

# IPv6 Hands-On

Pre-GDB IPv6 workshop  
CERN, 10<sup>th</sup> June 2014  
[edoardo.martelli@cern.ch](mailto:edoardo.martelli@cern.ch)

# MS Windows

# IPv6 at CERN



CERN uses DHCPv6

MAC addresses must be registered to get a lease

RAs (Router Advertisements) only used for default gateway and prefix length

# MS Windows 7



DHCPv6 on by default

## **Issue:**

DHCPv6 requests may be sent with the  
MAC address of another interface.

## **Solution:**

Register all the MAC addresses

# MS Windows Vista



## DHCPv6 off by default

Get the interface number:

```
netsh int ipv6 show int
```

Disable Router Discovery:

```
netsh int ipv6 set int [index] routerdiscovery=disabled
```

Enable Managed Address:

```
netsh int ipv6 set int [index] managedaddress=enabled
```

After enabling Managed Address, you may need to run the following commands to delete the existing IP address and renew the DHCP assigned IPv6 address:

```
netsh int ipv6 delete address [index] <static IPv6 address>  
ipconfig /renew6 [index]
```

*Disclaimer: not verified*

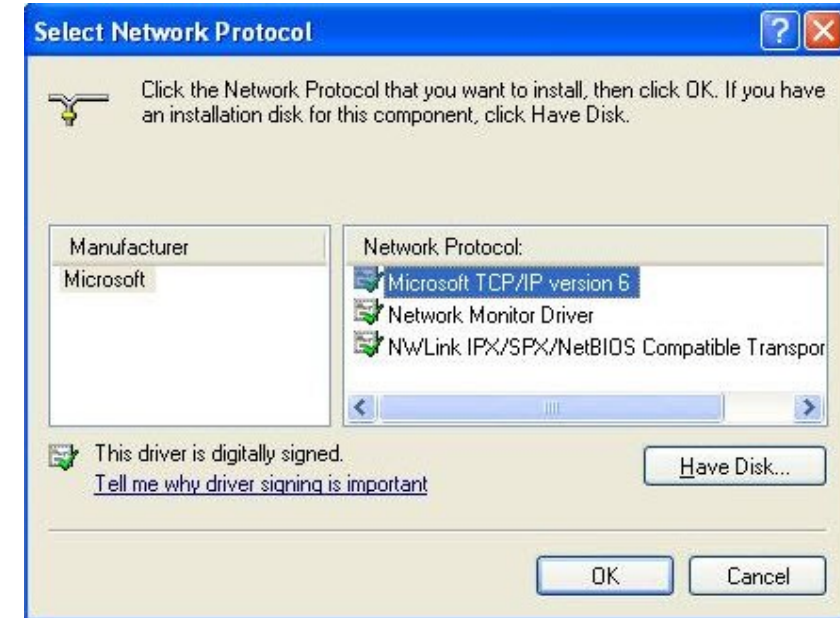
# MS Windows XP



## No DHCPv6 client

In case of SLAAC, IPv6 needs to be enabled manually:

1. Open Network Connections
2. Right-click any local area connection, and then click Properties.
3. Click Install.
4. In the Select Network Component Type dialog box, click Protocol, and then click Add.
5. In the Select Network Protocol dialog box, click Microsoft TCP/IP version 6, and then click OK.
6. Click Close to save changes to your network connection.



# MS Windows 7 checks



The screenshot shows the Windows 7 Control Panel, specifically the Network and Sharing Center. The main window displays network status for 'ITCSEM-KEIRA (This computer)' and a domain network 'cern.ch'. Three diagnostic windows are overlaid:

- Wireless Network Connection Status:** Shows connection details for the wireless network, including IPv4 and IPv6 connectivity (Internet), media state (Enabled), SSID (CERN), duration (00:11:27), speed (300.0 Mbps), and signal quality.
- Network Connection Details:** A table listing network properties and their values.

