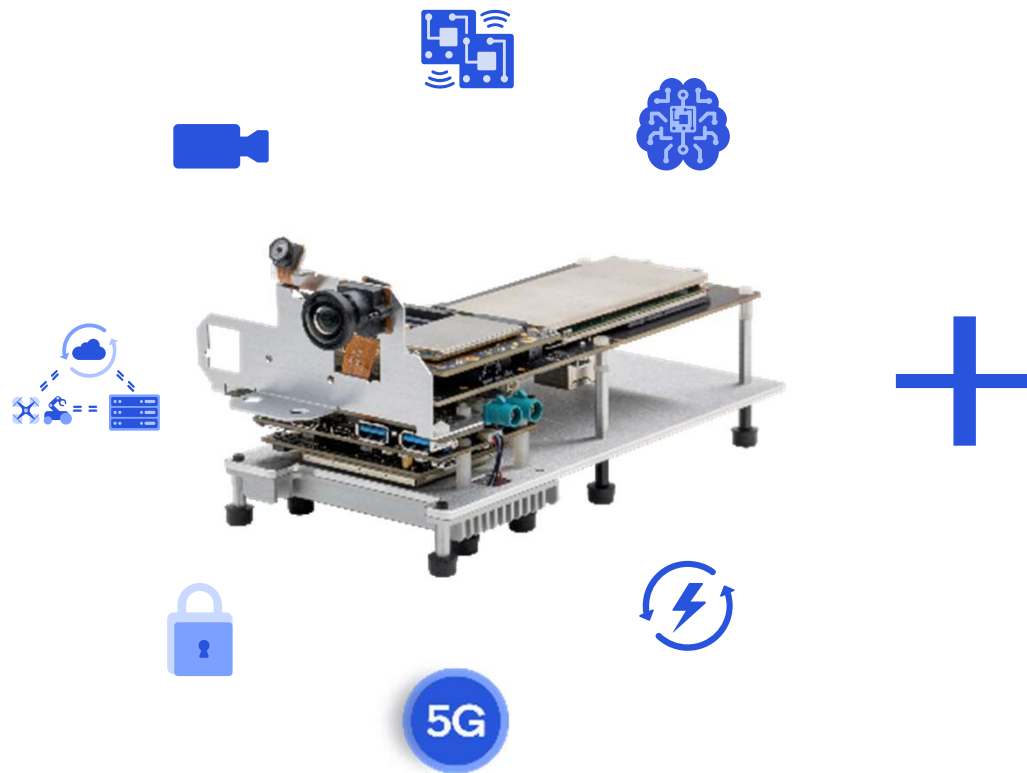
Energy Efficient



Secure processing unit for vault-like
hardware-based security



Integrated premium AI SDK to support end-to-end robotics applications



End-to-end deployment SW Support

Qualcomm® Intelligent Multimedia SDK

AI/ML

Computer
Vision

Multimedia

Networking

Qualcomm® Robotics Vision SDK

ROS

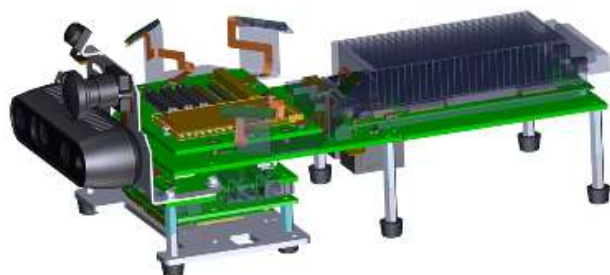
AI/ML Frameworks (Caffe 2, Chainer, MXNet, ONNX, PaddlePaddle, PyTorch, TensorFlow, etc.)

AI models

OS / Security

Applications: detection (e.g. face, license plate, threat, intrusion, camera tamper, temperature), people counting, access control, vehicle recognition, and more.

