



Citrix ADC BLX 13.0

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Overview and architecture

October 19, 2020

Citrix ADC BLX appliance is a software form-factor of Citrix ADC. It is designed to run natively on bare-metal-Linux on commercial off the shelf servers (COTS).

Following are the benefits of using a Citrix ADC BLX appliance:

- **Cloud-ready.** Citrix ADC BLX provides day-zero support for running on cloud.
Citrix ADC BLX appliances do not require any certifications to run on cloud because they run as a software application on Linux virtual machines provisioned on the cloud.
- **Easy-management.** Standard tools available as part of the Linux operating system can be used to easily monitor and manage Citrix ADC BLX appliances. Citrix ADC BLX appliances can be easily plugged with an existing orchestration setup.
- **Seamless third-party tools integration.** Open source tools (for example, monitoring, debugging, and logging) supported for Linux environments can be seamlessly integrated with Citrix ADC BLX appliances. There is no need to develop separate plug-ins for each integration.
- **Coexistence of other applications.** Because Citrix ADC BLX appliances run as a software application, other Linux applications can also run on the same host.
- **DPDK support.** Citrix ADC BLX appliance supports Data Plane Development Kit (DPDK) integration for better performance. A Citrix ADC BLX appliance uses the DPDK open source library to improve performance, and overcomes the Linux kernel bottleneck in packet processing.

General architecture

Citrix ADC BLX appliance is a software form-factor of Citrix ADC, and provides the same functionality as of a traditional Citrix ADC appliance. A Citrix ADC BLX appliance runs as a user space application in a Linux system. The BLX appliance uses the Linux drivers for Rx/Tx of packets and managing the NIC ports. Virtual interfaces `blx0` and `blx1`, which are created during the Citrix ADC BLX boot up phase, are used for communication between the kernel and the BLX appliance.

Network modes

Network mode of a Citrix ADC BLX appliance defines whether the NIC ports of the Linux host are shared or not shared with other Linux applications running on the host. A Citrix ADC BLX appliance can be configured to run on one of the following network modes:

- Shared mode
- Dedicated mode

Shared mode

A Citrix ADC BLX appliance configured to run in shared mode, shares the Linux host NIC ports with other Linux applications.

A Citrix ADC BLX appliance in shared mode is auto-assigned the network address of 192.0.0.1/24.

A Citrix ADC BLX appliance in shared mode operates with one single IP address that is used for management and data traffic. All the Citrix ADC owned IP addresses (for example, NSIP, SNIP, and VIP) have the same IP address of 192.0.0.1 but with different port numbers. In other words, this single IP address (192.0.0.1) uses different port numbers to function as the NSIP, SNIP, and VIPs.

Because the Linux NIC ports are shared between the BLX appliance and other Linux applications, an IP NAT table is added in the kernel for the BLX appliance. The Linux host uses this IP NAT table to recognize packets received on the Linux NIC ports belonging to the Citrix ADC BLX appliance.

The Linux host then performs NAT by translating the destination IP address of the received packet to the IP address (192.0.0.1) of the Citrix ADC BLX appliance. The Citrix ADC BLX appliance receives the packets through `blx0` and `blx1` virtual interfaces (`veth`).

The Citrix ADC BLX appliance processes the received packets and sends them to Linux kernel through `blx1` and `blx0` virtual interfaces. The Linux host performs NAT on these packets using the BLX IP NAT table, and then sends them out to the destination through the Linux NIC ports.

Dedicated mode

A Citrix ADC BLX appliance configured in dedicated mode has dedicated Linux host NIC ports and it does not share the ports with other Linux applications.

Other Linux applications on the host do not see the Linux NIC ports dedicated to the Citrix ADC BLX appliance.

The IP addressing scheme on a Citrix ADC BLX appliance in dedicated mode is similar to that of on a traditional Citrix ADC appliance. On a Citrix ADC BLX appliance in dedicated mode, ADC owned IP addresses (for example, NSIP, SNIP, and VIPs) can have different IP addresses.

Unlike in shared mode, there is no NAT operation required for the Citrix ADC BLX appliance in dedicated mode. The Citrix ADC BLX appliance receives/responds packets directly from/to the external network device through the configured dedicated Linux NIC ports.

The Citrix ADC BLX appliance in dedicated mode still uses `blx0` and `blx1` virtual interfaces (`veths`) to send SYSLOG and other management related information to the Linux kernel.

Citrix ADC BLX appliance with Data Plane Development Kit (DPDK) support

A Citrix BLX appliance uses the traditional Linux drivers for Rx/Tx of packets and managing the NIC ports. The packets transmitted between the Linux kernel and the BLX appliance in the user space

using the Linux drivers has several overheads. These overheads affect the performance of the BLX appliance.

The Citrix ADC BLX appliance has a full TCP/IP stack to process any packet. If the BLX appliance has a speedy way of receiving packet from underlying Linux NIC ports then the network performance is improved.

Data Plane Development Kit (DPDK) can be used to overcome this bottleneck. DPDK is a set of open source Linux libraries and network interface controllers used for better network performance. For more information on DPDK, see the official DPDK website at <https://www.dpdk.org/>

DPDK helps in bypassing the kernel and directly delivers the packets into the user space application for further processing. DPDK, in combined with Linux UIO module, helps the Citrix ADC BLX appliance to receive/transmit packet from/to the Linux NIC ports without involving the Linux kernel overhead of packet processing. Once memory is allocated, DPDK manages its own buffer to achieve better performance.

A Citrix ADC BLX Appliance with DPDK support works only in dedicated network mode.

