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| **IP QUERIES** | |
| **SUBCOMMAND** | **DESCRIPTIONS AND TASKS** |
| **addr** | Display IP Addresses and property information (abbreviation of address)  **ip addr**  Show information for all addresses  **ip addr show dev em1**  Display information only for device em1 |
| **link** | Manage and display the state of all network interfaces  **ip link**  Show information for all interfaces  **ip link show dev em1**  Display information only for device em1  **ip -s link**  Display interface statistics |
| **route** | Display and alter the routing table  **ip route**  List all of the route entries in the kernel |
| **maddr** | Manage and display multicast IP addresses  **ip maddr**  Display multicast information for all devices  **ip maddr show dev em1**  Display multicast information for device em1 |
| **neigh** | Show neighbour objects; also known as the ARP table for IPv4  **ip neigh**  Display neighbour objects  **ip neigh show dev em1**  Show the ARP cache for device em1 |
| **help** | Display a list of commands and arguments for each subcommand  **ip help**  Display ip commands and arguments  **ip addr help**  Display address commands and arguments  **ip link help**  Display link commands and arguments  **ip neigh help**  Display neighbour commands and arguments |
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| **MULTICAST ADDRESSING** | |
| **SUBCOMMAND** | **DESCRIPTIONS AND TASKS** |
| **maddr add** | Add a static link-layer multicast address  **ip maddr add 33:33:00:00:00:01 dev em1**  Add mutlicast address 33:33:00:00:00:01 to em1 |
| **maddr del** | Delete a multicast address  **ip maddr del 33:33:00:00:00:01 dev em1**  Delete address 33:33:00:00:00:01 from em1 |
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| **MODIFYING ADDRESS AND LINK PROPERTIES** | |
| **SUBCOMMAND** | **DESCRIPTIONS AND TASKS** |
| **addr add** | Add an address  **ip addr add 192.168.1.1/24 dev em1**  Add address 192.168.1.1 with netmask 24 to device em1 |
| **addr del** | Delete an address  **ip addr del 192.168.1.1/24 dev em1**  Remove address 192.168.1.1/24 from device em1 |
| **link set** | Alter the status of the interface  **ip link set em1 up**  Bring em1 online  **ip link set em1 down**  Bring em1 offline  **ip link set em1 mtu 9000**  Set the MTU on em1 to 9000  **ip link set em1 promisc on**  Enable promiscuous mode for em1 |

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| **ADJUSTING AND VIEWING ROUTES** | |
| **SUBCOMMAND** | **DESCRIPTIONS AND TASKS** |
| **route add** | Add an entry to the routing table  **ip route add default via 192.168.1.1 dev em1**  Add a default route (for all addresses) via the local gateway 192.168.1.1 that can be reached on device em1  **ip route add 192.168.1.0/24 via 192.168.1.1**  Add a route to 192.168.1.0/24 via the gateway at 192.168.1.1  **ip route add 192.168.1.0/24 dev em1**  Add a route to 192.168.1.0/24 that can be reached on  device em1 |
| **route delete** | Delete a routing table entry  **ip route delete 192.168.1.0/24 via 192.168.1.1**  Delete the route for 192.168.1.0/24 via the gateway at 192.168.1.1 |
| **route replace** | Replace, or add if not defined, a route  **ip route replace 192.168.1.0/24 dev em1**  Replace the defined route for 192.168.1.0/24 to use  device em1 |
| **route get** | Display the route an address will take  **ip route get 192.168.1.5**  Display the route taken for IP 192.168.1.5 |
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| **MANAGING THE ARP TABLE** | |
| **SUBCOMMAND** | **DESCRIPTIONS AND TASKS** |
| **neigh add** | Add an entry to the ARP Table  **ip neigh add 192.168.1.1 lladdr 1:2:3:4:5:6 dev em1**  Add address 192.168.1.1 with MAC 1:2:3:4:5:6 to em1 |
| **neigh del** | Invalidate an entry  **ip neigh del 192.168.1.1 dev em1**  Invalidate the entry for 192.168.1.1 on em1 |
| **neigh replace** | Replace, or adds if not defined, an entry to the ARP table  **ip neigh replace 192.168.1.1 lladdr 1:2:3:4:5:6 dev em1**  Replace the entry for address 192.168.1.1 to use MAC 1:2:3:4:5:6 on em1 |
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| **USEFUL NETWORKING COMMANDS (NOT NECESSARILY PROVIDED FROM IPROUTE)** | | |
| **SUBCOMMAND** | **DESCRIPTIONS AND TASKS** |
| **arping** | Send ARP request to a neighbour host  **arping -I eth0 192.168.1.1**  Send ARP request to 192.168.1.1 via interface eth0  **arping -D -I eth0 192.168.1.1**  Check for duplicate MAC addresses at 192.168.1.1 on eth0 |
| **ethtool** | Query or control network driver and hardware settings  **ethtool -g eth0**  Display ring buffer for eth0  **ethtool -i eth0**  Display driver information for eth0  **ethtool -p eth0**  Identify eth0 by sight, typically by causing LEDs to blink on the network port  **ethtool -S eth0**  Display network and driver statistics for eth0 |
| **ss** | Display socket statistics. The below options can be combined  **ss -a**  Show all sockets (listening and non-listening)  **ss -e**  Show detailed socket information  **ss -o**  Show timer information  **ss -n**  Do not resolve addresses  **ss -p**  Show process using the socket |
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| **COMPARING NET-TOOLS VS. IPROUTE PACKAGE COMMANDS** | |
| **NET-TOOLS COMMANDS** | **IPROUTE COMMANDS** |
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| **arp -a** | **ip neigh** |
| **arp -v** | **ip -s neigh** |
| **arp -s 192.168.1.1 1:2:3:4:5:6** | **ip neigh add 192.168.1.1 lladdr 1:2:3:4:5:6 dev eth1** |
| **arp -i eth1 -d 192.168.1.1** | **ip neigh del 192.168.1.1 dev eth1** |
| **ifconfig -a** | **ip addr** |
| **ifconfig eth0 down** | **ip link set eth0 down** |
| **ifconfig eth0 up** | **ip link set eth0 up** |
| **ifconfig eth0 192.168.1.1** | **ip addr add 192.168.1.1/24 dev eth0** |
| **ifconfig eth0 netmask 255.255.255.0** | **ip addr add 192.168.1.1/24 dev eth0** |
| **ifconfig eth0 mtu 9000** | **ip link set eth0 mtu 9000** |
| **ifconfig eth0:0 192.168.1.2** | **ip addr add 192.168.1.2/24 dev eth0** |
| **netstat** | **ss** |
| **netstat -neopa** | **ss -neopa** |
| **netstat -g** | **ip maddr** |
| **route** | **ip route** |
| **route add -net 192.168.1.0 netmask 255.255.255.0 dev eth0** | **ip route add 192.168.1.0/24 dev eth0** |
| **route add default gw 192.168.1.1** | **ip route add default via 192.168.1.1** |