Qualcomm RB6 Platform



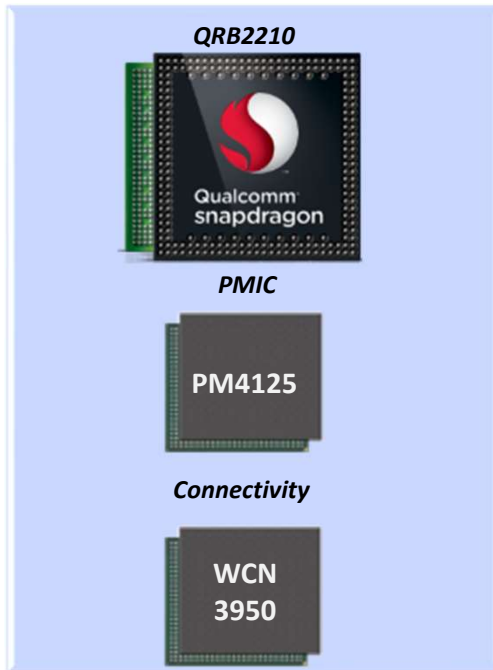
Component	Qualcomm® RB6 Development Kit
SOM Platform	Qualcomm® QRB5165 (Qualcomm® Kryo™ 585 , Qualcomm® Adreno™ 650 GPU, Adreno™ 665 VPU, Adreno™ 995 DPU Qualcomm® Hexagon™ DSP with quad HVX , Qualcomm® Spectra™ 480 image processing) + AIC100
RAM	8GB POP LPDDR5
Video	24x
Storage	1 Tbit UFS Flash and microSD card slot
Ethernet	1 x 1GbE Ethernet
Wireless	WLAN 802.11a/b/g/n/ac/ax 2.4/5GHz 2x2 MIMO Bluetooth 5.1, on-Board WLAN/BT Antennas
USB	1 x USB 2.0 Micro B (Debug only) 1 x USB 3.0 Type C (OTG Mode and display port) 2 x USB 3.0 Type A (Host Mode Only) 1 x USB 3.0 on expansion connectors (host mode only)
Display	1 x HDMI 1.4 (Type A - full) on Board Connector
Audio	2 x Class-D on Board Speaker Amplifier, WSA8815 1 x on Board PDM MIC on Mainboard, 4 x on Board PDM MIC on Vision mezzanine
Sensors	Mainboard: IMU (Accelerometer + Gyro Sensor), TDK ICM-42688-P Vision mezzanine: IMU (Accelerometer + Gyro sensor), TDK ICM-42688-P and TDK ICP-10111 (Barometric Pressure)
Camera	Vision Kit IMX577 (only support in Qualcomm® Robotics RB5 Vision Kit.) 2 x GMSL2 ports (only support in Qualcomm® Robotics RB5 Vision Kit.) OV9282 (only support in Qualcomm® Robotics RB5 Vision Kit.)
Expansion interfaces	Expansion connectors: HS1:1 x 60 pin high-speed connector (SDC I/F, 1 x 4L MIPI DSI, USB 2.0, CCI I2C x2, 2L+4L-MIPI CSI) HS2:1 x 60 pin high-speed connector (4L-MIPI CSI x 2, SPI x 1, PCIe 3.0 gen3 1L, USB 3.0 x1, GPIO x 8) HS3:1 x 60 pin high-speed connector (4L-MIPI CSI x 2, 4L-MIPI CSI x1(plus 2L CSI in HS1), RF CLK x 2, 2L-PCIe 3.0 x 1, 2L-PCIe 3.0 x 1(plus PCIe 1L in HS2), 4L-MIPI DSI x 1) LS1:1 x 40 pin low-speed connector (UART x 2, SPI, I2S/PCM, I2C x 2, GPIO x 12, DC powers) LS2:1 x 46 pin low-speed connector (Speaker x 2, DMIC I/F x 3, CAN, I2S, GPIOs, PWM, ADC, I2C, DC powers) LS3:1 x 46 pin low-Speed connector (SPI x 2, SSC I2C, sensor interrupt x 5, GPIOs, RTC clock, DC powers)
CAN bus	onboard CAN bus controller
LED	7 x LED Indicators , 4 x User Controllable , 2 x For radios (BT and WLAN activity) , 1 x Power indicator
Buttons	Power ,Volume Up/Down , Force USB Boot , Dip Switch x 2 (6pin+4pin)
Fan	(optional add on fan for higher power use cases)
Power Source	12 V @2.5A adapter with a DC plug inner diameter 1.75mm and outer diameter 4.75mm
Size	54mm x 85mm (96board CE edition form factor)

QRB2210



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QRB2210 Chipset Overview



Optional attached chipsets

- WGR7640: GNSS (L1) for QCS2290
- PM8008: Optional camera PMIC
- WSA8810: Optional Speaker Amplifier