Supported Linux Platforms and supported ADC features

February 15, 2021

Supported Linux Platforms for Citrix ADC BLX appliances

The following Linux platforms support Citrix ADC BLX appliances:

- **Citrix ADC BLX appliance without DPDK support:**

- CentOS Release 7.5 or later
- Oracle Linux Release 7.4 or later
- Linux on Oracle Cloud Infrastructure (OCI)
- Ubuntu release 16.04

- **Citrix ADC BLX appliance with DPDK support:**

- CentOS release 7.6
- Oracle Linux Release 7.4 or later
- Ubuntu release 16.04

Supported ADC features for Citrix ADC BLX appliances

Citrix ADC BLX appliances support the following Citrix ADC features:

- Load balancing
- SSL Offloading
- Content switching
- Web logging
- Rewrite
- Responder
- AppFlow
- DNS
- Authentication, authorization, and auditing application traffic
- Web application firewall
- Log streaming
- IPv6
- DSR
- High availability
- Dynamic routing protocols:
 - IPv4 and IPv6 BGP
 - IPv4 OSPF (OSPFv2)
- SNMP (Not supported for shared mode NIC interfaces)
- LA and LACP channels (Not supported for shared NIC interfaces, supported only between dedicated NIC interfaces or only between DPDK NIC interfaces.)
- Global server load balancing

Citrix ADC BLX licensing

September 29, 2020

Licensing a Citrix ADC BLX appliance expands the capability and performance of the appliance. By default, a Citrix ADC BLX appliance comes with an express license. You can upgrade an express license to a subscription-based local license that has a term date, or to a Citrix ADC pooled capacity license stored in a Citrix ADM appliance.

Citrix ADC BLX Express license

By default, all Citrix ADC BLX appliances come with an express license. A Citrix ADC BLX with an express license has the following features:

- 20 Mbps bandwidth
- All standard edition Citrix ADC features that are supported for Citrix ADC BLX appliances
- Maximum 250 SSL sessions

- 20 Mbps SSL throughput

Expand the capability and performance of a Citrix ADC BLX appliance running with an express license by upgrading the license to one of the following options:

- A subscription-based local license
- A Citrix ADC pooled capacity license in Citrix ADM. For more information, see [Citrix ADC Pooled Capacity](#).

Subscription-based local licenses for Citrix ADC BLX appliances

A Local license is similar to a perpetual license however they have an expiration date. The software subscription that makes up local licenses are term-based and can be installed without requiring ADM as a licensing server.

The following type of subscription local licenses is available for Citrix ADC BLX appliances:

- **Bandwidth-based subscription-based local license.** This type of license is enforced with a maximum allowed throughput that a particular Citrix ADC BLX appliance is entitled to. Each local license is also tied up with one of the Citrix ADC software editions (Standard, Enterprise, or Platinum), which unlocks the ADC feature set of this edition in a Citrix ADC BLX appliance. Embedded Select support is included with the subscription local license purchase.

Example:

A **Citrix ADC BLX Subscription 10 Gbps Premium Edition** entitles a Citrix ADC BLX appliance with a maximum allowed throughput of 10 Gbps. This license also unlocks all the ADC features, listed in the Premium edition, in the Citrix ADC BLX appliance.

The following table lists the bandwidth-based subscription-based local licenses available for Citrix ADC BLX appliances:

Bandwidth-based local licenses	Maximum bandwidth supported
Citrix ADC VPX/BLX Subscription 25 Mbps – Standard, Advanced, Premium Edition	25 Mbps
Citrix ADC VPX/BLX Subscription 200 Mbps – Standard, Advanced, Premium Edition	200 Mbps
Citrix ADC VPX/BLX Subscription 1 Gbps – Standard, Advanced, Premium Edition	1 Gbps
Citrix ADC VPX/BLX Subscription 3 Gbps – Standard, Advanced, Premium Edition	3 Gbps
Citrix ADC VPX/BLX Subscription 5 Gbps – Standard, Advanced, Premium Edition	5 Gbps

Bandwidth-based local licenses	Maximum bandwidth supported
Citrix ADC VPX/BLX Subscription 8 Gbps – Standard, Advanced, Premium Edition	8 Gbps
Citrix ADC VPX/BLX Subscription 10 Gbps – Standard, Advanced, Premium Edition	10 Gbps
Citrix ADC VPX/BLX Subscription 15 Gbps – Standard, Advanced, Premium Edition	15 Gbps
Citrix ADC VPX/BLX Subscription 25 Gbps – Standard, Advanced, Premium Edition	25 Gbps
Citrix ADC VPX/BLX Subscription 40 Gbps – Standard, Advanced, Premium Edition	40 Gbps

Deploy a Citrix ADC BLX appliance

September 29, 2020

Deploying a Citrix ADC BLX appliance on a Linux host consists of first downloading and installing the Citrix ADC BLX appliance. Then, the installed Citrix ADC BLX appliance can be deployed either with or without DPDK support. A Citrix ADC BLX appliance can be configured in either shared or dedicated network mode. A Citrix ADC BLX appliance with DPDK support can be configured only in dedicated mode.

Before you Begin

Before you start deploying a Citrix ADC BLX appliance on a Linux host, the following table lists the pre-requisites and consideration points:

Download a Citrix ADC BLX installation package on the Linux host

Citrix ADC BLX installation packages are hosted on the official Citrix ADC BLX downloads page. A Citrix ADC BLX installation package bundles Citrix ADC feature packages including a package with DPDK support. A Citrix ADC BLX installation package is a TAR file and has the following name format:

```
blx-<release number>-<build-number>.tgz
```

Example:

```
blx-13.0-41.20.tgz
```


To download a Citrix ADC BLX installation package:

1. Access the official [Citrix ADC BLX downloads](#) page.
2. Navigate to the desired **Citrix ADC Release > Citrix ADC BLX image build** page.
3. Download the Citrix ADC BLX installation package to the Linux host.

Install a Citrix ADC BLX appliance on the Linux host**To install a Citrix ADC BLX appliance on the Linux host:**

1. Untar the Citrix ADC BLX installation package and then change the working directory to the extracted Citrix ADC BLX installation directory:

```
1 tar -xvf blx-<release number>-<build-number>.tgz
2
3 cd <path to the extracted Citrix ADC BLX installation directory>
```

Sample output:

The following sample output shows that a Citrix ADC BLX installation package `blx-13.0-41.20.tgz`, which is already downloaded to the `/var/blxinstall` directory of a Linux host, is untared. Then, the working directory is changed to the extracted directory `blx-13.0-41.20`.

```
1 > cd /var/blxinstall
2
3 > tar -xvf blx-13.0-41.20.tgz
4
5 > cd blx-13.0-41.20
6
7 > pwd
8 /var/blxinstall/blx-13.0-41.20
```

2. Install a Citrix ADC BLX appliance on a Red Hat enterprise Linux (RHEL) host or Debian based Linux host.
 - Run the following command on a Red Hat enterprise Linux (RHEL) host:

```
1 yum install ./blx*.rpm
```

- Run the following command on a Debian based Linux host:

```
1 apt install ./blx*.deb
```

Note:

By default, the Citrix ADC BLX appliance is in **Down** state.

