



Quality of Service (QoS) Setup Guide

Modem Router - **NF4V**



speed-tests
(<http://speedtest.net>)



NF4V and Quality of Service (QoS)

The following Quality of Service (QoS) settings offer a basic setup example, setting up 2 devices connecting to an NF4V router, one with the highest priority QoS priority data traffic and the other with the lowest priority QoS priority data traffic flow. All other data packet traffic through the router assumes a default best effort setting.

Quality of Service refers to the reservation of bandwidth resources on the NF4V router to provide different priorities to different applications, users, or data flows, or to guarantee a certain level of performance to a data flow.

In this implementation Quality of Service employs DSCP – Differentiated Services Code Point – a computer networking architecture that specifies a simple, scalable and coarse-grained mechanism for classifying, managing network traffic.

This example guide sets up QoS with two devices (PC and laptop) connecting via ethernet cable to an NF4V router. One device (PC) is assigned high priority traffic while the other device (laptop) is assigned a low priority. Before Quality of Service can be implemented the first step involves reserving an IP address for each device linking the MAC address of each device to each IP address.

Quality of Service (QoS) Setup: Part 1 Reserve IP addresses

It is necessary to reserve an IP address for a device that is connecting to the NF4V router so that the QoS settings can manage each device and set data packet traffic priority by MAC and IP address.

LOGGING IN TO THE WEB INTERFACE

1. Open a web browser (such as Internet Explorer, Google Chrome or Firefox), type **http://192.168.20.1** into the address bar and press **enter**.
2. At the login screen, type **admin** into both the Username and the Password fields and click **OK**.



- Click on the **Advanced** menu at the left of the page and then click on **LAN** option.

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Local Area Network (LAN) Setup

Configure the Broadband Router IP Address and Subnet Mask for LAN interface. Group Name **Default** ▼

IP Address: 192.168.20.1
Subnet Mask: 255.255.255.0

Enable IGMP Snooping
 Enable LAN side firewall
 Disable DHCP Server
 Enable DHCP Server

Start IP Address: 192.168.20.2
End IP Address: 192.168.20.254
Primary DNS server: 192.168.20.1
Secondary DNS server: 192.168.20.1
Leased Time (hour): 24

Static IP Lease List: (A maximum 32 entries can be configured)

| MAC Address | IP Address | Remove |
|-------------|------------|--------|
| | | |

Configure the second IP Address and Subnet Mask for LAN interface

Buttons: Edit DHCP Option 60, Edit DHCP Option, DHCP Advance setup, Add Entries, Remove Entries, Apply/Save

- Click the **Add Entries** button.
- Enter the MAC address of the computer/device you are connecting to the router. The MAC address is a 12 character set of numbers and letters (A-F), with every 2 characters separated by a colon.
- Enter the IP address of the computer/device. This is the local address in the range of 192.168.20.x where x = 2 to 254.

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DHCP Static IP Lease

Enter the Mac address and Static IP address then click Apply/Save .

MAC Address: c8:0a:a9:da:34:3f
IP Address: 192.168.20.100

Apply/Save

(the end of this page there is a description of how to find the Mac Address and IP Address)

7. Click the **Apply/Save** button.
8. Complete steps 4 through 7 for each device connected to the NF4V router.
Each entry will be listed in the Static IP Lease List as shown below.

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Local Area Network (LAN) Setup
Configure the Broadband Router IP Address and Subnet Mask for LAN interface. Group Name: **Default**

IP Address: 192.168.20.1
Subnet Mask: 255.255.255.0

Enable IGMP Snooping

Standard Mode
 Blocking Mode

Enable LAN side firewall

Disable DHCP Server
 Enable DHCP Server

Start IP Address: 192.168.20.2
End IP Address: 192.168.20.254
Primary DNS server: 192.168.20.1
Secondary DNS server: 192.168.20.1
Leased Time (hour): 24

Static IP Lease List: (A maximum 32 entries can be configured)

Edit DHCP Option 60 Edit DHCP Option DHCP Advance setup

| MAC Address | IP Address | Remove |
|-------------------|----------------|--------------------------|
| c8:0a:a9:da:34:3f | 192.168.20.100 | <input type="checkbox"/> |
| 70:f1:a1:d5:37:37 | 192.168.20.5 | <input type="checkbox"/> |

Add Entries Remove Entries

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Quality of Service (QoS) Setup: Part 2 QoS Configuration Settings

The following guide shows how to setup 2 devices to an NF4V router, one with high priority QoS, one with low priority QoS.

