

# Command-Line IP Utilities

This document lists Windows command-line utilities that you can use to obtain TCP/IP configuration information and test IP connectivity. Command parameters and uses are listed for the following utilities in Tables 1 through 9:

- Arp
- Ipconfig
- Netsh
- Netstat
- Pathping
- Ping
- Route
- Tracert

## ARP

The Arp utility reads and manipulates local ARP tables (data link address-to-IP address tables).

### Syntax

```
arp -s inet_addr eth_addr [if_addr]
```

```
arp -d inet_addr [if_addr]
```

```
arp -a [inet_address] [-N if_addr] [-v]
```

Table 1 ARP command parameters and uses

Parameter	Description
-a or -g	Displays current entries in the ARP cache. If <i>inet_addr</i> is specified, the IP and data link address of the specified computer appear. If more than one network interface uses ARP, entries for each ARP table appear.
<i>inet_addr</i>	Specifies an Internet address.
-N <i>if_addr</i>	Displays the ARP entries for the network interface specified by <i>if_addr</i> .
-v	Displays the ARP entries in verbose mode.
-d	Deletes the host specified by <i>inet_addr</i> .
-s	Adds the host and associates the Internet address <i>inet_addr</i> with the data link address <i>eth_addr</i> . The physical address is given as six hexadecimal bytes separated by hyphens. The entry is permanent.
<i>eth_addr</i>	Specifies physical address.
<i>if_addr</i>	If present, this specifies the Internet address of the interface whose address translation table should be modified. If not present, the first applicable interface will be used.

## IPCONFIG

The Ipconfig utility displays and modifies IP address configuration information.

### Syntax

```
ipconfig /? | /all |  
    /release [adapter] | /renew [adapter]  
    /release6 [adapter] | /renew6 [adapter]  
    /flushdns | /displaydns | /registerdns  
    /showclassid adapter  
    /showclassid6 adapter  
    /setclassid adapter [classid]  
    /setclassid6 adapter [classid]
```

Table 2 Ipconfig command parameters and uses

Parameter	Description
adapter	Used to indicate the full name of an adapter, or match a pattern with *(any character) and ? (one character)
/?	Displays the help message
/all	Displays complete configuration information
/release	Uses DHCP to release the IP address for the specified adapter
/release6	Uses DHCPv6 to release the IPv6 address for the specified adapter
/renew	Uses DHCP to renew the IP address for the specified adapter
/renew6	Uses DHCPv6 to renew the IPv6 address for the specified adapter
/flushdns	Purges the DNS cache
/registerdns	Uses DHCP to refresh all DHCP leases and re-registers DNS names
/displaydns	Displays the contents of the DNS cache
/showclassid	Displays all the DHCP class IDs allowed for the adapter
/setclassid	Modifies the DHCP class ID
/showclassid6	Displays all the DHCPv6 class IDs allowed for the adapter
/setclassid6	Modifies the DHCPv6 class ID

By default, this command displays only the IP address, subnet mask, and default gateway for each adapter bound to TCP/IP.

## Netsh

Network shell (Netsh) is a command-line scripting utility for displaying and modifying network configuration of a local or remote computer.

### Syntax

```
netsh [-a AliasFile] [-c Context] [-r RemoteMachine] [-u [DomainName] UserName] [-p Password | *]
[Command | -f ScriptFile]
```

Table 3 Netsh command parameters and uses

Parameter	Description
-a	Returns you to the netsh prompt after running <i>AliasFile</i> .
<i>AliasFile</i>	Specifies the name of the text file that contains one or more netsh commands.
-c	Changes to the specified netsh context.
<i>Context</i>	Specifies the netsh context. The following table (Table 4) lists the available netsh contexts.
-r	Configures remote computer.
<i>RemoteMachine</i>	Specifies the remote computer to configure.
-u	Specifies that you want to run the netsh command under a user account.
<i>DomainName</i>	Specifies the domain name where the user account is located. If not specified, the local domain is used.
<i>UserName</i>	Specifies the user account name.
-p	Specifies that you want to provide a password for the user account as specified with -u <i>Username</i> .
<i>Password</i>	Specifies the password for the designated user account.
<i>Command</i>	Specifies the netsh command that you want to run.
-f	Exits Netsh.exe after running the script.
<i>ScriptFile</i>	Specifies the script that you want to run.

