3.18 STATIC

STATIC is a daemon that handles the installation and deletion of static routes.

3.18.1 Starting STATIC

Default configuration file for *staticd* is `staticd.conf`. The typical location of `staticd.conf` is /etc/frr/staticd.conf.

If the user is using integrated config, then `staticd.conf` need not be present and the `frr.conf` is read instead.

If the user has not fully upgraded to using the staticd.conf and still has a non-integrated config with zebra.conf holding the static routes, *staticd* will read in the `zebrad.conf` as a backup.

STATIC supports all the common FRR daemon start options which are documented elsewhere.

3.18.2 Static Route Commands

Static routing is a very fundamental feature of routing technology. It defines a static prefix and gateway.

ip route NETWORK GATEWAY table TABLENO nexthop-vrf VRFNAME DISTANCE vrf VRFNAME

ipv6 route NETWORK from SRCPREFIX GATEWAY table TABLENO nexthop-vrf VRFNAME DISTANCE vrf VRFNAME
NETWORK is destination prefix with a valid v4 or v6 network based upon initial form of the command. GATEWAY is gateway for the prefix it currently must match the v4 or v6 route type specified at the start of the command. GATEWAY can also be treated as an interface name. If the interface name is `null0` then zebra installs a blackhole route. TABLENO is an optional parameter for namespaces that allows you to create the route in a specified table associated with the vrf namespace. table will be rejected if you are not using namespace based vrfs. `nexthop-vrf` allows you to create a leaked route with a nexthop in the specified VRFNAME vrf VRFNAME allows you to create the route in a specified vrf. `nexthop-vrf` cannot be currently used with namespace based vrfs currently as well. The v6 variant allows the installation of a static source-specific route with the SRCPREFIX sub command. These routes are currently supported on Linux operating systems only, and perform AND matching on packet's destination and source addresses in the kernel's forwarding path. Note that destination longest-prefix match is "more important" than source LPM, e.g. `2001:db8:1::/64 from 2001:db8::/48` will win over `2001:db8::/48 from 2001:db8:1::/64` if both match.

3.18.3 Multiple nexthop static route

To create multiple nexthops to the same NETWORK, just reenter the same network statement with different nexthop information.

```
ip route 10.0.0.1/32 10.0.0.2
ip route 10.0.0.1/32 10.0.0.3
ip route 10.0.0.1/32 eth0
```

If there is no route to 10.0.0.2 and 10.0.0.3, and interface eth0 is reachable, then the last route is installed into the kernel.

If zebra has been compiled with multipath support, and both 10.0.0.2 and 10.0.0.3 are reachable, zebra will install a multipath route via both nexthops, if the platform supports this.

```
router> show ip route
S>  10.0.0.1/32 [1/0] via 10.0.0.2 inactive
    via 10.0.0.3 inactive
  *       is directly connected, eth0
```

```
ip route 10.0.0.0/8 10.0.0.2
ip route 10.0.0.0/8 10.0.0.3
ip route 10.0.0.0/8 null0 255
```

This will install a multihop route via the specified next-hops if they are reachable, as well as a high-distance blackhole route, which can be useful to prevent traffic destined for a prefix to match less-specific routes (e.g. default) should the specified gateways not be reachable. E.g.:

```
router> show ip route 10.0.0.0/8
Routing entry for 10.0.0.0/8
  Known via "static", distance 1, metric 0
    10.0.0.2 inactive
    10.0.0.3 inactive

Routing entry for 10.0.0.0/8
  Known via "static", distance 255, metric 0
    directly connected, Null0
```

Also, if the user wants to configure a static route for a specific VRF, then a specific VRF configuration mode is available. After entering into that mode with *vrf VRF* the user can enter the same route command as before, but this time, the route command will apply to the VRF.

```
# case with VRF
configure
vrf r1-cust1
 ip route 10.0.0.0/24 10.0.0.2
exit-vrf
```

3.18.4 SR-TE Route Commands

It is possible to specify a route using a SR-TE policy configured in Zebra.

e.g. to use the SR-TE policy with endpoint 6.6.6.6 and color 123 to reach the network 9.9.9.9/24:

```
ip route 9.9.9.9/24 6.6.6.6 color 123
```

3.19 VNC and VNC-GW

This chapter describes how to use VNC (Virtual Network Control) services, including NVA (Network Virtualization Authority) and VNC-GW (VNC Gateway) functions. Background information on NVAs, NVE (Network Virtualization Edge) s, UN (Underlay Network) s, and VN (Virtual Network) is available from the IETF. VNC-GW s support the import/export of routing information between VNC and CE (customer edge) routers operating within a VN. Both IP/Layer 3 (L3) VNs, and IP with Ethernet/Layer 2 (L2) VNs are supported.

BGP, with IP VPNs and Tunnel Encapsulation, is used to distribute VN information between NVAs. BGP based IP VPN support is defined in **RFC 4364**, and **RFC 4659**. Encapsulation information is provided via the Tunnel Encapsulation Attribute, **RFC 5512**.

The protocol that is used to communicate routing and Ethernet / Layer 2 (L2) forwarding information between NVAs and NVEs is referred to as the Remote Forwarder Protocol (RFP). *OpenFlow* is an example RFP. Specific RFP implementations may choose to implement either a *hard-state* or *soft-state* prefix and address registration model. To support a *soft-state* refresh model, a *lifetime* in seconds is associated with all registrations and responses.

The chapter also provides sample configurations for basic example scenarios.

3.19.1 Configuring VNC

Virtual Network Control (VNC) service configuration commands appear in the *router bgp* section of the BGPD configuration file (*Miscellaneous Configuration Examples*). The commands are broken down into the following areas:

- *General VNC* configuration applies to general VNC operation and is primarily used to control the method used to advertise tunnel information.
- *Remote Forwarder Protocol (RFP)* configuration relates to the protocol used between NVAs and NVEs.
- *VNC Defaults* provides default parameters for registered NVEs.
- *VNC NVE Group* provides for configuration of a specific set of registered NVEs and overrides default parameters.
- *Redistribution* and *Export* control VNC-GW operation, i.e., the import/export of routing information between VNC and customer edge routers (CE s) operating within a VN.

General VNC Configuration

RFP Related Configuration

The protocol that is used to communicate routing and Ethernet / L2 forwarding information between NVAs and NVEs is referred to as the Remote Forwarder Protocol (RFP). Currently, only a simple example RFP is included in FRR. Developers may use this example as a starting point to integrate FRR with an RFP of their choosing, e.g., *OpenFlow*. The example code includes the following sample configuration:

rfp example-config-value VALUE

This is a simple example configuration parameter included as part of the RFP example code. VALUE must be in the range of 0 to 4294967295.

VNC Defaults Configuration

The VNC Defaults section allows the user to specify default values for configuration parameters for all registered NVEs. Default values are overridden by *VNC NVE Group Configuration*.

vnc defaults

Enter VNC configuration mode for specifying VNC default behaviors. Use *exit-vnc* to leave VNC configuration mode. *vnc defaults* is optional.

```
vnc defaults
... various VNC defaults
exit-vnc
```

These are the statements that can appear between `vnc defaults` and `exit-vnc`. Documentation for these statements is given in *VNC NVE Group Configuration*.

- *rt import RT-LIST*
- *rt export RT-LIST*
- *rt both RT-LIST*
- *rd ROUTE-DISTINGUISHER*
- *l2rd NVE-ID-VALUE*