



Platform Guide

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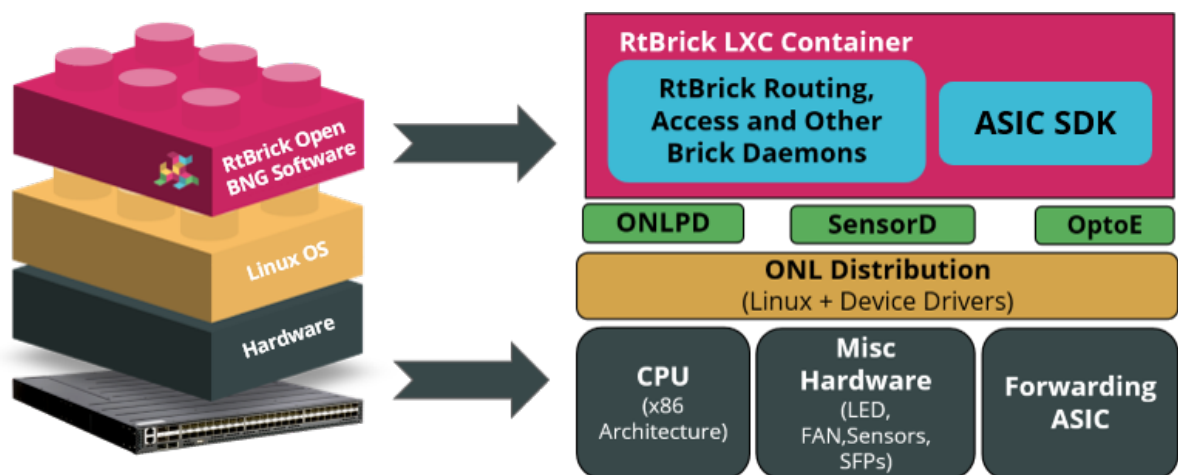
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1. Platform Overview

The RtBrick FullStack (RBFS) software runs as a LXC container on a Linux host operating system in the bare-metal 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 unit 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.



Platform hardware consists of forwarding ASICs and an Open Network Linux (ONL) operating system. A 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 CSR320 (AS7316-26XB)
- Edgecore CSR440 (AS7535-28XB)
- Edgecore AGR400 (AS7946-30XB)
- Edgecore AGR420 (AS7946-74XKSB)
- Delta AGCVA48S
- UfiSpace S9510-28DC
- 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. Guidelines and Limitations

QAX-based Platforms

- An additional restriction applies to ports belonging to a port group on QAX-based platforms. For more information, see section "1.9. Guidelines & Limitations" of the *Interfaces User Guide*.

1.3. 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).

1.3.1. 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*.

1.4. Setting Up System Parameters

You can configure basic host system parameters such as 'element name' and 'pod name' using the `set system host` command.

Syntax:

```
set system host <attribute> <value>
```

Attribute	Description
element-name <element-name>	Specify the name of the element (container). A pod can contain a group of elements.
pod name <pod-name>	Specifies the name of the Pod. Pod stands for point (zone) of deployment.

Example: System Parameters Configuration

```

supervisor@rtbrick>LEAF01: op> show config system host
{
  "rtbrick-config:host": {
    "element-name": "ufi10.q2c.u9.r4.nbg.rtbrick.net",
    "pod-name": "nbg4"
  }
}

```

1.5. CPU Watchdog Timer Utility for Hardware Platforms

The CPU watchdog timer utility is located in BMC and helps to detect any CPU failure. It also enables the CPU to recover from faults. By default, Watchdog Timer functionality is in enabled state, and it does not require any configuration from users. However, you can configure it to change the default settings.

1.5.1. Enable CPU Watchdog Timer in Hardware

Use the following command to enable watchdog timer on the hardware.

