



Grandstream Networks, Inc.

Load Balancing and Failover on GWN7000

Configuration Guide



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INTRODUCTION

The GWN7000 is an enterprise Gigabit router, that offers enhanced network reliability, high performance for routing / switching along with access security and protection. The various features of the GWN7000 include comprehensive Wi-Fi management, enhanced network reliability and security, VPN solutions, Multi-WAN for traffic load balancing and failover, as well as other advanced features.

Among the above cited features, the Load Balancing and Failover features aim to maximize network reliability across multi-WAN ports, by helping to share the broadband connections to all the LAN users, and ensure service continuity when the primary connection is lost.

This guide describes the utility and steps for configuring the Load Balancing and Failover on GWN7000, as a main feature when having multiple and redundant Internet connections, which ensures a higher reliability to the network connection.



OVERVIEW

The Load Balancing feature improves the distribution and balancing of broadband connection between multiple network links, to maximize throughput and minimize latency. The redundancy can be also ensured, when having Failover feature.

Load Balancing is using simultaneously both broadband connections through the two WAN ports, offering the ability to utilize both connections (Link aggregation is not supported). The Failover is mainly used when aiming to be connected using only the primary connection, and use the secondary broadband connection only when the primary is failed, this may be helpful for path-sensitive connections, such as VoIP or VPN traffic.

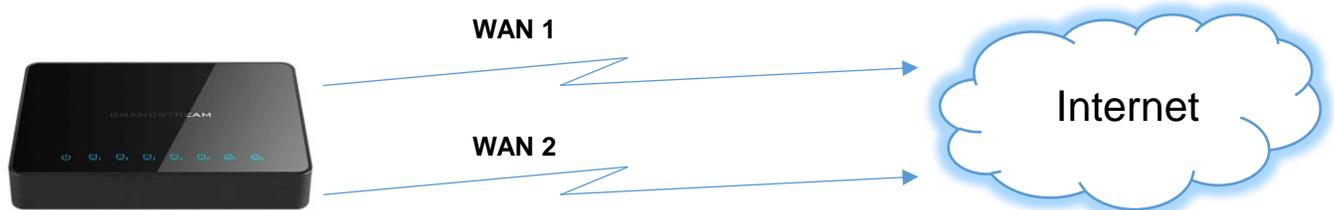


Figure 1 : Multi-WAN on GWN7000

The prerequisites are as follow:

- GWN7000 with firmware version 1.0.6.x or higher.
- Two different Broadband connections or two ISP lines.



LOAD BALANCING

WAN Ports Configuration

When configuring Load Balancing on the GWN7000 router, both WAN Ports will be used and will share the bandwidth of both Internet connections, instead of using only the primary WAN port until this one is failed, which is the case for Failover feature.

Various scenarios can be deployed for Load Balancing and the bandwidth sharing, this can be done either per-destination or per-packet. When the Load Balancing is based on the destination IP, all the packets for destination 1 will go over the first WAN port, all the packets for destination 2 will go over the second port, and so on.

On GWN7000, the Load Balancing is based on sharing all the packets on both WAN ports, meaning that the router sends one packet for destination 1 over the first path, the second packet for (the same) destination 1 over the second path, and so on, which will guarantee equal load across the two links, and equal utilization of both bandwidths. The following diagram illustrates the deployed scenario:

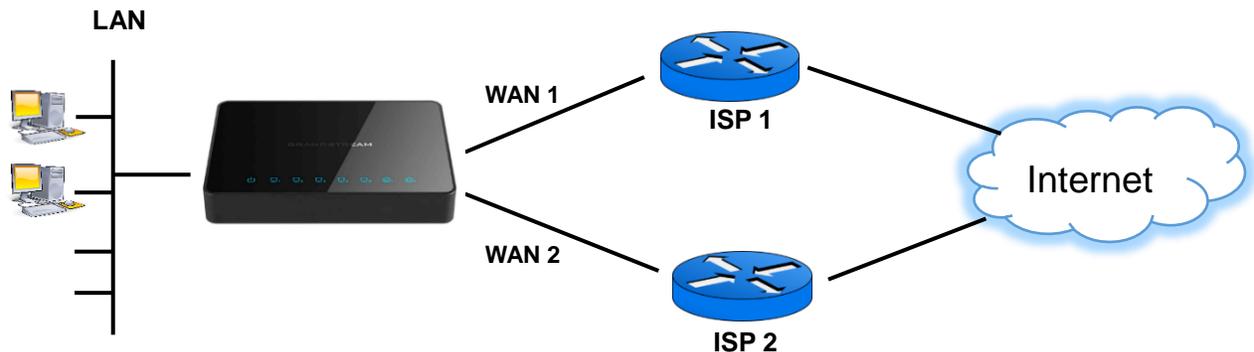
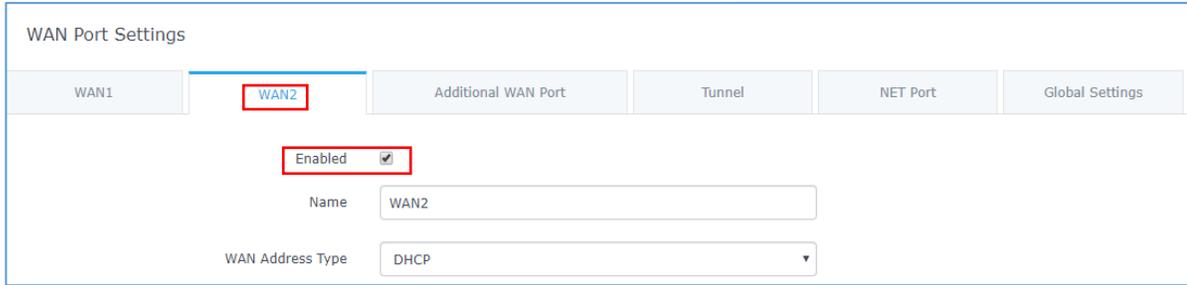