3. Check the status of Citrix ADC BLX appliance by running the following command:

```
1 systemctl status blx
```

Deploy a Citrix ADC BLX appliance

September 29, 2020

Deploying a Citrix ADC BLX appliance (without DPDK support) on a Linux host consists of the following steps:

- Configure the Citrix ADC BLX appliance to be in shared or dedicated network mode
- Setting the management IP address of the Citrix ADC BLX appliance for the first time (only in dedicated mode)
- Starting the Citrix ADC BLX appliance

Configure a Citrix ADC BLX appliance in shared mode

A Citrix ADC BLX appliance configured in shared mode shares the Linux host NIC ports with other application running on the host.

By default, A Citrix ADC BLX appliance starts in shared mode for the first time. A Citrix ADC BLX appliance also starts in shared mode, if all the lines in BLX configuration file (`blx.conf` file) are prefixed with `##`. The BLX configuration file is present in `/etc/blx` directory in the Linux host. By default, the HTTP management port (`mgmt-http`) is 9080, and HTTPS (`mgmt-https`) is 9443.

Configure a Citrix ADC BLX appliance in dedicated mode

A Citrix ADC BLX appliance configured in dedicated mode has dedicated Linux host NIC ports.

You can configure a Citrix ADC BLX appliance to be in dedicated mode by editing the BLX configuration file (`blx.conf`). The BLX configuration file is present in the `/etc/blx` directory on the Linux host. You

can set the values for one or more interfaces and IP addresses in the `blx.conf` file. These interfaces and IP addresses are not configured in the host network.

Note:

By default, all the lines in `blx.conf` file are prefixed with `##` symbol. Remove the `##` symbol and edit the `blx-system-config` section with any options you want to set.

Various options can be passed to the ADC BLX appliance by editing `blx-system-config` section in `blx.conf` file. The options that are available are as follows:

- **worker-processes.** The number of ADC BLX worker-processes (packet engines) that must be started. Default: 1, Maximum: 16.
- **ipaddress.** The IP address on which the ADC BLX listens. Default: ADC BLX listens on all IP addresses. A prefix is optional, and by default, it is `/24`.
- **interfaces.** The interfaces that are dedicated to the ADC BLX appliance.

Use the following CLI command to set the HTTP and HTTPS port in dedicated mode:

```
1 set nsparam - mgmthttpport 80 - mgmthttpsport 443
```

Notes:

- The format for HTTP or HTTPS port is `<PORT>` or `<IP:PORT>`.
- When you specify only the port number, the BLX management interface listens on this port on any IP address configured on host.
- When both `IP address:port` are specified, the ADC BLX management interface listens on that specific IP address and the port number.

You can specify either HTTP or HTTPS port. However, the other port does not open.

The following sample `blx.conf` file shows the edited **`blx-system-config`** section:

```
1 blx-system-config
2
3 {
4
5
6 worker-processes: 2
7
8 ipaddress: 7.7.7.10/24
9
10 interfaces: eth1
11
```

```
12  mgmt-http-port: 9080
13
14  mgmt-https-port: 9443
15
16  }
```

Setting the management IP address of the Citrix ADC BLX appliance for the first time

The management IP address of a Citrix ADC BLX appliance is the IP address at which you access the appliance for management purposes. The management IP address of the Citrix ADC BLX appliance is also called the Citrix ADC IP (NSIP) address.

A Citrix ADC BLX appliance can have only one Citrix ADC IP (NSIP) address. Also, you must add a default route for the configured Citrix ADC IP subnet so that the Citrix ADC IP becomes reachable from other networks on the LAN.

For setting the management IP address of the Citrix ADC BLX appliance for the first time, you set the related parameters in the Citrix ADC BLX configuration file (blx.conf).

To set the management IP address and the default route for the first time:

1. Open the Citrix ADC BLX configuration file (blx.conf) present in the Linux host. The complete path of the Citrix ADC BLX configuration file is:

```
/etc/blx/blx.conf
```

2. Uncomment the following parameter and set the management IP address:

```
## ipaddress:
```

3. Uncomment the following parameter and set the default route in the static route section:

```
## default
```

Sample config:

In the following sample excerpt of a `blx.conf` file, management IP address and default route are set:

```
1  .
2  .
3
4  ipaddress: 203.0.113.10
5  .
6  .
7  default 203.0.113.1
8  .
```

Starting the Citrix ADC BLX appliance

Start the Citrix ADC BLX appliance by running the following command:

```
systemctl start blx
```

The Citrix ADC BLX appliance is now in **Up** state.

Check the status of Citrix ADC BLX appliance again:

```
systemctl status blx
```

After successfully installing and starting a Citrix ADC BLX appliance, you can configure ADC features on the BLX appliance by using one of the following methods:

- Citrix ADC CLI
- Citrix ADC GUI
- Citrix NITRO REST APIs

For more information on using these methods, see [Configure a Citrix ADC BLX appliance](#).

For more information on Citrix ADC features, see [Citrix ADC Documentation](#).

Notes:

- You can check the processes running on the Linux host by running the following grep command:

```
ps aux | grep ns
```

- Ensure to check that the `nspe` process is running:

```
root 68332 2.7 5.5 485264 442084 ? Ss 16:25 0:02 /usr/sbin/nspe 1
```

- To stop the Citrix ADC BLX appliance, use the following command, which stops all the associated Citrix ADC BLX processes:

```
systemctl stop blx
```

- To uninstall the Citrix ADC BLX appliance from the Linux host, use the following command:

- Run the following command on a Red Hat enterprise Linux (RHEL) host:

```
yum remove blx
```

- Run the following command on a Debian based Linux host to uninstall the Citrix ADC BLX appliance but retain the BLX configuration file:

```
apt remove blx
```

- Run the following command on a Debian based Linux host to uninstall the Citrix ADC BLX appliance and also remove the BLX configuration file:

```
apt purge blx
```

On running the `apt purge blx` command, the Linux host might display some warning messages that some Citrix ADC BLX related system files were not removed even when all these files were removed.