- Click on the **Advanced** menu at the left of the page and then click on **Quality of Service** option.

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Routing

QoS -- Queue Management Configuration

If Enable QoS checkbox is selected, choose a default DSCP mark to automatically mark incoming traffic without reference to a particular classifier. Click 'Apply/Save' button to save it.

Note: If Enable QoS checkbox is not selected, all QoS will be disabled for all interfaces.

Note: The default DSCP mark is used to mark all egress packets that do not match any classification rules.

Enable QoS

Select Default DSCP Mark: default(000000) ▼

Apply/Save

- Check the “Enable QoS” checkbox.
- Select the **Default DSCP Mark** as **default(000000)**.
- Click the **Apply/Save** button.

High Priority QoS Queue Configuration

- Click on the **Advanced Setup** Menu at the left of page, then click on **Quality of Service** option and then click on **QoS Queue** option.

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QoS Queue Setup

In ATM mode, maximum 16 queues can be configured.
In PTM mode, maximum 8 queues can be configured.
For each Ethernet interface, maximum 3 queues can be configured.
To add a queue, click the **Add** button.
To remove queues, check their remove-checkboxes, then click the **Remove** button.
The **Enable** button will scan through every queues in the table. Queues with enable-checkbox checked will be enabled. Queues with enable-checkbox un-checked will be disabled.
The enable-checkbox also shows status of the queue after page reload.
If you disable WMM function in Wireless Page, queues related to wireless will not take effects.

The QoS function has been disabled. Queues would not take effects.

| Name | Key | Interface | Qid | Prec/Alg/Wght | DSL Latency | PTM Priority | Min Bit Rate(bps) | Shaping Rate(bps) | Burst Size(bytes) | Enable | Remove |
|--------------------|-----|-----------|-----|---------------|-------------|--------------|-------------------|-------------------|-------------------|--------------------------|--------|
| WMM Voice Priority | 1 | wl0 | 0 | 1/SP | | | | | | Enabled | |
| WMM Voice Priority | 2 | wl0 | 0 | 2/SP | | | | | | Enabled | |
| WMM Video Priority | 3 | wl0 | 0 | 3/SP | | | | | | Enabled | |
| WMM Video Priority | 4 | wl0 | 0 | 4/SP | | | | | | Enabled | |
| WMM Best Effort | 5 | wl0 | 0 | 5/SP | | | | | | Enabled | |
| WMM Background | 6 | wl0 | 0 | 6/SP | | | | | | Enabled | |
| WMM Background | 7 | wl0 | 0 | 7/SP | | | | | | Enabled | |
| WMM Best Effort | 8 | wl0 | 0 | 8/SP | | | | | | Enabled | |
| Default Queue | 34 | atm0 | 1 | 8/WRR/1 | Path0 | | | | | <input type="checkbox"/> | |
| Default Queue | 35 | ptm0 | 1 | 8/WRR/1 | Path0 | Low | | | | <input type="checkbox"/> | |

Add Enable Remove

- Click the **Add** Button

QoS Queue Configuration

This screen allows you to configure a QoS queue and add it to a selected layer2 interface.

Name:

Enable:

Interface:

Queue Precedence: (lower value, higher priority)
- The precedence list shows the scheduler algorithm for each precedence level.
- Queues of equal precedence will be scheduled based on the algorithm.
- Queues of unequal precedence will be scheduled based on SP.

Queue Scheduler
 Weighted Round Robin
 Weighted Fair Queuing

Queue Weight: [1-63]

DSL Latency:

15. Enter a **name** of 15 characters or less to reflect the device will use high priority QoS – eg. **PC1HighPriority**
16. Set **Enable** to “**Enable**”.
17. Set the **Interface** (Australian customers use **atm0(0_8_35)**, NZ customers use **atm0(0_0_100)**).
18. Enter a **Precedence**. For the highest priority set it to **1**. For the lowest priority use **3**.
19. Set the **DSL Latency** as **Path0**.
20. Click the **Apply/Save** button.

Low Priority QoS Queue Configuration

21. Click on the **Advanced Setup** Menu at the left of page, then click on **Quality of Service** option and then click on **QoS Queue** option.

