RICON

S9955OUT-5G

5G Outdoor Cellular Gateway

Contents

Figure-1
RICON S9955 Series 5G Outdoor Gateway

1. Platform Benefits

RICON S9955 Series, 5G Outdoor Gateways combine the latest cellular access technology with a very Wide-Range coverage supporting both traditional and optional customized SD-WAN deployments.

As a result of connectivity with stable performance, growth of using IoT devices, and higher demand on Cloud Based Applications, brings new connectivity solutions such as 5G and 4G technologies instead of traditional access.

RICON S9955 Series 5G Gateways are geared with gigabit-class 5G and 4G standards to provide stable and cellular connectivity with maximized band coverage for global operations. S9955 Series gateways also designed with gigabit-class Power Over Ethernet (PoE) which makes the deployment much easier than traditional equipment.

With the new design, RICON S9955 Gateways bring the ability to support third party new cloud-based or on-premise applications which makes the operations more flexible, reliable and faster than ever.

You can connect your clients and applications to your trusted network or cloud with RICON S9955 advanced 5G connectivity technology which will enable automation, management flexibility and far more monitoring capabilities.

Table 1. Benefits and Features

Benefits	Features
Connectivity Frequencies & Bands	**5G NR:** n1/2/3/5/7/8/12/13/14/18/20/25/26/28/29/30/38/40/41/48/66/70/71/75/76/77/78/79 **LTE-FDD:** B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/29/30/32/66/71 **LTE-TDD:** B34/38/39/40/41/42/43/48; LAA: B46 **WCDMA:** B1/2/4/5/8/19
Lightweight, compact size with low power consumption	Can be deployed in many different environments where space, heat dissipation, and low power consumption are critical factors
Flexible deployment	• Deploy up to 100 m from host router via Ethernet • Multiple mounting options (Pole, Wall Mount, DIN-Rail) • PoE and DC power options • Support for external antenna
Ease of management	• Seamless extension of business policy from the branch to the cloud • Zero-touch provisioning • IP passthrough mode using a single Packet Data Network (PDN), for operational simplicity
WAN versatility	• Cost-effective connectivity of branches to cloud using LTE Advanced Pro • Ability to leverage cellular for public cloud and internet access • Dual SIMs for multiple connection options

2. Hardware Design

RICON RNO Gateways Hardware is designed based on scalability, durability and flexibility basis which enable data connectivity while covering all possible Bands with 5G NR and LTE/LTE-A networks for global operations.

2.1. Hardware Controller (Main CPU)

The IPQ4019 is a highly integrated system-on-chip (SoC) communications processor with integrated 2.4 GHz and 5.8GHz Wi-Fi designed and built for high-performance, power-efficient,
and cost-effective wireless networking applications including carrier gateways, enterprise access points, home routers, and mesh nodes.
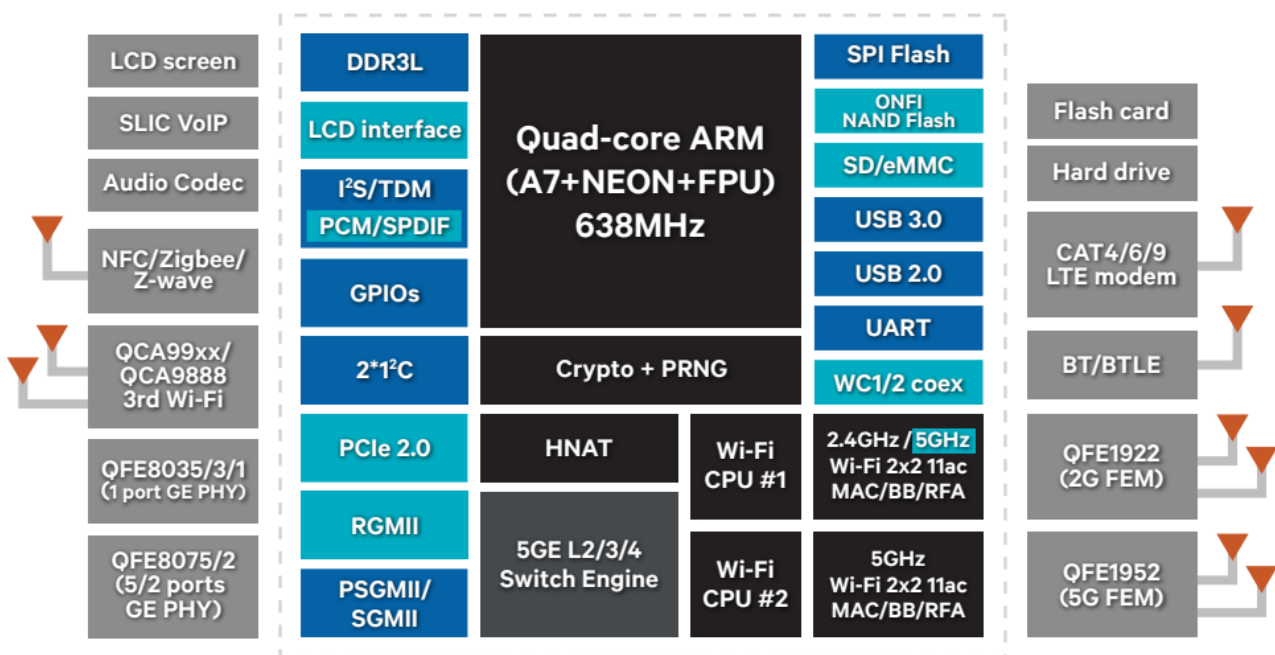

