Platform Guide

Version 22.7.1, 25 July 2022

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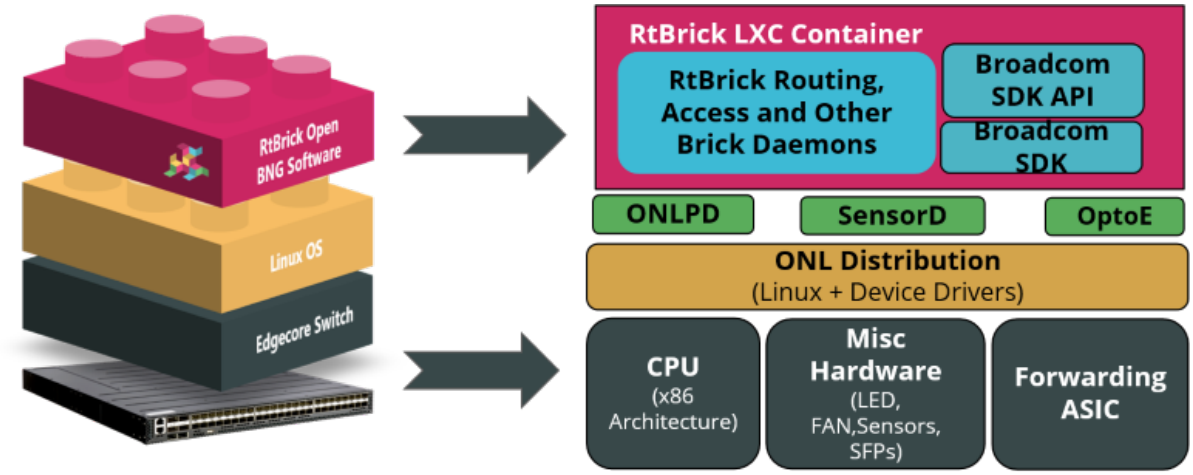
Table of Contents

1. Platform Overview

The RtBrick FullStack (RBFS) software runs as a LXC container on a Linux host operating system in the Edgecore switches, which are capable of Layer 2 and Layer 3 switching. Multiple switches can be combined to support several subscribers using a leaf and spine architecture or deployed as a standalone using the consolidated BNG approach. Additionally, the ZTP (Zero-Touch-Provisioning) and REST-based APIs that expose the state of the system are also supported.

The image below shows a high-level overview of the platform architecture.



The platform consists of hardware based on forwarding ASIC and host operating system based on Open Network Linux (ONL). An RBFS container that resides on top of this software includes all necessary packages to deliver access and routing protocols.

This guide looks at the platform features, the different supported hardware platforms, and features that are supported on each hardware platform.

1.1. Supported Platforms

RtBrick's software has been validated on the following hardware platforms.

- Edgecore AS7316-26XB
- Edgecore AS5916-54XKS
- Delta AGCVA48S
- UfiSpace S9500-22XST
- UfiSpace S9600-32X
- UfiSpace S9600-72XC

For a list of features and sub-features supported by each platform, see the Feature Support Matrix section.

1.2. Brick Daemon (BD)

RBFS runs multiple Brick Daemons (BD). Every application that runs within RBFS is fundamentally a brick daemon. For example, forwarding daemon (fibd), configuration daemon (confd), BGP (bgp.iod or bgp.appd), or interface management daemon (ifmd).

1.2.1. Brick Daemon (BD) Restartability

If a brick daemon fails (for a limited number of times), RBFS will restart it automatically. If the automatic restart does not succeed, you can use the Ubuntu system control to start a daemon.

For more information about troubleshooting the Brick Daemons, see section "2.2. Brick Daemons" of the *RBFS NOC Troubleshooting Guide*.

2. Platform Hardware Information

2.1. RBFS on UfiSpace S9600-72XC

RtBricks' open BNG software running as a spine-leaf and consolidated BNG architecture that provides full BNG functionality on an Ufispace S9600-72XC based on a Broadcom Q2C chip. RtBrick supports leaf and consolidated BNG images for the S9600-72XC platform.