Syntax:

set system platform-management watchdog CPU <attribute> <value>

Attribute	Description
action	<p>Specifies the possible timeout actions:</p> <ul style="list-style-type: none"> • hard-reset: A reset will take place based on the configured settings. • no-action: No action will be taken. • power-cycle: The watchdog timer will power cycle the device. • shutdown: The device will shut down per the configured setting. <p>Default value: power-cycle.</p>
interval	<p>Specifies the watchdog timer interval in seconds.</p> <p>Default value: 1800 seconds.</p>

Example: Enable CPU Watchdog Timer

```
supervisor@rtbrick>LEAF01: op> show config system platform-management watchdog
{
  "rtbrick-config:watchdog": [
    {
      "type": "CPU",
      "action": "hard-reset",
      "interval": 3600
    }
  ]
}
```

You can use the `ipmitool` utility to view the status of the CPU watchdog timer.

Log into the ONL and enter the command as shown below to validate CPU watchdog timer functionality.

```
supervisor@onl>rtbrick:~ $ sudo ipmitool mc watchdog get
Watchdog Timer Use:      OS Load (0x43)
Watchdog Timer Is:      Started/Running
Watchdog Timer Actions: Power Cycle (0x03)
Pre-timeout interval:   0 seconds
Timer Expiration Flags: 0x00
Initial Countdown:      1800 sec
Present Countdown:      1795 sec
```

1.6. Displaying Platform Information

To display platform information, use the `show platform` command, as shown in the example below.

```
supervisor@rtbrick>LEAF01: op> show platform
x86_64-ufispace_s9600_72xc-r0
Role                : consolidated-bng
Platform            : q2c(BCM88820_A1)
External Processor  : OP2(X-0x1069a17f)
Vendor              : Ufi Space
Manufacturer        : Ufi Space
Manufacture date    : 06/28/2021 10:51:29
MAC address         : e8:c5:7a:8f:78:0d
Part number         : S9600-72XC-RB6B
Serial number       : WJ91B67T00009B3
Product name        : S9600-72XC
Onie version        : 2020.02v01
Label revision      : N/A
Diag version        : 0.1.4
Country code        : CN
```




- Information about external processors is displayed only for Q2C platforms and non-spine image roles. "N/A" displayed otherwise.
- When using virtual platforms, the "show platform" CLI command does not provide any output.

1.7. Displaying RBFS Version Information

To display RBFS version information, use the `show version` command, as shown in the example below.

```
supervisor@rtbrick>LEAF01: op> show version
UUID          : a54edaa0-29ab-4ffe-ac6a-82775016c677
Version       : 23.8.1-candidate.0
Role          : consolidated-bng
Platform      : q2c
Format        : lxd
Build date    : 2023-08-22 10:48:50 UTC
```

To display detailed version information for RBFS along with library versions, use the `show version detail` command, as shown in the example below.

```
supervisor@rtbrick>LEAF01: op> show version detail
UUID       : a54edaa0-29ab-4ffe-ac6a-82775016c677
Version    : 23.8.1-candidate.0
Role       : consolidated-bng
Platform   : q2c
Format     : lxd
Build date : 2023-08-22 10:48:50 UTC
Component  Version                                     Timestamp
Branch
alertmanager 0.24.0-xdaily.20230818085706+Cfa52d276 2023-07-04
08:22:19     master
cligen        0.1.0-xdaily.20230818085715+Ccd1eae0c 2023-06-13
10:08:18     master
clixon        4.3.1-xdaily.20230821154020+Ca22bfa87 2023-08-18
05:04:44     master
ems-service-event 0.1.0-xdaily.20230818090808+C3ace4161 2023-06-02
12:32:04     master
etcd          0.9.1-xdaily.20230821154544+Cd4e0a651 2023-06-12
10:46:20     master
fwd-plugin-bcm-q2c-combined-cbng 2.0.3-xdaily.20230822104744+C5ef9e1b7 2023-08-21
16:33:00     master
fwd-plugin-bcm-q2c-s9600-72xc-cbng 2.0.3-xdaily.20230821165134+C5ef9e1b7 2023-08-21
16:33:00     master
hostconfd    0.6.0-xdaily.20230818085705+C05f4a7df 2023-07-31
16:22:34     master
hostnetconfd 0.3.0-xdaily.20230818085718+Ce2adec98 2023-08-09
07:13:46     master
json-builder 0.1.0-xdaily.20230818091101+C7e7495bd 2023-05-03
11:33:18     master
json-parser  1.1.0-xdaily.20230818085719+Cf2b50ee5 2023-05-03
11:33:56     master
libbgp       1.0.2-xdaily.20230821155936+Cad5b378a 2023-08-14
13:47:44     master
libcjson     1.0.0-xdaily.20230818085714+Cd6550b9a 2023-03-27
09:37:06     master
libconfd     1.0.3-xdaily.20230821154549+C51dc7de6 2023-08-18
04:53:01     master
<...>
```

