



# Platform

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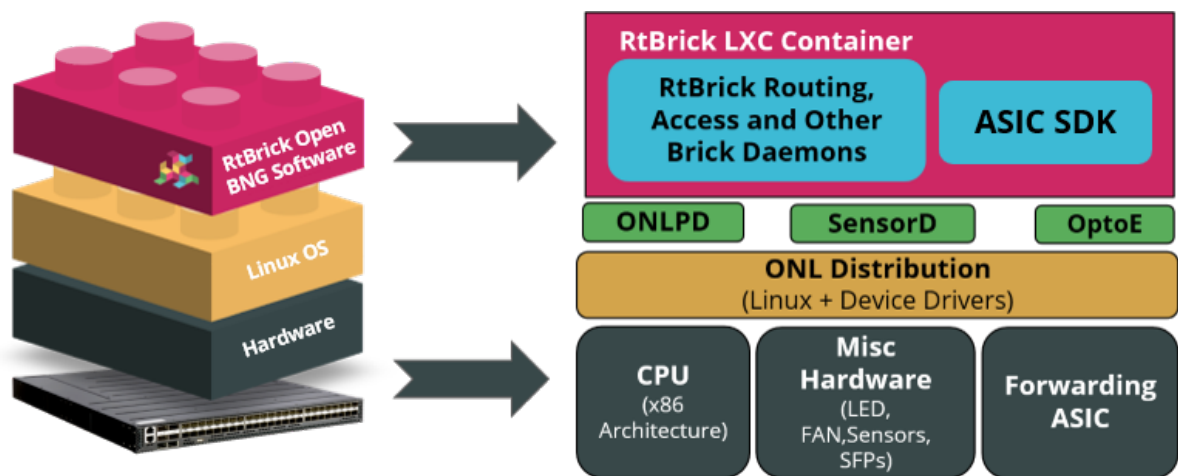
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# 1. Platform Overview

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.

## 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)

- UfiSpace S9510-28DC
- UfiSpace S9500-22XST
- UfiSpace S9600-32X
- UfiSpace S9600-72XC
- UfiSpace S9600-102XC

For a list of features and sub-features supported by each platform, see [Feature Support Matrix](#).

## End-of-Life Policy

RtBrick periodically introduces software support for new hardware platforms and use cases. Likewise, support for older software is discontinued to ensure that RtBrick can provide appropriate attention to software critical to drive business functions. The [End-of-Life Policy page](#) details the platforms that are no longer supported or have limited support from RtBrick.

## 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*.

## 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).

## 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*.

## 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": "ufil10.q2c.u9.r4.nbg.rtbrick.net",
    "pod-name": "nbg4"
  }
}
```

## 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.

### 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"> <li>• hard-reset: A reset will take place based on the configured settings.</li> <li>• no-action: No action will be taken.</li> <li>• power-cycle: The watchdog timer will power cycle the device.</li> <li>• shutdown: The device will shut down per the configured setting.</li> </ul> <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

## 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.

## 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
<...>

```

## Profile-based Allocation of Chipset Resources

Network operators can now choose a platform profile that suits their business needs, allocating chip resources accordingly.

Currently, the platform profile configuration is supported on the Consolidated BNG (C-BNG) image on the Q2C platform. By default, all the platform profile configurations are disabled.

Below is a table that provides information about the platform profiles and the resources allocated to each of them.

Profile Name	Resources Allocated
1q	
nat_1q	
nat_4q	



To set up the profile for a specific platform, use the command below.

**Syntax:**

**set system platform profile** <profile-name>

Attribute	Description
<profile-name>	Specifies the profile that you want to activate.

**Example: Profile-based Allocation**

```
supervisor@rtbrick>LEAF01: cfg> set system platform profile
  lq                               Platform profile name
  nat_1q                           Platform profile name
  nat_4q                           Platform profile name
supervisor@rtbrick>LEAF01: cfg>
```

To view the profiles configured for a platform after reboot, use the command below:

```
supervisor@rtbrick>LEAF01: op>show platform-profile
Platform-profile: lq
  Single Queue Profile: True
  Role: consolidated-bng
  MDB Profile: custom_rtb_cbng
  Counter Profile: cbng
supervisor@rtbrick>LEAF01: op>
```

## 2. Platform Hardware Information

### 2.1. RBFS Access Leaf and Consolidated BNG Images on UfiSpace S9600-102XC

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 S9600-102XC platform.