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- IPSec
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- Power Management
- Multicast

QoS Queue Setup

In ATM mode, maximum 16 queues can be configured.
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 For each Ethernet interface, maximum 3 queues can be configured.
 To add a queue, click the **Add** button.
 To remove queues, check their remove-checkboxes, then click the **Remove** button.
 The **Enable** button will scan through every queues in the table. Queues with enable-checkbox checked will be enabled. Queues with enable-checkbox un-checked will be disabled.
 The enable-checkbox also shows status of the queue after page reload.
 If you disable WMM function in Wireless Page, queues related to wireless will not take effects

The QoS function has been disabled. Queues would not take effects.

| Name | Key | Interface | Qid | Prec/Alg/Wght | DSL Latency | PTM Priority | Min Bit Rate(bps) | Shaping Rate(bps) | Burst Size(bytes) | Enable | Remove |
|--------------------|-----|-----------|-----|---------------|-------------|--------------|-------------------|-------------------|-------------------|--------------------------|--------------------------|
| WMM Voice Priority | 1 | wl0 | 0 | 1/SP | | | | | | Enabled | |
| WMM Voice Priority | 2 | wl0 | 0 | 2/SP | | | | | | Enabled | |
| WMM Video Priority | 3 | wl0 | 0 | 3/SP | | | | | | Enabled | |
| WMM Video Priority | 4 | wl0 | 0 | 4/SP | | | | | | Enabled | |
| WMM Best Effort | 5 | wl0 | 0 | 5/SP | | | | | | Enabled | |
| WMM Background | 6 | wl0 | 0 | 6/SP | | | | | | Enabled | |
| WMM Background | 7 | wl0 | 0 | 7/SP | | | | | | Enabled | |
| WMM Best Effort | 8 | wl0 | 0 | 8/SP | | | | | | Enabled | |
| Default Queue | 34 | atm0 | 1 | 8/WRR/1 | Path0 | | | | | <input type="checkbox"/> | |
| Default Queue | 35 | ptm0 | 1 | 8/WRR/1 | Path0 | Low | | | | <input type="checkbox"/> | |
| PC1HighPriority | 36 | atm0 | 2 | 1/WRR/1 | Path0 | | | | | <input type="checkbox"/> | <input type="checkbox"/> |

Add Enable Remove

22. Click the **add** button.

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- UPnP
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- DLNA

QoS Queue Configuration

This screen allows you to configure a QoS queue and add it to a selected layer2 interface.

Name:

Enable:

Interface:

Queue Precedence: (lower value, higher priority)

- The precedence list shows the scheduler algorithm for each precedence level.
- Queues of equal precedence will be scheduled based on the algorithm.
- Queues of unequal precedence will be scheduled based on SP.

Queue Scheduler

Weighted Round Robin

Weighted Fair Queuing

Queue Weight: [1-63]

DSL Latency:

23. Enter a **name** of 15 characters or less to reflect the device will use low priority QoS – eg. **PC2LowPriority**.

24. Set **Enable** to “**Enable**”.

25. Set the **Interface** (Australian customers use **atm0(0_8_35)**, NZ customers use **atm0(0_0_100)**).

26. Enter a **Precedence**. For the lowest priority set it to **3**. For the highest priority use **1**.

27. Set the **DSL Latency** as **Path0**.

28. Click the **Apply/Save** button.

High Priority QoS Classification

29. Click on the Advanced Setup menu, then click on Quality of Service option and then click on QoS Classification option.

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QoS Classification Setup -- maximum 32 rules can be configured.

To add a rule, click the Add button.
To remove rules, check their remove-checkboxes, then click the Remove button.
The Enable button will scan through every rules in the table. Rules with enable-checkbox checked will be enabled. Rules with enable-checkbox un-checked will be disabled.
The enable-checkbox also shows status of the rule after page reload.
If you disable WMM function in Wireless Page, classification related to wireless will not take effects.