2. Platform Hardware Information

2.1. RBFS Access Leaf and Consolidated BNG Images on UfiSpace S9600-72XC

The RBFS Access Leaf is a software image that supports subscriber termination functionality on the Leaf Switch in a Spine Leaf deployment for BNG. The RBFS Consolidated BNG is a software image that supports full BNG functionality on a single image. Both these images are supported on the UfiSpace S9600-72XC platform.

2.1.1. 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")
Switching Capacity	2.4 Tbps
Switch ASIC	Broadcom Qumran-2C BCM88820
Co-Processor	BCM16K
CPU	Intel Skylake-D D-2145NT 8 Cores @1.9GHz
Role	Access Leaf, Consolidated BNG
Storage (SSD)	128 GB
System Memory	2x 16GB DDR4 R-DIMM with ECC
Interfaces	<ul style="list-style-type: none"> • 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 Spine Image on UfiSpace S9600-32X

The RBFS Spine is a software image that supports aggregation functionality across the access leaves in a Spine Leaf deployment for BNG. This image is supported on UfiSpace S9600-32X platform.

2.2.1. 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")
Switching Capacity	2.4 Tbps
Switch ASIC	Broadcom Qumran-2C BCM88820
CPU	Intel Skylake-D D-2145NT 8 Core @1.9GHz
Role	Spine
System Memory	1x32GB DDR4 with ECC
Storage (SSD)	128GB
Interfaces	<ul style="list-style-type: none"> • 31 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 Access Leaf Image on Delta AGCVA48S

The RBFS Access Leaf is a software image that supports subscriber termination functionality on the Leaf Switch in a Spine Leaf deployment for BNG. This image is supported on the Delta AGCVA48S platform.

2.3.1. Hardware Specification

Table 3. Delta AGCVA48S Hardware Specification

Model	Delta AGCVA48S
Form-factor	2RU, 19 Inch, Rack-Mountable
Switching Capacity	2.4 Tbps
Switch ASIC	Broadcom Qumran-2C BCM88820
Co-Processor	BCM16K
CPU	Intel Xeon Broadwell-DE D1548 8-Cores 2.0 GHz
Role	Access Leaf
System Memory	2x16GB SO-DIMM

Storage (SSD)	128GB
Interfaces	<ul style="list-style-type: none"> • 4 x 10GbE SFP+ • 48 x 25GbE SFP28 • 10 x 100GbE QSFP28

2.4. RBFS Access Leaf & Consolidated BNG Images on

The RBFS Access Leaf is a software image that supports subscriber termination functionality on the Leaf Switch in a Spine Leaf deployment for BNG. This image is supported on the Edgecore AGR420 (AS7946-74XKSB) platform.

2.4.1. Hardware Specification

Table 4. Edgecore AGR420 Hardware Specification

Model	Edgecore AGR420 (AS7946-74XKSB)
Form-factor	2RU, 19 Inch, Rack-Mountable
Switching Capacity	2.4 Tbps
Switch ASIC	Broadcom Qumran-2C BCM88820
Co-Processor	BCM16K
CPU	Intel Broadwell (8-Core)
Role	Access Leaf, Consolidated BNG
System Memory	2 x 16 GB
Storage (SSD)	128 GB
Interfaces	<ul style="list-style-type: none"> • 10 x 100G • 64 x 25G

For more information, click the link below.

<https://www.edge-core.com/solution-inquiry.php?cls=5&id=129>

2.5. RBFS Spine Image on Edgecore AGR400 (AS7946-30XB)

The RBFS Spine is a software image that supports aggregation functionality across the access leaves in a Spine Leaf deployment for BNG. This image is supported on Edgecore AGR400 (AS7946-30XB) platform.