Property	Value
IPv4 Subnet Mask	255.255.255.0
Lease Obtained	26 May 2014 15:14:50
Lease Expires	26 May 2014 18:14:49
IPv4 Default Gateway	128.141.237.1
IPv4 DHCP Server	137.138.17.6
IPv4 DNS Servers	137.138.17.5 137.138.16.5
IPv4 WINS Servers	137.138.16.248 137.138.17.248
NetBIOS over Tcpip En...	Yes
IPv6 Address	2001:1458:202:180::101:efbf
Lease Obtained	26 May 2014 15:14:46
Lease Expires	27 May 2014 05:14:45
Link-local IPv6 Address	fe80::e151:89e2:2bc8:64fe%12
IPv6 Default Gateway	fe80::215:60ff:feed:ce00%12
IPv6 DNS Server	

# MS Windows 7 checks



```
Administrator: Command Prompt
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>netsh interface ipv6 show route

Publish Type Met Prefix Idx Gateway/Interface Name
-----
No Manual 256 ::/0 12 fe80::215:60ff:feed:ce00
No Manual 256 ::1/128 1 Loopback Pseudo-Interface
1
No Manual 8 2001:1458:202:180::/64 12 Wireless Network Connecti
on
No Manual 256 2001:1458:202:180::101:efbf/128 12 Wireless Network C
onnection
No Manual 8 fd01:1458:201:127d::/64 12 Wireless Network Connecti
on
No Manual 256 fe80::/64 15 Teredo Tunneling Pseudo-I
nterface
No Manual 256 fe80::/64 11 Local Area Connection
No Manual 256 fe80::/64 14 Bluetooth Network Connect
ion
No Manual 256 fe80::/64 12 Wireless Network Connecti
on
No Manual 256 fe80::100:7f:fffe/128 15 Teredo Tunneling Pseudo-I
nterface
No Manual 256 fe80::200:5efe:128.141.237.122/128 17 isatap.cern.ch
No Manual 256 fe80::14cf:8e27:436e:9897/128 11 Local Area Connectio
n
No Manual 256 fe80::2072:ba9f:68a2:a9c4/128 14 Bluetooth Network Co
nnection
No Manual 256 fe80::e151:89e2:2bc8:64fe/128 12 Wireless Network Con
nection
No Manual 256 ff00::/8 1 Loopback Pseudo-Interface
1
No Manual 256 ff00::/8 15 Teredo Tunneling Pseudo-I
nterface
No Manual 256 ff00::/8 11 Local Area Connection
No Manual 256 ff00::/8 14 Bluetooth Network Connect
ion
No Manual 256 ff00::/8 12 Wireless Network Connecti
on

C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
```



# Check IPv6: Windows 7



Check interface configuration:

**ipconfig**

Check routing table:

**netstat -rn**

**netsh interface ipv6 show route**

Manual configuration

Address:

**netsh interface ipv6 add address "Local Area Connection" 2001:1458:201:1::C**

Default gateway:

**netsh interface ipv6 add route ::/0 "Local Area Connection" 2001:1458:201:1::1**

DNS servers:

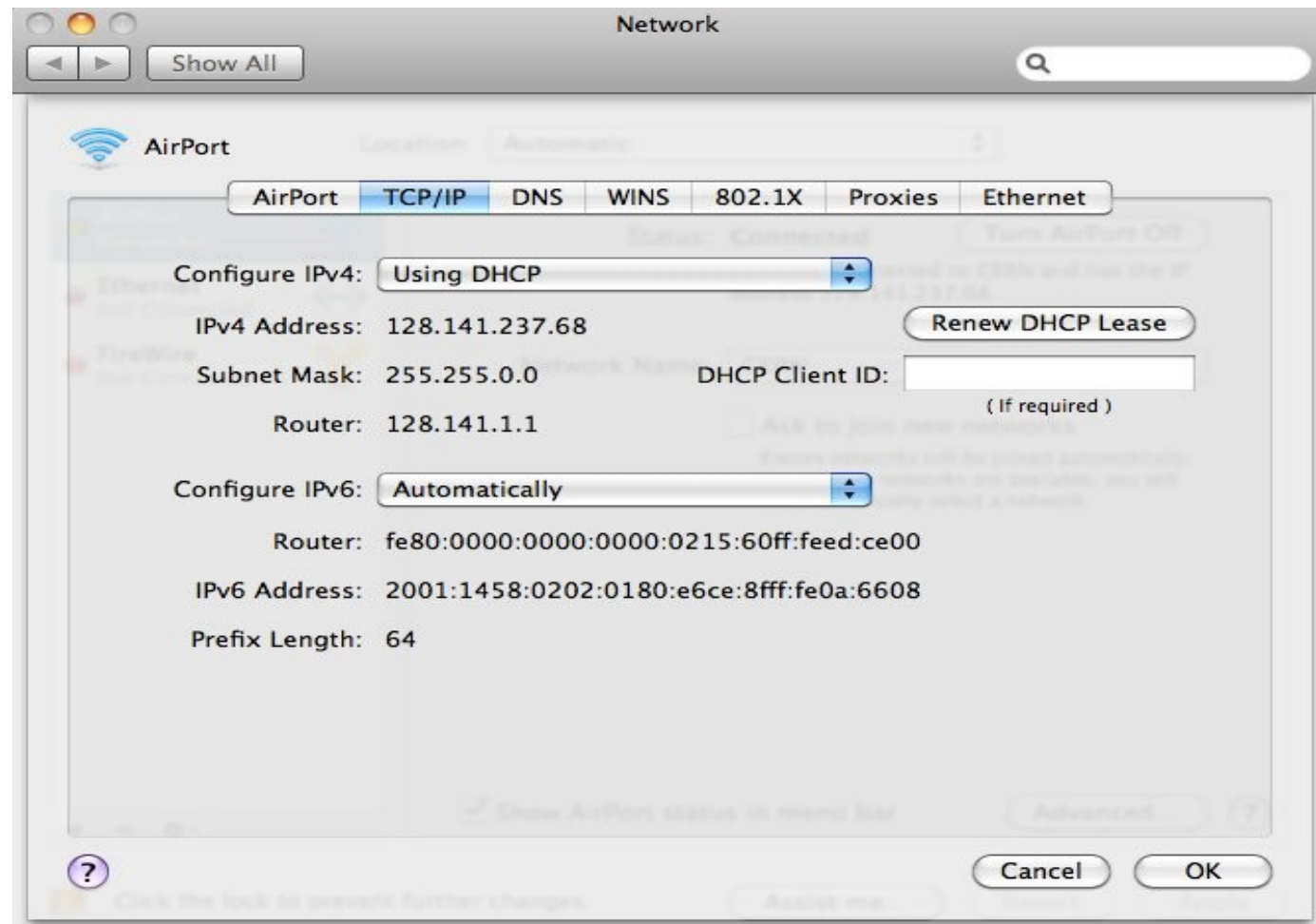
**netsh interface ipv6 add dnsserver "Local Area Connection" 2001:1458:201:1000::5**

# Apple MacOS

# Start IPv6: MacOS X



Enable IPv6 in System Preference, Network,  
Advanced:



# Check IPv6: MacOS X



```
mac$ ifconfig
```

```
en1: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    ether e4:ce:8f:0a:66:08
    inet6 fe80::e6ce:8fff:fe0a:6608%en1 prefixlen 64 scopeid 0x5
    inet 128.141.237.155 netmask 0xffffffff broadcast 128.141.237.255
    inet6 2001:1458:202:180::101:3602 prefixlen 64
    nd6 options=1<PERFORMNUD>
    media: autoselect
    status: active
```

```
mac$ netstat -rn
```

```
$ netstat -rn
```

```
[...]
```

```
Internet6:
```

Destination	Gateway	Flags	Netif
default	fe80::215:60ff:feed:ce00%en1	UGc	en1
::1	::1	UHL	lo0
2001:1458:202:180::/64	link#5	UC	en1
2001:1458:202:180::1	a:0:30:b0:78:1	UHLWI	en1
2001:1458:202:180::101:3602	e4:ce:8f:a:66:8	UHL	lo0
fd01:1458:201:127d::/64	link#5	UC	en1

# Linux

# Start IPv6: Linux



- **SLC5:** IPv6 may be disabled. Edit the file `/etc/modprobe.conf` and remove the lines disabling ipv6 (`#alias ipv6 off,`  
`#options ipv6 disable=1`); then reboot
- **Others:** on by default

# Check IPv6: Linux



```
marit> ifconfig
```

```
eth0      Link encap:Ethernet  HWaddr 00:22:4d:83:03:19  
          inet addr:137.138.32.137 Bcast:137.138.32.191 Mask:255.255.255.192  
          inet6 addr: fe80::222:4dff:fe83:319/64 Scope:Link  
          inet6 addr: 2001:1458:201:b459::100:a/128 Scope:Global  
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
```

```
marit> ip -6 route
```

```
2001:1458:201:b459::100:a dev eth0  proto kernel  metric 256  
2001:1458:201:b459::/64 dev eth0  proto kernel  metric 256  
fd01:1458:204:1a::/64 dev eth0  proto kernel  metric 256  
fe80::/64 dev eth0  proto kernel  metric 256  
default via fe80::215:60ff:feed:ce00 dev eth0  proto ra  metric 1024
```

# Useful commands



## **Static configuration:**

```
ip -6 addr flush scope global dev eth0
ip addr add FEC0::1:0:0:0:21/64 dev eth0
ip route add 0::/0 via 2001:1458:ef10::56
```

## **NDP**

```
ip -6 neighbor
```

*Delete a neighbor entry:*

```
ip -6 neighbor delete 2001:1458:201:b459::1 dev eth0
```

*Trigger neighbor discovery:*

```
ping6 -c2 -I eth0 ff02::1
```

## **Solicit Ras:**

```
rdisc6 eth0
```

## **Disable SLAAC address, but keeps RAs info:**

```
sysctl -w net.ipv6.conf.all.autoconf=0
```



# iOS and Android

# Mobiles



## **iOS**

v6: no DHCPv6 client, SLAAC OK

v7: DHCPv6 on by default, SLAAC OK

## **Android**

v4.x: no DHCPv6 client, only SLAAC

# Final checks

# Check IPv6: <http://ipv6-test.com>



The screenshot shows a Firefox browser window with the URL <http://ipv6-test.com>. The page title is "IPv6 test - IPv6/4 connectivity and speed test - Mozilla Firefox". The browser's address bar shows "ipv6-test.com". The page content includes a navigation menu with options: "connection test", "speed test", "ping test", "website test", "statistics", "api", and "forum".

The main content area contains the following text:

IPv6-test.com is a free service that checks your IPv6 and IPv4 connectivity and speed. Diagnose connection problems, discover which address(es) you are currently using to browse the Internet, and what is your browser's protocol of choice when both v6 and v4 are available.

When both protocols are available, your browser uses

**IPv6**

Your internet connection is **IPv6** capable

**2001:1458:201:b130::191**

**Cern**  
  
Address type is  
**Global Unicast / Native IPv6**

Your internet connection is **IPv4** capable

**137.138.32.137**  
pcitcsem-malli.cern.ch  
**RIPE Network Coordination Centre**  


At the bottom right of the browser window, the status bar shows: **FR 46.105.61.149 (+1) OVH Sarl 16276 OVH**

# Check IPv6: <http://test-ipv6.com>



Test your IPv6 - Mozilla Firefox

Firefox ▾ TEST-IPV6 Test your IPv6. ▾ TEST-IPV6 Test your IPv6. ▾ v6 IPv6 test-IPv6/4 connecti... ▾ Add-ons Manager ▾ entropy.me.uk - SixOrNot ▾ SixOrNot Online Docume... ▾ +

test-ipv6.com

Recent ▾ EM ▾ NET ▾ ITCS ▾ CERN ▾

Test IPv6 | [FAQ](#) | [World IPv6 Launch](#) | [Local Times](#) | [Mirrors](#) | [Stats](#)

## Test your IPv6 connectivity.

[Summary](#) | [Tests Run](#) | [Technical Info](#) | [Share Results / Contact](#)

- Your IPv4 address on the public Internet appears to be 137.138.32.137
- Your IPv6 address on the public Internet appears to be 2001:1458:201:b130::191
- The [World IPv6 Launch](#) day is June 6th, 2012. **Good news!** Your current browser, on this computer and at this location, are expected to keep working after the Launch. [\[more info\]](#)
- Congratulations! You appear to have both IPv4 and IPv6 Internet working. If a publisher publishes to IPv6, your browser will connect using IPv6. Your browser prefers IPv6 over IPv4 when given the choice (this is the expected outcome).
- Your DNS server (possibly run by your ISP) appears to have no access to the IPv6 Internet, or is not configured to use it. This may in the future restrict your ability to reach IPv6-only sites. [\[more info\]](#)

**Your readiness scores**

**10/10** for your IPv4 stability and readiness, when publishers offer both IPv4 and IPv6

**9/10** for your IPv6 stability and readiness, when publishers are forced to go IPv6 only

Click to see [test data](#)

(Updated server side IPv6 readiness stats)

Like Simon Leinen and 13,382 others like this. Tweet 4,749

---

Need something simpler? <http://omgipv6day.com> Spread the word!

Copyright (C) 2010, 2012 Jason Fesler. All rights reserved. -- r732  
[Mirrors](#) | [Mission](#) | [Source](#) | [Email](#) - - [Attributions](#) | [Debug](#)  
This is a mirror of test-ipv6.com. The views expressed here may or may not reflect the views of the mirror owner.

US 216.218.228.114 Hurricane Electric, Inc. 6939 HURRICANE

# Check IPv6: SixOrNot Firefox Add-on



The screenshot shows the Firefox Add-ons Manager interface. The browser tabs include 'WebHome < IPv6 < TWiki', 'Test your IPv6', 'IPv6 test - IPv6/4 connecti...', 'Add-ons Manager', 'entropy.me.uk - SixOrNot', and 'SixOrNot Online Docume...'. The main content area displays the 'SixOrNot 0.7.3' add-on by Timothy Baldock. The add-on is described as an 'IPv6 status indicator' that allows users to see at a glance if a site supports IPv6. It provides a panel with detailed information about the remote site's IP addresses and domains. The add-on can be shown as an address bar icon or a toolbar button. It does not consult external services for the user's IP address and uses platform-native methods for IP determination. It also combines connection-address-only approaches with DNS resolution to show when connecting via IPv4 but the site supports IPv6. The settings section includes 'Automatic Updates' (Default), 'Last Updated' (02/17/2012), 'Homepage' (http://entropy.me.uk/sixornot/), 'Rating' (4.5 stars, 10 reviews), 'Show addressbar icon' (checked), and 'Greyscale mode' (unchecked).

**6 SixOrNot 0.7.3**  
By [Timothy Baldock](#)

**IPv6 status indicator**

This extension allows you to see at a glance whether the site you are connecting to supports the current generation of the Internet Protocol (IPv6) and whether you are connecting using the same. A panel can be opened to provide more detailed information about the remote site's IP addresses, including information about all the domains contacted in order to load the page.

The icon can be shown either in the address bar or as a toolbar button, permitting positioning almost anywhere within the Firefox window.

This add-on does not consult with any external service to determine your own IP address, avoiding any privacy concerns arising from such behaviour. A major advantage this add-on has over similar IP address add-ons is that it tries to make use of platform-native methods for determining local IP addresses and resolving remote ones. This permits a more accurate assessment of your IPv4/IPv6 connectivity.

It also combines the connection-address-only approach of other add-ons with DNS resolution. This allows you to see when you are connecting via IPv4, but the remote site has the capability to be contacted via IPv6.

**Automatic Updates**  Default  On  Off

**Last Updated** 02/17/2012

**Homepage** <http://entropy.me.uk/sixornot/>

**Rating** ★★★★★ [10 reviews](#)

**Show addressbar icon**   
Sets whether the SixOrNot icon is shown in the address bar or not

**Greyscale mode**

# Questions?