ip (iproute2) Linux networking

CONCEPTS

ip is OBJECT COMMAND: objects are link, addr, route, neigh, netns. Any word can be abbreviated (ip a, ip r, ip l).

Network namespace own devices, routes, rules
- **Link (interface)** MAC, MTU, up/down
  - **Address** IPv4 / IPv6 on a link
    - **Route** which link and gateway for a prefix

What lives where

Changes made with ip are not persistent: they vanish on reboot. Use NetworkManager, systemd-networkd or netplan for permanent config.

Changing addresses or routes needs root. The show commands do not.

OPTIONS

ip -br a
Brief one-line-per-interface view

ip -c *<cmd>*
Colour output

ip -4 *<cmd>* **/ ip -6** *<cmd>*
Only IPv4 / only IPv6

OPTIONS (cont.)

ip -j -p *<cmd>*
JSON output, pretty-printed

ip -s link show *<dev>*
Packet and error counters

ip -n *<ns>* *<cmd>*
Run in a network namespace

ip -o addr
One record per line, for grep/awk

ADDRESSES

ip addr
Show all addresses

ip addr show dev *<dev>*
Addresses of one interface

ip addr add *<cidr>* **dev** *<dev>*
Add an address

ip addr del *<cidr>* **dev** *<dev>*
Remove an address

ip addr flush dev *<dev>*
Remove all addresses of a link

ip -4 addr show scope global
Only global IPv4 addresses

LINKS

ip link
List interfaces

LINKS (cont.)

ip link set *<dev>* **up**
Enable an interface

ip link set *<dev>* **down**
Disable an interface

ip link set *<dev>* **mtu** *<n>*
Set the MTU

ip link add *<name>* **type** *<type>*
Create a virtual link

ip link add *<name>* **type veth peer name** *<peer>*
Create a veth pair

ip link add link *<dev>* **name** *<dev>*.*<id>* **type vlan id** *<id>*
Create a VLAN

ip link set *<dev>* **master** *<bridge>*
Attach to a bridge or bond

ip link del *<dev>*
Delete a virtual link

ROUTES

ip route
Show the main routing table

ip -6 route
Show IPv6 routes

ip route get *<addr>*
Show the route a destination would use

ip route add default via *<gw>* **dev** *<dev>*
Set the default gateway

ROUTES (cont.)

ip route add *<cidr>* **via** *<gw>*
Add a static route

ip route add *<cidr>* **dev** *<dev>*
Add an on-link route

ip route del *<cidr>*
Delete a route

ip route replace *<cidr>* **via** *<gw>*
Add or overwrite a route

ip route show table *<id>*
Show a non-main table

ip rule
List policy routing rules

ip rule add from *<cidr>* **table** *<id>*
Route by source address

NEIGHBOURS

ip neigh
Show the ARP / NDP cache

ip neigh show dev *<dev>*
Neighbours on one interface

ip neigh del *<addr>* **dev** *<dev>*
Remove an entry

ip neigh flush dev *<dev>*
Clear the cache of a link

NAMESPACES

ip netns
List network namespaces

NAMESPACES (cont.)

ip netns add *<ns>*
Create a namespace

ip netns exec *<ns>* *<cmd>*
Run a command inside

ip netns del *<ns>*
Delete a namespace

ip link set *<dev>* **netns** *<ns>*
Move a link into a namespace

ip monitor
Watch link, address and route changes

RECIPES

Static address and gateway

```
ip link set eth0 up
ip addr add 192.168.1.10/24 dev eth0
ip route add default via 192.168.1.1
ip route get 1.1.1.1
```

Two namespaces joined by a veth

```
ip netns add a; ip netns add b
ip link add va type veth peer name vb
ip link set va netns a; ip link set vb netns b
ip -n a addr add 10.0.0.1/24 dev va
ip -n b addr add 10.0.0.2/24 dev vb
ip -n a link set va up; ip -n b link set vb up
ip netns exec a ping -c1 10.0.0.2
```