Deploy a Citrix ADC BLX appliance with DPDK support

February 20, 2021

Citrix ADC BLX appliances support Data Plane Development Kit (DPDK), which is a set of Linux libraries and network interface controllers for better network performance. A Citrix ADC BLX appliance with DPDK support works only in dedicated network mode. Deploying a Citrix ADC BLX appliance with DPDK support on a Linux host consists of the following steps:

- Download, install, and compile DPDK libraries on the Linux host
- Configure DPDK on the Linux host
- Configure the Citrix ADC BLX appliance for DPDK support
- Setting the management IP address of the Citrix ADC BLX appliance for the first time
- Starting the Citrix ADC BLX appliance

Download, install, and compile DPDK libraries on the Linux host

DPDK libraries are hosted on the official DPDK website. Installation of the DPDK libraries on the Linux host consists of extracting the DPDK package, setting DPDK environment variables, and compiling the DPDK libraries.

To download the supported DPDK libraries on the Linux host:

1. Access the official [DPDK Downloads](#) page.
2. Download the following supported DPDK package version to the Linux host:

[DPDK 17.11.6 \(LTS\)](#)

After downloading the DPDK libraries, extract the DPDK package on the Linux host, set the `RTE_SDK` DPDK environment variable, and then compile the DPDK libraries:

```
export RTE_SDK=<path to the extracted DPDK installation directory on the Linux host>
```

For more information on installing and compiling DPDK on a Linux device, see the official DPDK documentation at [Official DPDK Documentation](#).

Configure DPDK on the Linux host

After installing DPDK libraries, you must configure DPDK on the Linux host. Configuring DPDK includes the following tasks:

- Insert the DPDK IGB UIO kernel module
- Bind Linux host NIC ports, to be used for the Citrix ADC BLX appliance, to the DPDK IGB UIO module.
- Set up [hugepages](#) for DPDK

Use the DPDK setup script (`dpdk-setup.sh`), located in the DPDK `usertools` subdirectory, to perform these tasks.

Note

The following DPDK related procedures are added for your convenience. For more information on configuring DPDK on a Linux system, see the official DPDK documentation at [Official DPDK Documentation](#).

Insert the DPDK IGB UIO kernel module

To insert the DPDK IGB UIO kernel module:

1. Run the `dpdk-setup.sh` script:

```
bash $RTE_SDK/usertools/dpdk-setup.sh
```

2. Type option **17** in the user prompt and press enter.

```
1  .
2  .
3  [17] Insert IGB UIO module
4  [18] Insert VFIO module
5  [19] Insert KNI module
6  [20] Setup hugepage mappings for non-NUMA systems
7  [21] Setup hugepage mappings for NUMA systems
8  [22] Display current Ethernet/Crypto device settings
9  [23] Bind Ethernet/Crypto device to IGB UIO module
10 [24] Bind Ethernet/Crypto device to VFIO module
11 [25] Setup VFIO permissions
12  .
13  .
14  ... ..
15  [34] Exit Script
16
17 Option: 17
```

Bind Linux host NIC ports to DPDK IGB UIO module

To bind Linux host NIC ports to DPDK IGB UIO module:

1. Run the dpdk-setup.sh script:

```
./$RTE_SDK/usertoos/dpdk-setup.sh
```

2. Type option **23** in the user prompt and press enter.

```

1  .
2  .
3  [17] Insert IGB UIO module
4  [18] Insert VFIO module
5  [19] Insert KNI module
6  [20] Setup hugepage mappings for non-NUMA systems
7  [21] Setup hugepage mappings for NUMA systems
8  [22] Display current Ethernet/Crypto device settings
9  [23] Bind Ethernet/Crypto device to IGB UIO module
10 [24] Bind Ethernet/Crypto device to VFIO module
11 [25] Setup VFIO permissions
12  .
13  .
14  ... ..
15 [34] Exit Script
16
17 Option: 23

```

3. Type the PCI address of the Linux host port, which you want to bind to the DPDK IGB UIO kernel module, in the user prompt and press enter:

```

1 Network devices using DPDK-compatible driver
2 =====
3 0000:83:00.1 'I350 Gigabit Fiber Network Connection 1522' drv=
   igb_uio unused=igb
4
5 Network devices using kernel driver
6 =====
7 0000:01:00.0 'Ethernet Controller 10-Gigabit X540-AT2 1528' if=
   eno1 drv=ixgbe unused=igb_uio *Active*
8 0000:01:00.1 'Ethernet Controller 10-Gigabit X540-AT2 1528' if=
   eno2 drv=ixgbe unused=igb_uio
9 0000:83:00.0 'I350 Gigabit Fiber Network Connection 1522' if=
   enp131s0f0 drv=igb unused=igb_uio

```



```

10 0000:02:00.0 'Ethernet Controller XL710 for 40GbE QSFP+ 1584' drv=
    i40e unused=igb_uio. << add
11 0000:83:00.2 'I350 Gigabit Fiber Network Connection 1522' if=
    enp131s0f2 drv=igb unused=igb_uio
12 0000:83:00.3 'I350 Gigabit Fiber Network Connection 1522' if=
    enp131s0f3 drv=igb unused=igb_uio
13 0000:84:00.0 'I350 Gigabit Fiber Network Connection 1522' if=
    enp132s0f0 drv=igb unused=igb_uio
14 0000:84:00.1 'I350 Gigabit Fiber Network Connection 1522' if=
    enp132s0f1 drv=igb unused=igb_uio
15 ... ..
16 Mempool devices using kernel driver
17 =====
18 <none>
19
20 Other Mempool devices
21 =====
22 <none>
23
24
25 Enter PCI address of device to bind to IGB UIO driver:
    0000:02:00.0

```

- Repeat the above steps to bind another Linux host network port to DPDK IGB UIO module.

Set up hugepages for DPDK

To set up hugepages for DPDK:

- Run the `dpdk-setup.sh` script:


```
./$RTE_SDK/usertoos/dpdk-setup.sh
```
- Type option **20** or **21**, based on the Linux host memory architecture, in the user prompt and press enter.

```

1 .
2 .
3 [17] Insert IGB UIO module
4 [18] Insert VFIO module
5 [19] Insert KNI module
6 [20] Setup hugepage mappings for non-NUMA systems.
7 [21] Setup hugepage mappings for NUMA systems
8 [22] Display current Ethernet/Crypto device settings

```

```

 9 [23] Bind Ethernet/Crypto device to IGB UIO module
10 [24] Bind Ethernet/Crypto device to VFIO module
11 [25] Setup VFIO permissions
12 .
13 .
14 ... ..
15 [34] Exit Script
16
17 Option: 21

```

3. Type the number of **hugepages**, to be reserved for DPDK, in the user prompt and press enter:

```

 1 Removing currently reserved hugepages
 2 Unmounting /mnt/huge and removing directory
 3
 4 Input the number of 2048kB hugepages
 5 Example: to have 128MB of hugepages available in a 2MB huge page
   system,
 6 enter '64' to reserve 64 * 2MB pages
 7
 8 Number of pages: 1024
 9
10 Reserving hugepages
11 Creating /mnt/huge and mounting as hugetlbfs

```

Configure the Citrix ADC BLX appliance for DPDK support

To configure the Citrix ADC BLX appliance for DPDK support, you must set the following parameter in the Citrix ADC BLX configuration file (blx.conf).

- **DPDK config.** This parameter enables Citrix ADC BLX appliance to start in DPDK mode for better performance. Also, this parameter specifies the number of packet engines to be used by the Citrix ADC BLX appliance with DPDK support. The default value is set to 8 (0xff). Maximum number of packet engines supported by Citrix ADC BLX appliance with DPDK support is 16.

Note

After setting the `DPDK config` parameter and starting the Citrix ADC BLX appliance, the DPDK bound Linux NIC ports are automatically added as part of the BLX appliance.

To configure the Citrix ADC BLX appliance for DPDK support:

1. Open the Citrix ADC BLX configuration file (blx.conf) present in the Linux host. The complete path of the Citrix ADC BLX configuration file is:

```
/etc/blx/blx.conf
```

2. Uncomment the following line, containing the `dppk-config` parameter, in the Citrix ADC BLX configuration file (`blx.conf`) by removing the `#` (hash symbol) at the start of the line:

```
## dppk-config: -c 0xff
```

Sample config

In the following sample excerpt of a `blx.conf` file, `dppk-config` parameter setting is enabled.

```
1 .
2 .
3 # dppk EAL core mask parameter. Applicable only when blx-dppk is
   installed.
4
5 dppk-config: -c 0xff
6 .
7 .
```

Setting the management IP address of the Citrix ADC BLX appliance for the first time

The management IP address of a Citrix ADC BLX appliance is the IP address at which you access the appliance for management purposes. The management IP address of the Citrix ADC BLX appliance is also called the Citrix ADC IP (NSIP) address.

A Citrix ADC BLX appliance can have only one Citrix ADC IP (NSIP) address. Also, you must add a default route for the configured Citrix ADC IP subnet so that the Citrix ADC IP becomes reachable from other networks on the LAN.

For setting the management IP address of the Citrix ADC BLX appliance for the first time, you must set the related parameters in Citrix ADC BLX configuration file (`blx.conf`).

To set the management IP address and the default route for the first time:

1. Open the Citrix ADC BLX configuration file (`blx.conf`) present in the Linux host. The complete path of the Citrix ADC BLX configuration file is:

```
/etc/blx/blx.conf
```

2. Uncomment the following parameter and set the management IP address:

```
## ipaddress:
```

3. Uncomment the following parameter and set the default route in the static route section:

```
## default
```

Sample config:

In the following sample excerpt of a `blx.conf` file, management IP address and default route are set:

```
1 .
2 .
3 .
4 ipaddress: 203.0.113.10
5 .
6 .
7 default 203.0.113.1
8 .
9 .
```

Starting the Citrix ADC BLX appliance with DPDK support

Start the Citrix ADC BLX appliance by running the following command:

```
systemctl start blx
```

The Citrix ADC BLX appliance is now in **Up** state.

Check the status of Citrix ADC BLX appliance again:

```
systemctl status blx
```

After successfully installing and starting a Citrix ADC BLX appliance, you can configure Citrix ADC features on the appliance by using one of the following methods:

- Citrix ADC CLI
- Citrix ADC GUI
- Citrix NITRO REST APIs

For more information on using these methods, see [Configure a Citrix ADC BLX appliance](#).

For more information on Citrix ADC features, see [Citrix ADC Documentation](#).

Mellanox NIC for BLX with DPDK support

September 29, 2020

A Citrix ADC BLX appliance deployed in DPDK mode supports Mellanox NICs with MLX5 DPDK driver. Configuring Mellanox NICs for a Citrix ADC BLX appliance with DPDK support consists of the following steps:

- Download and install Mellanox OpenFabrics Enterprise Distribution on the Linux host
- Configure the Citrix ADC BLX appliance for DPDK bound Mellanox NICs

Before you Begin

Before you start configuring the Mellanox NICs for a Citrix ADC BLX appliance with DPDK support, make sure that:

- DPDK is configured on the Linux host as well on the Citrix ADC BLX appliance. For more information, see:
 - [Download, install, and compile DPDK libraries on the Linux host](#)
 - [Configure DPDK on the Linux host](#)
 - [Configure the Citrix ADC BLX appliance for DPDK support](#)
 - [Setting the management IP address of the Citrix ADC BLX appliance for the first time](#)
 - [Starting the Citrix ADC BLX appliance with DPDK support](#)
- You have read [Limitations of Mellanox NICs in Citrix ADC BLX appliance with DPDK support](#).

Download and install Mellanox OpenFabrics Enterprise Distribution on the Linux host

Mellanox OFED (MLNX_OFED) is a Mellanox tested and packaged version of OpenFabrics Enterprise Distribution (OFED). Mellanox OFED is used for running the Mellanox NICs on a Linux host. Download the Mellanox OFED package from the official Mellanox website to the Linux host. Then, install the Mellanox OFED DPDK libraries and kernel modules on the Linux host.

To download Mellanox OFED package on the Linux host:

1. Access the official Mellanox OFED page at [Mellanox OpenFabrics Enterprise Distribution for Linux \(MLNX OFED\)](#).
2. Download the appropriate Mellanox OFED package to the Linux host and then install the package. For more information on downloading and installing the Mellanox OFED package, see the **official Mellanox OFED for Linux documentation**.

To install the Mellanox OFED DPDK libraries on the Linux host:

Run the following command in the Linux host CLI:

```
1 ./mlnxofedinstall --upstream-libs - dpdk
```

Configure the Citrix ADC BLX appliance for DPDK bound Mellanox NICs

For adding the DPDK bound Mellanox NICs to the Citrix ADC BLX appliance, you must add the `dpdk-non-uis-intf` parameter in the Citrix ADC BLX configuration file (`blx.conf`). Then, you set the `dpdk-non-uis-intf` parameter with the name of the DPDK bound Mellanox NICs.