The QoS function has been disabled. Classification rules would not take effects.

| CLASSIFICATION CRITERIA | | | | | | | | | | | | | | CLASSIFICATION RESULTS | | | | | | |
|--|-------|-----------------|---------------|-----------------|----------------------|-------------------------|------------------------------|----------|-------------|------------------|------------|----------|--------------|------------------------|-----------|---------|-------------|------------------|--------|--------|
| Class Name | Order | Class Interface | Ethernet Type | Source MAC/Mask | Destination MAC/Mask | Source IP/Prefix Length | Destination IP/Prefix Length | Protocol | Source Port | Destination Port | DSCP Check | TC Check | 802.1P Check | Queue Key | DSCP Mark | TC Mark | 802.1P Mark | Rate Limit(kbps) | Enable | Remove |
| <input type="button" value="Add"/> <input type="button" value="Enable"/> <input type="button" value="Remove"/> | | | | | | | | | | | | | | | | | | | | |

30. Click the add button

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Add Network Traffic Class Rule

This screen creates a traffic class rule to classify the ingress traffic into a priority queue and optionally mark the DSCP or Ethernet priority of the packet. Click 'Apply/Save' to save and activate the rule.

Traffic Class Name: PCIHighPriority
Rule Order: Last
Rule Status: Enable

Specify Classification Criteria (A blank criterion indicates it is not used for classification.)

Class Interface: LAN
Ether Type: IP (0x800)
Source MAC Address: 70:f1:a1:d5:37:37
Source MAC Mask:
Destination MAC Address:
Destination MAC Mask:
Source IP Address[/Mask]: 192.168.20.5
Destination IP Address[/Mask]:
Differentiated Service Code Point (DSCP) Check: EF(101110)
Protocol: TCP
UDP/TCP Source Port (port or port:port):
UDP/TCP Destination Port (port or port:port):

Specify Classification Results (A blank value indicates no operation.)

Specify Class Queue (Required): wl0&Key1&Pre1
- Packets classified into a queue that exit through an interface for which the queue is not specified to exist, will instead egress to the default queue on the interface.

Mark Differentiated Service Code Point (DSCP): EF(101110)
Mark 802.1p priority: 5
- Class non-vlan packets egress to a non-vlan interface will be tagged with VID 0 and the class rule p-bits.
- Class vlan packets egress to a non-vlan interface will have the packet p-bits re-marked by the class rule p-bits. No additional vlan tag is added.
- Class non-vlan packets egress to a vlan interface will be tagged with the interface VID and the class rule p-bits.
- Class vlan packets egress to a vlan interface will be additionally tagged with the packet VID, and the class rule p-bits.

Set Rate Limit: [Kbits/s]

Apply/Save

31. Enter a Traffic Class **Name** reflecting the High Priority QoS rule; eg. **PC1HighPriority**.
32. Leave the Rule Order as **Last**.
33. Set the Rule Status to **Enable**.
34. Set the Class Interface according to how the device connects to the router. In the example above **LAN** is selected. Other options are **Wireless**, Local and **USB**.
35. Set the **Ether Type** to **IP(0x800)**. Other options include ARP(0x0806), Ipv6(0x86DD), PPPoE_DISC(0x8863), 8865(0x8865), 8866(0x8866), 8021Q(0x8100).
36. Enter the **Source MAC Address** of the device, the unique 12 character signature with every 2 characters separated by a colon(:), that you previously entered to reserve the device's IP address.
37. Enter the **Source IP Address** of the device that you previously entered into the Static IP Lease List, in the range of 192.168.20.x In the example above the IP address is 192.168.20.5.
38. Enter a **Destination MAC Address** if the connection is to a single device. This is useful for VPN connections. If you wish the destination MAC address to be any address leave the field blank.
39. Enter a **Destination IP Address** if the connection is to a single device. This is useful for VPN connections. If you wish the destination IP address to be any address leave the field blank.
40. Enter a **Destination Subnet Mask** if you have entered a Destination MAC address and Destination IP address. This would normally be 255.255.255.0 unless your system administrator advises otherwise. If you have not entered a Destination MAC or IP address leave the field blank.
41. Set the **Differentiated Service Code Point (DSCP) Check** to **EF(101110)**.
42. Set the **Protocol** to **TCP**. Other options include UDP, ICMP or IGMP.
43. Set "**Assign Classification Queue**" to Priority 1 (in the example above pppoa0&atm0&Path0&Key38&Pre1). Other options or priority 2 and 3. Priority 1 gives the highest priority with priority 3 being the lowest.
44. Set **Mark Differentiated Service Code Point (DSCP)** as **EF(101110)**.
45. Set **Mark 802.1p Priority** as **5**. In the scale 0-7, 0 is best effort, 6 and 7 are reserved for networking performance so set 5 as the highest priority.
46. Click the **Apply/Save** button.