Figure 2 : Load Balancing Schema

By default, only the port WAN 1 is enabled on the router, to ensure that WAN 2 port is enabled, please do the following:

1. Access the GWN7000's Web GUI from a computer connected to a LAN port, and navigate to **Router-> WAN** page.
2. Make sure to enable WAN Port 2.





WAN Port Settings

WAN1
 WAN2
 Additional WAN Port
 Tunnel
 NET Port
 Global Settings

Enabled

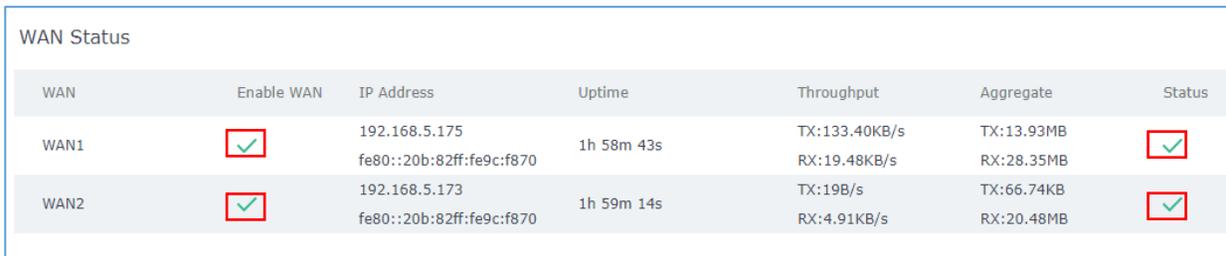
Name: WAN2

WAN Address Type: DHCP

Figure 3 : Enable WAN Port 2

In our scenario, we are using **DHCP** for WAN Address Type as illustrated on the above screenshot. The WAN Port in this case will acquire an IPv4 address automatically from the DHCP server through the broadband connection. You can set this option to **Static** if your ISP has provided a Fixed or Static IP address, or set it to **PPPoE** if your ISP uses this method.

After making sure that WAN port 2 is enabled, you can proceed from Router page then Status to verify the WAN port 2 interface status.

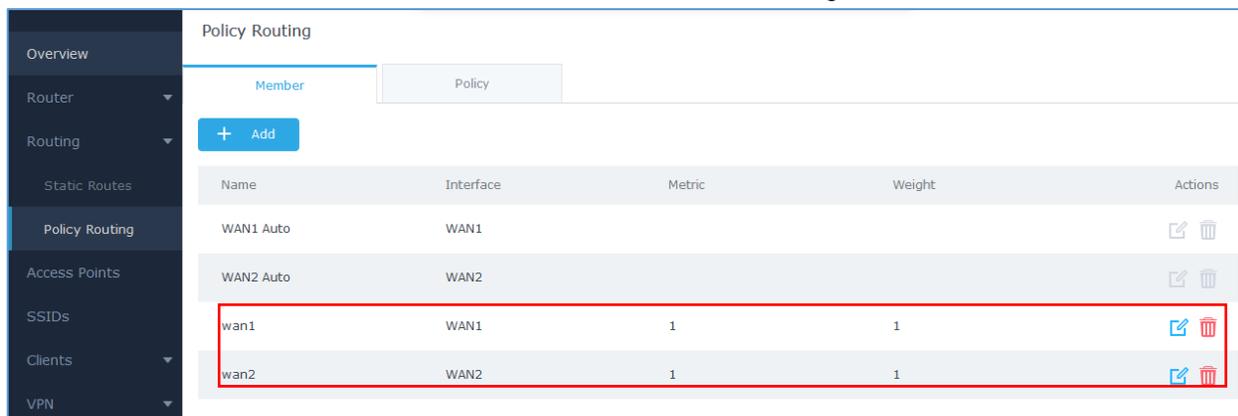


WAN	Enable WAN	IP Address	Uptime	Throughput	Aggregate	Status
WAN1	<input checked="" type="checkbox"/>	192.168.5.175 fe80::20b:82ff:fe9c:f870	1h 58m 43s	TX:133.40KB/s RX:19.48KB/s	TX:13.93MB RX:28.35MB	<input checked="" type="checkbox"/>
WAN2	<input checked="" type="checkbox"/>	192.168.5.173 fe80::20b:82ff:fe9c:f870	1h 59m 14s	TX:19B/s RX:4.91KB/s	TX:66.74KB RX:20.48MB	<input checked="" type="checkbox"/>

Figure 4 : WAN status

Policy Routing Configuration

1. Proceed from GWN7000 web interface→Routing→Routing Policy, and Add New Member on interface WAN1 with metric and weight set to 1 and name it wan1.
2. Add second Member on interface WAN2 with metric and weight set to 1 and name it wan2.