2.5.1. Hardware Specification

Table 5. Edgecore AGR400 Hardware Specification

Model	EdgeCore AGR400 (AS7946-30XB)
Form-factor	2RU, 19 Inch, Rack-Mountable
Switching Capacity	2.4 Tbps
Switch ASIC	Broadcom Qumran-2C BCM88823
Co-Processor	-
CPU	Intel Broadwell (8-Core)
Role	Spine
System Memory	SDRAM DDR4 SO-DIMM 32GB (16 GB x 2)
Storage (SSD)	128 GB
Interfaces	<ul style="list-style-type: none"> • 26 x 100G • 4 x 25G

For more information, click the link below.

<https://www.edge-core.com/solution-inquiry.php?cls=5&id=129>

2.6. RBFS Consolidated BNG Image on UfiSpace S9510-28DC

The RBFS Consolidated BNG is a software image that supports full BNG functionality on a single image. This image is supported on the UfiSpace S9510-28DC platform.

2.6.1. Hardware Specification

Table 6. UfiSpace S9510-28DC Hardware Specification

Model	UfiSpace S9510-28DC
Form-factor	1RU
Switching Capacity	800 Gbps
Switch ASIC	Broadcom Qumran-2A BCM88483
CPU	Intel Denverton-NS 8-Core @ 1.7GHz
Role	Consolidated BNG
System Memory	16GB DDR4
Storage (SSD)	128GB

Interfaces	<ul style="list-style-type: none"> • 2 x 400G • 2 x 100G • 24 x 25G
------------	--

For more information, click the link below.

<https://www.ufispace.com/files/1r/UfiSpace-Disaggregated-Cell-Site-Gateway-S9510-28DC-Datasheet.pdf>

2.7. RBFS Consolidated BNG Image on Edgecore CSR440 (AS7535-28XB)

The RBFS Consolidated BNG is a software image that supports full BNG functionality on a single image. This image is supported on the Edgecore CSR440 (AS7535-28XB) platform.

2.7.1. Hardware Specification

Table 7. Edgecore CSR440 (AS7535-28XB) Hardware Specification

Model	Edgecore CSR440 (AS7535-28XB)
Form-factor	1RU, 19 Inch, Rack-Mountable
Switching Capacity	800 Gbps
Switch ASIC	Broadcom Qumran-2A BCM88483
Co-Processor	—
CPU	Intel Broadwell (8-Core)
Role	Consolidated BNG
System Memory	DDR4 SO-DIMM 2x 8GB SDRAM with ECC support
Storage (SSD)	128 GB
Interfaces	<ul style="list-style-type: none"> • 24 x SFP28 (each supports 1/10 GbE or 25 GbE) • 2 x 100G QSFP28 (each supports 50/100 GbE) • 2 x 400G QSFP-DD (each supports 50/100/200/400 GbE)

For more information, click the link below.

<https://www.edge-core.com/productsInfo.php?cls=291&cls2=342&cls3=343&id=1004>

2.8. RBFS Consolidated BNG Image on UfiSpace S9500-22XST

The RBFS Consolidated BNG is a software image that supports full BNG functionality on a single image. This image is supported on the UfiSpace S9500-22XST platform.

2.8.1. Hardware Specification

Table 8. 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")
Switching Capacity	300 Gbps
Switch ASIC	Broadcom Qumran-AX BCM88470
Co-Processor	—
CPU	Intel Broadwell-DE D1519 4 Cores @1.5GHz
Role	Consolidated BNG
System Memory	1x8GB DDR4 SO-DIMM with ECC
Storage (SSD)	32GB
Interfaces	<ul style="list-style-type: none"> • 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>

2.9. RBFS Consolidated BNG Image on Edgecore CSR320 (AS7316-26XB)

The RBFS Consolidated BNG is a software image that supports full BNG functionality on a single image. This image is supported on the Edgecore CSR320 (AS7316-26XB) platform.

