These are the steps to add TAP+Bridge to Ubuntu, using nmcli.

$ **nmcli**

enp0s3: connected to Wired connection 1

"Intel 82540EM"

ethernet (e1000), 08:00:27:14:5C:13, hw, mtu 1500

ip4 default

inet4 192.168.4.52/16

route4 192.168.0.0/16 metric 100

route4 default via 192.168.0.1 metric 100

lo: connected (externally) to lo

"lo"

loopback (unknown), 00:00:00:00:00:00, sw, mtu 65536

inet4 127.0.0.1/8

inet6 ::1/128

DNS configuration:

servers: 192.168.0.12 192.168.4.51 1.1.1.1

interface: enp0s3

$ **nmcli device show**

GENERAL.DEVICE: enp0s3

GENERAL.TYPE: ethernet

GENERAL.HWADDR: 08:00:27:14:5C:13

GENERAL.MTU: 1500

GENERAL.STATE: 100 (connected)

GENERAL.CONNECTION: Wired connection 1

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/2

WIRED-PROPERTIES.CARRIER: on

IP4.ADDRESS[1]: 192.168.4.52/16

IP4.GATEWAY: 192.168.0.1

IP4.ROUTE[1]: dst = 192.168.0.0/16, nh = 0.0.0.0, mt = 100

IP4.ROUTE[2]: dst = 0.0.0.0/0, nh = 192.168.0.1, mt = 100

IP4.DNS[1]: 192.168.0.12

IP4.DNS[2]: 192.168.4.51

IP4.DNS[3]: 1.1.1.1

IP6.GATEWAY: --

GENERAL.DEVICE: lo

GENERAL.TYPE: loopback

GENERAL.HWADDR: 00:00:00:00:00:00

GENERAL.MTU: 65536

GENERAL.STATE: 100 (connected (externally))

GENERAL.CONNECTION: lo

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/1

IP4.ADDRESS[1]: 127.0.0.1/8

IP4.GATEWAY: --

IP6.ADDRESS[1]: ::1/128

IP6.GATEWAY: --

$ nmcli connection show

NAME UUID TYPE DEVICE

Wired connection 1 5bdb0081-2cc7-3dfd-9c05-16ea1c0bc6c9 ethernet enp0s3

lo f53e94c0-2516-4111-b1e2-0adcdcb97b01 loopback lo

$

$ sudo nmcli connection add type bridge con-name bridge0 ifname bridge0

Connection 'bridge0' (83547c4a-72a1-46f6-9e54-5a23c4cb8c40) successfully added.

**nmcli connection add type bridge-slave ifname <ethernet\_device> master <bridge\_name>**

$ nmcli con show

NAME UUID TYPE DEVICE

Wired connection 1 2a0d0381-64e0-448d-9c07-9d29436b8110 ethernet enp0s3

bridge0 5cca71a2-f875-4d47-b795-74a471b056e5 bridge bridge0

lo 4679c91b-9308-4d99-877d-30dc4ac6042b loopback lo

$ **sudo nmcli connection modify 'Wired connection 1' master bridge0**

$ **nmcli conn show**

NAME UUID TYPE DEVICE

Wired connection 1 2a0d0381-64e0-448d-9c07-9d29436b8110 ethernet enp0s3

bridge0 5cca71a2-f875-4d47-b795-74a471b056e5 bridge bridge0

lo 4679c91b-9308-4d99-877d-30dc4ac6042b loopback lo

$ **sudo nmcli connection modify bridge0 stp yes**

$ **sudo nmcli connection modify bridge0 ipv6.method disabled**

$ **sudo nmcli connection modify bridge0 ipv4.addresses '192.168.4.52/16'**

$ **sudo nmcli connection modify bridge0 ipv4.gateway '192.168.0.1'**

$ **sudo nmcli connection modify bridge0 ipv4.dns '192.168.0.12','192.168.4.51','1.1.1.1'**

$ **sudo nmcli connection modify bridge0 ipv4.dns-search 'c3cyphers.com'**

$ **sudo nmcli connection modify bridge0 connection.autoconnect-slaves 1**

$

$ **sudo nmcli connection up bridge0**

Connection successfully activated (master waiting for slaves) (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/9)

$

$ **nmcli connection show**

NAME UUID TYPE DEVICE

bridge0 5cca71a2-f875-4d47-b795-74a471b056e5 bridge bridge0

bridge-slave-enp0s3 56346fb1-cad6-4bb2-a331-a6c4109684b0 ethernet enp0s3

lo 4679c91b-9308-4d99-877d-30dc4ac6042b loopback lo

Wired connection 1 2a0d0381-64e0-448d-9c07-9d29436b8110 ethernet --

$ **sudo nmcli conn add type tun con-name tap0-kanga ifname tap0 mode tap owner 0 ip4 0.0.0.0/16**

Connection 'tap0-kanga' (838777c5-305a-401a-887c-8cd090838afa) successfully added.