The Ufispace S9600-72XC is based on Broadcom StrataDNX Qumran 2C switch silicon, capable of line-rate 2.4 Tbps Layer 2 and Layer 3 switching.

2.1.1. Switch Silicon: Broadcom Qumran-2C

The UfiSpace S9600-72XC switch is based on Broadcom's Qumran-2C BCM88820 chip.

2.1.2. Hardware Specification

Table 1. UfiSpace S9600-72XC Hardware Specification

Model	UfiSpace S9600-72XC
Form-factor	2RU, 436W x 87.7H x 609.6D mm (17.17"x3.45"x24")
Switch Silicon	Broadcom Qumran-2C BCM88820
Co-Processor	BCM16K
CPU	Intel Skylake-D D-2145NT 8 Cores @1.9GHz
System Memory	2x 16GB DDR4 R-DIMM with ECC
Configuration	• 64 x 25GE SFP28 ports • 8 x 100GE QSFP28 ports • 2 x 10GE SFP+ management ports • 1 x RJ45 serial console port

For more information, click the link below.
https://ufispace.com/products/telco/aggregation/s9600-72xc-25g-100g-open-aggregation-router-tcam

2.2. RBFS on UfiSpace S9600-32X

RtBricks' open BNG software running as a spine-leaf architecture that provides full BNG functionality on an Ufispace S9600-32X based on a Broadcom Q2C chip. RtBrick supports spine image for the S9600-32X platform.

The Ufispace S9600-32X is based on Broadcom StrataDNX Qumran 2C switch silicon, capable of line-rate 2.4 Tbps Layer 2 and Layer 3 switching.

2.2.1. Switch Silicon: Broadcom Qumran-2C

The UfiSpace S9600-32X switch is based on Broadcom's Qumran-2C BCM88820 chip.

2.2.2. Hardware Specification

Table 2. UfiSpace S9600-32X Hardware Specification

Model	UfiSpace S9600-32X
Form-factor	2RU, 436W x 87.8H x 762D mm (17.17"x3.46"x30")
Switch Silicon	Broadcom Qumran-2C BCM88820
CPU	Intel Skylake-D D-2145NT 8 Core @1.9GHz
System Memory	32GB DDR4 with ECC
Configuration	• 32 x 40GE/100GE QSFP28 ports • 4 x 1GE/10GE/25GE SFP28 ports (break out from Port 0) • 1 x RJ45 serial console port

For more information, click the link below.
https://ufispace.com/products/telco/aggregation/s9600-32x-25g-100g-aggregation-router

2.3. RBFS on Delta AGCVA48S

RtBricks' open BNG software running as spine-leaf architecture provides full BNG functionality on an Delta AGCVA48S based on a Broadcom-Q2C chip. RtBrick supports access-leaf images for the Delta AGCVA48S platform.

2.3.1. Switch Silicon: Broadcom Qumran-2C

The Delta AGCVA48S switch is based on Broadcom's Qumran-2C with a form-factor of 2RU, 19 Inch, Rack-Mountable equipment.

2.3.2. Hardware Specification

Table 3. Delta AGCVA48S Hardware Specification

Model	Delta AGCVA48S
Form-factor	2RU, 19 Inch, Rack-Mountable

Switch Silicon	Broadcom Qumran-2C BCM88820
Co-Processor	BCM16K
CPU	Intel Xeon Broadwell-DE D1548 8-Cores 2.0 GHz
System Memory	2x16GB SO-DIMM
Configuration	• 4 x 10GbE SFP+ • 48 x 25GbE SFP28 • 10 x 100GbE QSFP28

For more information, click the link below.
https://www.delta-japan.co.jp/event/interop2021/product/Delta_Agema_TriFold_Brochure-A4.pdf

2.4. RBFS on UfiSpace S9500-22XST

RtBricks' open BNG software running as Consolidated BNG architecture provides full BNG functionality on UfiSpace S9500-22XST that is based on Broadcom-QAX chip. RtBrick supports Consolidated BNG for the UfiSpace S9500-22XST.