2.9.1. Hardware Specification

Table 9. Edgecore CSR320 (AS7316-26XB) Hardware Specification

Model	Edgecore CSR320 (AS7316-26XB)
Form-factor	1RU, 19 Inch, Rack-Mountable
Switching Capacity	300 Gbps
Switch ASIC	Broadcom Qumran-AX BCM88470
Co-Processor	—
CPU	Intel Broadwell-DE D-1519 1.5G 4C
Role	Consolidated BNG
System Memory	DDR4 SO-DIMM 2x 8GB SDRAM with ECC support
Storage (SSD)	128GB
Interfaces	<ul style="list-style-type: none">• 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>

3. Feature Support Matrix

3.1. Overview

RtBrick supports the following images (also known as roles).

- Access-Leaf Image
- Consolidated BNG Image
- Spine Image
- L2 Wholesale (L2BSA) Image

The following sections provide information about what RtBrick features are supported by respective images for each hardware platform.

3.1.1. Access-Leaf Image

The following table shows the RBFS feature support for access-leaf images.

Table 10. Access-Leaf Images Feature Support

Component	Feature	UfiSpace S9600-72XC (Q2C)	EdgeCore AGR420 (AS7946-74XKSB) (Q2C)	Delta AGCVA48S (Q2C)
Routing Protocols	BGP	Yes	Yes	Yes
	IS-IS	No	No	No
	LDP	No	No	No
	OSPFv2	No	No	No
	Policy	Yes	Yes	Yes
	BFD	No	No	No
	Segment Routing (MPLS)	Yes	Yes	Yes
Forwarding	HQoS	Yes	Yes	Yes
	Multifield (MF) Classifier	Yes	Yes	Yes
	OAM (Ping & Traceroute)	Yes	Yes	Yes
	LLDP	Yes	Yes	Yes
	Inband Management	Yes	Yes	Yes
	LAG (Static, LACP)	Yes	Yes	Yes
	L2X (Local & Remote)	Yes	Yes	Yes
	Mirroring	Yes	Yes	Yes
Multicast	IGMPv2/v3	Yes	Yes	Yes
	PIM-SSM	Yes	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Q2C)	EdgeCore AGR420 (AS7946-74XKSB) (Q2C)	Delta AGCVA48S (Q2C)
Subscriber Management	PPPoE	Yes	Yes	Yes
	L3 Wholesale (L2TPv2 LAC)	Yes	Yes	Yes
	IPoE	Yes	Yes	Yes
	AAA (RADIUS)	Yes	Yes	Yes
	Dual Stack	Yes	Yes	Yes
	IPTV	Yes	Yes	Yes
	L2 Wholesale (L2BSA)	Yes	Yes	Yes
	Lawful Intercept	Yes	Yes	Yes
	Accounting	Yes	Yes	Yes
	Single-/double-tagged interfaces	Yes	Yes	Yes
	Untagged Interfaces	Yes	Yes	Yes
	Redundancy (Hot Standby)	No	No	No
	Subscriber Filters	Yes	Yes	Yes
	HTTP Redirect Service	No	No	No

Component	Feature	UfiSpace S9600-72XC (Q2C)	EdgeCore AGR420 (AS7946-74XKSB) (Q2C)	Delta AGCVA48S (Q2C)
Infrastructure	Logging	Yes	Yes	Yes
	NTP	Yes	Yes	Yes
	LED Control	Yes	Yes	Yes
	IPMI	Yes	Yes	Yes
	Watchdog Timer	Yes	Yes	Yes
Security	Securing the Management Plane	Yes	Yes	Yes
	Securing the Control Plane	Yes	Yes	Yes
	Local User Management	Yes	Yes	Yes
Telemetry	Resmon	Yes	Yes	No
	ASIC Resource Monitoring	Yes	Yes	Yes
	Prometheus TSDB	Yes	Yes	Yes

3.1.2. Consolidated BNG Image

The following table shows the RBFS feature support for Consolidated BNG (C-BNG) images.