Figure-2
Qualcomm IPQ4019 Block Diagram

2.1.1. Networking Sub-System:

The IPQ4019 supports multiple configurations of two 2.4GHz and/or 5GHz Wi-Fi radios or even tri-band (with 60GHz) with a 3rd radio on PCIe. Additional support for a rich set of interfaces including USB 3.0, LCD, SD/eMIMC, multi-channel audio, LTE and Ethernet. IPQ4019 also comes with a network processing subsystem that accelerates packet processing operations, including parsing, WAN tunnel processing, classification, routing, switching, metering, editing, statistics collection, queuing, scheduling, and traffic shaping. The IPQ4019's network subsystem is capable of processing 16.2 million packets per second and supporting an aggregate throughput rate of 14 Gbps making it very well suited for handling demanding packet classification, packet forwarding, and the complex traffic management workloads associated with Wi-Fi 6E and Wi-Fi 7 systems for future use. IPQ4019 integrates an inline security engine that supports AES 128/256, SHA1-96/128/256/512, and 3DES, and provides up to 4 Gbps throughput.

Table 2. Hardware Controller

Chipset Features	
Brand/Model	Qualcomm IPQ4019
CPU	Quad-Core ARM A7 with FPU & NEON
Coexistence	PTA master/slave
Networking Sub-System	Integrated L2/3 switch/router and ACL Hardware NAT engine Traffic steering
Security	Inline Security Engine Unified Secure Core Lite Crypto Engine TrustZone
Package	18.5 x 19.5 x 615-pin MSP package

2.1.2. Wi-Fi Sub-System:

The Wi-Fi subsystem supports IEEE802.11ac Wave2. One radio operates in 2.4 GHz with two antennas (2x2/40). The Wi-Fi PHY rates equate to 866 Mbps for 2.4 GHz. Additionally, IPQ4019 supports flexible Wi-Fi 6E/Wi-Fi 7 radio configurations via 4x PCIe interfaces.

- Antenna configuration: 2x2/40 MHz (2.4 GHz & 5.8GHz)
- Four I/Q transmit pairs and four I/Q receive pairs to external QCN5124
- 802.11ac mode (2.4 GHz)
    - PHY rate: 800 Mbps or proprietary PHY rate: 866 Mbps
    - SU-MIMO (4ss) and DL MU-MIMO (4ss, 3 users)
    - Explicit beamforming
    - 3.2 μs symbol duration; 0.4 μs and 0.8 μs GI
- Legacy 11a/b/g/n
- RTT

- Radio Control interfaces, including Smart Antenna interface to manage external antenna switch.
- Spectral Analysis Engine

2.1.3. Security:
- Inline security engine
  - Up to 4 Gbps
  - AES 128, 256
  - SHA 1-96, 128, 256, 512
  - 3DES 1-96, MD5-96
  - CCM and GCM operation
- Trust Management Engine (Lite)
  Trust Management Engine (Lite) or TME-Lite is the hardware root-of-trust for the IPQ4019 SoC. It serves as an anchor for security use cases including secure provisioning during Qualcomm's manufacturing process, remote attestation, authenticated debug, and key management.
- Crypto engine
  - Encryption algorithms AES (128-bit and 256-bit key support) and DES/3DES
  - Authentication algorithms SHA1, SHA224 (the result of supporting SHA256), SHA256, SHA384, SHA512,
  - and HMAC-SHA1 and HMAC-SHA2
  - XTS/CTR/CCM/CMAC mode for AES
  - CBC/ECB mode both for AES and DES/3DES
- FIPS level 2 certification
- 4 OTP keys for multi root revocation
- eMMC inline crypto
- Secure execution environment
- ARM TrustZone

(*)Trustworthy systems built with RICON Secure Technologies provide a highly secure foundation for RICON products. In the cellular gateways, these technologies enable assurance of hardware and software authenticity for supply chain trust and strong mitigation against man-in-the-middle attacks that compromise software and firmware. RICON Secure Technologies include:
● Image signing: Cryptographically signed images provide assurance that the firmware, BIOS, and other software are authentic and unmodified. As the system boots, its software signatures are checked for integrity.