Low Priority QoS Classification

47. Click on the **Advanced Setup** Menu at the left of page, then click on **Quality of Service** option and then click on **QoS Classification** option.

QoS Classification Setup -- maximum 32 rules can be configured.

To add a rule, click the **Add** button.
To remove rules, check their remove-checkboxes, then click the **Remove** button.
The **Enable** button will scan through every rules in the table. Rules with enable-checkbox checked will be enabled. Rules with enable-checkbox un-checked will be disabled.
The enable-checkbox also shows status of the rule after page reload.
If you disable WMM function in Wireless Page, classification related to wireless will not take effects.

The QoS function has been disabled. Classification rules would not take effects.

| CLASSIFICATION CRITERIA | | | | | | | | | | | | | CLASSIFICATION RESULTS | | | | | | | |
|-------------------------|-------|-----------------|---------------|---------------------|----------------------|-------------------------|------------------------------|----------|-------------|------------------|------------|----------|------------------------|-----------|-----------|---------|-------------|------------------|-------------------------------------|--------------------------|
| Class Name | Order | Class Interface | Ethernet Type | Source MAC/Mask | Destination MAC/Mask | Source IP/Prefix Length | Destination IP/Prefix Length | Protocol | Source Port | Destination Port | DSCP Check | TC Check | 802.1P Check | Queue Key | DSCP Mark | TC Mark | 802.1P Mark | Rate Limit(kbps) | Enable | Remove |
| PC1HighPriority | 1 | LAN | IP | 70:ff:aa:1d:5:37:37 | | 192.168.20.5 | | TCP | | | EF | | | 1 | EF | | 5 | | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

48. Click the **Add** button.

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Add Network Traffic Class Rule

This screen creates a traffic class rule to classify the ingress traffic into a priority queue and optionally mark the DSCP or Ethernet priority of the packet. Click 'Apply/Save' to save and activate the rule.

Traffic Class Name:

Rule Order:

Rule Status:

Specify Classification Criteria (A blank criterion indicates it is not used for classification.)

Class Interface:

Ether Type:

Source MAC Address:

Source MAC Mask:

Destination MAC Address:

Destination MAC Mask:

Source IP Address[/Mask]:

Destination IP Address[/Mask]:

Differentiated Service Code Point (DSCP) Check:

Protocol:

UDP/TCP Source Port (port or port:port):

UDP/TCP Destination Port (port or port:port):

Specify Classification Results (A blank value indicates no operation.)

Specify Class Queue (Required):

Mark Differentiated Service Code Point (DSCP):

Mark 802.1p priority:

Set Rate Limit: [Kbits/s]

49. Enter a **Traffic Class Name** reflecting the High Priority QoS rule; eg. **PC2LowPriority**.
50. Leave the **Rule Order** as **Last**.
51. Set the **Rule Status** to **Enable**.
52. Set the **Class Interface** according to how the device connects to the router. In the example above **LAN** is selected. Other options are **Wireless**, Local and **USB**.
53. Set the **Ether Type** to **IP(0x800)**. Other options include ARP(0x8086), Ipv6(0x86DD), PPPoE_DISC(0x8863), 8865(0x8865), 8866(0x8866), 8021Q(0x8100).
54. Enter the **Source MAC Address** of the device, the unique 12 character signature with every 2 characters separated by a colon(:), that you previously entered to reserve the device's IP address.
55. Enter the **Source IP Address** of the device that you previously entered into the Static IP Lease List, in the range of 192.168.20.x In the example above the IP address is 192.168.20.100.
56. Enter a **Destination MAC Address** if the connection is to a single device. This is useful for VPN connections. If you wish the destination MAC address to be any address leave the field blank.
57. Enter a **Destination IP Address** if the connection is to a single device. This is useful for VPN connections. If you wish the destination IP address to be any address leave the field blank.
58. Enter a **Destination Subnet Mask** if you have entered a Destination MAC address and Destination IP address. This would normally be 255.255.255.0 unless your system administrator advises otherwise. If you have not entered a Destination MAC or IP address leave the field blank.
59. Set the **Differentiated Service Code Point (DSCP) Check** to **AF11(001010)**.

