



Junosphere

Design Guide

Release

2.6



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Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

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Documentation and Release Notes

For disclosure information on Junosphere Connector, refer to the files located at <http://www.juniper.net/support/products/junosphereconnector>.

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Documentation Conventions

Table 1 on page ix defines notice icons used in this guide.

Table 1: Notice Icons


Icon	Meaning	Description
	Informational note	Indicates important features or instructions.

Table 2 on page x defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces important new terms. Identifies book names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS System Basics Configuration Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; interface names; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Enclose optional keywords or variables.	stub <default-metric <i>metric</i> >;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (<i>string1</i> <i>string2</i> <i>string3</i>)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Enclose a variable for which you can substitute one or more values.	community name members [<i>community-ids</i>]
Indentation and braces ({ })	Identify a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to techpubs-comments@juniper.net, or fill out the documentation feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>. If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

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 JNASC 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 <http://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: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>

- Join and participate in the Juniper Networks Community Forum:
<http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/> .
- 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 <http://www.juniper.net/support/requesting-support.html> .

To open a case with JTAC for Junosphere, you must provide the bank serial number. To find the serial number, double-click the bank icon in Junosphere.

PART 1

Designing Your Junosphere Environment

- [Designing Your Junosphere Environment on page 3](#)

CHAPTER 1

Designing Your Junosphere Environment

- [Planning Your Junosphere Environment on page 3](#)
- [Planning Your Capacity on page 8](#)
- [Buying Capacity on page 9](#)

Planning Your Junosphere Environment

Junosphere is a virtualization environment where multiple virtual machines representing network devices can be connected and configured to create network topologies.



NOTE: To obtain the best benefit from this guide, we recommend you first read the *Junosphere Guide for Bank Administrators* to familiarize yourself with the Junosphere system.

As a Bank Administrator, you plan and configure your Junosphere environment to meet the needs of your application. While each customer has unique needs, this guide provides you with typical design recommendations based on common application cases.

You have a number of choices to set up your environment to best meet the needs of your users. The parameters include division of virtual machine days (capacity) into sandbox pools, assignment of users to those pools, and topologies for those users. As you and your users continue working with Junosphere, you will discover new applications, combine some of these recommendations, and develop your own practices to fit your needs.

This guide provides recommendations for typical Junosphere applications such as individual utilization, preparation of training classes, and network design and planning, as well as operation, maintenance, and troubleshooting.

The following are most common use cases for your Junosphere environment.

- Case A: Individual Account—Learning or Analysis

One application case for this type of environment is to practice using network elements to conduct exercises in preparation for a certification test.

- Case B: Repeat Use of Topologies—Shared Topology

In this case, you want to use a specific set of topologies repeatedly and allow a pool of users to access the same virtual network concurrently.

One application would be in a training facility to demonstrate the operation principles of Junos OS-based networks. The students have access to one set of predefined training exercises using a single sandbox for the whole class.

A second example would be to conduct cyclical testing of a specific topology where multiple users need access to the same set of results and information.

- Case C: Repeat Use of Topologies—Individual Topologies

Similar to the previous case, you use a specific set of topologies consistently, but you need to enable users to build these topologies in independent virtual clouds to work with them.

For example, when an instructor delivers a hands-on networking class to advanced students who are learning how to build networks, the students need a virtual environment where they can work on network exercises independently of each other.

Another example is to reproduce one topology on multiple virtual networks to test simultaneously the outcome of different conditions.

- Case D: Use and Creation of Multiple Topologies—Project Based

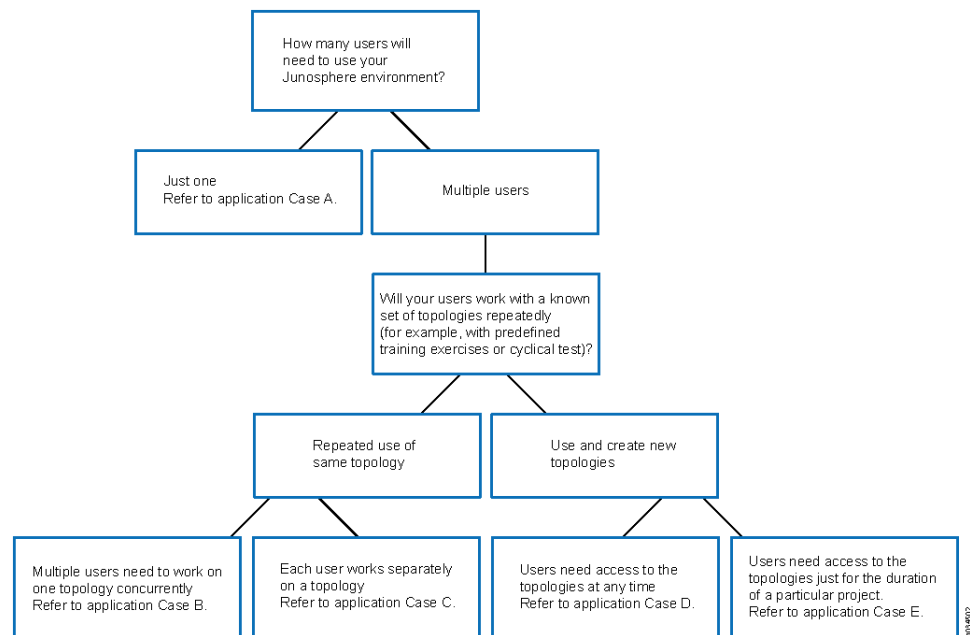
In this case, you are typically planning for new implementations or network expansions. You need to define the architecture of your project, predict its proper operation, or model the implementation. In this application, you might also want to verify the interaction of new network segments or elements with your existing network.

