CONFIGURING NETWORK INTERFACES ON RHEL9

medium.com/@murat.bilal/configuring-network-interfaces-on-rhel9-d2531a3083dd

Murat Bilal February 4, 2023

Murat Bilal

According to release notes for RHEL9 **NetworkManager stores new network configurations to `/etc/NetworkManager/system-connections/` in a key-file format.**

Previously, NetworkManager stored new network configurations to `/etc/sysconfig/network-scripts/` in the `ifcfg` format. Starting with RHEL 9.0, RHEL stores new network configurations at `/etc/NetworkManager/system-connections/` in a

key-file format. The connections for which the configurations are stored to `/etc/sysconfig/network-scripts/` in the old format still work uninterrupted. Modifications in existing profiles continue updating the older files.

The `teamd` service and the `libteam` library are deprecated in Red Hat Enterprise Linux 9 and will be removed in the next major release. As a replacement, configure a bond instead of a network team.

Red Hat focuses its efforts on kernel-based bonding to avoid maintaining two features, bonds and teams, that have similar functions. The bonding code has a high customer adoption, is robust, and has an active community development. As a result, the bonding code receives enhancements and updates.

Now let's continue with some examples:

```
[root@vmtest1 ~]# NetworkManager --print-config
# NetworkManager configuration: /etc/NetworkManager/NetworkManager.conf

[main]
# plugins=keyfile,ifcfg-rh
# rc-manager=auto
# auth-polkit=true
# dhcp=internal
# iwd-config-path=
configure-and-quit=no

[logging]
# backend=journal
# audit=false

[device]
# wifi.backend=wpa_supplicant

# no-auto-default file "/var/lib/NetworkManager/no-auto-default.state"
```

print config

This refers to the different storage locations like 'keyfile' and 'ifcfg-rh'. It looks up key files first, and then the ifcfg-rh files.

```
[root@vmtest1 ~]# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: ens3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:bd:d5:a3 brd ff:ff:ff:ff:ff:ff
    altname enp0s3
3: ens4: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:d2:56:ce brd ff:ff:ff:ff:ff:ff
    altname enp0s4
[root@vmtest1 ~]# cat /etc/NetworkManager/system-connections/ens3.nmconnection
[connection]
id=ens3
uuid=ebb5989f-eb0e-3a0e-8358-67f195efde6f
type=ethernet
autoconnect-priority=-999
interface-name=ens3

[ethernet]

[ipv4]
method=auto

[ipv6]
addr-gen-mode=eui64
method=auto

[proxy]
[root@vmtest1 ~]# ls /etc/sysconfig/network-scripts/
```

interface configs

Now as you can see there are two interfaces ens3 and ens4. And their keyfile format located in “/etc/NetworkManager/system-connections/ens3.nmconnection” for ens3 . There is no file now under “/etc/sysconfig/network-scripts”.

Now let’s Give an IP address on ens4 with nmcli.

```
[root@vmtest1 ~]# nmcli con mod ens4 ipv4.method manual ipv4.addr "192.168.1.4/24"
[root@vmtest1 ~]# nmcli con down ens4
Connection 'ens4' successfully deactivated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/32)
[root@vmtest1 ~]# nmcli con up ens4
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/36)
[root@vmtest1 ~]# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: ens3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:bd:d5:a3 brd ff:ff:ff:ff:ff:ff
    altname enp0s3
    inet 10.10.10.3/24 brd 10.10.10.255 scope global noprefixroute ens3
       valid_lft forever preferred_lft forever
    inet6 fe80::5054:ff:febd:d5a3/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: ens4: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:d2:56:ce brd ff:ff:ff:ff:ff:ff
    altname enp0s4
    inet 192.168.1.4/24 brd 192.168.1.255 scope global noprefixroute ens4
       valid_lft forever preferred_lft forever
    inet6 fe80::5054:ff:fed2:56ce/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
```

