

BQN Quick Start Guide

R3.1

This document will guide you in setting up the Bequant BQN, a device for traffic optimization, and will describe its main functionalities.

Installation

Prerequisites

- **Management IP address**, with mask and default gateway (e.g. 10.10.1.47/24 with gateway 10.10.1.1).
- **Remote access to the management IP address** for the TCP ports 22 (SSH) and 443 (HTTPS) from Bequant lab IP address (46.26.190.166). This access can be set up as port forwarding rules in the router accessing the management network.
- **AC power cabling**.
- **RJ45 management cabling**.
- **User traffic cabling**: for each port pair, a cable or fiber from the BQN to the router/switch on the access side and another cable/fiber to the router/switch on the Internet side.
- If **SFP+** are used, SFP+ transceivers or DAC-SFP+ cables, Intel-compatible.
- **Routing of traffic through the BQN**. It must be done **bidirectionally** (all uplink and downlink traffic for the selected users).

Steps

1. Connect the power supply and the management cable to the OAM port (see section *Supported Servers* for details of your server model).

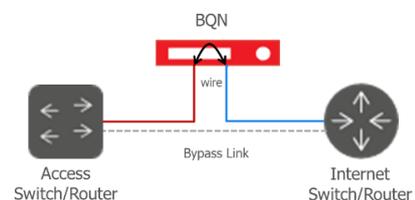


2. Switch the BQN server on and access the management GUI following the steps described in the *Login* section.

3. The BQN factory management IP address is **192.168.0.121/24**, with default gateway **192.168.0.1**. The management user is **bqnam** with **password** the server **serial number** (see in section *Supported Servers* where it is in your model).

4. If you need to change the management IP address or default gateway, see the section *How to Change Management IP Address*.

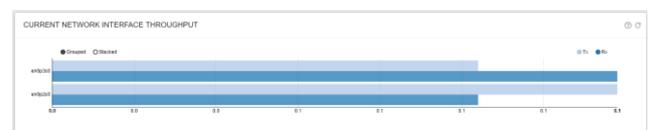
5. **Connect user traffic cables**. User traffic ports are paired in *wires*, internally connected so the traffic received by one port is sent to the other one and vice versa. Each *wire* in use needs its ports on the access and Internet sides connected. It is important to connect the ports to the right side (otherwise, the system performance will be affected). See the section *Supported Servers* for details of your server model.



6. The interfaces in use must be up and with the link detected. Both can be monitored in the GUI *Interface->Overview*.

NAME	TYPE	MAC	UP	LINK	MTU
lo	loopback	00:00:00:00:00:00	✓	✓	○
enp1s0	ethernet	40:02:31:01:76:27	✓	✓	⊕
enp1s1	ethernet	40:02:31:01:76:28	✗	✗	○
enp1s2	ethernet	90:4a:0b:03:00:02	✗	✗	○
enp1s3	ethernet	40:02:31:01:76:24	✓	✓	○
enp1s4	ethernet	40:02:31:01:76:26	✓	✓	○

7. Once the traffic is steered, you can see its instant value in *Interfaces->Throughput*.



8. And that is all. The installation is done.

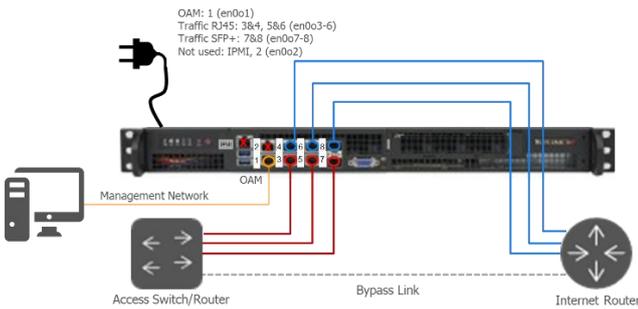
Supported Servers

Network ports are numbered in the diagrams, starting by 1 for the management port. User traffic ports are paired in *wires*, with the port of the access side first, followed by the port on the Internet side. For example, in the *wire 3&4*, port 3 is on access side and port 4 on Internet side.

Supermicro

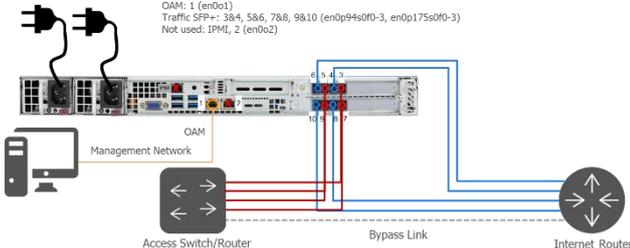
The **serial number** consists in fifteen alphanumeric characters printed on a label on the server back-left.

5018D-FN8T



Port 1 (front lower left) is for management. The *wires* are 3&4 (RJ45), 5&6 (RJ45) and 7&8 (SFP+). Ports 2 and IPMI are not used.

1029P-WTR

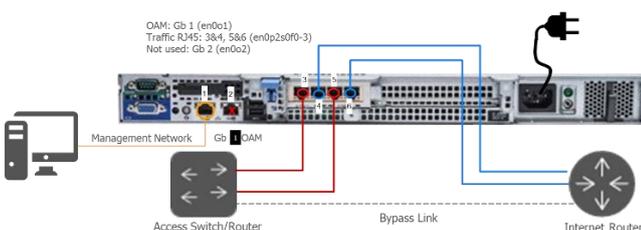


Port 1 (lower left) is for management. The *wires* are SFP+, pairing consecutive ports of the same card, with access port on the right of the pair. Ports 2 and IPMI are not used.

Dell

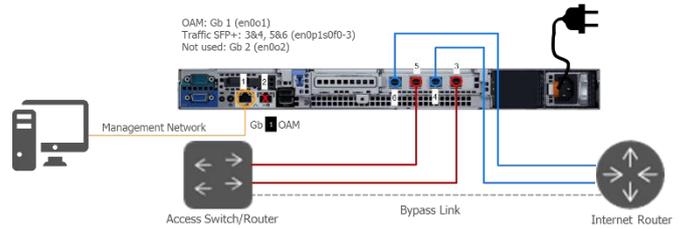
The **serial number** consists in seven alphanumeric characters, printed on a tag in the server front, labeled as "Service Tag".

PowerEdge R230



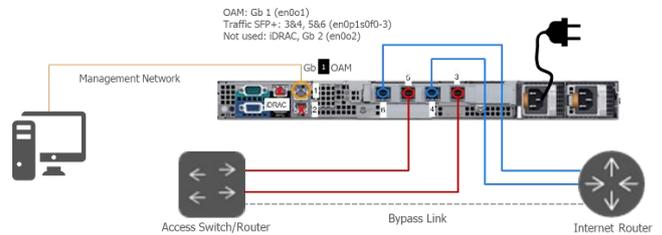
Port 1 (Gb 1) is for management. The available *wires* depend on the installed network cards. In the example, we use a card with four RJ45 ports. Port 2 (Gb 2) is not used.

PowerEdge R330



Port 1 (Gb 1) is for management. The available *wires* depend on the installed network cards. In the example, we use a card with four SFP+ ports. Port 2 (Gb 2) is not used.

PowerEdge R440

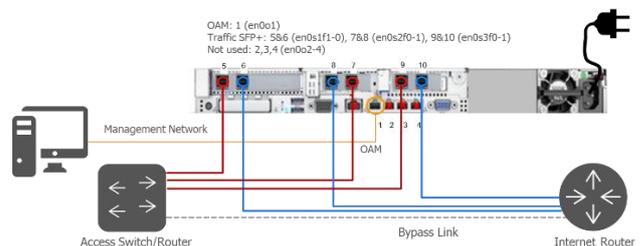


Port 1 (Gb 1) is for management. The available *wires* depend on the installed network cards. In the example, we use a card with four SFP+ ports. Port 2 (Gb 2) and iDRAC are not used.

HPE

The **serial number** consists in ten alphanumeric characters, printed on a tag in the server front, labeled as "S/N".

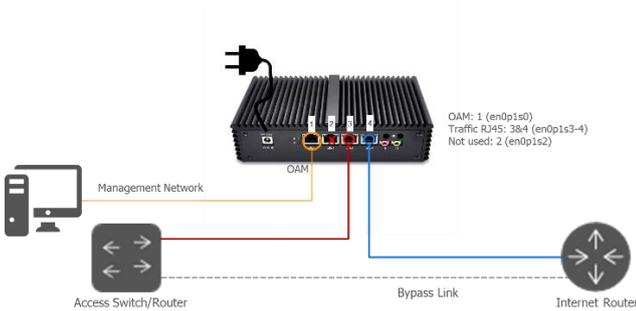
Proliant DL360



Port 1 is for management. The available *wires* depend on the installed network cards. In the example, we use three cards with two SFP+ ports each. Ports 2, 3, 4 and iLO are not used.

Fanless Platform HW

The **serial number** consists in ten alphanumeric characters, printed on the bottom of the server.



Port 1 is for management. The available *wire* is 3&4 (RJ45). Port 2 is not used.

GUI Description

The BQN has a web-based Graphic User Interface (GUI) to perform the most common management tasks. Desktop browsers Chrome, Firefox, Safari and Microsoft Edge are supported (MS Explorer is not).

The GUI has contextual help: press the (?) icon on the page for which help is needed.

Login

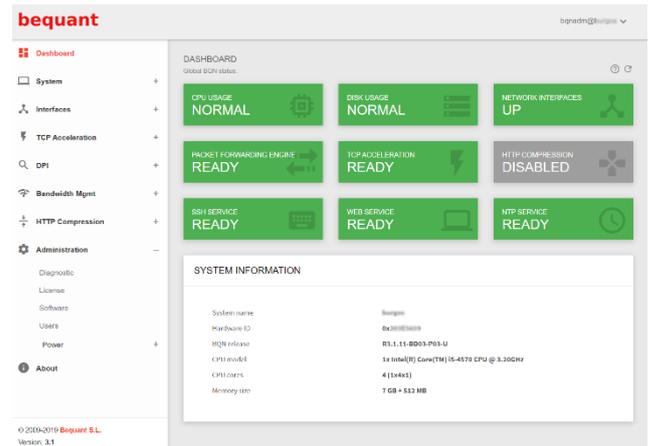
To access the GUI, open a browser and visit the URL: **https://oam-ip**, where *oam-ip* is the management IP address (192.168.0.121 by default).

The BQN uses a self-signed certificate and the browser will signal it as unsecure. Ignore the warning and go to the web page.

Enter `bqnam` user and the password (server serial number by default).



Home Page

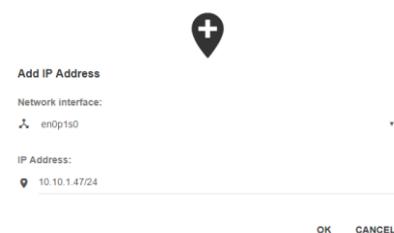


The home page has a lateral menu, a dashboard and a small summary of system information.

The dashboard must be with all icons in green, except *HTTP COMPRESSION*, which is a functionality not covered here. The *NETWORK INTERFACES* icon is in green only if it detects link for all the configured *wires* (if there are available *wires* not in use, it will remain in red).

How to Change Management IP Address

To **change the management IP address**, select on the lateral menu *Interfaces->IP->Addresses* and click on the **+** icon. Press *Add IP Address...* This option leads to a dialogue window where you can choose the management interface (port 1) and type the new address in the field *IP Address*, network mask included (e.g. 10.10.1.47/24). Click *OK* to confirm. The change will force to log back into the GUI.



We recommend keeping the default address (192.168.0.121) to have a well-known IP address to revert to, unless the new IP is in the same subnet and causes a conflict.

After that, **the default gateway** needs to be changed by selecting *Interfaces->IP->Routes* and clicking the **+** icon to press *Add Route...* This option leads to a dialogue window where you can enter the default route **0.0.0.0/0** in *Destination Route* and the default

gateway IP address in *Gateway IP Address*. Click *OK* to confirm the change.



Management Interface Firewall

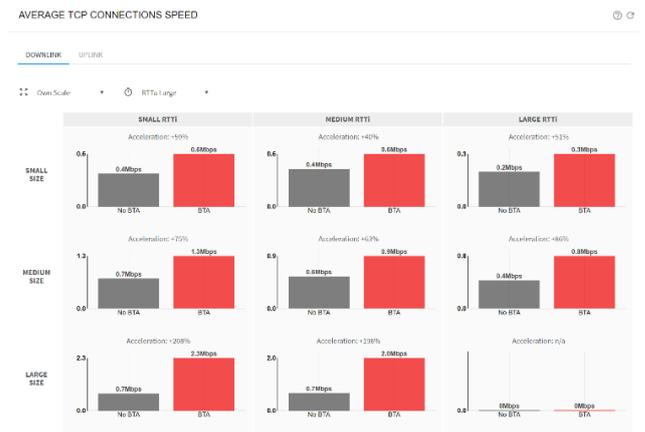
To set up the management interface firewall, select on the lateral menu *Interfaces->Mgmt I/F Firewall*. This will show IP address ranges that are allowed to access the management interface. By default, no IP address ranges are configured, and all are allowed.

To add an allowed IP address range, click the \vdots icon and press on *Add IP Address Range...* Once one IP address range is allowed, the firewall is enabled, and all IP addresses not covered by the configured IP address ranges will be blocked. It is therefore important to include an IP address range that includes the IP address from which we are accessing the GUI and the networks of the management IP address (the GUI will warn us about this).

TCP Acceleration Metrics

The BQN accelerates TCP traffic to raise the effective speed of data transfers and improve the user quality of experience.

TCP Acceleration->TCP Speed shows the average speed values of non-accelerated TCP connections (*no BTA*) and accelerated ones (*BTA*). In order to have comparable traffic, the traffic is classified into nine categories based on download sizes and latency to the content servers. Sizes are: *SMALL SIZE* (up to 100KB), *MEDIUM* (between 100KB and 1MB) and *LARGE* (more than 1MB). Latencies (*SMALL/MEDIUM/LARGE RTTi*) are defined with configurable thresholds which may change from network to network (see the section *TCP Acceleration Configuration*).

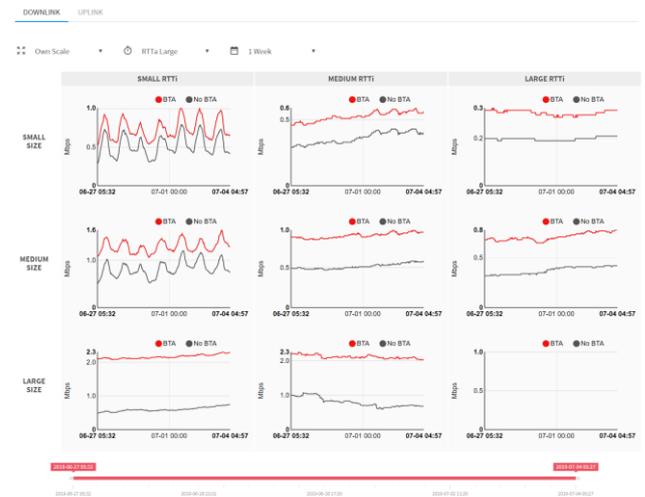


Values are shown for downlink and uplink.

When users have very different access latencies, they can be classified in two categories (*RTT Small/Large*). The threshold is configurable (see the section *TCP Acceleration Configuration*).

After a boot or after threshold changes, metrics starts from scratch. The BQN needs time to collect enough metrics to show results. If there are not enough samples, or the acceleration is not statistically significant, no results will be shown.

TCP Acceleration->Statistics->Speed shows speed temporal evolution:



TCP Acceleration Configuration

TCP Acceleration->Configuration->Acceleration leads to the configuration page of this functionality.

Random Acceleration Percentage defines the percentage of TCP connections to accelerate. Its typical value is 99%, leaving 1% without acceleration as a control group to compare against.

BTA CONFIGURATION: ACCELERATION
 Press **Apply Configuration** button at the end of the page to set the new configuration values.

Random Acceleration Percentage
 Set the percentage of TCP sessions to be accelerated randomly, while the rest of the sessions are directly forwarded. Enter the percentage value or move the knob to select the new random acceleration percentage.

Access Side RTT Parameter
 Measurements are classified into 2 groups depending on the access side RTT (round-trip time). The RTT_a parameter is the threshold that divides the access side RTT into small and large groups.

Internet Side RTT Parameters
 Measurements are classified into 3 groups depending on the internet side RTT (round-trip time). The RTT_{i-small} and RTT_{i-large} parameters are the thresholds that divide the internet traffic into small, medium and large groups.

UDR Generation
 UDRs (Usage Data Records) are generated for a percentage of all downloads and uploads, from which DPI results are obtained. Too high percentage makes collecting DPI data slow, too low percentage may cause lack of precision. 2% is recommended.

Apply Configuration

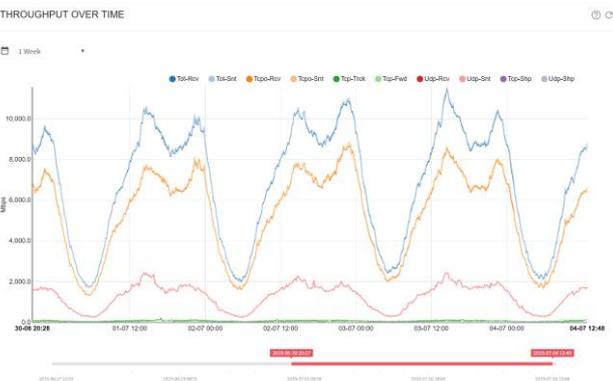


This page sets the thresholds in the Internet latency categories used by acceleration metrics (*RTT_{i-small}* and *RTT_{i-large}*) and also the access latency (*RTT_a*).

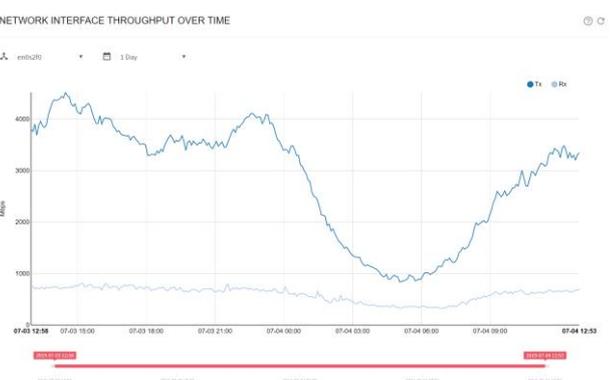
The UDRs are disk registers from which ANALYTICS metrics are obtained. By default, they are generated for 2% of connections.

Traffic Throughput

TCP Acceleration->Statistics->Throughput shows the temporal evolution of total traffic throughput, adding both directions and all wires.

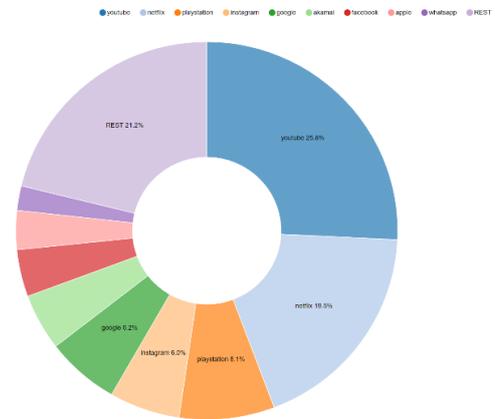


The temporal evolution per interface is available in *Interfaces->Statistics->Throughput*.

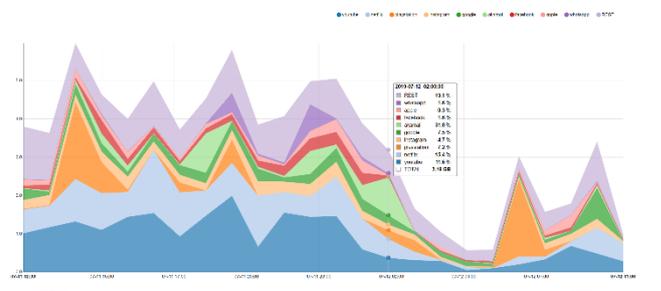


Analytics

The BQN shows the current traffic composition per service in *Analytics->Statistics->Total*. UDR generation must be active.



The hourly evolution can be obtained in *Analytics->Statistics->Hourly*.



It is also possible to track application usage per specific IP address. In order to do that, the IP addresses of interest are added in *Analytics->Configuration*. After a while, the usage of those IPs can be seen in *Analytics->Statistics->Hourly*, filtering per IP in the *Address Filter* box.

The options *Analytics->Statistics->Subscribers Hourly* and *Analytics->Statistics->Subscribers Total* show user IPs with the biggest traffic consumption, over time or for the aggregate of the period under consideration, respectively.

Bandwidth Management

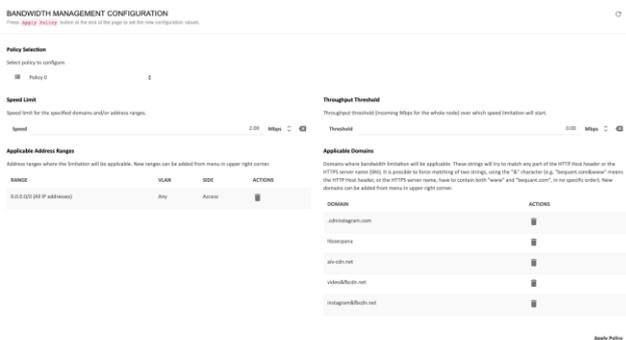
The BQN can define policies to limit the throughput (*Speed Limit*) per user IP address for certain services. The services to be limited can be specified by user or IP address ranges and VLAN tag. Additionally, services can be identified by a set of domain names (*host* name in http or *SNI* in https). Bequant Support can provide domain names for a number of typical services, like video streaming applications. Finally, it

is possible to restrict the speed limitation to those instants in time when the mean total throughput across the is above a threshold, so there would be no limitation unless the traffic load is high (*Throughput Threshold*).

The BQN comes with built-in domain collections to incorporate to a policy using the option *Predefined Signatures*. There are domains for video streaming, software downloads and subsets of those. It is also possible to add to a policy domains provided by Bequant support using the option *Add From Signature File* (o replace the policy domains by those in the file with option *Replace from Signature File*).

It is possible to specify up to 10 different speed limitations (*Policies*) for different kinds of services.

The configuration changes are done in *Bandwidth Mgmt->Configuration*. It is necessary to click on *Apply Policy* to apply the changes.



The throughput subject to rate limitation is shown in *TCP Acceleration->Statistics->Throughput*.

How to Update the License

A license is a file with extension `.lic` provided by Bequant. It is loaded in *Administration->License* clicking the `⋮` icon to select *Load...* A file selector allows to choose the license to load.

How to Update the Software

The update of a `bqn-R*.bpkg` packet (e.g. `bqn-R3.1.3.bpkg`) is done in two steps: first it is installed and then it is activated. The activation involves a traffic cut of ten seconds, so it is advisable to do it at times of low throughput.

The installation is done in *Administration->Software*, clicking the `⋮` icon and selecting *Install...* A file selector allows to choose the package, that it is transferred to the server and installed.

The activation is done in *Administration->Software* clicking on the `⌂` icon of the package to activate. This operation forces to log back into the BQN after the ten seconds period of reload.

NAME	VERSION	ACTIVE	BOOT	ACTIONS
bqnos	R2.0.10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
bqnos	R2.0.4	<input type="checkbox"/>	<input type="checkbox"/>	
linux	R2.0.1-20170410	<input type="checkbox"/>	<input type="checkbox"/>	
linux	R2.0.9-20180213	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
linuxkernel	R2.0.3-4.10.13-1-default	<input type="checkbox"/>	<input type="checkbox"/>	
linuxkernel	R2.0.1-4.10.13-3-default	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
kernel	R2.0.10-4.10.13-1-default	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
kernel	R2.0.4-10.13-1-default	<input type="checkbox"/>	<input type="checkbox"/>	
git	R2.0.5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
bqn	R2.2.20	<input type="checkbox"/>	<input type="checkbox"/>	⌂
bqn	R3.1.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	⌂
bqn	R3.1.3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	⌂

How to Generate a Diagnostic

When requested by Bequant support, a diagnostic file can be generated in *Administration->Diagnostic*.