$ **sudo nmcli conn add type tun con-name tap1-roo ifname tap1 mode tap owner 0 ip4 0.0.0.0/16**

Connection 'tap1-roo' (60ff6f9c-6fca-4773-8e09-9813a5504c0b) successfully added.

$ **sudo nmcli conn add type tun con-name tap2-tigger ifname tap2 mode tap owner 0 ip4 0.0.0.0/16**

Connection 'tap2-tigger' (47500cec-a2f6-41fe-929d-268279bf0709) successfully added.

$ **sudo nmcli conn add type tun con-name tap3 ifname tap3 mode tap owner 0 ip4 0.0.0.0/16**

Connection 'tap3' (16a87363-8f0d-47f4-975f-0b9dff1ad2ed) successfully added.

$ **sudo nmcli connection modify bridge0 ipv6.method disabled**

$ **sudo nmcli connection modify tap0-kanga ipv6.method disabled**

$ **sudo nmcli connection modify tap1-roo ipv6.method disabled**

$ **sudo nmcli connection modify tap2-tigger ipv6.method disabled**

$ **sudo nmcli connection modify tap3 ipv6.method disabled**

$

$ **nmcli conn show**

NAME UUID TYPE DEVICE

Wired connection 1 2a0d0381-64e0-448d-9c07-9d29436b8110 ethernet enp0s3

bridge0 5cca71a2-f875-4d47-b795-74a471b056e5 bridge bridge0

tap0-kanga 838777c5-305a-401a-887c-8cd090838afa tun tap0

tap1-roo 60ff6f9c-6fca-4773-8e09-9813a5504c0b tun tap1

tap2-tigger 47500cec-a2f6-41fe-929d-268279bf0709 tun tap2

tap3 16a87363-8f0d-47f4-975f-0b9dff1ad2ed tun tap3

lo 3ed32856-0d54-46fa-8aa4-ebf398b31cb0 loopback lo

$ **nmcli connection up bridge0**

Connection successfully activated (master waiting for slaves) (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/12)

Tap connections will come up once SIMH connects to them

$ sudo touch /etc/systemd/system/bridge-promisc.service

$ sudo nano /etc/systemd/system/bridge-promisc.service

[Unit]

Description=Make Tap interfaces run in promiscuous mode at boot

After=network-online.target

[Service]

Steve Cyphers

ExecStart=/usr/bin/ip link set dev tap0 promisc on

ExecStart=/usr/bin/ip link set dev tap1 promisc on

ExecStart=/usr/bin/ip link set dev tap2 promisc on

ExecStart=/usr/bin/ip link set dev tap3 promisc on

TimeoutStartSec=0

RemainAfterExit=yes

[Install]

WantedBy=default.target

$

$ **sudo systemctl enable bridge-promisc**

Created symlink /etc/systemd/system/default.target.wants/bridge-promisc.service → /etc/systemd/system/bridge-promisc.service.

==== reboot ======

$ **nmcli connection show**

NAME UUID TYPE DEVICE

bridge0 5cca71a2-f875-4d47-b795-74a471b056e5 bridge bridge0

bridge-slave-enp0s3 56346fb1-cad6-4bb2-a331-a6c4109684b0 ethernet enp0s3

tap0-kanga 838777c5-305a-401a-887c-8cd090838afa tun tap0

tap1-roo 60ff6f9c-6fca-4773-8e09-9813a5504c0b tun tap1

tap2-tigger 47500cec-a2f6-41fe-929d-268279bf0709 tun tap2

tap3 16a87363-8f0d-47f4-975f-0b9dff1ad2ed tun tap3

lo abce0966-18b9-4747-aba0-69980052674b loopback lo

Wired connection 1 2a0d0381-64e0-448d-9c07-9d29436b8110 ethernet --

$ **ip address**

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

2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc fq\_codel master bridge0 state UP group

default qlen 1000 link/ether 08:00:27:14:5c:13 brd ff:ff:ff:ff:ff:ff

3: bridge0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc noqueue state UP group default qlen

1000 link/ether 42:82:83:ef:cf:41 brd ff:ff:ff:ff:ff:ff

inet 192.168.4.52/16 brd 192.168.255.255 scope global noprefixroute bridge0

valid\_lft forever preferred\_lft forever

4: tap3: <NO-CARRIER,BROADCAST,MULTICAST,PROMISC,UP> mtu 1500 qdisc fq\_codel state DOWN group

default qlen 1000 link/ether 06:a5:29:62:2f:99 brd ff:ff:ff:ff:ff:ff

5: tap2: <NO-CARRIER,BROADCAST,MULTICAST,PROMISC,UP> mtu 1500 qdisc fq\_codel state DOWN group

default qlen 1000 link/ether 4e:65:ca:e2:d6:25 brd ff:ff:ff:ff:ff:ff

6: tap1: <NO-CARRIER,BROADCAST,MULTICAST,PROMISC,UP> mtu 1500 qdisc fq\_codel state DOWN group

default qlen 1000 link/ether b6:d7:80:a1:9f:34 brd ff:ff:ff:ff:ff:ff

7: tap0: <NO-CARRIER,BROADCAST,MULTICAST,PROMISC,UP> mtu 1500 qdisc fq\_codel state DOWN group

default qlen 1000 link/ether b2:c9:03:ef:11:46 brd ff:ff:ff:ff:ff:ff

$ **nmcli device show**

GENERAL.DEVICE: bridge0

GENERAL.TYPE: bridge

GENERAL.HWADDR: 42:82:83:EF:CF:41

GENERAL.MTU: 1500

GENERAL.STATE: 100 (connected)

GENERAL.CONNECTION: bridge0

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/12

IP4.ADDRESS[1]: 192.168.4.52/16

IP4.GATEWAY: 192.168.0.1

IP4.ROUTE[1]: dst = 192.168.0.0/16, nh = 0.0.0.0, mt = 425

IP4.ROUTE[2]: dst = 0.0.0.0/0, nh = 192.168.0.1, mt = 425

IP4.DNS[1]: 192.168.0.12

IP4.DNS[2]: 192.168.4.51

IP4.DNS[3]: 1.1.1.1

IP6.GATEWAY: --

GENERAL.DEVICE: enp0s3

GENERAL.TYPE: ethernet

GENERAL.HWADDR: 08:00:27:14:5C:13

GENERAL.MTU: 1500

GENERAL.STATE: 100 (connected)

GENERAL.CONNECTION: Wired connection 1

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/13

WIRED-PROPERTIES.CARRIER: on

IP4.GATEWAY: --

IP6.GATEWAY: --

GENERAL.DEVICE: tap0

GENERAL.TYPE: tun

GENERAL.HWADDR: B2:C9:03:EF:11:46

GENERAL.MTU: 1500

GENERAL.STATE: 70 (connecting (getting IP configuration))

GENERAL.CONNECTION: tap0-kanga

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/7

IP4.GATEWAY: --

IP6.GATEWAY: --

GENERAL.DEVICE: tap1

GENERAL.TYPE: tun

GENERAL.HWADDR: B6:D7:80:A1:9F:34

GENERAL.MTU: 1500

GENERAL.STATE: 70 (connecting (getting IP configuration))

GENERAL.CONNECTION: tap1-roo

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/6

IP4.GATEWAY: --

IP6.GATEWAY: --

GENERAL.DEVICE: tap2

GENERAL.TYPE: tun

GENERAL.HWADDR: 4E:65:CA:E2:D6:25

GENERAL.MTU: 1500

GENERAL.STATE: 70 (connecting (getting IP configuration))

GENERAL.CONNECTION: tap2-tigger

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/5

IP4.GATEWAY: --

IP6.GATEWAY: --

GENERAL.DEVICE: tap3

GENERAL.TYPE: tun

GENERAL.HWADDR: 06:A5:29:62:2F:99

GENERAL.MTU: 1500

GENERAL.STATE: 70 (connecting (getting IP configuration))

GENERAL.CONNECTION: tap3

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/4

IP4.GATEWAY: --

IP6.GATEWAY: --

GENERAL.DEVICE: lo

GENERAL.TYPE: loopback

GENERAL.HWADDR: 00:00:00:00:00:00

GENERAL.MTU: 65536

GENERAL.STATE: 100 (connected (externally))

GENERAL.CONNECTION: lo

GENERAL.CON-PATH: /org/freedesktop/NetworkManager/ActiveConnection/1

IP4.ADDRESS[1]: 127.0.0.1/8

IP4.GATEWAY: --

IP6.GATEWAY: --

$ **nmcli -f bridge connection show bridge0**

bridge.mac-address: --

bridge.stp: yes

bridge.priority: 32768

bridge.forward-delay: 15

bridge.hello-time: 2

bridge.max-age: 20

bridge.ageing-time: 300

bridge.group-forward-mask: 0

bridge.multicast-snooping: yes

bridge.vlan-filtering: no

bridge.vlan-default-pvid: 1

bridge.vlans: --