60. Set the **Protocol** to **TCP**. Other options include UDP, ICMP or IGMP.
61. Set "**Assign Classification Queue**" to Priority 3 (in the example above pppoa0&atm0&Path0&Key39&Pre3). Other options are priority 1 and 2. Priority 1 gives the highest priority with priority 3 being the lowest.
62. Set **Mark Differentiated Service Code Point (DSCP)** as **AF11(001010)**.
63. Set **Mark 802.1p Priority** as **0**. In the scale 0-7, 0 is best effort, 6 and 7 are reserved for networking performance so set 0 as the lowest priority.
64. Click the **Apply/Save** button.
65. You now have 2 Quality of Service rules implemented for 2 devices connecting to the NF4V router.

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QoS Classification Setup -- maximum 32 rules can be configured.

To add a rule, click the **Add** button.
To remove rules, check their remove-checkboxes, then click the **Remove** button.
The **Enable** button will scan through every rules in the table. Rules with enable-checkbox checked will be enabled. Rules with enable-checkbox un-checked will be disabled.
The enable-checkbox also shows status of the rule after page reload.
If you disable WMM function in Wireless Page, classification related to wireless will not take effects.

The QoS function has been disabled. Classification rules would not take effects.

| CLASSIFICATION CRITERIA | | | | | | | | | | | | | | CLASSIFICATION RESULTS | | | | | | |
|-------------------------|-------|-----------------|---------------|-------------------|----------------------|-------------------------|------------------------------|----------|-------------|------------------|------------|----------|--------------|------------------------|-----------|---------|-------------|------------------|-------------------------------------|--------------------------|
| Class Name | Order | Class Interface | Ethernet Type | Source MAC/Mask | Destination MAC/Mask | Source IP/Prefix Length | Destination IP/Prefix Length | Protocol | Source Port | Destination Port | DSCP Check | TC Check | 802.1P Check | Queue Key | DSCP Mark | TC Mark | 802.1P Mark | Rate Limit(kbps) | Enable | Remove |
| PC1HighPriority | 1 | LAN | IP | 70:f1:a1:d5:37:37 | | 192.168.20.5 | | TCP | | | EF | | | 1 | EF | | 5 | | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| PC2LowPriority | 2 | LAN | IP | e8:0a:a9:da:34:3f | | 192.168.20.100 | | TCP | | | AF11 | | | 3 | AF11 | | 0 | | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

66. Click on the **Management** menu, then click on **Reboot** option and then Click the **Reboot button** to restart the router and save the new settings.

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Access Control
Update Software
Reboot

Click the button below to reboot the router.

67. To test your Quality of Service settings try running speed-tests (<http://speedtest.net>) on both pcs/devices **simultaneously**.

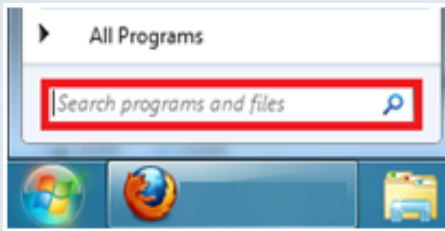
How to Find a Computer's MAC Address (Windows 7 and 8) PRINT EMAIL

Option 1:

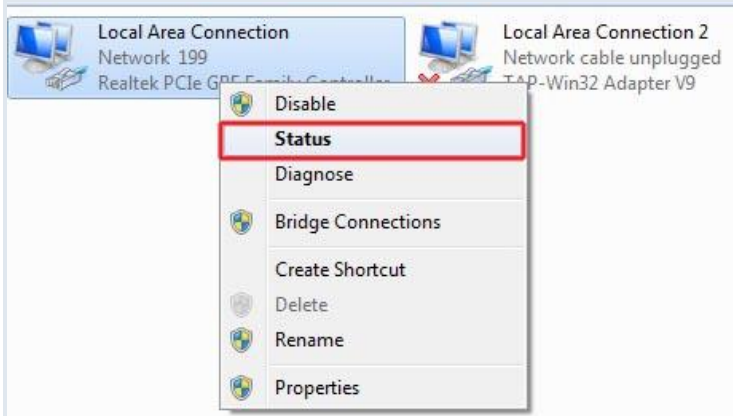
- 1) For windows 7 : *Click* the **Start** at the bottom left of your screen,