● Secure Boot: Secure Boot technology anchors the boot sequence chain of trust to immutable hardware, mitigating threats against a system's foundational state and the software that is to be loaded, regardless of a user's privilege level. It provides layered protection against the persistence of illicitly modified firmware.

2.1.4. Peripherals and Interfaces:
- Four PCIe-gen3 ports (two single-lane and two dual-lanes)
- One USB3.0 with EUD support
- Multiple programmable serial interfaces for SPI, UART, or I2C
- Two I2S/TDM, SoundWire, PCM, PDM
- QSPI NAND and eMMC

- Serial NOR
- 16-bit or 32-bit DDR3L at 1866 MT/s or DDR4 at 3200 MT/s
- Wi-Fi/IOT coexistence interfaces for up to two radios

2.1.5. Power Management:
- Advanced power management for lowest active and stand-by power consumption
- Interface to external PMIC (MP5496)

2.1.6. Platform extension Options:
- BT/BLE/15.4 companion chip through SPI/UART
- Cellular-WAN through PCIe
- Small cell through PCIe
- 802.11ad through PCIe
- Wi-Fi radio through PCIe
- IOT radio with coexistence I/F through UART/SPI
- SLIC through PCM
- Audio Tx/Rx through I2S/TDM/PCM/SoundWire
- DECT through PCM/SPI
- Storage through USB3.0

2.2. Modem Options & Chipsets

With RICON capable technologies; you can use your existing Category 5e or 6 cabling, allowing for higher throughputs with minimum cost. RICON Cellular Gateways' Gigabit port(s) supports 2.5 Gbps in addition to 1 Gbps. All speeds are supported on Category 5e cabling as well as 10GBASE-T (IEEE 802.3bz) cabling.
The cellular gateways have the option to be powered via PoE (along with an external power option), which enables flexible deployment in remote locations with no external power source.

2.2.1. Modem 1 Broadband

The default modem chipset for 5G NR broadband access is Qualcomm Snapdragon X62

The chipset is designed to fit with a MiniPCIe slot and can be used optionally for dual module (Simultaneous data network) needs by customization.

Table 4. Broadband Modem 1 Chipset Features

Modem 2 Chipset Features	
Brand/Model	Qualcomm / Snapdragon X62
Basics	• 4.4 Gbps peak speeds • 3GPP Release 16 support • Upgradable architecture for rapid feature rollout • 5G mmWave-sub6 aggregation • Supports any key 5G band, mode, or combination
5G Spectrum	• mmWave-sub6 aggregation, sub-6 carrier aggregation (FDD-TDD, FDD-FDD, TDD-TDD), Dynamic Spectrum Sharing (DSS) • 5G Modes: FDD, TDD, SA (standalone), NSA (non-standalone) • 5G mmWave specs: 400 MHz bandwidth, 4 carriers, 2x2 MIMO • 5G sub-6 GHz specs: 120 MHz bandwidth, 256-QAM, 4x4 MIMO • 5G Peak Download Speed: 4.4 Gbps • 5G SIM: Global 5G Multi-SIM support • Cellular Technology: 5G NR, LTE, LAA, WCDMA (DB-DC-HSDPA), TD-SCDMA, CDMA 1x, GSM/EDGE, CBRS
5G Modes	• FDD, TDD, SA (standalone), NSA (non-standalone)
5G mmWave and sub-6 Specs	• 1000 MHz bandwidth, 10 carriers, 2x2 MIMO • 300 MHz bandwidth, 256-QAM, 4x4 MIMO
Cellular Technology	5G SA Sub-6: Max. 2.4 Gbps (DL)/Max. 900 Mbps (UL); 5G NSA Sub-6: Max. 3.4 Gbps (DL)/Max. 550 Mbps (UL)
Power	• Qualcomm® 5G PowerSave 2.0 • Qualcomm® • Wideband Envelope Tracking (7th gen) • Qualcomm® • AI-Enhanced Signal Boost
Bands	• Global 5G band support including the new n259 (41 GHz), n70, n53
Data Speed	5G SA Sub-6: Max. 2.4 Gbps (DL)/Max. 900 Mbps (UL); 5G NSA Sub-6: Max. 3.4 Gbps (DL)/Max. 550 Mbps (UL)

