Quality of Service (QoS) Setup
(3G29Wn)
3G29Wn and Quality of Service (QoS)

The following Quality of Service (QoS) settings offer a basic setup example, setting up 3 devices connecting to the 3G29Wn router, the first with the highest priority QoS settings for data traffic with a VoIP ATA, the second with medium priority QoS settings for data traffic flow for a gaming console and the third with low priority QoS settings for data traffic flow to a PC intended for browsing the internet only. 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 3G29Wn router to provide different priorities to different applications, users, or data flows, or to guarantee a certain level of performance to a data flow. The guide helps create a series of traffic class rules to classify the upstream traffic and assign queuing priority.

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 (VoIP ATA, gaming console) connecting via ethernet cable to an 3G29Wn series router. A third device connects via wireless to the 3G29Wn router. One device (VoIP ATA) is assigned the highest priority traffic while the second device (gaming console) is assigned a medium priority while the third device (PC) is assigned a low best effort 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 as shown in step one. The MAC address is a unique identifier comprised of 12 characters that most network devices possess. To find the MAC address of a network device check underneath the device or for a pc look for the physical address after typing “ipconfig /all” in a command prompt.
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 3G29Wn router so that the QoS settings can manage each device and prioritize data packet traffic to each device. Each device connected to the router is identified by MAC and IP address. So that the IP address of a device does not change when the router or device is rebooted it is best practice to reserve the IP address.

1. Navigate to http://192.168.1.1 in a web browser using "admin" (no quotes) as both the username and password.
2. Select Advanced > LAN and select the Add Entries button.
3. Enter the **MAC address** of the device you are connecting to the 3G29Wn. Ensure you enter a colon (:) between every 2 characters.

4. Enter the IP address of the device you are connecting to the 3G29Wn. This will be a local address in the range of 192.168.1.x where x can be from 2 to 254.

5. Press the **Apply/Save** button.
6. Complete steps 2 - 5 until you have reserved an IP address for all devices connected to the 3G29Wn. The Advanced > LAN page should then show the **Static IP Lease List** similar to the screenshot below.
**Quality of Service (QoS) Setup: Part 2 QoS Queue Management Configuration**

1. Select **Advanced > Quality of Service > Queue Management**.

   ![NetComm Gateway Interface](image)

   **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

2. Check the “**Enable QoS**” checkbox.

3. Set the “**Select Default DSCP Mark**” to **default(000000)**.

4. Press the **Apply/Save** button.
Quality of Service (QoS) Setup: Part 3 QoS Queue Setup

1. Select Advanced > Quality of Service > Queue Setup.

2. Press the Add button.
3. The first queue we will create is for high priority QoS. Enter a **Name** to reflect this. In the example below the name is simply High_Priority.

4. Set the **Enable** option to “**Enable**”.

5. Set the **Interface**. For Australian users select pppoe(0_8_35). For New Zealand users select pppoa(0_0_100).

6. Set the **Precedence** to “1”. (1 being the highest priority, 3 being lowest priority).

7. Set the **DSL Latency** to “Path0”.

8. Press the **Apply/Save** button.
9. Back on the **Advanced > Quality of Service > Queue Setup** page press the **Add** button.

10. Enter a **Name** to reflect a QoS queue of **Medium_Priority**.

11. Set the **Enable** option to “**Enable**”.

12. Set the **Interface**. For Australian users select `pppoe(0_8_35)`, for New Zealand users select `pppoa(0_0_100)`.

13. Set the **Precedence** to “**2**”.

14. Set the **DSL Latency** to “**Path0**”.

15. Press the **Apply/Save** button.
16. Back on the Advanced > Quality of Service > Queue Setup page press the Add button.

17. Enter a Name to reflect a QoS queue of Low_Priority.

18. Set the Enable option to “Enable”.

19. Set the Interface. For Australian users select pppoe(0_8_35), for New Zealand users select pppoa(0_0_100).

20. Set the Precedence to “3”.

21. Set the DSL Latency to “Path0”.

22. Press the Apply/Save button.
23. The **Advanced > Quality of Service > Queue Setup** page of the 3G29Wn interface should now resemble the screenshot below.
Quality of Service (QoS) Setup: Part 4 QoS Queue Configuration

The following steps show how to setup 3 devices with QoS to a 3G29Wn router, one with high priority QoS settings, one with medium priority QoS settings one with low priority QoS settings.

