Static Route Tag Addendum

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About This Guide

This addendum to the Vyatta *Basic Routing Configuration Guide* describes the Static Route Tag functionality that was added to Release 17.2.0 of the AT&T Vyatta vRouter (also referred to as a virtual router, vRouter, or router in the guide). The release 17.2.0 has been updated to be 1801.

Features	vRouter Release	Rev of Basic Routing Configuration Guide 5600 Addendum	Date
Static Route Tag	1801	1	March 2019
Static Route Tag	1801	2	April 2019
Static Route Tag	1801	3	April 2019

Static Route Tag

In Release 1801, AT&T added support for the assignment and utilization of tags on static routes.

Introduction

As described in this addendum, the static route tag feature supports the following capabilities:

- Assigning a tag to a static route

- Filtering and redistributing of static routes from the current routing protocol into other protocols

Enhancements to the static route/route6/interface-route/interface-route6 configuration let you attach a tag to a route. The filtering and redistribution of static routes into other routing protocols are based on the tag.

Functional Description

The routing protocols that are able to redistribute static routes based on a tag are OSPFv2, OSPFv3, RIP, RIPng, and BGP.

> **NOTE**: PBR routes (**set protocols static table** *<n>* ...) are not supported for static route tagging because PBR routes are not redistributed to protocols.

The tag is distributed along with the route to the IGP peers. (This does not apply to BGP because it does not include a tag in its updates). The tag is visible in the peer RIB, where it can be utilized for downstream redistribution.

The **route-map** parameter can match on the tag value for the purpose of distributing static routes to dynamic routing protocols, as described in this addendum.

In addition to matching on a specific tag, you can change a tag's value redistribution by using **set policy route route-map** *<name>* **rule** *<num>* **set tag** *<new-tag-value>*. This addendum includes an example of this action.

Equal Cost Multi-path Routing

Equal Cost Multi-path Routing (ECMP)

A tag is associated with each entry in the routing information base (RIB), and a RIB can have multiple, equal-cost nexthops.

The tag is specified for each nexthop and must have the same value for all nexthops with the same administrative distance. You can use a different tag for a different administrative distance because a different distance forms a different RIB entry. For example, you might want to redistribute the route only when it is using the primary path(s) but not if it has fallen over to a back-up path. The way to set

up this behavior is to add a **tag** option for a static route if a *distance* option exists, as in the following example.

```
set protocols static route 11.1.4.0/24 next-hop 10.10.1.2 tag 1
set protocols static route 11.1.4.0/24 next-hop 10.10.2.2 distance 5
set protocols static route 11.1.4.0/24 next-hop 10.10.2.2 tag 2
```

The preceding commands result in two RIB entries. The first entry is for 10.10.1.2, with tag 1. The second is for 10.10.2.2, with tag 2: the second route is activated only if the first route goes down.

Operational Mode Commands

To see the tag assigned to a static route, use a **show ip[v6] route** *<prefix>* command. In the following examples, 11.1.5.0/24 was configured with tag 1 and 11:1:3::/64 with tag 2.

```
~$ show ip route 11.1.5.0
Routing entry for 11.1.5.0/24
 Known via "static", distance 1, metric 0, tag 1, best
  * via 10.10.100.2, dp0p1s2.100

~$ show ipv6 route 11:1:3::
Routing entry for 11:1:3::/64
  Known via "static", distance 1, metric 0, tag 2, best
     * is a summary, Reject
```

Configuration Data Model

This section describes the commands that pertain to static route tagging. The static route tagging functionality in these commands is for selecting a static route to redistribute it, based on the tag.

IPv4 Interface Route

The tag assigned to a static IPv4 interface route can be used to control redistribution.

Syntax

set protocols static interface-route *<v4prefix>* **next-hop-interface** *<interface>* **tag** *<1..4294967295>*

Parameter	Description	Values
interface-route *v4prefix*	IPv4 address of the destination	
next-hop-interface	Name of the interface	dp0p1s1.200 and dp0p1s1, for example
tag	A tag is assigned to the next-hop interface. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv4 Cross-routing-instance Interface Route

The tag assigned to a static IPv4 interface route can be used to control redistribution.