2.3. Features & Ordering Information

Table 5. General Features & Ordering Information

Feature	S9955OUT-5G
Modem Scalability	**Single Modem:** 5G NR MiniPCIe Modular LTE Advanced Fallback
Modem Chipset	**Single Modem:** Qualcomm / Snapdragon X62
Modem Category and Bands	**LTE-A:** • Category 18 **5G NR:** • Global 5G band support
Download/upload bandwidth	**LTE-A:** • 3CA 4X4 MIMO: 1.6Gbps • 5CA 2X2 MIMO with 256 QAM: 1.6Gbps **5G NR:** • 5G mmWave specs: 1000 MHz bandwidth, 10 carriers, 2x2 MIMO • 5G sub-6 GHz specs: 300 MHz bandwidth, 256-QAM, 4x4 MIMO • 5G Peak Download Speed: 4.4 Gbps
Ports and Interfaces	• 3x 1GE RJ45 LAN • 1x 1G RJ45 Power Over Ethernet (PoE) WAN Combo • 1x DC Input • 2x SIM Slots • 4x4 TNC Wifi antenna ports [*] • 4x4 TNC 5G NR / LTE Antenna ports [*]
Management	• CLI • Local WEB UI • RICON Management System Controller
SIM Card	• Micro-SIMs (active/passive)
Antennas	• 4x4 TNC Wifi antenna ports [*] • 4x4 TNC 5G NR / LTE Antenna ports [*] • 1x TNC GPS/GNSS antenna port (Optional)
GPS	• TNC-Type GPS antenna port (Optional)
Power Consumption	• <=15.5W • PoE-In Power
Dimensions	• 217.3×164.00×52.00mm. without antennas
Environmental	• Nonoperating (storage) temperature: -40° to 158°F (-40° to 85°C) • Nonoperating (storage) humidity: 5% to 95% relative humidity (noncondensing) • Nonoperating (storage) altitude: 0 to 15,000 ft (0 to 4570 m) • Operating temperature: -40° to 85°C) • Operating humidity: 10% to 95% relative humidity (noncondensing) • Operating altitude: 0 to 10,000 ft (0 to 3000 m); no temperature de-rating required
MTBF	• 1.220.390 hours

3. Software Features
3.1. Protocols

Table 6. Supported Software Protocols

Protocol Definition	Contents
IP Multicast	Supported
Supported IP versions	IPv4,IPv6
DHCP Support	DHCP Server, Client, Relay
IP Reservation for DHCP Clients based on MAC address	Supported
UPNP and DLNA Support	UPnP, DLNA
DNS cache should be able to reset through TR-069	Supported
Advanced Port Forwarding (Defining incoming and outgoing IPs / Ports for source and destination) with full TR-069 parameters.	Supported
Any port any service support	Supported
NAT support	Supported
NAPT support as defined in IETF 2663 ,3022 ,3027	Supported
Nat-traversal / ALG and supported protocols	Supported
NTP, SNTP Support	Supported
Routing	Static Routing, RIPv1/v2, BGP, eBGP, Policy Routing

3.2. Security and VPN

Table 7. Security and VPN Support

Security and VPN	Descriptions
Firewall features	Firewall (+ SPI) + Rule definition
Secure client for (HTTP, FTP, TELNET)	HTTP, HTTPs, TELNET, FTP, SFTP
DoS (Denial of Service)and log support	DoS
VPN support and encryption	Passtrough, IPSec, PPTP, L2TP, OpenVPN, DMVPN, EoGRE Layer2, GREoIPSec

Site to Site VPN (Explain supported VPN types)	Supported
IPSec Support	IKEv2, IKEv3
Web URL Filtering based on domain name and IP address	Supported
Different user rights definition on Web UI	Supported
Trusted IP support (ACL management) for WAN interface management	Supported

4. Safety and Compliance

Table 8. Safety and compliance specifications

Description	Specification
Europe	CE RED 2014/53/EU 3GPP, WLAN, GNSS EMI, EMC, Safety, RF Exposure RoHS 2011/65/EU
FCC	Respective FCC rules for 3GPP, WLAN, RF Exposure
ISED (Industry Canada)	Respective ISED rules for 3GPP, WLAN, RF Exposure
CB Safety	IEC 62368-1:2014; IEC 60950-22
WIFI	TBD- Related WIFI Certificate
Safety	IEC 61010-1, IEC 61010-2-201; IEC 62368-1; IEC 60950-22
Ingress Protection	IP67
Anti-Shock	Non-Operating: MIL-STD-810G, Method 514.7, Procedure 5 (Shock) - 160G Operating: MIL-STD-810G, Method 514.7, Procedure 1 (Shock) - 40G

5. Warranty Information

The RICON Gateways come with a 1-year warranty that provides coverage of the hardware for the original end user.

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