For Windows 8 : press Windows logo Icon and R together

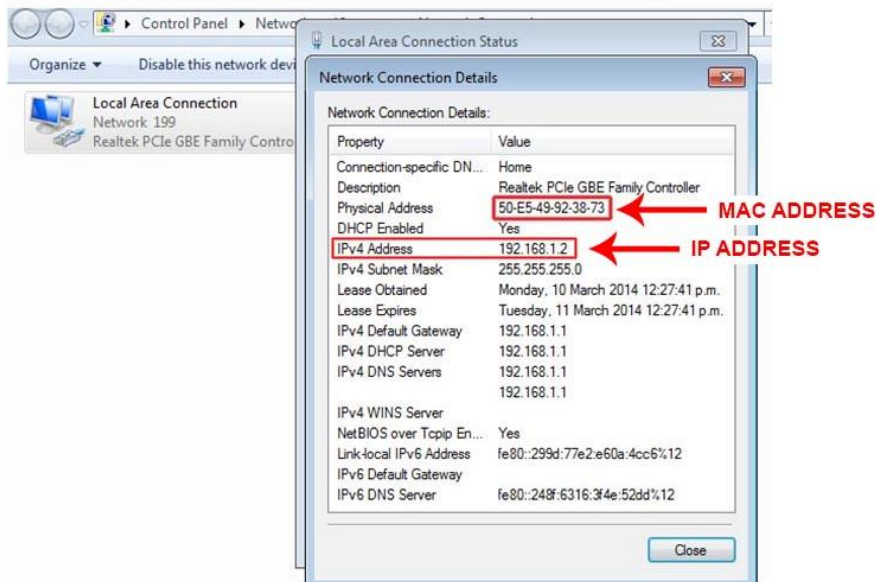
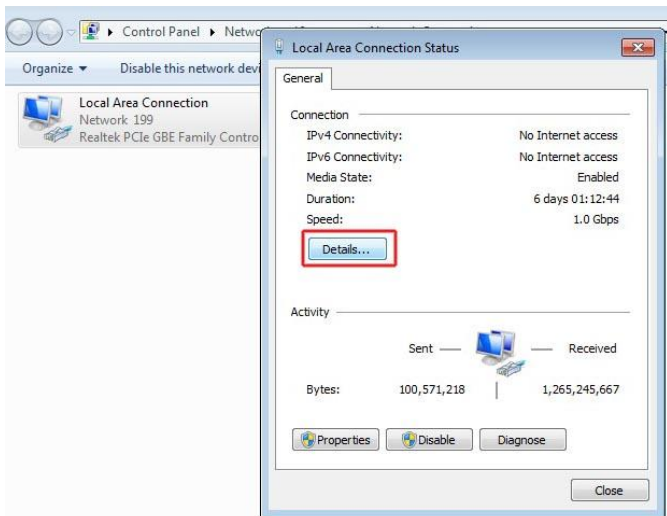
2) Type **ncpa.cpl** into the search box and press **ENTER**.



3) Right-click your **Local Area Connection** and select **Status**.



4) Click **Details** and the **Physical Address** is your MAC Address.

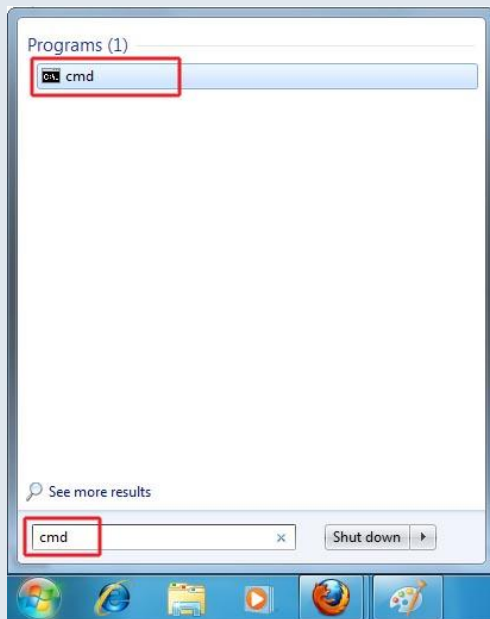


Option 2:

1) For windows 7 : *Click* the **Start** at the bottom left of your screen,

For Windows 8 : press Windows logo Icon and R together

2). In the search box, type in **cmd** and press enter.



3. In the command prompt, type in **getmac** (with no spaces) and push enter.

```
C:\Users\techsupport>getmac
Physical Address      Transport Name
-----
50-E5-49-92-38-73    \Device\NPF{54D1C54D-686A-4428-A794-190B2B0754AC}
00-FF-75-CF-EF-7B    Media disconnected
```



NetCommWireless

NF4V