To configure the Citrix ADC BLX appliance for Mellanox NICs DPDK support:

1. Open the Citrix ADC BLX configuration file (`blx.conf`) present in the Linux host at:

```
1 /etc/blx/blx.conf
```

2. In the `blx-system-config` section of the `blx.conf` file, add the `dpdk-non-uis-intf` parameter. Then, specify the names of the DPDK bound Mellanox NICs (as shown on the Linux CLI), which you want to add to the Citrix ADC BLX appliance. Specify the names of the NICs separated by commas.

```
1 dpdk-non-uis-intf: <Mellanox NIC name>, <Mellanox NIC name>, ...
```

Example:

```
1 dpdk-non-uis-intf: ens1f1, ens1f2
```

Note:

`dpdk-non-uis-intf` is not present by default in the `blx.conf` file.

Access a Citrix ADC BLX appliance and configure ADC features

September 29, 2020

You can access a Citrix ADC BLX appliance and configure ADC features by using one of the following methods:

- Citrix ADC CLI
- Citrix ADC GUI
- Citrix NITRO REST APIs

For information about Citrix ADC features, see [Citrix ADC Documentation](#).

Access a Citrix ADC BLX appliance and configure ADC features by using the Citrix ADC CLI

A Citrix ADC BLX appliance has a command line interface (CLI) where you can run ADC CLI commands to configure ADC features on the appliance.

You can remotely access the CLI of a Citrix ADC BLX appliance by connecting through the secure shell (SSH) from a workstation.

The following table lists the IP address and port on which the Citrix ADC CLI is available through SSH:

Citrix ADC BLX deployment mode	IP address and port to access Citrix ADC CLI through SSH
Shared	<Linux host IP address>:9022
Dedicated	<Citrix ADC IP address (NSIP)>:22

To access a Citrix ADC BLX appliance by using the Citrix ADC CLI:

1. On your workstation, start an SSH client.
2. Specify the IP address and port on which the CLI of the BLX appliance is available, and then connect to the CLI.
3. Log on to the BLX appliance by using your BLX login credentials.

IMPORTANT:

- On your first logon with default admin (`nsroot`) password, the BLX appliance prompts you to change the password for security reasons. After changing the password, you must save the configuration. If the configuration is not saved and the appliance restarts, you must log on with the default password. Change the password again at the prompt and save the configuration.
- Strong password enforcement is enabled by default in a Citrix ADC BLX appliance for all local system users. The default minimum length for a strong password is 4 characters. A strong password must contain at least one lower case character, one upper case character, one numeric character, and one special character from the set (`!, @, ##, (,), $, %, ^, &, *`). Make sure that the password for each system user of a Citrix ADC BLX appliance matches the strong password criteria. Otherwise, users with weak passwords cannot access the appliance. For more information on the strong password criteria, see:
 - [How to enforce password complexity on a Citrix ADC appliance](#)
 - [Citrix ADC command reference](#)

For more information about Citrix ADC CLI commands, see the [Citrix ADC Command Reference Guide](#).

Access a Citrix ADC BLX appliance and configure ADC features by using the Citrix ADC GUI

The Citrix ADC GUI includes a configuration utility and a dashboard utility.

The following list shows the management IP address of the BLX appliance deployed in dedicated and shared mode:

- BLX in dedicated mode: Citrix ADC IP address (NSIP)
- BLX in shared mode: Linux host IP address

The following table lists the default IP address and port on which the Citrix ADC GUI is available:

Citrix ADC BLX deployment mode	Access type	IP address and port to access Citrix ADC GUI
Shared	HTTP	<Linux host IP address>:9080
Shared	HTTPS	<Linux host IP address>:9443
Dedicated	HTTP	<Citrix ADC IP address (NSIP)>:9080
Dedicated	HTTPS	<Citrix ADC IP address (NSIP)>:9443

You can modify these default port numbers to access the GUI in the BLX configuration file (blx.conf) file. You must restart the BLX appliance after you modify the blx.conf file.

The Citrix ADC GUI prompts you for BLX login credentials. Once you log on to the Citrix ADC GUI, you can configure the Citrix ADC BLX appliance through the configuration utility.

IMPORTANT:

- On your first logon with default admin (`nsroot`) password, the BLX appliance prompts you to change the password for security reasons. After changing the password, you must save the configuration. If the configuration is not saved and the appliance restarts, you must log on with the default password. Change the password again at the prompt and save the configuration.
- Strong password enforcement is enabled by default in a Citrix ADC BLX appliance for all local system users. The default minimum length for a strong password is 4 characters. A strong password must contain at least one lower case character, one upper case character, one numeric character, and one special character from the set (`!, @, ##, (,), $, %, ^, &, *`).

Make sure that the password for each system user of a Citrix ADC BLX appliance matches the strong password criteria. Otherwise, users with weak passwords cannot access the appliance. For more information on the strong password criteria, see:

- [How to enforce password complexity on a Citrix ADC appliance](#)
- [Citrix ADC command reference](#)

To access a Citrix ADC BLX appliance in shared mode by using the Citrix ADC GUI:

1. Open a web browser.
2. Use one of the following access methods:
 - For HTTP access, type the following in the URL field: <Linux host IP address>:9080
 - For HTTPS access, type the following in the URL field: <Linux host IP address>:9443
3. On the login page, enter your BLX login credentials, and click Login.

To access a Citrix ADC BLX appliance in dedicated mode by using the Citrix ADC GUI:

1. Open a web browser.
2. Use one of the following access methods:
 - For HTTP access, type the following in the URL field: <Citrix ADC IP address (NSIP)>:9080
 - For HTTPS access, type the following in the URL field: <Citrix ADC IP address (NSIP)>:9443
3. On the login page, enter your BLX login credentials, and click Login.

Configure a Citrix ADC BLX appliance and configure ADC features by using the NITRO APIs

You can use the Citrix ADC NITRO API to configure a Citrix ADC BLX appliance. NITRO exposes its functionality through Representational State Transfer (REST) interfaces. Therefore, NITRO applications can be developed in any programming language. Also, for applications that must be developed in Java or .NET or Python, NITRO APIs are exposed through relevant libraries that are packaged as separate Software Development Kits (SDKs).