- Case E: Anytime Network—Priority Availability

In this case, your users operate, maintain, or troubleshoot network conditions and need access to Junosphere at any time to reproduce and resolve network needs as they arise. In this case, you need to deliver capacity to your users on a continuous basis and manage such capacity for a diverse population of users.

Follow the tree diagram in [Figure 1 on page 5](#) to determine which use case best fits your needs.

Figure 1: Determining Your Junosphere Environment



Based on your recommended application case from [Figure 1 on page 5](#), refer to [Table 3 on page 7](#) to find recommended practices on:

- How to define your users, administrators, and permissions.
- How many sandboxes should be required and how the capacity should be distributed.
- What types of topologies your users might require and how to manage your reservations.

The following are the recommendations contained in [Table 3 on page 7](#):

- **Typical Number of Bank Administrators to Users**—The ratio of bank administrators to users that you should maintain.
- **Number of Sandboxes**—Sandboxes are pools of capacity (virtual machine days) and the users assigned to them.
- **Capacity Assignment**—How to assign a bank's capacity (virtual machine days) to the sandboxes in the environment.
- **Number of Users**—The number of users to create. You do not have to add a user for a bank administrator as they are also users.
- **Sandbox Assignment**—How to assign users to sandboxes: as a group to one sandbox, as individual users of a sandbox, or to multiple sandboxes.
- **Permissions**—Privileges assigned to users:
 - **Topology Management**—Allows you to start or stop topologies.
 - **Library Management**—Allows you to create new libraries.
 - **Reservation Management**—Allows you to reserve time and capacity.

- Topology Recommendation—What topology library you should use for your topologies
- Reservation Practices—When you should make a reservation to use a sandbox. You reserve a time to assure virtual machine day resource availability on the virtual network.
- Connector—Enables your virtual network to communicate with a physical network.

[Table 3 on page 7](#) lists the most common use cases and the bank administrator design considerations.

Table 3: Junosphere Use Cases

	Case A Individual Account Learning or Analysis	Case B Repeat Use of Topologies Shared Topology	Case C Repeat Use of Topologies Individual Topologies	Case D Multiple Topologies Project Based	Case E Anytime Network Priority Availability
Typical Number of Bank Administrators to Users	One, you are both the bank administrator and a user.	Instructor is the bank administrator. One bank administrator to n students.	Instructor is the bank administrator. One bank administrator to n students.	At least two bank administrators.	At least two bank administrators.
Sandboxes and Capacity Considerations					
Number of Sandboxes	Create one sandbox for yourself.	Create one sandbox per class.	Create one sandbox per student.	Create one sandbox per project.	Create one or two sandboxes, such as small and medium.
Capacity Assignment	Assign 100 percent of the virtual machine days capacity in the bank to your sandbox.	Assign virtual machine days to each class sandbox to cover class topology needs.	Split capacity into n student sandboxes.	Fill up the number of virtual machine days per project.	Size sandbox to typical need: small, medium, or large per number of virtual machine days.
User					
Number of Users	You do not need to create users. Bank administrators are users.	Create one user per student. Use generic usernames such as "student1."	Create one user per student. Use generic usernames such as "student1."	Create unique usernames for each member of the project team.	Total population - one account per user.
Sandbox Assignment	No need to assign users to a sandbox. A sandbox assignment is automatically assigned to the bank administrator.	Assign students to their class sandbox.	Assign one student per sandbox.	Assign all project team members to their project sandbox.	Assign all users to all sandboxes.
Permissions	The bank administrator automatically has all permissions.	Do not give users any permissions.	Give each user Topology (start/stop), Library, and Reservation.	Give each user Topology (start/stop), Library, and Reservation.	Give each user Topology (start/stop), and Library.
Topology Recommendation	You can use the public topologies, and optionally upload others to the Sandbox Library.	The instructor should load the class topology into the Sandbox Library.	Instructor - load topology into the Bank Library.	Load your topology into the Sandbox Library.	Load your topology into the Sandbox Library.