Syntax

set protocols static interface-route *<v4prefix>* **next-hop-routing-instance** *<name>* **next-hop-interface** *<interface>* **tag** *<1..4294967295>*

Parameter	Description	Values
interface-route *v4prefix*	IPv4 address of the destination	
next-hop-routing-instance *name*	User-specified alphanumeric string	
next-hop-interface	Name of the interface	dp0p1s1.200 and dp0p1s1, for example
tag	A tag is assigned to the next-hop interface. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv6 Interface Route

The tag assigned to a static IPv6 interface route can be used to control redistribution of routes.

Syntax

set protocols static interface-route6 *<v6prefix>* **next-hop-interface** *<interface>* **tag** *<1..4294967295>*

Parameter	Description	Values
interface-route6 *v6prefix*	IPv6 address of the destination	
next-hop-interface	Name of the interface	dp0p1s1.200 and dp0p1s1, for example
tag	A tag is assigned to the next-hop interface. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv6 Cross-routing-instance Interface Route

The tag assigned to a static IPv6 interface route can be used to control its distribution.

Syntax

set protocols static interface-route6 *<v6prefix>* **next-hop-routing-instance** *<name>* **next-hop-interface** *<interface>* **tag** *<1..4294967295>*

Parameter	Description	Values
interface-route6 *V6prefix*	IPv6 address of the destination	
next-hop-routing-instance	User-specified alphanumeric string	
next-hop-interface	Name of the interface	dp0p1s1.200 and dp0p1s1, for example
tag	A tag is assigned to the next-hop interface. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv4 Black Hole Route

This command is for assigning a tag to a static IPv4 black hole route to control its distribution.

Syntax

set protocols static route *<v4prefix>* **blackhole tag** *<1..4294967295>*

Parameter	Description	Values
static route *v4prefix*	IPv4 address of the destination (a black hole)	
blackhole	Keyword indicating the tag is for a black hole	
tag	A tag is assigned to the next-hop interface. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv4 Unreachable Route

This command is for assigning a tag to an unreachable static IPv4 route to control its redistribution.

Syntax

set protocols static route *<v4prefix>* **unreachable tag** <1…4294977295>

Parameter	Description	Values
static route *v4prefix*	IPv4 address of the destination	
unreachable tag	A tag is assigned to the unreachable route. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv4 Next-hop Route

This command is for assigning a tag to a static IPv4 next-hop route to control its redistribution.

Syntax

set protocols static route *<v4prefix>* **next-hop** *<v4address>* **tag** *<1..4294967295>*

Parameter	Description	Values
static route *v4prefix*	IPv4 address of the destination	
next-hop	IPv4 address of the next hop	
tag	A tag is assigned to the next-hop interface. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv4 Cross-routing-instance next-hop Route

This command is for assigning a tag to a static IPv4 next-hop route to control its distribution.

Syntax

set protocols static route *<v4prefix>* **next-hop-routing-instance** *<name>* **next-hop** *<v4address>* **tag** *<1..4294967295>*

Parameter	Description	Values
static route *v4prefix*	IPv4 address of the destination	
next-hop-routing-instance	User-specified alphanumeric string	
next-hop	IPv4 address of the next hop	
tag	A tag is assigned to the next-hop interface. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv6 Black Hole Route

This command is for assigning a tag to a static IPv6 black hole route to control its redistribution.

Syntax

set protocols static route6 *<v6prefix>* **blackhole tag** *<1..4294967295>*

Parameter	Description	Values
static route6 *v6prefix*	IPv6 address of the destination	
blackhole tag	A tag is assigned to the black hole route. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv6 Unreachable Route

This command is for assigning a tag to an unreachable static IPv6 route to control its distribution.

Syntax

set protocols static route6 *<v6prefix>* **unreachable tag** *<1..4294967295>*

Parameter	Description	Values
Static route6 *v6prefix*	IPv6 address of the destination	
unreachable tag	A tag for the unreachable route is assigned. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv6 Next-hop Route

This command is for assigning a tag to a static IPv6 next-hop route to control its distribution.