Baseband: QRB2210

- Process: 11nm LPP
- CPU: Cortex-A53 Quad-core
- Graphics: Adreno 702 GPU
- Display: HD+ 60Hz
- Camera: Spectra 340L Dual ISP, 25MP, 13+13MP
- Video: 1080p30 Enc/Dec
- Memory: 2x16 LPDDR4x / 1x32 LPDDR3
- Storage: eMMC5.1, SD3.0
- Peripheral: USB3.1 Type C
- Pin to Pin compatible with QCM4290/QCS4290

PMIC + PMI + Codec : PM4125

PMI and Codec integration
PM4125-2 (uUSB), PM4125-3 (Type C)

Connectivity: WCN3950

- 802.11 1x1 ac, BT5.0

* WTR support may vary with different SKU²²

QRB2210 Chipset Capabilities

	QRB2210
Process tech.	11nm LPP
Package	12mm x 12.4mm non-pop
Processor	4xA53 2.0GHz 512KB L2 cache
Memory	LPDDR3 1x32 933MHz, LPDDR4x 2x16 1804MHz
GNSS/location	Gen 9, GPS, Glonass, BeiDou, Galileo, QZSS, and SBAS. NavIC support, Dual-Frequency GNSS (L1+L5)
Display	HD+ (1680x720) @ 60 fps. One 4-lane DSI D-PHY
Video	1080p 30 fps encode / 1080p 30fps decode
Camera	2-ISP, 13 MP +13 MP, 25MP @ 30fps
GPU	Adreno 702 @ 845MHz
Audio	Low power audio, Integrated SVA on LPI
WLAN/BT	802.11 a/b/g/n/ac (WCN3950), BT 5.0, FM
Peripherals	USB Type C3.1, MMC5.1, SD3.0
Security and DRM	Secure boot, Crypto engines, Key provisioning security, Qualcomm TEE, Qualcomm Content Protection (Widevine), Secure Periphery, Debug security

QRB2210 LE SW Roadmap

Items highlighted in **red** are not PoR and in planning, subject to change

				2022			
1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q



QRB2210

Items highlighted in **red** are not PoR and in planning, subject to change

HW CS 7/2020; HW available through 2027 subject to MOQ

Chipset SP	SP CS date	Android/Linux version	Kernel version	Standard period* for security maintenance for HLOS SI ends	Standard maintenance for non-HLOS SI ends (i.e., SP EOL Date)	Extended maintenance period ends
QRB2210.LE.1.0	April'2022	Linux (Dunfell)	5.4	April'2024	April'2024	n/a

* Additional SW license fee is applicable

QRB2210 Product Kits

Items highlighted in **red** are not PoR and in planning, subject to change

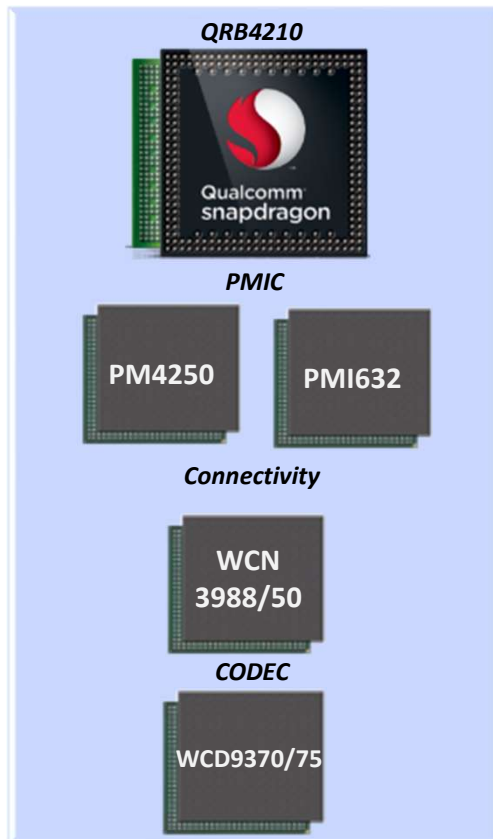
Active Product Kit	Kit Level	License Model	Chipset	Available SPs
QRB2210 IoT for Linux	STRT/DEV	PKLA	QRB2210	QRB2210.LE.1.0

QRB4210



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QRB4210 Chipset overview



Baseband: QRB4210 (no modem)

