JUNIPER NETWORKS

Load Balancing

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Documentation and Release Notes

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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.

Supported Platforms

For the features described in this document, the following platforms are supported:

- MX Series

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   system {
     scripts {
       commit {
         file ex-script.xsl;
       }
     }
   }
   interfaces {
     fxp0 {
       disable;
       unit 0 {
         family inet {
           address 10.0.0.1/24;
         }
       }
     }
   }
   ```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

   ```
   [edit]
   user@host# load merge /var/tmp/ex-script.conf
   load complete
   ```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   commit {
     file ex-script-snippet.xsl; }
   ```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see the CLI User Guide.

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.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.

Table 2 on page ix 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`

Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
Italic text like this	• Introduces or emphasizes important new terms. • Identifies book names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS System Basics Configuration Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	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** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• 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** ***metric*****>;**
| (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** **(*string1* | *string2* | *string3*)**
# (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 [** ***community-ids*** **]**

Indention and braces ({ })	Identify a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

Documentation Feedback

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- 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.

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- 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.

PART 1

Overview

CHAPTER 1

Aggregated Multiservices (AMS)

Adaptive Services Overview

MultiServices PICs and MultiServices Dense Port Concentrators (MS-DPCs) provide *adaptive services interfaces*, which allow you to coordinate multiple services on a single PIC by configuring a set of services and applications. MultiServices PICs and MS-DPCs offer a special range of services you configure in one or more service sets.

The MultiServices PIC is available in three versions, the MultiServices 100, the MultiServices 400, and the MultiServices 500, which differ in memory size and performance. All versions offer enhanced performance in comparison with AS PICs. MultiServices PICs are supported on M Series and T Series routers except M20 routers.

The MultiServices DPC is available for MX Series routers; it includes a subset of the functionality supported on the MultiServices PIC. Currently the MultiServices DPC supports the following Layer 3 services: stateful firewall, NAT, IDS, IPsec, active flow monitoring, RPM, and generic routing encapsulation (GRE) tunnels (including GRE key and fragmentation); it also supports graceful Routing Engine switchover (GRES) and Dynamic Applicaton Awareness for Junos OS. For more information about supported packages, see Enabling Service Packages.

It is also possible to group several Multiservices PICs into an aggregated Multiservices (AMS) system. An AMS configuration eliminates the need for separate routers within a system. The primary benefit of having an AMS configuration is the ability to support load balancing of traffic across multiple services PICs. Starting with Junos OS 11.4, all MX Series routers will support high availability (HA) and Network Address Translation (NAT) on AMS infrastructure. See "Configuring Load Balancing on AMS Infrastructure" on page 7 for more information.

NOTE: **The MultiServices PICs are polling based and not interrupt based; as a result, a high value in the show chassis pic "Interrupt load average" field may not mean that the PIC has reached its maximum limit of processing.**

The following services are configured within a service set and are available only on adaptive services interfaces:

- Stateful firewall—A type of firewall filter that considers state information derived from previous communications and other applications when evaluating traffic.
- Network Address Translation (NAT)—A security procedure for concealing host addresses on a private network behind a pool of public addresses.
- Intrusion detection service (IDS)—A set of tools for detecting, redirecting, and preventing certain kinds of network attack and intrusion.
- IP Security (IPsec)—A set of tools for configuring manual or dynamic security associations (SAs) for encryption of data traffic.
- Class of service (CoS)—A subset of CoS functionality for services interfaces, limited to DiffServ code point (DSCP) marking and forwarding-class assignment. CoS BA classification is not supported on services interfaces.

The configuration for these services comprises a series of rules that you can arrange in order of precedence as a *rule set*. Each rule follows the structure of a firewall filter, with a **from** statement containing input or match conditions and a **then** statement containing actions to be taken if the match conditions are met.