Table 11. Consolidated BNG Images Feature Support

Component	Feature	UfiSpace S9600-72XC (Q2C)	Edgecore AGR420 (AS7946- 74XKSB) (Q2C)	UfiSpace S9510-28DC (Q2A)	Edgecore CSR440 (AS7535- 28XB) (Q2A)	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 (AS7316- 26XB) (QAX)
Routing Protocols	BGP	Yes	Yes	Yes	Yes	Yes	Yes
	IS-IS	Yes	Yes	Yes	Yes	Yes	Yes
	LDP	Yes	Yes	Yes	Yes	Yes	Yes
	OSPFv2	Yes	Yes	Yes	Yes	Yes	Yes
	Policy	Yes	Yes	Yes	Yes	Yes	Yes
	BFD	No	No	No	No	No	No
	Segment Routing (MPLS)	Yes	Yes	Yes	Yes	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Q2C)	Edgecore AGR420 (AS7946-74XKSB) (Q2C)	UfiSpace S9510-28DC (Q2A)	Edgecore CSR440 (AS7535-28XB) (Q2A)	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 (AS7316-26XB) (QAX)
Forwarding	HQoS	Yes	Yes	Yes	Yes	Yes	Yes
	Multifield (MF) Classifier	Yes	Yes	Yes	Yes	Yes	Yes
	OAM (Ping & Traceroute)	Yes	Yes	Yes	Yes	Yes	Yes
	LLDP	Yes	Yes	Yes	Yes	Yes	Yes
	Inband Management	Yes	Yes	Yes	Yes	Yes	Yes
	LAG (Static, LACP)	Yes	Yes	No	No	Yes	Yes
	L2X (Local & Remote)	Yes	Yes	Yes	Yes	Yes	Yes
	Mirroring	Yes	Yes	Yes	Yes	Yes	Yes
Multicast	IGMPv2/v3	Yes	Yes	Yes	Yes	Yes	Yes
	PIM-SSM	Yes	Yes	Yes	Yes	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Q2C)	Edgecore AGR420 (AS7946- 74XKSB) (Q2C)	UfiSpace S9510-28DC (Q2A)	Edgecore CSR440 (AS7535- 28XB) (Q2A)	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 (AS7316- 26XB) (QAX)
Subscriber Management							

Platform Guide	Single/double-tagged interfaces	Yes	Yes	Yes	Yes	Yes	Yes
Component	Untagged Interfaces Redundancy (Hot Standby)	Yes UfiSpace S9600-72XC (Q2C)	Yes Edgecore AGR420 (AS7946-74XKSB) (Q2C)	No UfiSpace S9510-28DC (Q2A)	No Edgecore CSR440 (AS7535-28XB) (Q2A)	No UfiSpace S9500-22XST (QAX)	No Edgecore CSR320 (AS7316-26XB) (QAX)
	Subscriber Filters	Yes	Yes	Yes	Yes	Yes	Yes
	HTTP Redirect Service	Yes	Yes	Yes	Yes	Yes	Yes
Infrastructure	Logging	Yes	Yes	Yes	Yes	Yes	Yes
	NTP	Yes	Yes	Yes	Yes	Yes	Yes
	LED Control	Yes	Yes	Yes	Yes	Yes	Yes
	IPMI	Yes	Yes	No	No	No	No
	Watchdog Timer	Yes	Yes	Yes	Yes	Yes	Yes
Security	Securing the Management Plane	Yes	Yes	Yes	Yes	Yes	Yes
	Securing the Control Plane	Yes	Yes	Yes	Yes	Yes	Yes
	Local User Management	Yes	Yes	Yes	Yes	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Q2C)	Edgecore AGR420 (AS7946-74XKSB) (Q2C)	UfiSpace S9510-28DC (Q2A)	Edgecore CSR440 (AS7535-28XB) (Q2A)	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 (AS7316-26XB) (QAX)
Telemetry	Resmon	Yes	Yes	Yes	Yes	Yes	Yes
	ASIC Resource Monitoring	Yes	Yes	Yes	Yes	No	No
	Prometheus TSDB	Yes	Yes	Yes	Yes	Yes	Yes

3.1.3. Spine Image

The following table shows the RBFS feature support for spine images.