- CPU: Kryo260, Octa-core CPU
- Graphics: Adreno 610 series
- CDSP: Hexagon 683
- Display: FHD+ 60Hz, up to 2520x1080
- Camera: Spectra 340T 3x ISP 13+13+5MP
- Video: 1080p60 Enc/Dec
- Memory: 2x16 LPDDR4x / 1x32 LPDDR3
- Storage: eMMC5.1, SD3.0, UFS2.1 (1-lane)

PMIC + Codec: PM4250 + PMI632 + WCD9370

- Switch Mode Regulators, LDOs, Clocks, QC Battery Charger, Fuel Gauge, Camera Flash Driver, USB Type-C Support
- Standalone CODEC with improved KPIs

Connectivity: WCN3988 or 3950

- 802.11 b/g/n/1x1 ac, 1x1. 11ax ready, BT5.1 with WCN3988

Optional attached chipsets

- WGR7640: GNSS (L1) required for QRB4210
- PM8008: Camera PMIC
- SMB1355: Parallel charging
- WSA8810: Speaker Amplifier

* WTR support may vary with different SKU

QRB4210 Chipset Capabilities

	QRB4210
Process tech.	11nm LPP
Package	12mm x 12.4mm non-pop
Processor	Kryo260 CPU: 4xGold @ 2.0GHz 1MB L2 cache + 4xSilver @ 1.8GHz 512KB L2 cache
Memory	LPDDR3 1x32 933MHz, LPDDR4x 2x16 1804MHz
GNSS/location	Gen 9, GPS, Glonass, BeiDou, Galileo, QZSS, and SBAS. NavIC support, Dual-Frequency GNSS (L1+L5)
Display	FHD+ (1080x2520) 60 fps. One 4-lane DSI D-PHY
Video	1080p 60 fps encode / 1080p 60fps decode
Camera	Qualcomm Spectra 340T 3x ISP: (13+13+5MP), (25+5MP), (13+13MP) @30fps or (16+16MP)@ 24fps Multi-Frame NR (MFNR) for snapshot, Temporal Noise Reduction (TNR) for video, Electronic Image Stabilization (EIS), HEIC photo and video capture
GPU	Adreno 610 @950MHz
c-DSP	Hexagon™ 683 2x HVX @1.0GHz
Audio	Low power audio, Integrated SVA on LPI and 2 VA engines (or NS + 1 VA)
WLAN/BT	802.11 a/b/g/n/ac.11ax ready, BT 5.1 with WCN3988, FM
Peripherals	UFS2.1, eMMC5.1, SD3.0, USB Type C 3.1
Security and DRM	Secure boot, Crypto engines, Key provisioning security, Qualcomm TEE, Qualcomm Content Protection (Widevine), Secure Periphery, Debug security

QRB4210 LE SW Roadmap

SPs highlighted in **red** are not PoR

2021				2022			
1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q



QRB4210

HW CS 7/2020; HW available through 2027 **subject to MOQ**

Items highlighted in **red** are not PoR and in planning, subject to change

Chipset SP	SP CS date	Android/Linux version	Kernel version	Standard period* for security maintenance for HLOS SI ends	Standard maintenance for non-HLOS SI ends (i.e., SP EOL Date)	Extended maintenance period ends
QRB4210.LE.1.0	April'2022	Linux (Dunfell)	5.4	April'2024	April'2024	n/a

* Additional SW license fee is applicable

QRB4210 Product Kits

Items highlighted in **red** are not PoR and in planning, subject to change

Active Product Kit	Kit Level	License Model	Chipset	Available SPs
QRB4210 IoT for Linux	STRT/DEV	PKLA	QRB4210	QRB4210.LE.1.0

QRB3165

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QRB3165 Chipset Overview



Baseband: QRB3165

- Process: 7 nm process
- CPU: 3XGold@2.42GHz + 3XSilver@1.8GHz
- Graphics: Adreno™ 650 GPU
- Display: 5040 × 2160 at 60 Hz (or 120 Hz in VR mode), up to 30 bpp + 4K60 Miracast
- CVP: Computer vision processor for Improved video denoising, digital video stabilization and Image correction adjustment
- Camera: 64 MP 30 fps ZSL with a dual ISP and dual IFE lite
- Video: Video decode up to 4K60. Video encode up to 4K60
- NPU: Neural processing unit for performance and always-on neural network (NN) use cases. 5 TOPs
- Memory: Four-channel PoP high-speed memory – LPDDR5 or LPDDR4X SDRAM. (4 × 16-bit) @ 2750 MHz (LPDDR5) or 2133 MHz (LPDDR4X)
- Package: 12.4x12.7mm LP4, 12.4 x 14mm LP5 MEP
- Modem: NA