2.4.1. Switch Silicon: Broadcom Qumran-AX

The UfiSpace S9500-22XST switch is based on Broadcom-QAX BCM88470 chip.

2.4.2. Hardware Specification

Table 4. UfiSpace S9500-22XST Hardware Specification

Model	UfiSpace S9500-22XST
Form-factor	1RU, 440w x 43.5h x 302d mm (17.32" x 1.713" x 11.89")
Switch Silicon	Broadcom Qumran-AX BCM88470
CPU	Intel Broadwell-DE D1519 4 Cores @1.5GHz
System Memory	1 x 8 GB
Configuration	• 2 x 100GE QSFP28 port • 8 x 25GE SFP28 ports • 8 x 10GE SFP+ ports • 4 x 1GE RJ45 ports

For more information, click the link below.
https://www.ufispace.com/products/telco/access/s9500-22xst-rj45-disaggregated-

cell-site-gateway

2.5. RBFS on Edgecore CSR320 (AS7316-26XB)

RtBricks' open BNG software running as a Consolidated BNG, that provides full BNG functionality on an EdgeCore CSR320 (AS7316-26XB) based on a Broadcom QAX chip, which is suitable for deployments in low-density areas and hardened platforms at cell-sites.

The Edgecore CSR320 (AS7316-26XB) is an open design cell site gateway platform that provides a combination of 1/10 Gbps, 25 Gbps, and 100 Gbps interfaces, utilizing merchant silicon and an x86 processor with optimized performance for service provider access and aggregation networks.

2.5.1. Switch Silicon: Broadcom Qumran-AX BCM88470

Broadcom Qumran-AX BCM88470 platform which is delivered on a single 1RU device provides a Consolidated BNG. The QAX platform has a lower form factor chipset from Broadcom Jericho-1 family.

2.5.2. Hardware Specification

Table 5. Edgecore CSR320 (AS7316-26XB) Hardware Specification

Model	Edgecore CSR320 (AS7316-26XB)
Form-factor	1RU, 19 Inch, Rack-Mountable
Switch Silicon	Broadcom Qumran-AX BCM88470
CPU	Intel Broadwell-DE D-1519 1.5G 4C
System Memory	DDR4 SO-DIMM 2x 8GB SDRAM with ECC support
Configuration	• 16 x SFP+ (each supporting 10 GbE or 1 GbE) • 8 x SFP28 (each supporting 10 GbE or 25 GbE) • 2 x 100G QSFP28 (each supporting 1 x 40/100 GbE or 4 x 10/25 GbE or 2 x 50 GbE)

For more information, click the link below.
https://www.edge-core.com/productsInfo.php?cls=291&cls2=342&cls3=343&id=603

2.6. RBFS on Edgecore AGR130 (AS5916-54XKS)

RtBricks' open BNG software running as a spine-leaf architecture, that provides full BNG functionality on an EdgeCore AGR130 (AS5916-54XKS) based on a Broadcom QMX chip. RtBrick supports spine as well access-leaf images for the EdgeCore

AGR130 (AS5916-54XKS) platform.

The Edgecore AGR130 (AS5916-54XKS) is based on Broadcom StrataDNX Qumran MX switch silicon, capable of line-rate 800 Gbps Layer 2 and Layer 3 switching. The switch can be deployed either as a top-of-rack switch in a data center, or as a carrier access/aggregation switch, and edge router.

2.6.1. Switch Silicon: Broadcom Qumran-MX BCM88375

Broadcom Qumran-MX BCM88375 platform can help build fixed form factor, feature-rich, deep-buffered switches to enable cloud-scale networking and Carrier network applications. The BCM88375 device processes up to 800 Gbps traffic, supporting up to six 100G full-duplex ports at Layer 2 through Layer 4 with integrated deep-buffer traffic management capabilities, and a fabric interface.