High Priority Device QoS Settings

1. Select Advanced > Quality of Service > Queue Configuration.
2. Set the Traffic Class Name for the device you wish to set High Priority QoS for. In the example above the Traffic Class Name is simply called High_Priority.

3. Set the Rule Order as "Last".

4. Set the Rule Status to "Enable".

5. Set the Class Interface. Options include Local (traffic between devices connected to the 3G29Wn ie in the range 192.168.1.2-254), eth0 – ethernet cable connection, wi0 – wireless connection).

6. Select the Ether type. Options include IP(0x800), ARP(0x806), IPv6(0x86DD), PPPoE_DISC(0x8863), PPPoE_SES(0x8864), 8865(0x8865), 8866(0x8866), 8021Q(0x8100).

7. Enter the Source MAC Address, the MAC address of the device you are connecting to the router.

8. Enter the Source MAC Mask. Also known as a source MAC Address wild card mask. Wildcards are used to mask all or part of a source IP address. Wild card masks specify which bits are used and which bits are ignored. A MAC mask of ff:ff:ff:ff:ff:ff indicates that no bits are important. A MAC mask of 00:00:00:00:00:00 indicates that all the bits are important. Use 00:00:00:00:00:00 or no mask at all.

9. Enter the Destination MAC Address if the destination is to a single server address and you know what the MAC address is. If you require the destination MAC address to be any address on the internet leave this field blank.

10. Enter the Destination Subnet Mask of 00:00:00:00:00:00:00 if you have entered a Destination MAC Address. If you did not enter a Destination MAC Address leave this field blank.

11. Enter the Source IP Address, the IP address of the device you have connected to the router.

12. Enter the Source MAC Mask of 255.255.255.0 if you have entered a Source IP address.

13. Enter the Destination IP Address if the destination IP address is to a single server address. If the destination is required to be any IP address leave this field blank.

14. Enter the Destination Subnet Mask of 255.255.255.0 if you entered a Class 3 Destination IP Address, otherwise leave this field blank.

15. Set the Differentiated Service Code Point (DSCP) Check as EF(101110).

16. Select the Protocol. The above example is for a VoIP ATA so UDP for ports 5060 – 5061 is selected. Other options include TCP, ICMP and IGMP.

17. Enter the UDP/TCP Source Port (or port range) and UDP/TCP Destination Port (or port range) if required.

18. Set the Assign Classification Queue field. For this queue being of high priority select pppoa0&Prec1&Path0 or pppoe0&Prec1&Path0 depending on your type of connection.


20. Mark 802.1p priority as 5. In the scale from 0 -7, 0 is best effort, 6 and 7 are reserved for networking so set the highest priority as 5.

21. Set the Tag VLAN ID [0-4094]: to 0.

22. Set the Rate Control (kbps) if you wish to have a limit to the bandwidth, or else leave this field blank.

23. Press the Apply/Save button.
Medium Priority Device QoS Settings

NETCOMM GATEWAY™ SERIES
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Add Network Traffic Class Rule
The screen creates a traffic class rule to classify the upstream traffic, assign queue which defines the precedence and the interface and optionally overwrite the IP header DSCP byte. A rule consists of a class name and at least one condition below. All of the specified conditions in this classification rule must be satisfied for the rule to take effect. Click ‘Save/Apply’ to save and activate the rule.

Traffic Class Name:
Medium_Priority

Rule Order:
Last

Rule Status:
Enable

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

Class Interface:

Ether Type:

Source MAC Address:

Destination MAC Address:

Source IP Address:

Source Subnet Mask:

Destination IP Address:

Destination Subnet 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
Must select a classification queue. A blank mark or tag value means no change.