PMIC + Codec: PM8250 + PM8150L or PM8150A + PM8150B + PM3003A + PM8009 + WCD9380 or WCD9385 + WSA8810

Connectivity: QCA6391

- 802.11 ax, BT5.1

QRB3165 Chipset Capabilities

		QRB3165
Process		7FFP
Package		12.4x12.7mm LP4, 12.4 x 14mm LP5 MEP
CPU		3XGold@2.42GHz + 3XSilver@1.8GHz
Memory		Four-channel PoP high-speed memory – LPDDR5 or LPDDR4X SDRAM. (4 × 16-bit) designed for a 2750 MHz (LPDDR5) or 2133 MHz (LPDDR4X) clock and system cache
Modem		NA
Location		NA
WLAN/BT/FM		External 2x2 802.11ax, BT5.1
RF		NA
PMIC		PM8250 + PM8150L or PM8150A + PM8150B + PM3003A
CVP		Dedicated Computer vision processor to do hardware-based Image Correction & Adjustment (ICA), Depth From Stereo (DFS), Object Detection and Tracking, Visual Inertial Odometry (VIO), Feature Point Extraction
GPU	Core	Adreno 650
	APIs	OpenGL ES 3.2, Vulkan 1.1, DX12 FL 12_1; OpenCL 2.0 full profile
Display	Resolution	Adreno DPU 995, supports up to three 4K display (one internal display through DSI and two external displays through DisplayPort)
	Interface	Two 4-lane DSI D-PHY 1.2 or two 3-trio C-PHY v1.1 with VESA DSC v1.1. DisplayPort v1.4 at 8.1 Gbps/lane over Type-C with support for MST and VESA DSC v1.1 and FEC (USB3 and USB2 concurrency supported). Miracast – up to 4K60
Camera	Performance	64 MP 30 fps ZSL with a dual ISP and dual IFE lite
	Interface	MIPI CSI configurable in 4 + 4 + 4 + 4 configuration
Video	Decode	Video decode up to 4K60. Native decode support for H.265 Main 10, H.265 Main, H.264 High, VP9 profile 2, VP8, and MPEG-2 codecs
	Encode	Video encode up to 4K60. Native encode support for H.265 Main 10, H.265 Main, H.264 High, and VP8 codecs
	Enc & Dec	Concurrent 4K30 decode and 4K30 encode
Audio	Analog	Integrated WCD9380 high fidelity audio codec
	I/F	SoundWire interface (two Tx and two Rx data lines; optional configuration of three Tx and one Rx data lines) for codec. Dedicated SoundWire interface for smart speaker amplifier
	Voice	Essential and advance voice communications package, Voice UI activation package, Voice UI speech enhancement package, 3D audio capture package
Audio DSP		V66, integrated low power island, 2MB L2, 1.5GHz
Compute DSP		V66 1.5GHz 4xHVX
NPU (Neural Processing Unit)		Qualcomm® Neural Processing Unit for high-performance machine learning use cases
Sensor DSP		Qualcomm® All-Ways Aware™ Sensor Technology for contextual awareness and always-on sensor support
Storage		UFS 3.0 gear 4 – for on-board memory and UFS 2.1 gear 3. SD v3.0 4 bit for SD card
Peripherals		PCIe (x3), USB 3.1, USB 3.1 Type-C w/DP
Security		Qualcomm® Secure Processing Unit (SPU240) for advanced secure use cases

QRB3165

Items highlighted in **red** are not PoR and in planning, subject to change

HW CS 12/2023; HW available through 2029 subject to MOQ

Chipset SP	CS date	Android/Linux version	Kernel version	Standard period* for security maintenance for HLOS SI ends	Standard maintenance for non-HLOS SI ends (i.e., SP EOL Date)	Extended maintenance period ends
QRB5165.LE.2.1	Dec'23	Yocto Kirkstone	5.15	Dec'25	Dec'25	TBD



Thank you

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