Syntax

set protocols static route6 *<v6prefix>* **next-hop** *<v6address>* **tag** *<1..4294967295>*

Parameter	Description	Values
route6 *v6prefix*	IPv6 address of the destination	
next-hop	IPv6 address of the next hop	
tag	A tag is assigned to the next-hop interface. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

IPv6 Cross-routing-instance Next-hop Route

This command is for assigning a tag to a static IPv6 next-hop route to control its distribution.

Syntax

set protocols static route6 *<v6prefix>* **next-hop-routing-instance** *<name>* **next-hop** *<v6address>* **tag** *<1..4294967295>*

Parameter	Description	Values
route6 *v6prefix*	IPv6 address of the destination	
next-hop-routing-instance *name*	Name for the routing instance	
next-hop *v6address*	IPv6 address of the next hop	
tag	This tag is assigned to the next-hop interface.. All next-hops for a RIB entry (prefix + distance) must have the same tag.	32-bit integer Range: 1 – 4294977295

Command Examples

The output of the **show ip[v6] route** *<prefix>* command shows the tag value.

Example of Help Text

The section contains examples of Help text related to static route tagging follow:

1. vyatta@vm-yv-1# **set protocols static interface-route6 12:1:1::/64 next-hop-interface dp0p1s1**

   Possible Help content for incomplete entries of this command are:

   <Enter> Execute the current command

   disable   Disable IPv6 interface static route

   distance Distance value for this route

   tag Tag value to control redistribution

2. vyatta@vm-yv-1# **set protocols static interface-route6 12:1:1::/64 next-hop-interface dp0p1s1 tag**

   Possible Help content for incomplete entries of this command are:

   <1..4294967295> Tag value to control redistribution

Example of Static Route/Interface-route

This section shows an examples of set commands for static route and static interface route and two show commands for the results.

1. **set protocols static route 12.1.1.0/24 next-hop 11.1.2.2 tag 1**

    vyatta@vm-yv-1:~$ **show ip route 12.1.1.0/24**

    Routing entry for 12.1.1.0/24

      Known via "static", distance 1, metric 0, tag 1, best

      * via 11.1.2.2, dp0p1s1.2110

2. **set protocols static interface-route 13.1.1.0/24 next-hop-interface dp0p1s1 tag 10**

    vyatta@vm-yv-1:~$ **show ip route 13.1.1.0/24**

    Routing entry for 13.1.1.0/24

      Known via "static", distance 1, metric 0, tag 10, best

      * is directly connected, dp0p1s1

Example of Static Route6/Interface-route6

This section shows an examples of set commands for IPv6 static route and IPv6 static interface route and two show commands for the results.

1. **set protocols static route6 12:1:1::/64 next-hop 10:10:100::2 tag 20**

    vyatta@vm-yv-1:~$ **show ipv6 route 12:1:1::/64**

    Routing entry for 12:1:1::/64

      Known via "static", distance 1, metric 0, tag 20, best

      * via 10:10:100::2, dp0p1s2.100

2. **set protocols static interface-route6 13:1:1::/64 next-hop-interface dp0p1s2. 100 tag 30**

    vyatta@vm-yv-1:~$ **show ipv6 route 13:1:1::/64**

    Routing entry for 13:1:1::/64

      Known via "static", distance 1, metric 0, tag 30, best

      * is directly connected, dp0p1s2.100

Static Cross-Routing-Instance Route

This section shows an examples of set commands for IPv6 static route and IPv6 static interface route and two show commands for the results.

1. **set protocols static route 14.1.1.0/24 next-hop-routing-instance red next-hop 10.10.200.2 tag 50**

   vyatta@vm-yv-1:~$ **show ip route 14.1.1.0/24**

   Routing entry for 14.1.1.0/24

     Known via "static", distance 1, metric 0, tag 50, best

     * via 10.10.200.2, dp0p1s2.200 (red)

2. **set routing routing-instance red protocols static interface-route 14.1.1.0/24 next-hop-routing-instance default next-hop-interface dp0p1s1 tag 60**

   vyatta@vm-yv-1:~$ **show ip route routing-instance red 14.1.1.0/24**

   Routing entry for 14.1.1.0/24

     Known via "static", distance 1, metric 0, tag 60, best

     * is directly connected, dp0p1s1 (default)