Table 4 Netsh command contexts and uses

Context	Description
add	Adds a configuration entry
advfirewall	Configures Windows Firewall with advanced security
branchcache	Configures BranchCache, a wide area network (WAN) bandwidth optimization technology
bridge	For adapters that are part of Network Bridge, enables or disables Layer 3 compatibility mode and displays adapter configuration information
delete	Deletes a configuration entry
dhcpclient	Configures the DHCP client options
dnsclient	Configures the DNS client options
dump	Displays a configuration script
exec	Loads a script file and runs it; requires netshe exec <i>ScriptFile</i>

Context	Description
firewall	Configures Windows Firewall
help	Displays a list of available commands
http	Configures Hypertext Transfer Protocol (HTTP) properties for the HTP service
interface	Configures the TCP/IP protocol (including IPv4 and IPv6 addresses, default gateways, DNS servers, and WINS servers) and displays configuration and statistical information
ipsec	Configures IPSec Denial of Service protection
lan	Configures local area networking
mbn	Configures Mobile Broadband Network (MBN)
namespace	Displays the Name Resolution Policy Table (NRPT) in a DirectAccess client
netio	Configures Network Input Output (NETIO) binding filters
p2p	Configures peer-to-peer (P2P) networking
ras	Administers remote access servers
rpc	Configures Remote Procedure Call (RPC) firewall filters
set	Updates configuration settings
show	Displays information
trace	Allows collection of specific diagnostic and event data utilizing Event Tracing for Windows (ETW) to log events to a single file
wcn	Allows query and connection to a wireless LAN; WCN stands for Wireless Connect Now
wfp	Allows troubleshooting of Windows Firewall and IPSec by capturing diagnostic data; WFP stands for Windows Filtering Platform
winhttp	Configures Windows Hypertext Transfer Protocol (WINHTTP) proxy and tracing settings
winsock	Configures Windows Sockets
wlan	Configures wireless local area networking
/? or ?	Displays help at the command prompt

If you specify `-r` followed by another command, netsh executes the command on the remote computer and then returns to the Windows command prompt. If you specify `-r` without another command, netsh opens in remote mode. The process is similar to using `set machine` at the netsh command prompt. When you use `-r`, you set the target computer for the current instance of netsh only. After you exit and reenter netsh, the target computer is reset as the local computer. You can run netsh commands on a remote computer by specifying a computer name stored in WINS, a UNC name, an Internet name to be resolved by the DNS server, or a numerical IP address.

**Note:** You can learn more about the Netsh utility on the Microsoft Web site at <http://technet.microsoft.com/en-us/library/cc754516%28v=ws.10%29>.

## NETSTAT

This utility displays protocol statistics and details about the current TCP/IP network connections.

### Syntax

```
netstat [-a] [-b] [-e] [-f] [-n] [-o] [-p proto] [-r] [-s] [-x] [-t] [interval]
```

Table 5 Netstat command parameters and uses

Parameter	Description
-a	Lists all current connections and open, listening ports on the local system.
-b	Displays executable for creating connection or listening port.
-e	Displays Data Link layer statistics (also can be used with the -s parameter).
-f	Displays fully qualified domain names (FQDN).
-n	Displays addresses and port numbers in numerical form.
-o	Displays the owning process ID associated with a connection.
-p <i>proto</i>	Shows the connections for the specified protocol. The protocol defined may be UDP or TCP. When used with the -s parameter, the protocol definition IP, IPv6, ICMP, ICMPv6, TCP, or UDP also may be used.
-r	Displays the routing table (also see the route command).
-s	Displays statistics organized based on the protocols, such as IP, UDP, and TCP, by default (also can be used with the -p parameter to define a subset of the default).
-t	Displays the current connection offload state.
-x	Displays NetworkDirect connections, listeners, and shared endpoints.
<i>interval</i>	Redisplays the statistics on a regular basis using the interval (in seconds) value between displays. Press Ctrl+C to stop displaying the statistics. If this parameter is not included, the statistics appear only once.

## PATHPING

This utility is used to test router and link latency along a path to a host. Pathping uses a combination of Tracert and Ping to first determine the path to a specified host and then test the round trip to the host to identify packet loss to the destination and each router along the path. Pathping uses ICMP Echo packets.