2.6.2. Hardware Specification

Table 6. Edgecore AGR130 (AS5916-54XKS) Hardware Specification

Model	Edgecore AGR130 (AS5916-54XKS)
Form-factor	1RU
Switch Silicon	Broadcom Qumran-MX BCM88375
Co-Processor	BCM52311
CPU	Intel Xeon D-1548 processor 8 cores 2.0 GHz
System Memory	DDR4 SO-DIMM 16 GB x 2
Configuration	• 48 x SFP+ each supporting 10 GbE or 1 GbE • 6 x 100G QSFP28 each supporting 1 x 40/100 GbE

For more information, click the link below.
https://www.edge-core.com/productsInfo.php?cls=291&cls2=327&cls3=328&id=753.

3. Feature Support Matrix

3.1. Overview

The following table shows the RBFS features supported in each hardware platform.

Component	Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA48S (Access Leaf)	Delta AGCVA48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Routing Protocols	BGP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	IS-IS	No	Yes	Yes	No	Yes	Yes	No	Yes	No	No	Yes
	OSPFv2	No	Yes	Yes	No	Yes	Yes	No	Yes	No	No	Yes
	Policy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	BFD	No	No	No	No	No	No	No	No	No	No	No

Component	Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA48S (Access Leaf)	Delta AGCVA48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Forwarding	HQoS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Multifield (MF) Classifier	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes
	OAM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	LLDP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Inband Management	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	LAG	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
	L2X (Local & Remote)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Accounting	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	Mirroring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA48S (Access Leaf)	Delta AGCVA48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Multicast	IGMPv2/v3	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	PIM	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA48S (Access Leaf)	Delta AGCVA48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Subscriber Management	PPPoE	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	L2TPv2	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	IPoE	Yes	Yes	No	Yes	No	Yes	No	Yes	No	No	No
	RADIUS Services	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	Dual Stack	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	IPTV Service	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	L2BSA	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No
	LI	Yes	Yes	No	Yes	No	No	No	No	No	Yes	No
	Single-/double-tagged interfaces	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No
	Untagged Interfaces	Yes	Yes	No	Yes	No	No	Yes	No	Yes	Yes	No

Component	Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA48S (Access Leaf)	Delta AGCVA48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Infrastructure	Logging	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	NTP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	LED Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	IPMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Security	Securing the Management Plane	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Securing the Control Plane	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Local User Management	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA48S (Access Leaf)	Delta AGCVA48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Telemetry	Resmon	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
	ASIC Resource Monitoring	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
	TSDB	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

3.2. BGP

The following table shows the BGP features supported in each hardware platform.

Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA48S (Access Leaf)	Delta AGCVA48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Basic BGP Protocol	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA 48S (Access Leaf)	Delta AGCVA 48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Multiprotocol extension for BGP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Multipath for iBGP and eBGP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Four-byte AS numbers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nexthop Self or nexthop unchanged	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fast external-failover	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Route reflection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MD5 Authentication	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Route refresh	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Advanced route refresh	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Route redistribution	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Multihop EBGP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Route selection flexibility	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Add path	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Host name/Domain name	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Feature	UfiSpace S9600-72XC (Access Leaf)	UfiSpace S9600-72XC (Consolidated BNG)	UfiSpace S9600-32X (Spine)	Delta AGCVA 48S (Access Leaf)	Delta AGCVA 48S (Spine)	UfiSpace S9500-22XST (Consolidated BNG)	UfiSpace S9500-22XST (L2BSA)	Edgecore CSR320 (AS7316-26XB) (Consolidated BNG)	Edgecore CSR320 (AS7316-26XB) (L2BSA)	Edgecore AGR130 (AS5916-54XKS) (Access Leaf)	Edgecore AGR130 (AS5916-54XKS) (Spine)
Dynamic peers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community, Extended Community, and Large Community support	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6PE Support	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes