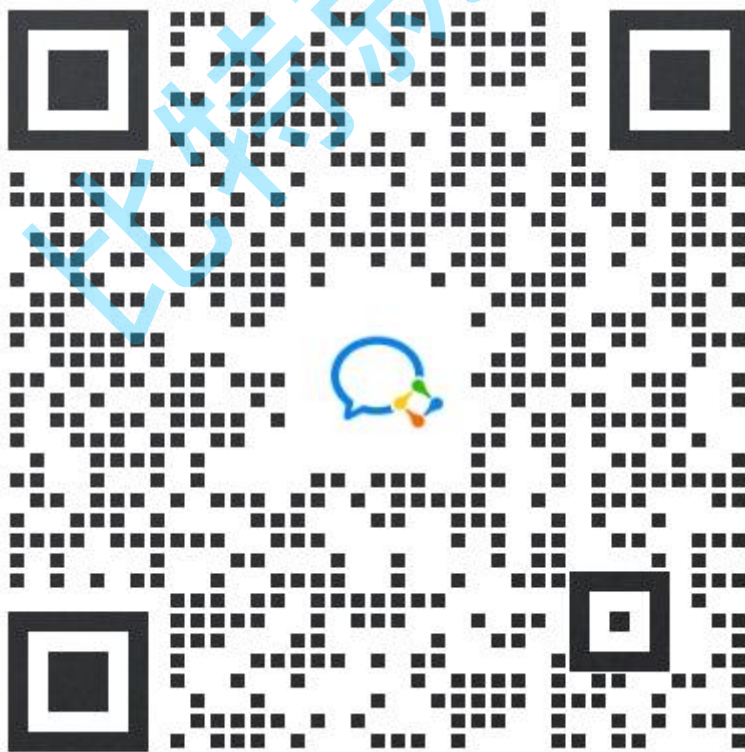


# 虚拟网卡实战

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## 基础知识

在计算机网络中，**tun** 与 **tap** 是操作系统内核中的虚拟网络设备。不同于普通靠硬件网络适配器实现的设备，这些虚拟的网络设备全部用软件实现，并向运行于操作系统上的软件提供与硬件的网络设备完全相同的功能。

**tun** 是网络层的虚拟网络设备，可以收发第三层数据报文包，如 IP 封包，因此常用于一些点对点 IP 隧道，例如 OpenVPN，IPSec 等。

**tap** 是链路层的虚拟网络设备，等同于一个以太网设备，它可以收发第二层数据报文包，如以太网数据帧。**Tap** 最常见的用途就是做为虚拟机的网卡，因为它和普通的物理网卡更加相近，也经常用作普通机器的虚拟网卡。

## 基础命令

### 1. 添加网卡

```
Shell
# 创建 tap
ip tuntap add dev tap0 mode tap
# 创建 tun
ip tuntap add dev tun0 mode tun
```

### 2. 删除网卡

```
Shell
# 删除 tap
ip tuntap del dev tap0 mode tap
# 删除 tun
ip tuntap del dev tun0 mode tun
```

### 3. 激活网卡

```
Shell
ip link set tun0 up
```

### 4. 设置 ip

```
Shell
ip addr add 10.5.0.1/24 dev tun0
```

### 5. 查看帮助

```
Shell
ip tuntap help
```

## 实战目的

了解什么是虚拟网卡。

## 实战步骤

1. 查看当前网卡，其中 eth0 是我们的物理网卡

Shell

```
root@139-159-150-152:~# ifconfig
br-df863876204e: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 192.168.0.1 netmask 255.255.0.0 broadcast
192.168.255.255
    inet6 fe80::42:20ff:feb7:55bb prefixlen 64 scopeid
0x20<link>
    ether 02:42:20:b7:55:bb txqueuelen 0 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 29 bytes 4216 (4.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

docker0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 172.17.0.1 netmask 255.255.0.0 broadcast
172.17.255.255
    inet6 fe80::42:d7ff:fe87:d11b prefixlen 64 scopeid
0x20<link>
    ether 02:42:d7:87:d1:1b txqueuelen 0 (Ethernet)
    RX packets 586466 bytes 36737314 (36.7 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 860320 bytes 1655179375 (1.6 GB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.183 netmask 255.255.255.0 broadcast
192.168.0.255
    inet6 fe80::f816:3eff:fe9d:f4ac prefixlen 64 scopeid
0x20<link>
    ether fa:16:3e:9d:f4:ac txqueuelen 1000 (Ethernet)
    RX packets 4031203 bytes 4359821919 (4.3 GB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 2642059 bytes 470413180 (470.4 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 1125305 bytes 449342149 (449.3 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 1125305 bytes 449342149 (449.3 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lxcbr0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 10.0.3.1 netmask 255.255.255.0 broadcast 10.0.3.255
    inet6 fe80::216:3eff:fe00:0 prefixlen 64 scopeid
    0x20<link>
    ether 00:16:3e:00:00:00 txqueuelen 1000 (Ethernet)
    RX packets 595 bytes 72213 (72.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 817 bytes 73558 (73.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

2. 我们通过 ip link 命令可以完成虚拟网卡的创建, 创建网卡

```

Shell
ip tuntap add dev tun0 mod tun

```

3. 查看网卡信息, 新添加的虚拟网卡默认是 DOWN 状态.需要用-a 参数显示

```

Shell
root@139-159-150-152:~# ifconfig -a
br-df863876204e: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 192.168.0.1 netmask 255.255.0.0 broadcast
    192.168.255.255
    inet6 fe80::42:20ff:feb7:55bb prefixlen 64 scopeid
    0x20<link>
    ether 02:42:20:b7:55:bb txqueuelen 0 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 29 bytes 4216 (4.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

docker0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 172.17.0.1 netmask 255.255.0.0 broadcast
    172.17.255.255
    inet6 fe80::42:d7ff:fe87:d11b prefixlen 64 scopeid

```

```

0x20<link>
    ether 02:42:d7:87:d1:1b txqueuelen 0 (Ethernet)
    RX packets 586466 bytes 36737314 (36.7 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 860320 bytes 1655179375 (1.6 GB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.183 netmask 255.255.255.0 broadcast
192.168.0.255
    inet6 fe80::f816:3eff:fe9d:f4ac prefixlen 64 scopeid
0x20<link>
    ether fa:16:3e:9d:f4:ac txqueuelen 1000 (Ethernet)
    RX packets 4031391 bytes 4359857658 (4.3 GB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 2642250 bytes 470440756 (470.4 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 1125373 bytes 449348155 (449.3 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 1125373 bytes 449348155 (449.3 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lxcbr0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 10.0.3.1 netmask 255.255.255.0 broadcast 10.0.3.255
    inet6 fe80::216:3eff:fe00:0 prefixlen 64 scopeid
0x20<link>
    ether 00:16:3e:00:00:00 txqueuelen 1000 (Ethernet)
    RX packets 595 bytes 72213 (72.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 817 bytes 73558 (73.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

tun0: flags=4240<POINTOPOINT,NOARP,MULTICAST> mtu 1500
    unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
txqueuelen 500 (UNSPEC)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

#### 4. 激活网卡

```
Shell
ip link set tun0 up
```

#### 5. 再次 ifconfig 可以看到网卡了

```
Shell
root@139-159-150-152:~# ifconfig
tun0: flags=4241<UP,POINTOPOINT,NOARP,MULTICAST> mtu 1500
    unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
txqueuelen 500 (UNSPEC)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

#### 6. 分配 ip 地址

```
Shell
ip addr add 10.5.0.1/24 dev tun0
```

#### 7. 查看 ip 地址, ping 该地址是通的

```
Shell

root@139-159-150-152:~# ifconfig
tun0: flags=4241<UP,POINTOPOINT,NOARP,MULTICAST> mtu 1500
    inet 10.5.0.1 netmask 255.255.255.0 destination 10.5.0.1
    unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
txqueuelen 500 (UNSPEC)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@139-159-150-152:~# ping 10.5.0.1
PING 10.5.0.1 (10.5.0.1) 56(84) bytes of data.
64 bytes from 10.5.0.1: icmp_seq=1 ttl=64 time=0.037 ms
64 bytes from 10.5.0.1: icmp_seq=2 ttl=64 time=0.040 ms
```

```
64 bytes from 10.5.0.1: icmp_seq=3 ttl=64 time=0.042 ms
^C
--- 10.5.0.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2035ms
rtt min/avg/max/mdev = 0.037/0.039/0.042/0.002 ms
```

8. 此时说明我们的虚拟网卡已经添加好了，通过 `del` 可以删除网卡

```
Shell
ip tuntap del dev tun0 mod tun
```

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