#### Hardware Specification

*UfiSpace S9600-102XC Hardware Specification*

Model	UfiSpace S9600-102XC
Form-factor	2RU in height with physical dimensions of: Width 436mm (17.16"), Depth 609.6mm (24"), and Height 87.7mm (3.45")
Switching Capacity	2.4 Tbps
Switch ASIC	Broadcom Qumran-2C BCM88820
Co-Processor	BCM16K
CPU	Intel Skylake-D D-2145NT 8 core / 1.9GHz
Role	Access Leaf, Consolidated BNG (C-BNG)
Storage (SSD)	128 GB
System Memory	16GB x2 DDR4 ECC RDIMM
Interfaces	<ul style="list-style-type: none"> <li>• 96x25G</li> <li>• 6x100G</li> </ul>

For detailed information about the hardware specifications, contact UfiSpace.

### 2.2. 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.

## Hardware Specification

### *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"> <li>• 64 x 25GE SFP28 ports</li> <li>• 8 x 100GE QSFP28 ports</li> <li>• 2 x 10GE SFP+ management ports</li> <li>• 1 x RJ45 serial console port</li> </ul>

For more information, click the link below.

<https://ufispace.com/products/telco/aggregation/s9600-72xc-25g-100g-open-aggregation-router-tcam>

## 2.3. 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.

## Hardware Specification

### *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"> <li>• 31 x 40GE/100GE QSFP28 ports</li> <li>• 4 x 1GE/10GE/25GE SFP28 ports (break out from Port 0)</li> <li>• 1 x RJ45 serial console port</li> </ul>

For more information on the UfiSpace S9600-32X platform, click [here](#).

## 2.4. RBFS Access Leaf & Consolidated BNG Images on Edgecore AGR420 (AS7946-74XKSB)

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.

### Hardware Specification

#### *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"> <li>• 10 x 100G</li> <li>• 64 x 25G</li> </ul>

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.

### Hardware Specification

*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"> <li>• 26 x 100G</li> <li>• 4 x 25G</li> </ul>

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.

### Hardware Specification

*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"> <li>• 2 x 400G</li> <li>• 2 x 100G</li> <li>• 24 x 25G</li> </ul>

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.

## Hardware Specification

### *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"> <li>• 24 x SFP28 (each supports 1/10 GbE or 25 GbE)</li> <li>• 2 x 100G QSFP28 (each supports 50/100 GbE)</li> <li>• 2 x 400G QSFP-DD (each supports 50/100/200/400 GbE)</li> </ul>

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 L2 Wholesale (L2BSA) Image on UfiSpace S9500-22XST

The RBFS L2BSA is a software image that supports transparent forwarding on the A10-NSP interface received from U Interface and vice versa.

## Hardware Specification

### *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	L2 Wholesale (L2BSA)
System Memory	1x8GB DDR4 SO-DIMM with ECC
Storage (SSD)	32GB
Interfaces	<ul style="list-style-type: none"> <li>• 2 x 100GE QSFP28 port</li> <li>• 8 x 25GE SFP28 ports</li> <li>• 8 x 10GE SFP+ ports</li> <li>• 4 x 1GE RJ45 ports</li> </ul>

For more information, click the link below.

<https://www.ufispace.com/products/telco/access/s9500-22xst-rj45-disaggregated-cell-site-gateway>

## 2.9. RBFS L2 Wholesale (L2BSA) Image on Edgecore CSR320 (AS7316-26XB)

The RBFS L2BSA is a software image that supports transparent forwarding on the A10-NSP interface received from U Interface and vice versa.

### Hardware Specification

*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	L2 Wholesale (L2BSA)
System Memory	DDR4 SO-DIMM 2x 8GB SDRAM with ECC support



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Storage (SSD)	128GB
Interfaces	<ul style="list-style-type: none"><li>• 16 x SFP+ (each supporting 10 GbE or 1 GbE)</li><li>• 8 x SFP28 (each supporting 10 GbE or 25 GbE)</li><li>• 2 x 100G QSFP28 (each supporting 1 x 40/100 GbE or 4 x 10/25 GbE or 2 x 50 GbE)</li></ul>

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

## 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.

## Access-Leaf Image

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

*Access-Leaf Images Feature Support*

Component	Feature	UfiSpace S9600-72XC (Q2C)	UfiSpace S9600-102XC (Q2C)	EdgeCore AGR420 (AS7946-74XKSB) (Q2C)
<b>Routing Protocols</b>	BGP	Yes	Yes	Yes
	IS-IS	No	No	No
	LDP	No	No	No
	OSPFv2/v3	No	No	No
	Policy	Yes	Yes	Yes
	BFD	No	No	No
	Segment Routing (MPLS)	Yes	Yes	Yes
<b>Layer 2 Services</b>	L2X (Local & Remote)	Yes	Yes	Yes
	EVPN-VPWS	Yes	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Q2C)	UfiSpace S9600-102XC (Q2C)	EdgeCore AGR420 (AS7946-74XKSB) (Q2C)
<b>Forwarding</b>	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
	Mirroring	Yes	Yes	Yes
<b>Multicast</b>	IGMPv2/v3	Yes	Yes	Yes
	PIM-SSM	Yes	Yes	Yes

Component	Feature	UfiSpace S9600-72XC (Q2C)	UfiSpace S9600-102XC (Q2C)	EdgeCore AGR420 (AS7946-74XKSB) (Q2C)
<b>Subscriber Management</b>	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

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-72XC (Q2C)</b>	<b>UfiSpace S9600-102XC (Q2C)</b>	<b>EdgeCore AGR420 (AS7946-74XKSB) (Q2C)</b>
<b>Infrastructure</b>	Logging	Yes	Yes	Yes
	NTP	Yes	Yes	Yes
	LED Control	Yes	Yes	Yes
	IPMI	Yes	Yes	Yes
	Watchdog Timer	Yes	Yes	Yes
<b>Security</b>	Securing the Management Plane	Yes	Yes	Yes
	Securing the Control Plane	Yes	Yes	Yes
	Local User Management	Yes	Yes	Yes
<b>Telemetry</b>	Resmon	Yes	Yes	Yes
	ASIC Resource Monitoring	Yes	Yes	Yes
	Prometheus TSDB	Yes	Yes	Yes
	SNMPv2c/SNMPv3	Yes	Yes	Yes

## Consolidated BNG Image

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

*Consolidated BNG Images Feature Support*

Component	Feature	UfiSpace S9600-72XC (Q2C)	UfiSpace S9600-102XC (Q2C)	Edgecore AGR420 (AS7946- 74XKSB) (Q2C)	UfiSpace S9510-28DC (Q2A)	Edgecore CSR440 (AS7535-28XB) (Q2A)
<b>Routing Protocols</b>	BGP	Yes	Yes	Yes	Yes	Yes
	IS-IS	Yes	Yes	Yes	Yes	Yes
	LDP	Yes	Yes	Yes	Yes	Yes
	OSPFv2/v3	Yes	Yes	Yes	Yes	Yes
	Policy	Yes	Yes	Yes	Yes	Yes
	BFD	No	No	No	No	No
	Segment Routing (MPLS)	Yes	Yes	Yes	Yes	Yes
<b>Layer 2 Services</b>	L2X (Local & Remote)	Yes	Yes	Yes	Yes	Yes
	EVPN-VPWS	Yes	Yes	Yes	Yes	Yes

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-72XC (Q2C)</b>	<b>UfiSpace S9600-102XC (Q2C)</b>	<b>Edgecore AGR420 (AS7946- 74XKSB) (Q2C)</b>	<b>UfiSpace S9510-28DC (Q2A)</b>	<b>Edgecore CSR440 (AS7535-28XB) (Q2A)</b>
<b>Forwarding</b>	HQoS	Yes	Yes	Yes	Yes	Yes
	Multifield (MF) Classifier	Yes	Yes	Yes	Yes	Yes
	OAM (Ping & Traceroute)	Yes	Yes	Yes	Yes	Yes
	LLDP	Yes	Yes	Yes	Yes	Yes
	Inband Management	Yes	Yes	Yes	Yes	Yes
	LAG (Static, LACP)	Yes	Yes	Yes	Yes	Yes
	Mirroring	Yes	Yes	Yes	Yes	Yes
<b>Multicast</b>	IGMPv2/v3	Yes	Yes	Yes	Yes	Yes
	PIM-SSM	Yes	Yes	Yes	Yes	Yes



<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-72XC (Q2C)</b>	<b>UfiSpace S9600-102XC (Q2C)</b>	<b>Edgecore AGR420 (AS7946- 74XKSB) (Q2C)</b>	<b>UfiSpace S9510-28DC (Q2A)</b>	<b>Edgecore CSR440 (AS7535-28XB) (Q2A)</b>
<b>Subscriber Management</b>	PPPoE	Yes	Yes	Yes	Yes	Yes
	L3 Wholesale (L2TPv2 LAC)	Yes	Yes	Yes	Yes	Yes
	IPoE	Yes	Yes	Yes	Yes	Yes
	AAA (RADIUS)	Yes	Yes	Yes	Yes	Yes
	Dual Stack	Yes	Yes	Yes	Yes	Yes
	IPTV	Yes	Yes	Yes	Yes	Yes
	L2BSA (L2 Wholesale)	Yes	Yes	Yes	No	No

Component	Feature	UfiSpace S9600-72XC (Q2C)	UfiSpace S9600-102XC (Q2C)	Edgecore AGR420 (AS7946- 74XKSB) (Q2C)	UfiSpace S9510-28DC (Q2A)	Edgecore CSR440 (AS7535-28XB) (Q2A)
<b>Subscriber Management (Cont'd)</b>	Lawful Intercept	Yes	Yes	Yes	Yes	Yes
	Accounting	Yes	Yes	Yes	Yes	Yes
	Single-/double- tagged interfaces	Yes	Yes	Yes	Yes	Yes
	Untagged Interfaces	Yes	Yes	Yes	No	No
	Redundancy (Hot Standby)	Yes	Yes	Yes	No	No
	Subscriber Filters	Yes	Yes	Yes	Yes	Yes
	HTTP Redirect Service	Yes	Yes	Yes	Yes	Yes
	Carrier-Grade NAT	Yes	Yes	Yes	No	No

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-72XC (Q2C)</b>	<b>UfiSpace S9600-102XC (Q2C)</b>	<b>Edgecore AGR420 (AS7946- 74XKSB) (Q2C)</b>	<b>UfiSpace S9510-28DC (Q2A)</b>	<b>Edgecore CSR440 (AS7535-28XB) (Q2A)</b>
<b>Infrastructure</b>	Logging	Yes	Yes	Yes	Yes	Yes
	NTP	Yes	Yes	Yes	Yes	Yes
	LED Control	Yes	Yes	Yes	Yes	Yes
	IPMI	Yes	Yes	Yes	Yes	No
	Watchdog Timer	Yes	Yes	Yes	Yes	Yes
<b>Security</b>	Securing the Management Plane	Yes	Yes	Yes	Yes	Yes
	Securing the Control Plane	Yes	Yes	Yes	Yes	Yes
	Local User Management	Yes	Yes	Yes	Yes	Yes

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-72XC (Q2C)</b>	<b>UfiSpace S9600-102XC (Q2C)</b>	<b>Edgecore AGR420 (AS7946- 74XKSB) (Q2C)</b>	<b>UfiSpace S9510-28DC (Q2A)</b>	<b>Edgecore CSR440 (AS7535-28XB) (Q2A)</b>
<b>Telemetry</b>	Resmon	Yes	Yes	Yes	Yes	Yes
	ASIC Resource Monitoring	Yes	Yes	Yes	Yes	Yes
	Prometheus TSDB	Yes	Yes	Yes	Yes	Yes
	SNMPv2c/SNMPv 3	Yes	Yes	Yes	Yes	Yes

## Spine Image

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

*Spine Images Feature Support*

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-32X (Q2C)</b>	<b>EdgeCore AGR400 (AS7946-30XB) (Q2C)</b>
<b>Routing Protocols</b>	BGP	Yes	Yes
	IS-IS	Yes	Yes
	LDP	Yes	Yes
	OSPFv2	Yes	Yes
	Policy	Yes	Yes
	BFD	No	No
	Segment Routing (MPLS)	Yes	Yes
<b>Layer 2 Services</b>	L2X (Local & Remote)	Yes	Yes
	EVPN-VPWS	Yes	Yes
<b>Forwarding</b>	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
	Mirroring	Yes	Yes

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-32X (Q2C)</b>	<b>EdgeCore AGR400 (AS7946-30XB) (Q2C)</b>
<b>Multicast</b>	IGMPv2/v3	No	No
	PIM-SSM	Yes	Yes
<b>Infrastructure</b>	Logging	Yes	Yes
	NTP	Yes	Yes
	LED Control	Yes	Yes
	IPMI	Yes	No
	Watchdog Timer	Yes	Yes
<b>Security</b>	Securing the Management Plane	Yes	Yes
	Securing the Control Plane	Yes	Yes
	Local User Management	Yes	Yes
<b>Telemetry</b>	Resmon	Yes	Yes
	ASIC Resource Monitoring	Yes	Yes
	Prometheus TSDB	Yes	Yes
	SNMPv2c/SNMPv3	Yes	Yes

