

# Release Notes

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## Juniper Networks® vMX Virtual Router Release Notes

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### SUPPORTED ON

- vMX Virtual Router

### SOFTWARE HIGHLIGHTS

- Juniper Agile Licensing introduces the new License Manager application that enables more efficient licensing at scale (vMX, vBNG).
- MANDATORY: New license keys are required for vMX and vBNG when running Junos 19.2R1 or later.
- IPFIX flow-cache support
- 40G ports on NIC support

# Juniper Networks<sup>®</sup> vMX Virtual Router Release Notes Release Notes

**Release 19.2R1**  
14, July 2020

These release notes accompany the Junos OS Release 19.2R1 of the Juniper Networks<sup>®</sup> virtual MX Series router (vMX). They describe new and changed features, limitations, and known problems in the software.

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# Introduction

The vMX Virtual Router (vMX) is an MX Series router optimized to run on x86 servers. vMX is supported on Red Hat Enterprise Linux, CentOS, and Ubuntu.

**NOTE:** See [“System Requirements” on page 5](#) for details on each supported environment.

vMX enables you to leverage Junos OS Release 19.2R1 to provide a quick and flexible deployment. vMX provides the following benefits:

- Optimizes carrier-grade routing for the x86 environment
- Simplifies operations as the management and configuration are the same as for MX Series routers
- Introduces new services without requiring a reconfiguration of the current infrastructure

This release of vMX supports most of the features available on Juniper Networks MX Series routers.

## New and Changed Features

- **Juniper Agile Licensing (vMX and vBNG)** - Starting in Junos OS Release 19.2R1, Juniper Agile Licensing introduces a new capability that significantly improves the ease of license management across the network. The Junos OS Release 19.2R1 also introduces support for Agile License Manager specifically for vMX and vBNG instances.
  - **Juniper Agile Licensing**— Juniper Agile Licensing is a solution to manage licenses for all your Juniper devices. Agile Licensing provides simplified and centralized license administration and deployment.
  - **Juniper Agile Licensing Portal**— The Juniper Agile Licensing Portal enables you to install and manage licenses for hardware and software features. For more information about Agile Licensing keys and capabilities, see [Juniper Agile Licensing portal FAQ](#).
  - **Juniper Agile License Manager**—The Juniper Agile License Manager is a software application that runs on your network and provides an on-premise repository of licenses that are dynamically consumed by Juniper Networks devices and applications as required. Integration with Juniper's Entitlement Management System and Portal provides a natural extension of the existing user experience that enables you to manage all your licenses.
  - **License Key Exchange** — To use the licenses for vMX and vBNG features in Junos OS Release 19.2R1, you need new license keys. Previous license keys are supported for previous Junos OS releases, but for Junos OS Release 19.2R1 and later releases, you need to migrate existing licenses (one-time activity).

Contact [Customer Care](#) to exchange previous licenses. Note that you can choose either to use individual license keys for each device or to deploy Juniper Agile License Manager for more efficient management of licenses.

It is not mandatory to install the Agile License Manager to use vMX or vBNG licenses on Junos OS Release 19.2R1 and later releases. The Agile License Manager is a new option that provides more efficient management of licenses. You can continue to use individual license keys for each device if required.

Existing license keys are not supported on Junos OS Release 19.2R1 and later releases. Contact [Customer Care](#) for exchanging previous license keys.

[See [Juniper Agile Licensing Guide](#) for more details on how to obtain, install, and use the Agile License Manager.]

- **IPFIX flow-cache support (vMX Instances)**—Starting with Junos OS Release 19.2R1, the flow cache infrastructure support is extended to IPFIX to provide improved throughput with IPFIX service enabled. In earlier releases, without flow-cache support for IPFIX, all data traffic would take microcode path which is a lot slower than flow cache. With this feature, the unsampled traffic gets forwarded using flow-cache which results in better throughput.
- **40G ports on NIC support (vMX Instances)**—Starting in Junos OS Release 19.2R1, support for 40G ports with Intel XL710-QDA2 NICs are available for vMX instances. As part of this feature, support for multiple speed ports in same vMX instance is available. vMX instance consumes CPU resource for all ports based on highest speed port.  
[See [Example: Enabling SR-IOV on vMX Instances on KVM.](#)]
- **RHEL 7.6 version support (vMX Instances)**—Starting with Junos OS Release 19.2R1, Red Hat Enterprise Linux 7.6 version with RedHat OpenStack 10 is supported. Support RHEL 7.6 version with script install is not available.