Similar to the Citrix ADC GUI, the NITRO API requests must be sent to port 9080 (HTTP) or 9443 (HTTPS) of the Citrix ADC BLX management IP address.

To configure a Citrix ADC BLX appliance in shared mode by using the NITRO API, in a web browser, type:

`http://<Linux host IP address>:9080/nitro/v1/config/<resource-type>`

`https://<Linux host IP address>:9443/nitro/v1/config/<resource-type>`

To retrieve statistics of a Citrix ADC BLX appliance in shared mode by using the NITRO API, in a web browser, type:

`http://<Linux host IP address>:9080/nitro/v1/stats/<resource-type>`

`https://<Linux host IP address>:9443/nitro/v1/stats/<resource-type>`

To configure a Citrix ADC BLX appliance in dedicated mode by using the NITRO API, in a web browser, type:

`http://<Citrix ADC IP address (NSIP)>:9080/nitro/v1/config/<resource-type>`

`https://<Citrix ADC IP address (NSIP)>:9443/nitro/v1/config/<resource-type>`

To retrieve statistics of a Citrix ADC BLX appliance in dedicated mode by using the NITRO API, in a web browser, type:

`http://<Citrix ADC IP address (NSIP)>:9080/nitro/v1/stats/<resource-type>`

`https://<Citrix ADC IP address (NSIP)>:9443/nitro/v1/stats/<resource-type>`

For more information about using the Citrix ADC NITRO API, see [Citrix ADC NITRO APIs](#).

Limitations and usage guidelines

November 17, 2020

The following are the limitations and some usage guidelines related to Citrix ADC BLX appliances.

- The following are the limitations related to LA/LACP channels:
 - LA/LACP channels are not supported for shared mode NIC interfaces.
 - LA/LACP channels are supported only between dedicated NIC interfaces or only between DPDK NIC interfaces.
 - LA/LACP channels are not supported for blx1 and ns1 virtual interfaces.
- High availability is supported for Citrix ADC BLX appliances only in dedicated mode.
- High availability for ADC BLX appliances is not supported if the `nsinternal` user login is disabled.
- Web application firewall (WAF) is supported only for ADC BLX in dedicated mode.
- In a Citrix ADC BLX appliance deployed in dedicated mode, management HTTP or HTTPS port (`mgmt-http-port` or `mgmt-https-port`) settings specified in the BLX configuration file do not apply. By default, 9080 and 9443 port numbers are dedicated for HTTP and HTTPS management access.

To change these ports for ADC BLX appliances in dedicated mode, you must use the Citrix ADC command:

```
set ns param (-mgmthttpport <value> | -mgmthttpsport <value>).
```

Example:

```
set ns param -mgmthttpport 2080”
```

- If firewall is enabled on the Linux host, then you might have to add exceptions for the Citrix ADC BLX management ports in addition to the SYSLOG ports.
- A stable start for a Citrix ADC BLX appliance might take around 45 seconds.
- Citrix ADC BLX configurations are stored in the `/nsconfig/ns.conf` file. For configurations to be available across sessions, you must save the configuration after every configuration change.

To view the running configuration by using the Citrix ADC BLX CLI

At the Citrix ADC BLX CLI prompt, type:

```
show ns runningConfig
```

To save configurations by using the Citrix ADC BLX CLI

At the command prompt, type:

```
save ns config
```

- The Citrix ADC BLX configurations in `/nsconfig/ns.conf` take precedence over `/etc/blx/blx.conf` file.
- A Citrix ADC BLX appliance does not start if the memory allocated is less than 1 GB per ADC BLX worker-processes.
- The following system settings are changed on installing a Citrix ADC BLX appliance in Linux environment: `ip_forward` is set to 1.
- After a Citrix ADC BLX appliance is uninstalled, BLX configuration file `blx.conf` is retained and backed up as `blx.conf.rpmsave`.

To apply this backup configuration file to a newly installed Citrix ADC BLX appliance on the same Linux host, you must manually rename the file back to `blx.conf`

Limitations specific to a Citrix ADC BLX appliance with DPDK support

- A Citrix ADC BLX appliance with DPDK support might fail to start on Linux hosts running on some older CPU models.

Examples:

- Intel(R) Xeon(R) CPU E5-2690 v4 @ 2.60 GHz

- Intel(R) Xeon(R) CPU E5504 @ 2.00 GHz
- The Linux host might crash if you unbind NICs bound to the DPDK module when the Citrix ADC BLX appliance is running.
- A Citrix ADC BLX appliance with DPDK support takes a little more time to restart as compared to a Citrix ADC BLX appliance without DPDK support.
- DPDK configurations (DPDK IGB UIO insertion, DPDK bound ports, and huge pages) on the Linux host are lost whenever the host is restarted. Because of this reason, the Citrix ADC BLX appliance will fail to start after the Linux host is restarted. You must reconfigure DPDK for the Citrix ADC BLX appliance on the Linux host every time the host is restarted.

For more information on configuring DPDK on the Linux host, see [Configure DPDK on the Linux host](#).

- All DPDK bound Linux NIC ports are automatically dedicated for the Citrix ADC BLX appliance and cannot be used for other DPDK Linux applications.

Limitations of Mellanox NICs in a Citrix ADC BLX appliance with DPDK support

- A Citrix ADC BLX appliance supports only one type of DPDK NICs at a time. For example, either all Mellanox NICs or all Intel NICs.
- A Citrix ADC BLX appliance supports only the MLX5 DPDK driver for Mellanox NICs.
- For more information about the MLX5 DPDK driver and its limitations, see the official [MLX5 DPDK documentation](#).
- For more information about Mellanox NICs and its limitations, see the official [Mellanox documentation](#).

FAQs

October 19, 2020

What is Citrix ADC BLX?

It is a bare metal software version of Citrix ADC that runs on Linux host as a set of processes.

Why is there a need for a bare metal version of Citrix ADC?

Citrix BLX appliances provide simplicity with no virtual machine overhead for better performance. Also, you can run a Citrix ADC BLX appliance on your preferred server hardware.

What is the difference between Citrix BLX, CPX and VPX appliances?

They are all software versions of Citrix ADC but Citrix ADC VPX is a virtual appliance and must run on a hypervisor installed on the server.