Assign Classification Queue:
pppoa0@Ptwc2&Path0

Mark Differentiated Service Code Point (DSCP):
AF32(011100)

Mark IPv4 1p priority:
3

Tag VLAN ID (0-4094):
1

Set Rate Control(kbps):

Apply/Save.
24. Select Advanced > Quality of Service > Queue Configuration.
25. Set the **Traffic Class Name** for the device you wish to set High Priority QoS for. In the example above the Traffic Class Name is simply called **Medium_Priority**.
26. Set the **Rule Order** as "Last".
27. Set the **Rule Status** to “Enable”.
28. Set the **Class Interface**. Options include **Local** (traffic between devices connected to the 3G29Wn ie in the range 192.168.1.2-254), **eth0** – ethernet cable connection, **wl0** – wireless connection).
29. Select the **Ether Type**. Options include **IP(0x800)**, **ARP(0x806)**, **IPv6(0x86DD)**, **PPPoE_DISC(0x8863)**, **PPPoE SES(0x8864)**, **8865(0x8865)**, **8866(0x8866)**, **8021Q(0x8100)**.
30. Enter the **Source MAC Address**, the MAC address of the device you are connecting to the router.
31. Enter the **Source MAC Mask**. Also known as a source MAC Address wild card mask. Wildcards are used to mask all or part of a source IP address. Wild card masks specify which bits are used and which bits are ignored. A MAC mask of ff:ff:ff:ff:ff:ff indicates that all the bits are important. A MAC mask of 00:00:00:00:00:00 indicates that all the bits are important. Use 00:00:00:00:00:00 or no mask at all.
32. Enter the **Destination MAC Address** if the destination is to a single server address and you know what the MAC address is. If you require the destination MAC address to be any address on the internet leave this field blank.
33. Enter the **Destination Subnet Mask** of 00:00:00:00:00:00:00:00 if you have entered a **Destination MAC Address**. If you did not enter a Destination MAC Address leave this field blank.
34. Enter the **Source IP Address**, the IP address of the device you have connected to the router.
35. Enter the **Source MAC Mask** of 255.255.255.0 if you have entered a **Source IP address**.
36. Enter the **Destination IP Address** if the destination IP address is to a single server address. If the destination is required to be any IP address leave this field blank.
37. Enter the **Destination Subnet Mask** of 255.255.255.0 if you entered a (Class 3) **Destination IP Address**, otherwise leave this field blank.
38. Set the **Differentiated Service Code Point (DSCP) Check** as **AF32(011100)**.
39. Select the **Protocol**. Options include **TCP**, **UDP**, **ICMP** and **IGMP**.
40. Enter the **UDP/TCP Source Port** (or port range) and **UDP/TCP Destination Port** (or port range) if required.
41. Set the **Assign Classification Queue** field. For this queue being of high priority select **pppoa0&Prec2&Path0** or **pppoe0&Prec2&Path0** depending on your type of connection.
42. Set the **Differentiated Service Code Point (DSCP) as AF32(011100)**. (Assured forwarding – for medium priority).
43. **Mark 802.1p priority** to 3. In the scale from 0 -7, 0 is best effort, 6 and 7 are reserved for networking.
44. Set the **Tag VLAN ID [0-4094]**: to 1.
45. Set the **Rate Control (kbps)** if you wish to have a limit to the bandwidth, or else leave this field blank.
46. Press the **Apply/Save** button.
Low Priority Device QoS Settings

Add Network Traffic Class Rule

The screen creates a traffic class rule to classify the upstream traffic, assign queue which defines the precedence and the interface and optionally overwrite the IP header DSCP byte. A rule consists of a class name and at least one condition below. All of the specified conditions in this classification rule must be satisfied for the rule to take effect. Click 'Save/Apply' to save and activate the rule.

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

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 Fall
Source Subnet Mask:
Destination IP Address:
Destination Subnet 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
Must select a classification queue. A blank mark or tag value means none.

Assign Classification Queue:
Mark Differentiated Service Code Point (DSCP):
Mark 802.1p priority:
Tag VLAN ID (0-4094):
Set Rate Control(kbps):