The following services are also configured on the MultiServices PICs and MS-DPCs, but do not use the rule set definition:

- Layer 2 Tunneling Protocol (L2TP)—A tool for setting up secure tunnels using Point-to-Point Protocol (PPP) encapsulation across Layer 2 networks.
- Link Services Intelligent Queuing (LSQ)—Interfaces that support Junos OS class-of-service (CoS) components, link fragmentation and interleaving (LFI) (FRF.12), Multilink Frame Relay (MLFR) user-to-network interface (UNI) network-to-network interface (NNI) (FRF.16), and Multilink PPP (MLPPP).
- Voice services—A feature that uses the Compressed Real-Time Transport Protocol (CRTP) to enable voice over IP traffic to use low-speed links more effectively.

In addition, Junos OS includes the following tools for configuring services:

- Application protocols definition—Allows you to configure properties of application protocols that are subject to processing by router services, and group the application definitions into application sets.
- Service-set definition—Allows you to configure combinations of directional rules and default settings that control the behavior of each service in the service set.

NOTE: Logging of adaptive services interfaces messages to an external server by means of the fxp0 port is not supported on M Series routers. The architecture does not support system logging traffic out of a management interface. Instead, access to an external server is supported on a Packet Forwarding Engine interface.

PART 2

Configuration

CHAPTER 2

Configuration Tasks

Configuring Load Balancing on AMS Infrastructure

Configuring load balancing requires an aggregated Multiservices (AMS) system. AMS involves grouping several Multiservices PICs together. An AMS configuration eliminates the need for separate routers within a system. The primary benefit of having an AMS configuration is the ability to support load balancing of traffic across multiple services PICs. Starting with Junos OS 11.4, high availability (HA) is supported on AMS infrastructure on all MX Series 3D Universal Edge routers. AMS has several benefits:

- Support for configuring behavior if a Multiservices PIC that is part of the AMS configuration fails
- Support for specifying hash keys for each service set in either direction
- Support for adding routes to individual PICs within the AMS system

Configuring AMS Infrastructure

AMS supports load balancing across multiple service sets. All ingress or egress traffic for a service set can be load balanced across different services PICs. To enable load balancing, you have to configure an aggregate interface with existing services interfaces.

To configure failure behavior in AMS, include the **member-failure-options** statement:

```
[edit interfaces ams1]
load-balancing-options {
   member-failure-options {
      drop-member-traffic {
         rejoin-timeout rejoin-timeout;
      }
      redistribute-all-traffic {
         enable-rejoin;
      }
   }
}
```

If a PIC fails, the traffic to the failed PIC can be configured to be redistributed by using the **redistribute-all-traffic** statement at the **[edit interfaces** *interface-name* **load-balancing-options member-failure-options]** hierarchy level. If the **drop-member-traffic**

statement is used, all traffic to the failed PIC is dropped. Both options are mutually exclusive.

NOTE: If **member-failure-options** is not explicitly configured, the default behavior is to drop member traffic with a rejoin timeout of 120 seconds.

Only **mams-** interfaces (services interfaces that are part of AMS) can be aggregated. After an AMS interface has been configured, the constituent **mams-** interfaces cannot be individually configured. A **mams-** interface cannot be used as an **rms** interface. AMS supports only IPv4; inet6 family is not supported. It is not possible to configure addresses on an AMS interface. Network Address Translation (NAT) is the only application that runs on AMS infrastructure at this time.

NOTE: Unit 0 on an AMS interface cannot be configured.

To support multiple applications and different types of translation, AMS infrastructure supports configuring hashing for each service set. The hash keys can be configured separately for ingress and egress. The default configuration uses source IP, destination IP, and the protocol for hashing; incoming-interface for ingress and outgoing-interface for egress are also available.

Configuring High Availability

In an AMS system configured with high availability, a designated Multiservices PIC acts as a backup for other active PICs that are part of the AMS system. Presently, only N:1 backup for high availability is supported; only one PIC is available as backup for all other active PICs. High availability for load balancing is configured by adding the **high-availability-options** statement at the **[edit interfaces *interface-name* load-balancing-options]** hierarchy level.