Table 12. Spine Images Feature Support

Component	Feature	UfiSpace S9600-32X (Q2C)	EdgeCore AGR400 (AS7946-30XB) (Q2C)
Routing Protocols	BGP	Yes	Yes
	IS-IS	Yes	Yes
	LDP	Yes	Yes
	OSPFv2	Yes	Yes
	Policy	Yes	Yes
	BFD	No	No
	Segment Routing (MPLS)	Yes	Yes

Component	Feature	UfiSpace S9600-32X (Q2C)	EdgeCore AGR400 (AS7946-30XB) (Q2C)
Forwarding	HQoS	Yes	Yes
	Multifield (MF) Classifier	Yes	Yes
	OAM (Ping & Traceroute)	Yes	Yes
	LLDP	Yes	Yes
	Inband Management	Yes	Yes
	LAG (Static, LACP)	Yes	Yes
	L2X (Local & Remote)	Yes	Yes
	Mirroring	Yes	Yes
Multicast	IGMPv2/v3	No	No
	PIM-SSM	Yes	Yes
Infrastructure	Logging	Yes	Yes
	NTP	Yes	Yes
	LED Control	Yes	Yes
	IPMI	Yes	No
	Watchdog Timer	Yes	Yes
Security	Securing the Management Plane	Yes	Yes
	Securing the Control Plane	Yes	Yes
	Local User Management	Yes	Yes

Component	Feature	UfiSpace S9600-32X (Q2C)	EdgeCore AGR400 (AS7946-30XB) (Q2C)
Telemetry	Resmon	Yes	Yes
	ASIC Resource Monitoring	Yes	Yes
	Prometheus TSDB	Yes	Yes

3.1.4. L2 Wholesale (L2BSA) Image

The following table shows the RBFS feature support for L2 Wholesale (L2BSA) images.

Table 13. L2 Wholesale (L2BSA) Images Feature Support

Component	Feature	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 AS7316-26XB (QAX)
Routing Protocols	BGP	Yes	Yes
	IS-IS	No	No
	LDP	No	No
	OSPFv2	No	No
	Policy	Yes	Yes
	BFD	No	No
	Segment Routing (MPLS)	Yes	Yes

Component	Feature	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 AS7316-26XB (QAX)
Forwarding	HQoS	Yes	Yes
	Multifield (MF) Classifier	No	No
	OAM (Ping & Traceroute)	Yes	Yes
	LLDP	Yes	Yes
	Inband Management	Yes	Yes
	LAG (Static, LACP)	Yes	Yes
	L2X (Local & Remote)	Yes	Yes
	Mirroring	Yes	Yes
Infrastructure	Logging	Yes	Yes
	NTP	Yes	Yes
	LED Control	Yes	Yes
	IPMI	Yes	Yes
	Watchdog Timer	Yes	Yes
Security	Securing the Management Plane	Yes	Yes
	Securing the Control Plane	Yes	Yes
	Local User Management	Yes	Yes

Component	Feature	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 AS7316-26XB (QAX)
Telemetry	Resmon	Yes	Yes
	ASIC Resource Monitoring	No	No
	Prometheus TSDB	Yes	Yes

3.2. BGP

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

BGP Features	Supported Platforms
<ul style="list-style-type: none">• 6PE Support• Add path• Advanced route refresh• Basic BGP Protocol• Community, Extended Community, and Large Community support• Dynamic peers• Fast external-failover• Four-byte AS numbers• Host name/Domain name• MD5 authentication• Multihop EBGp• Multipath for iBGP and eBGP• Multiprotocol extension for BGP• Nexthop Self or nexthop unchanged• Prefix Limit• Route redistribution• Route reflection• Route refresh• Route selection flexibility	<p data-bbox="1124 199 2056 239">Access Leaf:</p> <ul style="list-style-type: none">• UfiSpace S9600-72XC• EdgeCore AGR420 (AS7946-74XKSB)• Delta AGCVA48S <p data-bbox="1124 470 2056 510">Consolidated BNG:</p> <ul style="list-style-type: none">• UfiSpace S9600-72XC• UfiSpace S9500-22XST• UfiSpace S9510-28DC (S9510-28DC)• Edgecore CSR320 (AS7316-26XB)• Edgecore CSR440 (AS7535-28XB)• Edgecore AGR420 (AS7946-74XKSB) <p data-bbox="1124 917 2056 957">Spine:</p> <ul style="list-style-type: none">• UfiSpace S9600-32X• EdgeCore AGR400 (AS7946-30XB) <p data-bbox="1124 1133 2056 1173">L2 Wholesale (L2BSA):</p> <ul style="list-style-type: none">• UfiSpace S9500-22XST• Edgecore CSR320 (AS7316-26XB)