## Known Behavior

There are no known behaviors and limitations in this release.

## Known Issues

This section lists the known issues in this release.

- After you delete the chassis license bandwidth configuration in the Agile licensing mode using the following command:

```
user@host# delete chassis license bandwidth
```

you must restart the vMX instance.

[PR1433157](#)

## Resolved Issues

This section lists the issues fixed in this release.

- On VMX instances deployed in subscriber scenario, RIOT core might be observed on VMX instances. The respective FPC might reboot after generating RIOT core. All the traffic or service related to that FPC are impacted. [PR1393660](#)
- On vMX instances, continuous disk error logs requesting for switchover due to disk failure on ada1 are seen on vCP console. [PR1421977](#)
- On vMX instances, FPC crashes during continuous traffic flow. [PR1416405](#)

## Licensing

Starting in Junos OS Release 19.2R1, Juniper Agile Licensing introduces a new capability that significantly improves the ease of license management network wide. The Juniper Agile License Manager is a software application that runs on your network and provides an on-premise repository of licenses that are dynamically consumed by Juniper Networks devices and applications as required. Integration with Juniper's Entitlement Management System and Portal provides an intuitive extension of the existing user experience that enables you to manage all your licenses

- The Agile License Manager is a new option that provides more efficient management of licenses, but you can continue to use individual license keys for each device if required.
- To use vMX or vBNG features licenses in Junos OS Release 19.2R1 version, you need new license keys. Previous license keys will continue to be supported for previous Junos OS releases, but for the Junos OS 19.2R1 release and later you need to carry out a one-time migration of existing licenses. Contact [Customer Care](#) to exchange previous licenses. Note that you can choose to use individual license keys for each device, or to deploy Agile License Manager for more efficient management of licenses.
- For more information about Agile Licensing keys and capabilities, see [Juniper Agile Licensing portal FAQ](#).

See [Juniper Agile Licensing Guide](#) for more details on how to obtain, install and use the License Manager.

# Upgrade Instructions

You cannot upgrade Junos OS for the vMX router from earlier releases using the **request system software add** command.

You must deploy a new vMX instance using the downloaded software package.

Remember to prepare for upgrades with new license keys and/or deploying Agile License Manager.

# System Requirements

## IN THIS SECTION

- [Minimum Hardware and Software Requirements for KVM | 5](#)
- [Minimum Hardware and Software Requirements for VMware | 9](#)

These topics provide system requirements for each supported environment.

## Minimum Hardware and Software Requirements for KVM

[Table 1 on page 6](#) lists the hardware requirements for KVM.