To configure high availability, include the **high-availability-options** statement:

```
[edit interfaces ams1]
load-balancing-options {
  high-availability-options {
    many-to-one {
      preferred-backup preferred-backup;
    }
  }
}
```

Load Balancing Network Address Translation Flows

Starting with Junos OS Release 11.4, Network Address Translation (NAT) has been programmed as a plug-in and is a function of load balancing and high availability. The plug-in runs on AMS infrastructure. All flows for translation are automatically distributed to different services PICs that are part of the AMS infrastructure. In case of failure of an active Multiservices PIC, the configured backup Multiservices PIC will take over the NAT

pool resources of the failed PIC. The hashing method selected depends on the type of NAT. Using NAT on AMS infrastructure has a few limitations:

- NAT flows to failed PICs cannot be restored.
- There is no support for IPv6 flows.
- Twice NAT is not supported for load balancing.

See "Example: Configuring Static Source Translation on AMS Infrastructure" on page 11 for more details on configuring NAT flows for load balancing.

CHAPTER 3

NAT on AMS Infrastructure Examples

Example: Configuring Static Source Translation on AMS Infrastructure

This example shows a static source translation configured on an AMS interface. The flows will be load balanced across member interfaces with this example.

Configure the AMS interface **ams0** with load balancing options.

```
[edit interfaces ams0]
load-balancing-options {
member-interface mams-5/0/0;
member-interface mams-5/1/0;
}
unit 1 {
    family inet;
}
unit 2 {
    family inet;
}
```

Configure hashing for the service set for both ingress and egress traffic.

```
[edit services service-set ss1]
interface-service {
    service-interface ams0.1;
    load-balancing-options {
        hash-keys {
            ingress-key destination-ip;
            egress-key source-ip;
        }
    }
}
```

NOTE: Hashing is determined based on whether the service set is applied on the ingress or egress interface.

Configure two NAT pools because you have configured two member interfaces for the AMS interface.

```
[edit services]
nat {
    pool p1 {
        address-range low 20.1.1.80 high 20.1.1.80;
    }
pool p2 {
        address 20.1.1.81/32;
    }
}
```

Configure the NAT rule and translation.

```
[edit services]
nat {
    rule r1 {
        match-direction input;
        term t1 {
            from {
                source-address {
                    20.1.1.2/32;
                }
            }
            then {
                translated {
                    source-pool p1;
                    translation-type {
                        basic-nat44;
                    }
                }
           }
        term t1 {
              from {
                  source-address {
                      40.1.1.2/32;
                  }
             }
             then {
                 translated {
                     source-pool p2;
                     translation-type {
                         basic-nat44;
                     }
                 }
            }
      }
 }
```

NOTE: A similar configuration can be applied for translation types dynamic-nat44 and napt-44. Twice NAT cannot run on AMS infrastructure at this time.

Related Documentation

- Configuring Load Balancing on AMS Infrastructure on page 7

CHAPTER 4

Configuration Statements

drop-member-traffic (Aggregated Multiservices)

Syntax

```
drop-member-traffic {
  rejoin-timeout rejoin-timeout;
}
```

Hierarchy Level [edit interfaces *interface-name* load-balancing-options member-failure-options]

Release Information Statement introduced in Junos OS Release 11.4.

Description Specify whether the broadband gateway should drop traffic to a Multiservices PIC when it fails.

For many-to-one (N:1) high availability (HA) for service applications like Network Address Translation (NAT), this configuration is valid only when two or more Multiservices PICs have failed.

The remaining statement is explained separately.

Default If this statement is not configured, then the default behavior is to drop member traffic with a rejoin timeout of 120 seconds.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- member-failure-options (Aggregated Multiservices) on page 21

enable-rejoin (aggregated Multiservices)

Syntax enable-rejoin;

Hierarchy Level [edit interfaces *interface-name* load-balancing-options member-failure-options redistribute-all-traffic]

Release Information Statement introduced in Junos OS Release 11.4.

Description Enable the failed member to rejoin the aggregated Multiservices (AMS) interface after the member comes back online.

For many-to-one (N:1) high availability (HA) for service applications like Network Address Translation (NAT), this configuration allows the failed members to rejoin the pool of active members automatically.

Default If you do not configure this option, then the failed members do not automatically rejoin the **ams** interface even after coming back online.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- redistribute-all-traffic (Aggregated Multiservices) on page 24

family (aggregated Multiservices)

Syntax family *family*;

Hierarchy Level [edit interfaces *interface-name* unit *interface-unit-number*]

Release Information Statement introduced in Junos OS Release 11.4.

Description Configure protocol family information for the logical interface.

Options ***family***—Protocol family. Currently, only one option, **inet** (IP version 4 suite), is supported.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- unit (Aggregated Multiservices) on page 25

high-availability-options (aggregated Multiservices)

Syntax

```
high-availability-options {
  many-to-one {
    preferred-backup preferred-backup;
  }
}
```

Hierarchy Level [edit interfaces *interface-name* load-balancing-options]

Release Information Statement introduced in Junos OS Release 11.4.

Description Configure the high availability options for the aggregated Multiservices (AMS) interface. For service applications, if only the load-balancing feature is being used, then this configuration is optional.

For many-to-one (N:1) high availability support for service applications like Network Address Translation (NAT), the preferred backup Multiservices PIC, in hot standby mode, backs up one or more (N) active Multiservices PICs.

NOTE: In both cases, if one of the active Multiservices PICs goes down, then the backup replaces it as the active Multiservices PIC. When the failed PIC comes back up, it becomes the new backup. This is called floating backup.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- load-balancing-options on page 19

interfaces (Aggregated Multiservices)

Syntax

```
interfaces interface-name {
  load-balancing-options {
    high-availability-options {
      many-to-one {
        preferred-backup preferred-backup;
      }
    }
    member-failure-options {
      drop-member-traffic {
        rejoin-timeout rejoin-timeout;
      }
      redistribute-all-traffic {
        enable-rejoin;
      }
    }
    member-interface interface-name;
  }
  unit interface-unit-number {
    family family;
  }
}
```

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 11.4.

Description Configure the aggregated Multiservices (AMS) interface. The AMS interface provides the infrastructure for load balancing and high availability (HA).

NOTE: The interfaces must be valid aggregated Multiservices interfaces (ams)—for example, ams0 or ams1, and so on. The ams infrastructure is supported only in chassis with Trio-based modules and Multiservices Dense Port Concentrators (MS-DPCs).

The remaining statements are explained separately.

Options **interface-name**—Name of the aggregated Multiservices interface (**ams**)—for example, **ams0** or **ams1**, and so on.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Load Balancing on AMS Infrastructure on page 7

load-balancing-options (Aggregated Multiservices)

Syntax

```
load-balancing-options {
  high-availability-options {
    many-to-one {
      preferred-backup preferred-backup;
    }
  }
  member-failure-options {
    drop-member-traffic {
      rejoin-timeout rejoin-timeout;
    }
    redistribute-all-traffic {
      enable-rejoin;
    }
  }
  member-interface interface-name;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 11.4.

Description Configure the high availability (HA) options for the aggregated Multiservices (AMS) interface.

Many-to-one (N:1) high availability mode for service applications like Network Address Translation (NAT) is supported. In this case, one Multiservices PIC is the backup (in hot standby mode) for one or more (N) active Multiservices PICs. If one of the active Multiservices PICs goes down, then the backup replaces it as the active Multiservices PIC. When the failed PIC comes back online, it becomes the new backup. This is called floating backup mode.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- interfaces on page 18

many-to-one (Aggregated Multiservices)

Syntax