4. Feature/Resource Usage

Limiting the resource usage or consumption (wherever applicable) helps to improve the system stability and also restricts over utilization of system capacity. In RBFS, the usage limits for the following resources are pre-defined:

- IPv4 Route Count
- IPv6 Route Count
- MTU Profile
- L3 MTU-Profile
- Subscriber MTU Profile
- Physical MTU Profile

In addition, you can track the resource usage of the following features.

- 6PE label
- High Precision QoS

You can specify resource limits on the following images (also known as roles).

- [Access-Leaf Image](#)
- [Consolidated BNG Image](#)
- [Spine Image](#)
- [L2 Wholesale \(L2BSA\) Image](#)

4.1. Access-Leaf Image

The following table provides the limits defined for the resources for the access-leaf images that RBFS supports.

Table 14. Access-Leaf Images - Feature/Resource Usage

Component	Feature/Resource	UfiSpace S9600-72XC (Q2C)	EdgeCore AGR420 (AS7946-74XKSB) (Q2C)	Delta AGCVA48S (Q2C)
FIB	IPv4 Route Count	1200000	1200000	1200000
	IPv6 Route Count	250000	250000	250000
	Low Rate Shaping Enabled (<1000 Kbps)	Yes	Yes	Yes
CONFD	MTU-Profile Count	8	—	8
	L3 MTU-Profile Count	3	—	3
	Subscriber MTU-Profile Count	5	—	5
	Physical MTU Profile Count	8	—	8
BGP	6PE label value	2	—	2

4.2. Consolidated BNG Image

The following table provides the limits defined for the resources for the consolidated BNG (C-BNG) images that RBFS supports.

Table 15. Consolidated BNG Images - Feature/Resource Usage

Component	Feature	UfiSpace S9600-72XC (Q2C)	Edgecore AGR420 (AS7946- 74XKSB) (Q2C)	UfiSpace S9510-28DC (Q2A)	EdgeCore CSR440 (AS7535- 28XB) (Q2A)	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 (AS7316- 26XB) (QAX)	EdgeCore AGR420 (AS7946- 74XKSB) (Q2C)
FIB	IPv4 Route Count	1200000	1200000	500000	500000	—	—	—
	IPv6 Route Count	250000	250000	200000	200000	—	—	—
	Low Rate Shaping Enabled (<1000 Kbps)	Yes	Yes	Yes	Yes	—	—	Yes
CONFD	MTU-Profile Count	—	—	—	—	1	—	—
	L3 MTU-Profile Count	—	—	—	—	—	—	—
	Subscriber MTU-Profile Count	—	—	—	—	—	—	—
	Physical MTU Profile Count	—	—	—	—	1	1	—
BGP	6PE label value	2	2	2	2	—	—	—

4.3. Spine Image

The following table provides the limits defined for the resources for the spine images that RBFS supports.

Table 16. Spine Images - Feature/Resource Usage

Component	Feature	UfiSpace S9600-32X (Q2C)	EdgeCore AGR400 (AS7946-30XB) (Q2C)
FIB	IPv4 Route Count	1200000	1200000
	IPv6 Route Count	250000	250000
CONFD	MTU-Profile Count	8	—
	L3 MTU-Profile Count	3	—
	Subscriber MTU-Profile Count	5	—
	Physical MTU Profile Count	8	—
BGP	6PE label value	2	—

4.4. L2 Wholesale (L2BSA) Image

The following table provides the limits defined for the resources for the L2BSA images that RBFS supports.

Table 17. L2 Wholesale (L2BSA) Images - Feature/Resource Usage

Component	Feature	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 (AS7316-26XB) (QAX)
FIB	IPv4 Route Count	—	—
	IPv6 Route Count	—	—

Component	Feature	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 (AS7316-26XB) (QAX)
CONFD	MTU-Profile Count	8	8
	L3 MTU-Profile Count	3	3
	Physical MTU Profile Count	8	1
BGP	6PE label value	—	—