Table 1: Minimum Hardware Requirements for KVM

Description	Value
<p>Required CPUs and NICs</p>	<p>For lab simulation and low performance (less than 100 Mbps) use cases, any x86 processor (Intel or AMD) with VT-d capability.</p> <p>For all other use cases, Intel Ivy Bridge processors or later are required. Example of Ivy Bridge processor: Intel Xeon E5-2667 v2 @ 3.30 GHz 25 MB Cache</p> <p>To use single root I/O virtualization (SR-IOV) NIC type on vMX, the following NICs are required and no other NICs are supported with SR-IOV.</p> <ul style="list-style-type: none"> <li>● Intel X520 or X540 using 10G ports and ixgbe driver</li> <li>● Intel X710 or XL710 using 10G ports and i40e driver</li> <li>● Intel XL710-QDA2 NIC using 40G ports and i40e driver. XL710-QDA2 is only supported with i40e driver version 2.7.11 with firmware version 6.01 0x80003484 1.1747.0 or later on Ubuntu 16.04 or RHEL 7.5 When using 40G ports on the vMX instances, quality-of-service (QoS) is not supported.</li> </ul>
<p>Number of cores</p> <p><b>NOTE:</b> Performance mode is the default mode and the minimum value is based on one port.</p>	<p>For lite mode with lab simulation use case applications: Minimum of 4</p> <ul style="list-style-type: none"> <li>● 1 for VCP</li> <li>● 3 for VFP</li> </ul> <p><b>NOTE:</b> If you want to use lite mode when you are running more than 3 vCPUs for the VFP, you must explicitly configure lite mode.</p> <hr/> <p>For performance mode with low-bandwidth (virtio) or high-bandwidth (SR-IOV) applications: Minimum of 9</p> <ul style="list-style-type: none"> <li>● 1 for VCP</li> <li>● 8 for VFP</li> </ul> <p>The exact number of vCPUs needed differs depending on the Junos OS features that are configured and other factors, such as average packet size. You can contact Juniper Networks Technical Assistance Center (JTAC) for validation of your configuration and make sure to test the full configuration under load before use in production. For typical configurations, we recommend the following formula to calculate the minimum vCPUs needed by the VFP.</p> <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>● Without CoS—<math>(4 * \text{number-of-ports}) + 4</math></li> <li>● With CoS—<math>(5 * \text{number-of-ports}) + 4</math></li> </ul> <p><b>NOTE:</b> All VFP vCPUs must be in the same physical non-uniform memory access (NUMA) node for optimal performance. In addition to vCPUs for the VFP, we recommend 2 x vCPUs for VCP and 2 x vCPUs for Host OS on any server running the vMX.</p>

Table 1: Minimum Hardware Requirements for KVM (*continued*)

Description	Value
Memory	For lite mode: Minimum of 3 GB
<b>NOTE:</b> Performance mode is the default mode.	<ul style="list-style-type: none"> <li>• 1 GB for VCP</li> <li>• 2 GB for VFP</li> </ul> For performance mode: <ul style="list-style-type: none"> <li>• Minimum of 5 GB               <ul style="list-style-type: none"> <li>1 GB for VCP</li> <li>4 GB for VFP</li> </ul> </li> <li>• Recommended for 16 GB               <ul style="list-style-type: none"> <li>4 GB for VCP</li> <li>12 GB for VFP</li> </ul> </li> </ul> Additional 2 GB recommended for host OS
Storage	Local or NAS  Each vMX instance requires 30 GB of disk storage.
Other requirements	Intel VT-d capability  Hyperthreading (recommended)  AES-NI

[Table 2 on page 7](#) lists the software requirements for Ubuntu.

Table 2: Software Requirements for Ubuntu

Description	Value
Operating system	Ubuntu 14.04  Ubuntu 16.04.5 LTS (recommended host OS) Linux 4.4.0-generic
Virtualization	QEMU-KVM 2.0.0+dfsg-2ubuntu1.11
Required packages	bridge-utils qemu-kvm libvirt-bin python python-netifaces vnc4server libyaml-dev python-yaml numactl libparted0-dev libpciaccess-dev libnuma-dev libyajl-dev libxml2-dev libglib2.0-dev libnl-dev python-pip python-dev libxml2-dev libxslt-dev  <b>NOTE:</b> libvirt 1.3.1

[Table 3 on page 8](#) lists the software requirements for Red Hat Enterprise Linux.

**Table 3: Software Requirements for Red Hat Enterprise Linux**

Description	Value
Operating system	Red Hat OpenStack Platform 10  Red Hat Enterprise Linux 7.6  <b>NOTE:</b> Running the script to install for RHEL 7.5 does not support OpenStack, and Openstack installation with RHEL 7.6 does not support using scripts for installation.
Virtualization	QEMU-KVM 1.5.3
Required packages  <b>NOTE:</b> SR-IOV requires these packages: kernel-devel gcc	python27-python-pip python27-python-devel numactl-libs libpciaccess-devel parted-devel yajl-devel libxml2-devel glib2-devel libnl-devel libxslt-devel libyaml-devel numactl-devel redhat-lsb kmod-ixgbe libvirt-daemon-kvm numactl telnet net-tools  <b>NOTE:</b> libvirt 1.2.17 or later

[Table 4 on page 8](#) lists the software requirements for CentOS.