```
many-to-one {
  preferred-backup preferred-backup;
}
```

Hierarchy Level [edit interfaces *interface-name* load-balancing-options high-availability-options]

Release Information Statement introduced in Junos OS Release 11.4.

Description Configure the initial preferred backup for the aggregated Multiservices (AMS) interface.

NOTE: The preferred backup must be one of the member interfaces (mams–) that have already been configured at the [edit interfaces *interface-name* load-balancing-options] hierarchy level. Even in the case of mobile control plane redundancy, which is one-to-one (1:1), the initial preferred backup is configured at this hierarchy level.

The remaining statements are explained separately.

Options

preferred-backup *preferred-backup*—Name of the preferred backup member interface. The member interface format is **mams-a/b/0**, where **a** is the Flexible PIC Concentrator (FPC) slot number and **b** is the PIC slot number.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- high-availability-options (aggregated Multiservices) on page 17

member-failure-options (Aggregated Multiservices)

Syntax

```
member-failure-options {
  drop-member-traffic {
    rejoin-timeout rejoin-timeout;
  }
  redistribute-all-traffic {
    enable-rejoin;
  }
}
```

Hierarchy Level [edit interfaces *interface-name* load-balancing-options]

Release Information Statement introduced in Junos OS Release 11.4.

Description Configure the possible behavior for the aggregated Multiservices (AMS) interface in case of failure of more than one active member.

NOTE: The **drop-member-traffic** configuration and the **redistribute-all-traffic** configuration are mutually exclusive.

Table 3 on page 21 displays the behavior of the member interface after the failure of the first Multiservices PIC. Table 4 on page 22 displays the behavior of the member interface after the failure of two Multiservices PICs.

NOTE: The AMS infrastructure has been designed to handle one failure automatically. However, in the unlikely event that more than one Multiservices PIC fails, the AMS infrastructure provides configuration options to minimize the impact on existing traffic flows.

Table 3: Behavior of Member Interface After One Multiservices PIC Fails

High Availability Mode	Member Interface Behavior
Many-to-one (N:1) high availability support for service applications	Automatically handled by the AMS infrastructure

Table 4: Behavior of Member Interface After Two Multiservices PICs Fail

High Availability Mode	Configuration	rejoin-timeout	Behavior when member rejoins before rejoin-timeout expires	Behavior when member rejoins after rejoin-timeout expires
Many-to-one (N:1) high availability support for service applications	**drop-member-traffic**	Configured	The existing traffic for the second failed member will *not* be redistributed to the other members. The first member to rejoin becomes an active member. The second member to rejoin becomes the backup. This behavior is handled automatically by the AMS infrastructure.	The existing traffic for the second failed member will *not* be redistributed to the other members. The first member will rejoin the AMS automatically. However, the other members who are rejoining will be moved to the discard state.
Many-to-one (N:1) high availability support for service applications	**redistribute-all-traffic**	Not applicable	Before rejoin, the traffic is redistributed to existing active members. After a failed member rejoins, the traffic is load-balanced afresh. This may impact existing traffic flows.	

The remaining statements are explained separately.

Default If **member-failure-options** are not configured, then the default behavior is to drop member traffic with a rejoin timeout of 120 seconds.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- load-balancing-options (Aggregated Multiservices) on page 19

member-interface (Aggregated Multiservices)

Syntax member-interface *interface-name*;

Hierarchy Level [edit interfaces *interface-name* load-balancing-options]

Release Information Statement introduced in Junos OS Release 11.4.

Description Specify the member interfaces for the aggregated Multiservices (AMS) interface. You can configure multiple interfaces by specifying each interface in a separate statement.

For high availability service applications like Network Address Translation (NAT) that support many-to-one (N:1) redundancy, you can specify two or more interfaces.

NOTE: **The member interfaces that you specify must be members of aggregated Multiservices interfaces (mams-).**

The remaining statements are explained separately.

Options *interface-name*—Name of the member interface. The member interface format is **mams-a/b/0**, where **a** is the Flexible PIC Concentrator (FPC) slot number and **b** is the PIC slot number.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- load-balancing-options (Aggregated Multiservices) on page 19

redistribute-all-traffic (Aggregated Multiservices)

Syntax