Apply/Save
47. Select Advanced > Quality of Service > Queue Configuration.
48. Set the Traffic Class Name for the device you wish to set High Priority QoS for. In the example above the Traffic Class Name is simply called Low_Priority.
49. Set the Rule Order as "Last".
50. Set the Rule Status to “Enable”.
51. Set the Class Interface. Options include Local (traffic between devices connected to the 3G29Wn ie in the range 192.168.1.2-254), eth0 – ethernet cable connection, wl0 – wireless connection).
52. Select the Ether Type. Options include IP(0x800), ARP(0x806), IPv6(0x86DD), PPPoE_DISC(0x8863), PPPoE_SES(0x8864), 8865(0x8865), 8866(0x8866), 8021Q(0x8100).
53. Enter the Source MAC Address, the MAC address of the device you are connecting to the router.
54. Enter the Source MAC Mask. Also known as a source MAC Address wild card mask. Wildcards are used to mask all or part of a source IP address. Wild card masks specify which bits are used and which bits are ignored. A MAC mask of ff:ff:ff:ff:ff:ff indicates that no bits are important. A MAC mask of 00:00:00:00:00:00 indicates that all the bits are important. Use 00:00:00:00:00:00 or no mask at all.
55. Enter the Destination MAC Address if the destination is to a single server address and you know what the MAC address is. If you require the destination MAC address to be any address on the internet leave this field blank.
56. Enter the Destination Subnet Mask of 00:00:00:00:00:00 if you have entered a Destination MAC Address. If you did not enter a Destination MAC Address leave this field blank.
57. Enter the Source IP Address, the IP address of the device you have connected to the router.
58. Enter the Source MAC Mask of 255.255.255.0 if you have entered a Source IP address.
59. Enter the Destination IP Address if the destination IP address is to a single server address. If the destination is required to be any IP address leave this field blank.
60. Enter the Destination Subnet Mask of 255.255.255.0 if you entered a (Class 3) Destination IP Address, otherwise leave this field blank.
61. Set the Differentiated Service Code Point (DSCP) Check as AF11(001010).
62. Select the Protocol. Options include TCP, UDP, ICMP and IGMP.
63. Enter the UDP/TCP Source Port (or port range) and UDP/TCP Destination Port (or port range) if required.
64. Set the Assign Classification Queue field. For this queue being of high priority select pppoa0&Prec3&Path0 or pppoe0&Prec3&Path0 depending on your type of connection.
66. Mark 802.1p priority to 0. In the scale from 0 -7, 0 is best effort, 6 and 7 are reserved for networking.
67. Set the Tag VLAN ID [0-4094]: to 2.
68. Set the Rate Control (kbps) if you wish to have a limit to the bandwidth, or else leave this field blank. In the example screenshot above a limit of 200 kbps has been entered.
69. Press the Apply/Save button.
70. Select **Advanced > Quality of Service > Queue Classification**. You should now have QoS entries similar to the screenshot below.

![QoS Classification Setup](image)

**CLASSIFICATION CRITERIA**

<table>
<thead>
<tr>
<th>Class Name</th>
<th>Order</th>
<th>Class Intf</th>
<th>Ether Type</th>
<th>SrcMAC/ Mask</th>
<th>DstMAC/ Mask</th>
<th>SrcIP/ Mask</th>
<th>DstIP/ Mask</th>
<th>Proto</th>
<th>Src Port</th>
<th>Dst Port</th>
<th>DSCP Check</th>
<th>802.1P Check</th>
<th>Queue Key</th>
<th>DSCP Mark</th>
<th>802.1P Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>High_Priority</td>
<td>1</td>
<td>eth0</td>
<td>IP</td>
<td>00:1A:92:11:52:85</td>
<td></td>
<td>192.168.1.2/24</td>
<td></td>
<td>UDP</td>
<td>5060:5061</td>
<td>5060:5061</td>
<td>EF</td>
<td>33</td>
<td>EF</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Medium_Priority</td>
<td>2</td>
<td>eth0</td>
<td>IP</td>
<td>00:14:A5:7A:63:EE</td>
<td>192.168.1.3/24</td>
<td></td>
<td></td>
<td>TCP</td>
<td></td>
<td></td>
<td>AF32</td>
<td>34</td>
<td>AF32</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Low_Priority</td>
<td>3</td>
<td>wlan0</td>
<td>IP</td>
<td>70:F1:A1:53:A4:3D</td>
<td>192.168.1.4/24</td>
<td></td>
<td></td>
<td>TCP</td>
<td></td>
<td></td>
<td>AF11</td>
<td>35</td>
<td>AF11</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
71. Select Management > Save/Reboot.

72. Press the Reboot button and wait while the 3G29Wn reboots to enable the new QoS settings.