## L2 Wholesale (L2BSA) Image

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

*L2 Wholesale (L2BSA) Images Feature Support*

Component	Feature	UfiSpace S9500-22XST (QAX)	Edgecore CSR320 AS7316-26XB (QAX)
<b>Routing Protocols</b>	BGP	Yes	Yes
	IS-IS	No	No
	LDP	No	No
	OSPFv2	No	No
	Policy	Yes	Yes
	BFD	No	No
	Segment Routing (MPLS)	Yes	Yes
<b>Layer 2 Services</b>	L2X (Local & Remote)	Yes	Yes
	EVPN-VPWS	Yes	Yes

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9500-22XST (QAX)</b>	<b>Edgecore CSR320 AS7316-26XB (QAX)</b>
<b>Forwarding</b>	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
	Mirroring	Yes	Yes
<b>Infrastructure</b>	Logging	Yes	Yes
	NTP	Yes	Yes
	LED Control	Yes	Yes
	IPMI	Yes	Yes
	Watchdog Timer	Yes	Yes
<b>Security</b>	Securing the Management Plane	Yes	Yes
	Securing the Control Plane	Yes	Yes
	Local User Management	Yes	Yes



<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9500-22XST (QAX)</b>	<b>Edgecore CSR320 AS7316-26XB (QAX)</b>
<b>Telemetry</b>	Resmon	Yes	Yes
	ASIC Resource Monitoring	No	No
	Prometheus TSDB	Yes	Yes
	SNMPv2c/SNMPv3	Yes	Yes

## 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
- NAT44 Rule 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

## Access-Leaf Image

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

*Access-Leaf Images - Feature/Resource Usage*

<b>Component</b>	<b>Feature/Resource</b>	<b>UfiSpace S9600-102XC (Q2C)</b>	<b>UfiSpace S9600-72XC (Q2C)</b>	<b>EdgeCore AGR420 (AS7946-74XKSB) (Q2C)</b>
<b>FIB</b>	IPv4 Route Count	1200000	1200000	1200000
	IPv6 Route Count	250000	250000	250000
	Low Rate Shaping Enabled (<1000 Kbps)	Yes	Yes	Yes
<b>CONFD</b>	MTU-Profile Count	8	8	—
	L3 MTU-Profile Count	3	3	—
	Subscriber MTU-Profile Count	5	5	—
	Physical MTU Profile Count	8	8	—
<b>BGP</b>	6PE label value	2	2	—

## Consolidated BNG Image

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

*Consolidated BNG Images - Feature/Resource Usage*

Component	Feature	UfiSpace S9600-102XC (Q2C)	UfiSpace S9600-72XC (Q2C)	Edgecore AGR420 (AS7946-74XKSB) (Q2C)	UfiSpace S9510-28DC (Q2A)	EdgeCore CSR440 (AS7535-28XB) (Q2A)
<b>FIB</b>	IPv4 Route Count	1200000	1200000	1200000	500000	500000
	IPv6 Route Count	250000	250000	250000	200000	200000
	NAT44 Rule Count	4500000	4500000	4500000	—	—
	Low Rate Shaping Enabled (<1000 Kbps)	No	No	No	Yes	Yes

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-102XC (Q2C)</b>	<b>UfiSpace S9600-72XC (Q2C)</b>	<b>Edgecore AGR420 (AS7946-74XKSB) (Q2C)</b>	<b>UfiSpace S9510-28DC (Q2A)</b>	<b>EdgeCore CSR440 (AS7535-28XB) (Q2A)</b>
<b>CONFD</b>	MTU-Profile Count	—	—	—	—	—
	L3 MTU-Profile Count	—	—	—	—	—
	Subscriber MTU-Profile Count	—	—	—	—	—
	Physical MTU Profile Count	—	—	—	—	—
<b>BGP</b>	6PE label value	2	2	2	2	2

## Spine Image

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

*Spine Images - Feature/Resource Usage*

<b>Component</b>	<b>Feature</b>	<b>UfiSpace S9600-32X (Q2C)</b>	<b>EdgeCore AGR400 (AS7946-30XB) (Q2C)</b>
<b>FIB</b>	IPv4 Route Count	1200000	1200000
	IPv6 Route Count	250000	250000
	Low Rate Shaping Enabled	No	—
<b>CONFD</b>	MTU-Profile Count	8	—
	L3 MTU-Profile Count	3	—
	Subscriber MTU-Profile Count	5	—
	Physical MTU Profile Count	8	—
<b>BGP</b>	6PE label value	2	—

## L2 Wholesale (L2BSA) Image

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

*L2 Wholesale (L2BSA) Images - Feature/Resource Usage*

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

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



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