```
redistribute-all-traffic {
  enable-rejoin;
}
```

Hierarchy Level [edit interfaces *interface-name* load-balancing-options member-failure-options]

Release Information Statement introduced in Junos OS Release 11.4.

Description Enable the option to redistribute traffic of a failed active member to the other active members.

For many-to-one (N:1) high availability support for Network Address Translation (NAT), the traffic for the failed member is automatically redistributed to the other active members.

The remaining statement is explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- member-failure-options (Aggregated Multiservices) on page 21

rejoin-timeout (Aggregated Multiservices)

Syntax rejoin-timeout *rejoin-timeout*;

Hierarchy Level [edit interfaces *interface-name* load-balancing-options member-failure-options drop-member-traffic]

Release Information Statement introduced in Junos OS Release 11.4.

Description Configure the time by when a failed member should rejoin the aggregated Multiservices (AMS) interface automatically. If the failed member does not rejoin by the configured time, then the member is moved to the “inactive” state and the traffic meant for this member is dropped.

Default If you do not configure a value, the default value of 120 seconds is used.

Options ***rejoin-timeout***—Time, in seconds, by which a failed member must rejoin.

Default: 120 seconds

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- drop-member-traffic (Aggregated Multiservices) on page 15

unit (Aggregated Multiservices)

Syntax

```
unit interface-unit-number {
  family family;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 11.4.

Description Configure the logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

The remaining statements are explained separately.

Options ***interface-unit-number***—Number of the logical unit.

NOTE: Unit 0 is reserved and cannot be configured under the aggregated Multiservices interface (ams).

Range: 1 through 16,384

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- interfaces on page 18

PART 3

Administration

CHAPTER 5

Load Balancing Operational Mode Commands

show interfaces load-balancing

Syntax show interfaces load-balancing
<detail>

Release Information Command introduced in Junos OS Release 11.4.

Description Display status information about load balancing on aggregated Multiservices (AMS) interfaces.

Options **none**—Display standard information about status of all AMS interfaces.

detail—(Optional) Display detailed status of all AMS interfaces.

Required Privilege Level view

List of Sample Output show interfaces load-balancing on page 32
show interfaces load-balancing detail on page 32

Output Fields Table 5 on page 30 lists the output fields for the **show interfaces load-balancing** (aggregated Multiservices interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 5: Aggregated Multiservices show interfaces load-balancing Output Fields

Field Name	Field Description	Level of Output
Interface	Name of the aggregated Multiservices (AMS) interface.	All levels
State	Status of AMS interfaces: • **Up**—Interface is configured and operational. • **Coming Up**—Interface is becoming operational. • **Wait Timer**—Interface is waiting for member interfaces (mams) to come online. • **Members Seen**—Member interfaces (mams) are available. • **Wait for Members**—Member interfaces (mams) are not available.	All levels
Last change	Time elapsed since the last change to the interface.	All levels
Member count	Number of member PICs (mams) that are part of the aggregated interface.	All levels
Members Interface	List of all member PICs (mams) that are part of the aggregated interface.	**detail**
Weight	Weight associated with each member PIC for load balancing. The minimum weight is 1, maximum weight is 100; default weight is 10.	**detail**

Table 5: Aggregated Multiservices show interfaces load-balancing Output Fields *(continued)*

Field Name	Field Description	Level of Output
State	Status of each member PIC (mams) : • **Invalid**—Configured interface is not valid. • **Down**—Interface is not operational. • **Active**—Interface is configured and operational. • **Discard**—Interface has been discarded. • **Inactive**—Configured interface is not online. • **Backup**—Interface has been configured as backup.	**detail**

Sample Output

show interfaces load-balancing

```
user@host> show interfaces load-balancing
Interface  State           Last change  Member count
ams0       Up              1d 00:50     2
ams1       Up              00:00:59     2
```

show interfaces load-balancing detail

```
user@host>show interfaces load-balancing detail
Load-balancing interfaces detail
Interface         : ams0
  State           : Up
  Last change     : 1d 00:51
  Member count    : 2
  Members         :
      Interface    Weight   State
      mams-2/0/0    10        Active
      mams-2/1/0    10        Active
```

PART 4

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