### Syntax

```
pathping [-n] [-g host_list] [-h maximum_hops] [-i address] [-p period]
        [-q number_of_queries] [-w timeout] [-4] [-6] target_name
```

Table 6 Pathping command parameters and uses

Parameter	Description
-n	Determines that addresses should not be resolved to host names
-g <i>host_list</i>	Defines that loose source route should be used along the path defined by the <i>host_list</i>
-h <i>maximum_hops</i>	Defines the maximum number of hops to search for target

-i <i>address</i>	Use a specific source address
-p <i>period</i>	Defines the waiting period between pings in milliseconds
-q <i>number_of_queries</i>	Defines the number of queries per hop
-w <i>timeout</i>	Defines the timeout for each reply in milliseconds
-4	Use IPv4 specifically
-6	Use IPv6 specifically

## PING

The Ping utility executes an end-to-end connectivity test to other devices and obtains the round-trip time between source and destination device. Ping uses the ICMP Echo and Echo Reply packets to test connectivity. Excessive usage may appear to be a denial of service (DoS) attack.

### Syntax

```
ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
    [-r count] [-s count] [[-j host-list] / [-k host-list]]
    [-w timeout] [R] [-S srcaddr] [-p] [-4] [-6] target_name
```

Table 7 Ping command parameters and uses

Parameter	Description
-t	Pings the specified host until interrupted (press Ctrl+C to stop sending).
-a	Resolves addresses to hostnames.
-n <i>count</i>	Indicates the number of Echo Requests to send.
-l <i>size</i>	Sends a specific size of data. If this size is greater than the local network can handle, the sender will generate fragmented packets directly on the network.
-f	Sets the Don't Fragment flag in the packet.
-i <i>TTL</i>	Sets the Time to Live value in the packet.
-v <i>TOS</i>	Sets the type of service in the packet.
-r <i>count</i>	Indicates that the Ping process should record the route for the number of count hops specified.
-s <i>count</i>	Indicates that the Ping process should maintain Timestamp information for the number of count hops specified.
-j <i>host_list</i>	Indicates that the Ping process should follow a loose source route path along the <i>host_list</i> path.
-k <i>host_list</i>	Indicates that the Ping process should follow a strict source route along the <i>host_list</i> path.
-w <i>timeout</i>	Indicates the number of milliseconds the host should wait for each reply.
-R	Use the router header to test the reverse route as well (IPv6 only).
-S <i>srcaddr</i>	What address to use to source ping from.
-p	Ping yper-V Network Virtualization provider address.
-4	Use IPv4 specifically.
-6	Use IPv6 specifically.

## ROUTE

The Route utility reads and manipulates IP routing tables on a local device and identifies the current default gateway setting.

### Syntax

```
route [-f] [-p] [-4] [-6] command [destination] [MASK netmask] [gateway] [METRIC metric] [IF interface]
```

Table 8 Route command parameters and uses

Parameter	Description
-f	Clears the routing tables of all gateway entries. If this is used with one of the commands listed, the tables are cleared prior to running the command.
-p	When combined with the ADD command, creates a route that is persistent across system boots.
-4	Use IPv4 specifically.
-6	Use IPv6 specifically.
<i>command</i>	Specifies one of four commands: PRINT: Prints/views a route ADD: Adds a route DELETE: Deletes a route CHANGE: Modifies an existing route
<i>destination</i>	Specifies the host to send command.
MASK	If the mask keyword is present, the next parameter is interpreted as the netmask parameter, which specifies a subnet mask value to be associated with a route entry. If not specified, it defaults to 255.255.255.255.
<i>gateway</i>	Specifies a gateway.
METRIC	Calculates the cost, or metric, for the destination.
IF	Specifies the interface number for the route.

## TRACERT

The Tracert utility traces the routers along a path and obtains round-trip times from source to path routers, and from the source to the destination host.

### Syntax

```
tracert [-d] [-h maximum_hops] [-j host_list] [-w timeout] [-R] [-S srcaddr] [-4] [-6] target_name
```

Table 9 Tracert command parameters and uses

Parameter	Description
-d	Tells the system not to resolve addresses to host names
-h <i>maximum_hops</i>	Specifies the maximum number of hops to search for target
-j <i>host_list</i>	Defines loose source route along host list

<i>-w timeout</i>	Specifies the number of milliseconds to wait for each reply
<i>-R</i>	Traces the round-trip path (IPv6 only)
<i>-S srcaddr</i>	Specifies which address to use to source ping from (IPv6 only)
<i>-4</i>	Specifies to use IPv4 specifically
<i>-6</i>	Specifies to use IPv6 specifically

Consider using a more robust trace route utility, such as VisualRoute by Visualware, Inc. You can run an online demonstration or download a trial version of VisualRoute from [www.visualroute.com](http://www.visualroute.com).