

Chapter 3

Routing Policy Overview

All routing protocols store their routing information in a common routing table that is maintained by JUNOS software. From the collected routing information, the JUNOS software calculates the best routes to each destination. These routes are used to forward traffic through the router, and they can be advertised to neighbors via one or more routing protocols.

Routing policy allows you to control the routing information that is transferred between different routing databases. You can filter the routing information so that only some of it is transferred, and you can set properties associated with the routes.

This chapter discusses the following topics related to understanding and configuring routing policy:

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The JUNOS routing policy is quite versatile and liberal in what it allows you to configure. You can create a wide variety of policies and apply them when routes are moving between the routing protocols and the routing table. But versatility is a two-way street: the JUNOS routing policy also allows you to define nonsensical policies and to apply them so that they have unintended effects. Therefore, it is essential that you design and apply routing policies carefully.

Before designing routing policies, we recommend that you read through this entire section to become familiar with all the routing policy terminology, concepts, and configuration guidelines.


After you have designed routing policies, you should analyze them logically to ensure that they make sense. Before implementing policies, especially complex ones, you should test them to determine whether they will have the desired effect. To do this, use the test policy command.

Import and Export

Before discussing the design of routing policy, it is necessary to define two terms—*import* and *export*—which JUNOS routing policy uses to describe how routes move between the routing protocols and the routing tables (see Figure 2):

When a routing protocol places its routes into the routing table, this process is referred to as *importing* routes into the routing table. Applying routing policy to routes being imported to the routing table allows you to control the routes that the routing protocol process uses to determine active routes.

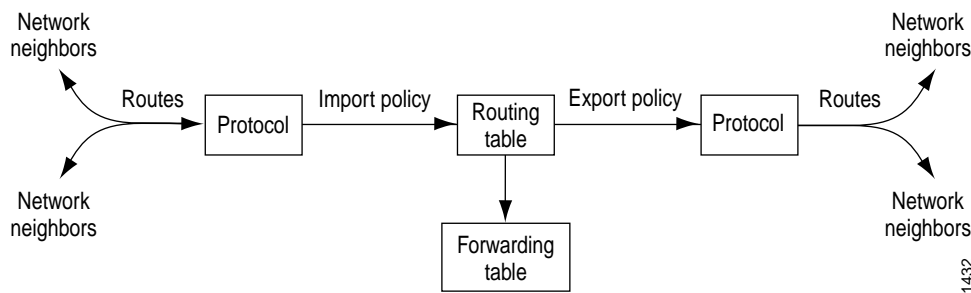
When a dynamic routing protocol uses the routes in the routing table to send a protocol advertisement, the protocol takes the route from the routing table, a process referred to as *exporting* routes from the routing table. Applying routing policy to routes being exported from the routing table allows you to control the routes that a protocol advertises to its neighbors.



Note

The process of moving routes between a routing protocol and the routing table always is described *from the point of view of the routing table*. That is, routes are *imported into* a routing table from a routing protocol and they are *exported from* a routing table to a routing protocol. It is important to remember this distinction when working with routing policy.

Figure 2: Importing and Exporting Routing Policies



When to Define Routing Policies

You define routing policies in the following circumstances:

You do not want a routing protocol to transfer all its routes into the routing table. If the routing table does not learn about certain routes, they can never be used to forward packets and they can never be redistributed into other routing protocols.

You do not want a routing protocol to advertise all the active routes learned by that protocol.

You want a routing protocol to receive active routes learned from another routing protocol. This is sometimes called *route redistribution*.

You want to set the information associated with a route, such as the preference value, AS path, or the BGP community.

You want to define BGP damping parameters.

You want to perform per-packet load balancing.

Routing Policy Components

A routing policy consists of policy terms. Each term consists of two components:

Match conditions—Circumstances that a route must match. If a route matches the conditions, an action is applied to that route. You can define various match conditions, including a route's source and destination; the interface on which the route was received; the OSPF path; the IS-IS level; the AS path; and various BGP path attributes, including community, local preference, and origin. You can also specify lists of routes.

Action—What to do if the route matches. The action can specify whether to accept or reject the route, it can control how a series of policies is evaluated, and it allows you to set various properties associated with the route, such as the AS path and BGP community value.

Default Routing Policy Actions

If you do not define any routing policies, or if routes do not match any conditions in a policy, the following default actions are taken:

When importing routes, all routing protocols import all their routes into the routing table. If a protocol has more than one route to the same destination, its routing algorithm calculates the best route to that destination and that route is installed into the routing table. For equal-cost routes, multiple next hops are installed into the routing table.

When exporting routes, the routing protocols export only the active routes that were learned by that protocol. In addition, IGPs (that is, IS-IS and OSPF) export the direct (interface) routes for the interfaces on which they are explicitly configured.

The routing protocol process automatically maintains three routing tables. For more information, see "JUNOS Routing Tables" on page 4.

inet.0—For unicast routes. By default, unicast routing protocols import their routes into and export their routes from this routing table.

inet.1—For the multicast cache. By default, multicast routing protocols import their routes into and export their routes from this routing table.

inet.2—For unicast routes used for multicast reverse path forwarding (RPF) lookup. By default, these are populated from multicast network layer reachability information (NLRI) tables.

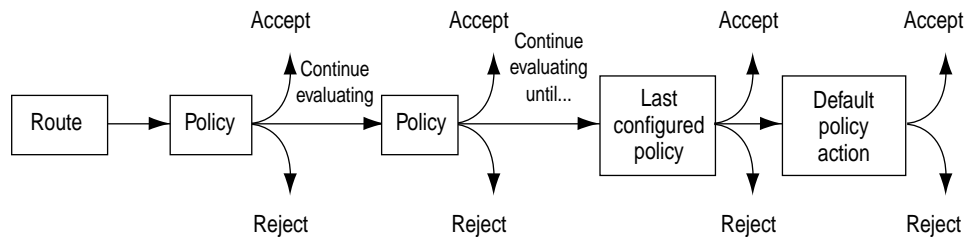
inet.3—For Multiprotocol Label Switching (MPLS). By default, MPLS imports its routes into and export its routes from this routing table.

How Routing Policies Are Evaluated

Figure 3 provides a high-level illustration of how routing policies are evaluated. Each route passes through one or a series of sequential policies and is evaluated to determine whether it matches the policy. The evaluation process stops when one of the following happens:

- The route matches and the action specifies to accept the route.
- The route matches and the action specifies to reject (discard) the route.
- The route matches none of the policies. In this case, the default action is taken.

Figure 3: Evaluating a Route Using Routing Policy

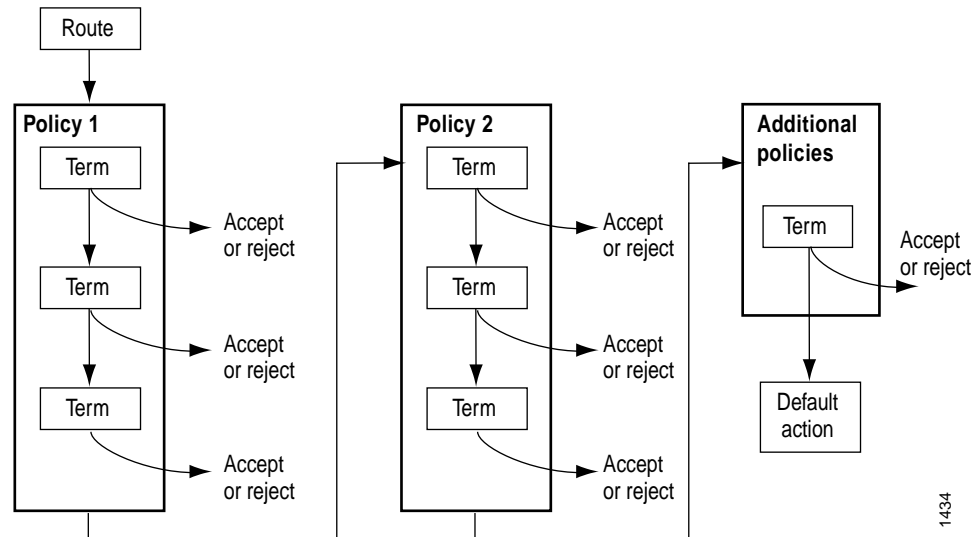


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Figure 4 provides a more detailed illustration of how routing policies are evaluated. Each policy consists of a series of terms. Within each term, you define match conditions and actions to apply to matching routes. Each route is evaluated as follows:

1. The route is evaluated against the first term in the first policy. If it matches, the specified action is taken. If the action is to accept or reject the route, the route is evaluated no further.
2. If the route does not match, it is evaluated against the second term in the first policy.
3. If the route matches no terms in the first policy, it is evaluated against the first term in the second policy.
4. The evaluation process continues until the route matches a term or until there are no more policies to evaluate.

Figure 4: Evaluating the Terms in a Routing Policy



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Figure 5 illustrates how each term in a routing policy is evaluated. Within each term, you can define conditions that match the route's source and destination, and then you define actions to apply to routes that match. Each term is evaluated as follows:

1. The route is evaluated against the source conditions.
2. The route is evaluated against the destination conditions.
3. If the route does not match all source and destination conditions, the appropriate default action is taken.
4. If the route matches all source and destination conditions, the configured action is taken.

Figure 5: Evaluating a Single Term in a Routing Policy