IP config for ens4

Now Let’ check the configuration properties:

```
[root@vmtest1 ~]connection.id:                          ens4connection.uuid:
0f6091c3-180b-3fbb-a5bf-44fee8e16c75connection.stable-id:                  --
connection.type:                        802-3-ethernetconnection.interface-name:
ens4connection.autoconnect:                 connection.autoconnect-priority:
-999connection.autoconnect-retries:         -1 (default)connection.multi-connect:
0 (default)connection.auth-retries:                -1connection.timestamp:
1675531206connection.read-only:                   noconnection.permissions:
--connection.zone:                        --connection.master:
--connection.slave-type:                  --connection.autoconnect-slaves:
-1 (default)connection.secondaries:                --connection.gateway-ping-
timeout:        0connection.metered:                    unknownconnection.lldp:
defaultconnection.mdns:                        -1 (default)connection.llmnr:
-1 (default)connection.dns-over-tls:               -1 (default)connection.wait-
device-timeout:         -1802-3-ethernet.port:                    --802-3-
ethernet.speed:                    0802-3-ethernet.duplex:                  --802-
3-ethernet.auto-negotiate:          no802-3-ethernet.mac-address:             -
-802-3-ethernet.cloned-mac-address:      --802-3-ethernet.generate-mac-address-
mask:--802-3-ethernet.mac-address-blacklist:   --802-3-ethernet.mtu:
auto802-3-ethernet.s390-subchannels:        --802-3-ethernet.s390-nettype:
--802-3-ethernet.s390-options:            --802-3-ethernet.wake-on-lan:
default802-3-ethernet.wake-on-lan-password:    --802-3-ethernet.accept-all-mac-
addresses:-1 (default)ipv4.method:                            manualipv4.dns:
--ipv4.dns-search:                        --ipv4.dns-options:
--ipv4.dns-priority:                      0ipv4.addresses:
192.168.1.4/24ipv4.gateway:                            --
```

No gateway assigned, let’s modify

```
[root@vmtest1 ~][root@vmtest1 ~]connection.gateway-ping-timeout:
0ipv4.gateway:                          192.168.1.254[root@vmtest1 ~]
```

Now Let’s configure DNS

```
[root@vmtest1 ~][root@vmtest1 ~][root@vmtest1 ~]connection.mdns:
-1 (default)connection.dns-over-tls:               -1 (default)ipv4.dns:
8.8.8.8,8.8.4.4
```

If you want to set your DNS domain:

```
[root@vmtest1 ~]ipv4.dns-search:                       --ipv6.dns-search:
--[root@vmtest1 ~][root@vmtest1 ~]ipv4.dns-search:
blahblah.comipv6.dns-search:                       --
```

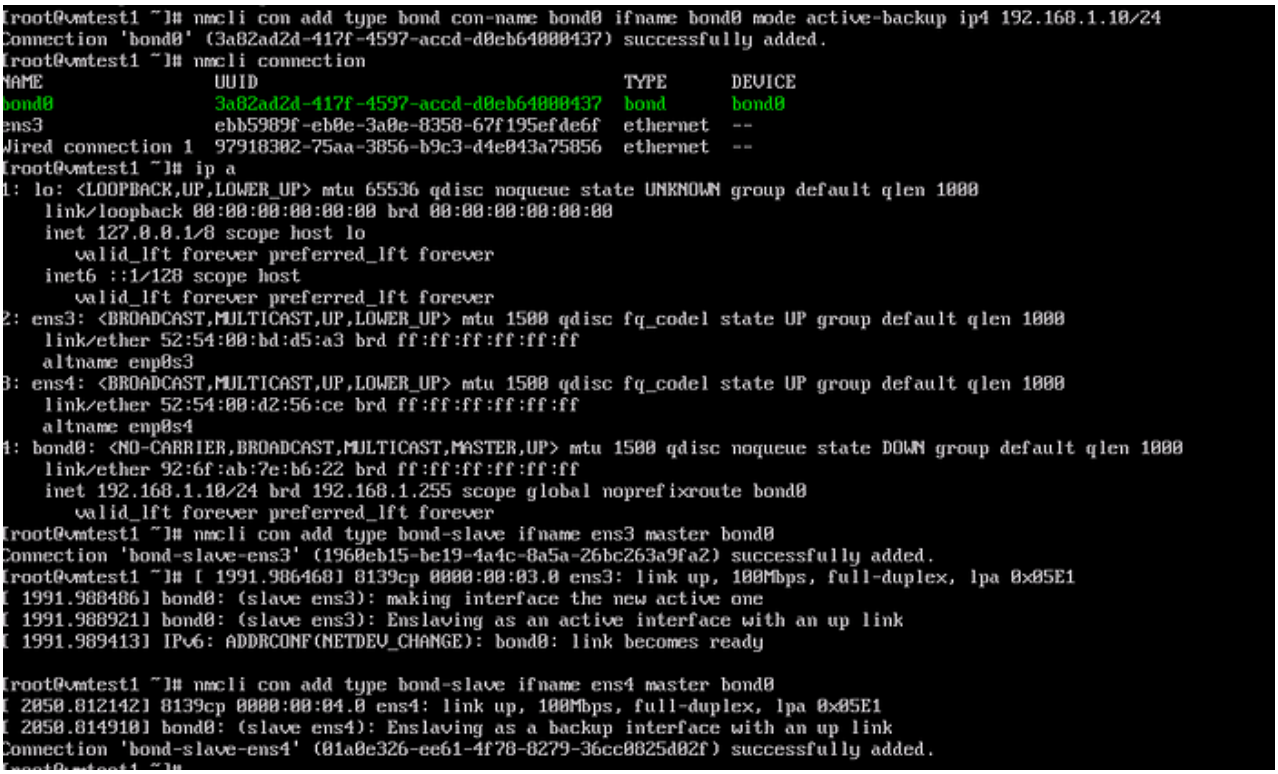
Now check device status and config file:

```
[root@vmtest1 ~]# nmcli device status
DEVICE  TYPE      STATE                                  CONNECTION
ens4    ethernet  connected                              ens4
ens3    ethernet  connecting (getting IP configuration)  ens3
lo      loopback  unmanaged                              --
[root@vmtest1 ~]# cat /etc/NetworkManager/system-connections/ens4.nmconnection
[connection]
id=ens4
uuid=0f6091c3-180b-3fbb-a5bf-44fee8e16c75
type=ethernet
autoconnect-priority=-999
interface-name=ens4
timestamp=1675531748



[ethernet]



[ipv4]
address1=192.168.1.4/24,192.168.1.254
dns=8.8.8.8;8.8.4.4;
dns-search=blahblah.com;
method=manual



[ipv6]
addr-gen-mode=eui64
method=auto

[proxy]
```

Now delete configuration for bond setup:

```
[root@vmtest1 ~]Connection  (0f6091c3-180b-3fbb-a5bf-44fee8e16c75) successfully
deleted
```

Now create bond0 with slave ens3 and ens4



Bond configuration

```
nmcli con add  bond con-name bond0 ifname bond0 mode active-backup ip4
192.168.1.10/24nmcli con add  bond-slave ifname ens3 master bond0nmcli con add
bond-slave ifname ens4 master bond0If necessary you can bring up the interfaces by
running:nmcli con up bond-slave-ens3nmcli con up bond-slave-ens4nmcli con up bond0
```

Bond is up now check the configuration and config files:

```
[root@vmtest1 ~]# nmcli connection
NAME                UUID                                  TYPE      DEVICE
bond0               3a82ad2d-417f-4597-accd-d0eb64000437  bond      bond0
bond-slave-ens3     1960eb15-be19-4a4c-8a5a-26bc263a9fa2  ethernet  ens3
bond-slave-ens4     01a0e326-ee61-4f78-8279-36cc0825d02f  ethernet  ens4
ens3                ebb5989f-eb0e-3a0e-8358-67f195efde6f  ethernet  --
Wired connection 1  97918302-75aa-3856-b9c3-d4e043a75856  ethernet  --
[root@vmtest1 ~]# cat /etc/NetworkManager/system-connections/
bond0.nmconnection            bond-slave-ens3.nmconnection  bond-slave-
ens4.nmconnection  ens3.nmconnection
[root@vmtest1 ~]# cat /etc/NetworkManager/system-connections/bond0.nmconnection
[connection]
id=bond0
uuid=3a82ad2d-417f-4597-accd-d0eb64000437
type=bond
interface-name=bond0



[bond]
mode=active-backup



[ipv4]
address1=192.168.1.10/24
method=manual



[ipv6]
addr-gen-mode=stable-privacy
method=auto



[proxy]
[root@vmtest1 ~]# cat /etc/NetworkManager/system-connections/bond-slave-
ens3.nmconnection
[connection]
id=bond-slave-ens3
uuid=1960eb15-be19-4a4c-8a5a-26bc263a9fa2
type=ethernet
interface-name=ens3
master=bond0
slave-type=bond



[ethernet]



[bond-port]
[root@vmtest1 ~]# cat /etc/NetworkManager/system-connections/bond-slave-
ens4.nmconnection
[connection]
id=bond-slave-ens4
```

```
uuid=01a0e326-ee61-4f78-8279-36cc0825d02f
type=ethernet
interface-name=ens4
master=bond0
slave-type=bond



[ethernet]

[bond-port][root@vmtest1 ~]DEVICE  TYPE      STATE      CONNECTIONbond0   bond
connected  bond0ens3    ethernet  connected  bond-slave-ens3ens4    ethernet
connected  bond-slave-ens4lo      loopback  unmanaged  --
```

Viewing bonding information:

```
[root@vmtest1 ~]# ls /sys/class/net/
bond0  bonding_masters  ens3  ens4  lo
[root@vmtest1 ~]# ls /sys/class/net/bond0/
addr_assign_type  bonding    carrier_changes     dev_id    duplex
ifalias  link_mode   mtu                  netdev_group  phys_port_name
proto_down  statistics  threaded      uevent
address           broadcast  carrier_down_count  dev_port  flags
ifindex  lower_ens3  name_assign_type      operstate     phys_switch_id  queues
subsystem   tx_queue_len
addr_len          carrier    carrier_up_count    dormant   gro_flush_timeout
iflink   lower_ens4  napi_defer_hard_irqs  phys_port_id  power           speed
testing     type
[root@vmtest1 ~]# ls /sys/class/net/bond0/bonding/
active_slave       ad_aggregator      ad_select          arp_interval
fail_over_mac      miimon             num_grat_arp       primary            slaves
xmit_hash_policy
ad_actor_key       ad_num_ports       ad_user_port_key   arp_ip_target
lacp_active        mii_status         num_unsol_na       primary_reselect
tlb_dynamic_lb
ad_actor_sys_prio  ad_partner_key     all_slaves_active  arp_validate
lacp_rate          min_links          packets_per_slave  queue_id
updelay
ad_actor_system    ad_partner_mac     arp_all_targets    downdelay
lp_interval        mode               peer_notif_delay   resend_igmp
use_carrier
[root@vmtest1 ~]# cat /sys/class/net/bond0/bonding/active_slave
ens3
[root@vmtest1 ~]# cat /sys/class/net/bond
bond0/           bonding_masters
[root@vmtest1 ~]# cat /sys/class/net/bonding_masters
bond0
[root@vmtest1 ~]# cat /sys/class/net/bond0/operstate
up
[root@vmtest1 ~]# cat /sys/class/net/bond0/address
52:54:00:bd:d5:a3
[root@vmtest1 ~]# cat /sys/class/net/bond0/bonding/mode
active-backup 1



[root@vmtest1 ~]# cat /proc/net/bonding/bond0
Ethernet Channel Bonding Driver: v5.14.0-70.22.1.el9_0.x86_64



Bonding Mode: fault-tolerance (active-backup)
Primary Slave: None
Currently Active Slave: ens3
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0
Peer Notification Delay (ms): 0
```

```
Slave Interface: ens3
MII Status: up
Speed: 100 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: 52:54:00:bd:d5:a3
Slave queue ID: 0

Slave Interface: ens4MII Status: upSpeed: 100 MbpsDuplex: fullLink Failure Count:
0Permanent HW addr: 52:54:00:d2:56:ceSlave queue ID: 0
```

Finally our bond is ready , just set our gateway:

```
[root@vmtest1 ~]GENERAL.DEVICE:                         bond0GENERAL.TYPE:
bondGENERAL.HWADDR:                         52:54:00:BD:D5:A3GENERAL.MTU:
1500GENERAL.STATE:                          100 (connected)GENERAL.CONNECTION:
bond0GENERAL.CON-PATH:
/org/freedesktop/NetworkManager/ActiveConnection/9IP4.ADDRESS[1]:
192.168.1.10/24IP4.GATEWAY:                             --IP4.ROUTE[1]:
dst = 192.168.1.0/24, nh = 0.0.0.0, mt = 300IP6.ADDRESS[1]:
fe80::4fb5:3678:7768:8ddd/64IP6.GATEWAY:                                --
IP6.ROUTE[1]:                           dst = fe80::/64, nh = ::, mt =
1024[root@vmtest1 ~]
```

We have finished this short article about network configuration on RHEL9. Things are changed, now nmcli or nmtui can be used for configuring network on RHEL9.