Citrix ADC CPX is a containerized version of Citrix ADC, which must reside in a container. Citrix ADC BLX is a lightweight software package that runs natively on Linux systems.

When to use each?

Citrix ADC VPX, CPX, and BLX represent the most comprehensive, software-centric ADC lineup in the industry for supporting transition to hybrid multi-cloud. The following table gives guidance on the differences and use cases.

Product	Use Cases	Characteristics
Citrix ADC VPX (over hypervisor)	Virtualization of hardware infrastructure, consolidation of workloads over common infrastructure	hardware and OS agnostic, full isolation, and support for multitenancy
Citrix ADC CPX (with container)	DevOps, micro-services, automated staging, testing, and deployment, East-West traffic	Lightweight, small footprint, API gateway functions, micro-service centric, authentication
Citrix ADC BLX (on bare metal servers)	High traffic load, mission critical applications, latency sensitive workload, North-South traffic	Lightweight software package and no VM overhead

What does the absence of a hypervisor or container mean?

With no hypervisor translation layer or container, the Citrix ADC BLX software has more control of the underlying hardware and therefore performance is better. It also means that there are no additional costs for hypervisor software.

Can I run a Citrix ADC BLX appliance on any server hardware?

Yes, there is no hardware compatibility list (HCL) as the hardware does not matter.

How can I install Citrix ADC BLX appliance on a Linux server?

Citrix ADC BLX is distributed as an `.rpm` file format (Red Hat Package Manager) and `.deb` (Debian based). These two formats are used in many Linux distributions and have become a de facto standard in the industry.

Can I automate the Citrix ADC BLX software deployment?

Yes. Any software deployment tool in the data center that support `.rpm` or `.deb` can deploy Citrix ADC BLX appliance. Also, Citrix Application Delivery Manager (ADM) can deploy Citrix ADC BLX appliances.

If Citrix ADC BLX is installed on a server with Linux OS, can I install other things on the same server?

Yes. Other process can be run alongside Citrix ADC BLX.

How is Citrix ADC BLX Packaged?

Citrix ADC BLX comes in the regular Citrix ADC editions: Standard, Advanced, and Premium

How can you buy a Citrix ADC BLX appliance?

Citrix ADC BLX is an entitlement to Pooled Capacity and vCPU subscription pricing. In vCPU subscription, the license is applied to the software based on the number of CPUs the Citrix ADC BLX is using. In Pooled Capacity, each Citrix ADC BLX deployed consumes an instance in addition to the relevant processing capacity.

Can a Citrix license currently being used for a Citrix ADC VPX appliance be used for a Citrix ADC BLX appliance?

Yes, a Citrix pooled license can be used for a Citrix ADC BLX appliance as well.

Can a Citrix ADC BLX appliance be deployed in one-arm and two-arm modes at the same time?

Yes.

Does a Citrix ADC BLX appliance use its own network stack or use the network stack of the Linux host?

A Citrix ADC BLX appliance in dedicated mode uses its own network stack. In shared mode, the Citrix ADC BLX appliance uses the network stack of the Linux host.

Do Citrix ADC BLX appliances support high availability?

High availability is supported for Citrix ADC BLX appliances only if they are deployed in dedicated mode.

Can you set up a high availability pair between a Citrix ADC BLX appliance in shared mode and a Citrix ADC BLX appliance in dedicated mode?

No.

Can you set up high availability pair between a Citrix ADC BLX appliance and a Citrix ADC VPX or CPX appliance?

No.

Can a Citrix ADC BLX appliance run on a virtualized Linux virtual machine?

Yes, a Citrix ADC BLX appliance in non-DPDK mode can be run on a virtualized Linux virtual machine.

Is a Citrix ADC BLX appliance supported on non-x86 Linux platforms?

No, a Citrix ADC BLX appliance is supported only on x86_64 (64-bit) Linux platforms.

What is the management IP address of a Citrix ADC BLX appliance?

The following list shows the management IP address of the Citrix ADC BLX appliance deployed in dedicated or shared mode:

- Citrix ADC BLX appliance in dedicated mode: Citrix ADC IP address (NSIP)
- Citrix ADC BLX in shared mode: Linux host IP address

The management IP address (NSIP) of a Citrix ADC BLX appliance in dedicated mode was changed in the BLX configuration file (blx.conf) but the Citrix ADC BLX appliance still has the old management IP address?

The management IP address of a Citrix ADC BLX appliance in dedicated mode is always the IP address (`ipaddress` parameter) set in BLX configuration file (`blx.conf`) unless configured using one of the following ways:

- **Citrix ADC BLX CLI:** Run the `set ns config` command in the Citrix ADC BLX CLI, and change the management IP address. The configuration changes made are saved in the Citrix ADC BLX saved configuration file (`/nsconfig/ns.conf`).
- **Citrix ADC BLX GUI:** On the Configuration utility screen of the Citrix ADC BLX GUI, click the gear icon on the top-right corner, click the **NSIP address** pane, and change the management IP address.

The configuration changes made are saved in the Citrix ADC BLX saved configuration file (`/nsconfig/ns.conf`).

The changes in the `ns.conf` file always take precedence over the `blx.conf` file.

Troubleshooting Tips

November 17, 2020

Running the `systemctl start blx` command does not start the Citrix ADC BLX appliance?

- Look for any logs related to BLX configuration file (`/etc/blx/blx.conf`) parsing error in the Citrix ADC BLX boot log file (`/var/log/blx-boot.log`).
- Look for crash related logs or any error logs in the SYSLOG file (`/var/log/messages`).

The Citrix ADC BLX appliance does not display any DPDK NIC ports?

Verify that Linux host NIC ports, to be used by the Citrix ADC BLX appliance, are bound to DPDK. For more information on binding NIC ports to DPDK, see [Configure DPDK on the Linux host](#).

The Citrix ADC BLX appliance is always starting in the non-DPDK mode?

- Verify that DPDK environment is set up properly.
- Verify that `libnsdpdk-orig.so` file is present at the following location: `/usr/lib64/blx`.
- Verify that the line `dpsdk-config` is uncommented in the BLX configuration file (`/etc/blx/blx.conf`).

**Locations**

Corporate Headquarters | 851 Cypress Creek Road Fort Lauderdale, FL 33309, United States
Silicon Valley | 4988 Great America Parkway Santa Clara, CA 95054, United States

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