	Case A Individual Account Learning or Analysis	Case B Repeat Use of Topologies Shared Topology	Case C Repeat Use of Topologies Individual Topologies	Case D Multiple Topologies Project Based	Case E Anytime Network Priority Availability
Reservation Practices	Make a reservation when you are ready.	Make reservation one day before class.	Each student makes a reservation.	Make reservations when team is ready.	Bank administrator schedules <i>n</i> virtual machines total time every day. Bulk reservation.
Connector	Typically not required.	Typically not required.	Optional, depending on test case to connect to a physical lab or device	Optional, depending on test case to connect to a physical lab or device	Typically not required.

Related Documentation • [Planning Your Capacity on page 8](#)

Planning Your Capacity

Capacity is the virtual machine workdays. Capacity is purchased for a bank and divided among sandboxes. Calculate the capacity needed for each sandbox and total the capacities to get the bank capacity.

Calculate the virtual machines needed for each sandbox by adding the following:

___ Number of VJX1000 (router) virtual machines

___ Junos Space virtual machine

___ BGP service image

___ CentOS host virtual machines

___ Cariden MATE virtual machine

___ Mu Studio and Test Engine virtual machine

___ Packet Design Virtual Route Explorer virtual machine

___ Virtual Spirent TestCenter virtual machine

=

___ Total virtual machines (nodes) for one day

x Number of days

=

___ Total capacity to run a topology for the required number of days

**Related
Documentation**

- [Planning Your Junosphere Environment on page 3](#)

Buying Capacity

There are two ways to replenish your capacity: online using a credit card and by contacting your Juniper Networks representative.

To buy capacity online:

1. Click the **Click to Buy Now** link on the login page or go to the [Learning Portal](#) and click **Junosphere** under the Resources section.

A page appears that lists the types of capacity that you can buy:

- **Classroom**—Enables you to create virtual networking labs that provide students with full hands-on access to Juniper's state-of-the-art commercial networking technology, without the expense of building or maintaining your own physical lab.
- **Lab**—Provides a virtual environment where you can create and run elements and networks running the Junos operating system. You can use these networks to design your network; test new features, protocols or topologies; train new employees; and many more tasks.
- **Developer**—Enables developers to test their applications against Junos OS nodes in a virtual environment. Junosphere includes a topology file, and one optional configuration file for each Junos OS device described in the topology file, and optional information files that contain diagrams or generic instructions for using the topologies (these files can be PDFs, PPTs, TXTs or any other file type).



NOTE: Currently, capacity for Developers is not available via the learning portal. Work with your Junosphere sales representative to place an order.

- **Connector**—Runs as a virtual machine that connects a virtual network to a physical network. The Connector utilizes Virtual Distributed Ethernet (VDE) switches to connect to physical devices and creates a VDE switch on a server that is connected to the physical device, a VDE switch connected to the virtual machine, and bridges the two VDE switches across an SSH:tunnel.

2. Click the link for the type of capacity you want to buy.

The page for that capacity appears, listing the purchase information for that type of capacity.

3. Click the **Purchase** button.

[Table 4 on page 10](#) lists the different types of environments that you can purchase.

Table 4: SKUs

SKU	Description
JUS-CLASS-10VM-1	10 Classroom VM units. Includes images and tools.
JUS-CLASS-10VM-30	300 Classroom VM units. Includes images and tools.
JUS-CONNECT-1	Connect and transfer data at the rate of 1 Mbs to the virtual network topology for 1 day .
JUS-CONNECT-30	Connect and transfer data at the rate of 1 Mbs to the virtual network topology for 30 days.
JUS-DEV-10VM-1	10 Developer VM units. Includes images and tools. Memory up to 30 GB per day.
JUS-DEV-10VM-30	30 Developer VM units. Includes images and tools. Memory up to 30 GB per day.
JUS-LAB-10VM-1	10 LAB VM units. Includes images and tools.
JUS-LAB-10VM-30	300 LAB VM units. Includes images and tools.



NOTE: Virtual machine capacity expires one year after the date of purchase. Thirty (30) days before the expiration date, Junosphere sends an e-mail to the bank administrator with a reminder of the expiration date and providing instructions and a link for reordering capacity. This e-mail may go to spam/junk e-mail folders or it may go to a quarantine server.

Spam/junk e-mail folder—Outlook users can fix this problem by going to their spam/junk e-mail folder, selecting the e-mail, selecting Actions → Junk E-mail → Add Sender to Safe Senders List. This automatically adds junosphereadmin-noreply@juniper.net to the Safe Senders tab of the Junk E-mail Options dialog box. Your Outlook Administrator may have an alternative way of preventing these e-mails from going to your span/junk e-mail folder. Users of other email applications should work with their e-mail administrators to fix this issue.

Quarantine server—If it is determined that the Junosphere e-mails are being quarantined, work with your IT department to make sure that the e-mails are routed to your e-mail application.



NOTE: Every time you add capacity to a bank, the expiry date of the bank changes to one year from the date and time of the latest assignment of capacity to the bank.

PART 2

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