**Table 4: Software Requirements for CentOS**

Description	Value
Operating system	CentOS 7.2 Linux 3.10.0-327.22.2
Virtualization	QEMU-KVM 1.5.3
Required packages	python27-python-pip python27-python-devel numactl-libs libpciaccess-devel parted-devel yajl-devel libxml2-devel glib2-devel libnl-devel libxslt-devel libyaml-devel numactl-devel redhat-lsb kmod-ixgbe libvirt-daemon-kvm numactl telnet net-tools  <b>NOTE:</b> libvirt 1.2.19  To avoid any conflicts, install libvirt 1.2.19 instead of updating from libvirt 1.2.17.

## Minimum Hardware and Software Requirements for VMware

Table 5 on page 9 lists the hardware requirements for VMware.

Table 5: Minimum Hardware Requirements for VMware

Description	Value
Number of cores  <b>NOTE:</b> Performance mode is the default mode and the minimum value is based on one port.	<p>For performance mode with low-bandwidth (virtio) or high-bandwidth (SR-IOV) applications: Minimum of 9</p> <ul style="list-style-type: none"> <li>• 1 for VCP</li> <li>• 8 for VFP</li> </ul> <p>The exact number of vCPUs needed differs depending on the Junos OS features that are configured and other factors, such as average packet size. You can contact Juniper Networks Technical Assistance Center (JTAC) for validation of your configuration and make sure to test the full configuration under load before use in production. For typical configurations, we recommend the following formula to calculate the minimum vCPUs needed by the VFP.</p> <p><b>NOTE:</b> To calculate the optimal number of vCPUs needed by VFP for performance mode:</p> <ul style="list-style-type: none"> <li>• Without CoS—<math>(4 * \text{number-of-ports}) + 4</math></li> <li>• With CoS—<math>(5 * \text{number-of-ports}) + 4</math></li> </ul> <p><b>NOTE:</b> All VFP vCPUs must be in the same physical non-uniform memory access (NUMA) node for optimal performance. In addition to vCPUs for the VFP, we recommend 2 x vCPUs for VCP and 2 x vCPUs for Host OS on any server running the vMX.</p> <hr/> <p>For lite mode: Minimum of 4</p> <ul style="list-style-type: none"> <li>• 1 for VCP</li> <li>• 3 for VFP</li> </ul> <p><b>NOTE:</b> If you want to use lite mode when you are running with more than 3 vCPUs for the VFP, you must explicitly configure lite mode.</p>

Table 5: Minimum Hardware Requirements for VMware (continued)

Description	Value
Memory	<p>For performance mode:</p> <ul style="list-style-type: none"> <li>• Minimum of 5 GB <ul style="list-style-type: none"> <li>1 GB for VCP</li> <li>4 GB for VFP</li> </ul> </li> <li>• Recommended for 16 GB <ul style="list-style-type: none"> <li>4 GB for VCP</li> <li>12 GB for VFP</li> </ul> </li> </ul> <p>For lite mode: Minimum of 3 GB</p> <ul style="list-style-type: none"> <li>• 1 GB for VCP</li> <li>• 2 GB for VFP</li> </ul>
Storage	<p>Local or NAS</p> <p>Each vMX instance requires 30 GB of disk storage.</p>
vNICs	<ul style="list-style-type: none"> <li>• SR-IOV</li> <li>• VMXNET3</li> </ul>

Table 6 on page 10 lists the software requirements.

Table 6: Software Requirements for VMware

Description	Value
Hypervisor	<p>VMware ESXi 5.5 (Update 2), 6.0, or 6.5</p> <p><b>NOTE:</b> Due to a DPDK version change in Junos OS Release 18.1R1 or later, ESXi 6.5 is the minimum version required to run the vMX router if you are operating in high-bandwidth mode (performance mode). If you are operating the vMX router in low-bandwidth(lite) mode, you can use ESXi 6.0 or ESXi 5.5.</p>
Management Client	vSphere 5.5 or vCenter Server

# Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or Partner Support Service support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

## Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <https://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://entitlementsearch.juniper.net/entitlementsearch/>

## Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <https://support.juniper.net/support/requesting-support/>.

## Revision History

14, July 2020—Revision 3, Junos OS Release 19.2R1—vMX

20, April 2020—Revision 2, Junos OS Release 19.2R1—vMX

25, June 2019—Revision 1, Junos OS Release 19.2R1—vMX

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