Example of Static ECMP Route

set protocols static route 12.1.1.0/24 next-hop 11.1.2.2 tag 1

set protocols static route 12.1.1.0/24 next-hop 11.1.2.6 tag 1

set protocols static route 12.1.1.0/24 next-hop 11.1.2.8 distance 2

set protocols static route 12.1.1.0/24 next-hop 11.1.2.8 tag 2

vyatta@vm-yv-1:~$ **show ip route 12.1.1.0/24**

Routing entry for 12.1.1.0/24

  Known via "static", distance 1, metric 0, tag 1, best

  * via 11.1.2.6, dp0p1s1.2111

  * via 11.1.2.2, dp0p1s1.2110

Routing entry for 12.1.1.0/24

  Known via "static", distance 2, metric 0, tag 2

   via 11.1.2.8, dp0p1s1.2112

Example of Invalid ECMP: Tag Value Conflict

This example illustrates

vyatta@vm-yv-1# **set protocols static route 12.2.2.0/24 next-hop 11.1.2.2 tag 1**

vyatta@vm-yv-1# **set protocols static route 12.2.2.0/24 next-hop 11.1.2.8 tag 2**

vyatta@vm-yv-1# **commit**

[protocols static route 12.2.2.0/24 next-hop 11.1.2.2]

Next-hops with the same distance must have the same tag.

[[protocols static route 12.2.2.0/24 next-hop 11.1.2.2]] failed.

[protocols static route 12.2.2.0/24 next-hop 11.1.2.8]

Next-hops with the same distance must have the same tag.

[[protocols static route 12.2.2.0/24 next-hop 11.1.2.8]] failed.

Commit failed!

Example of Redistribution

set policy route route-map static-export rule 10 action permit

set policy route route-map static-export rule 10 match tag 5

set protocols ospf redistribute static route-map static-export

set protocols static route 15.1.1.0/24 next-hop 11.1.2.2 tag 5

vyatta@vm-yv-1:~$ **show ip ospf database external**

   OSPF Router with ID (1.1.1.1) (Process ID 0 routing-instance default)
     AS External Link States
      LS age: 90
      Options: 0x22 (-|-|DC|-|-|-|E|-)
      LS Type: AS-external-LSA
      Link State ID: 15.1.1.0 (External Network Number)
      Advertising Router: 1.1.1.1
      LS Seq Number: 80000001

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Checksum: 0x2b59

Length: 36

Network Mask: /24

Metric Type: 2 (Larger than any link state path)

TOS: 0

Metric: 20

Forward Address: 0.0.0.0

External Route Tag: 5

Example of Redistribution by Use of a Different Tag

set policy route route-map static-export rule 10 action permit

set policy route route-map static-export rule 10 match tag 5

set policy route route-map static-export rule 10 set tag 50

set protocols static interface-route6 15:1:1::/64 next-hop-interface dp0p1s1 tag 5

set protocols ospfv3 redistribute static route-map static-export

vyatta@vm-yv-1:~$ **show ipv6 route 15:1:1::/64**

Routing entry for 15:1:1::/64

  Known via "static", distance 1, metric 0, tag 5, best

  * is directly connected, dp0p1s1

vyatta@vm-yv-1:~$ **show ipv6 ospfv3 database external**

OSPFv3 Router with ID (1.1.1.1) (Process *null* Routing-instance default)

  AS-external-LSA

LS age: 161

LS Type: AS-External-LSA

Link State ID: 0.0.0.1

Advertising Router: 1.1.1.1

LS Seq Number: 0x80000002

Checksum: 0x4C1C

Length: 40

Metric Type: 2 (Larger than any link state path)

Metric: 20

Prefix: 15:1:1::/64

Prefix Options: 0 (-|-|-|-)

External Route Tag: 50

Troubleshooting

The following commands can help with troubleshooting:

- **show ip[v6] route** *<prefix>* - shows the tag associated with the route

- **show ip ospf database external** - shows redistributed routes, including the external tag

- **show ipv6 ospfv3 database external** - as above, but for IPv6 and OSPFv3