Policy Routing

Member Policy

[+ Add](#)

Name	Interface	Metric	Weight	Actions
WAN1 Auto	WAN1			Edit Delete
WAN2 Auto	WAN2			Edit Delete
wan1	WAN1	1	1	Edit Delete
wan2	WAN2	1	1	Edit Delete

Figure 5 : Add Members

- Go to Policy, click on Add and select Member to be wan1 and wan2 and name policy load_balance.

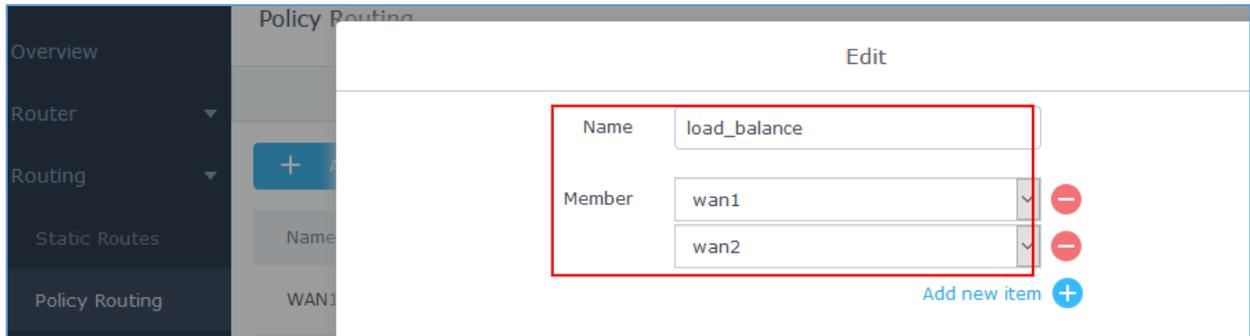


Figure 6 : Add load balancing policy

- Access Routing page → LAN → edit the LAN configuration by setting Routing Policy to “load_balance” previously created to be applied for this specific local network, and make sure on Destination that both WAN1 and WAN2 port are checked, then click on Save then Apply.

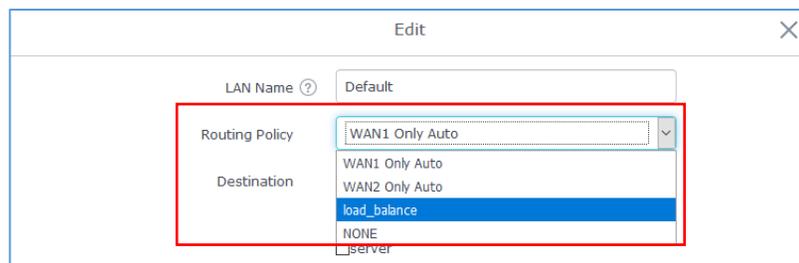


Figure 7 : LAN configuration

Status and Overview

The **Overview** page can also illustrate the bandwidth usage, the download and upload throughputs on both WAN port 1 and WAN port 2 are equivalents:

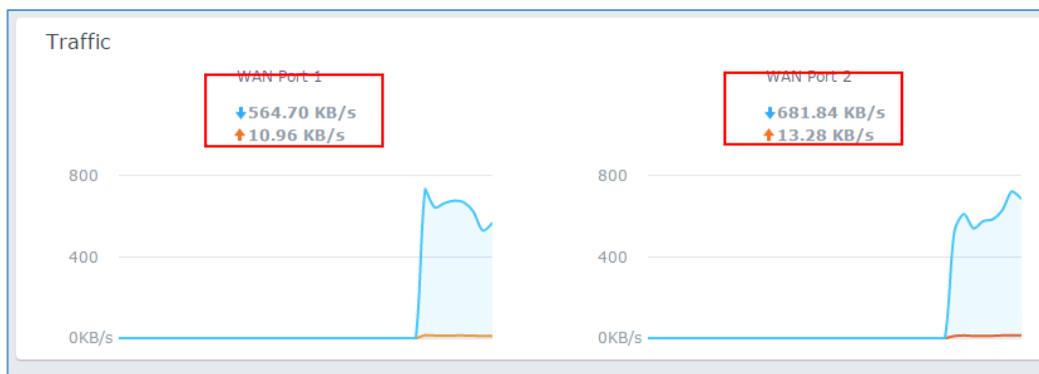


Figure 8 : Load Balancing and Bandwidth

As you can see on the above screenshots, the bandwidth is shared between the two WAN ports.



The following section will be illustrating the Failover feature as a second option for Multi-WAN usage. Instead of using both broadband connections as Load Balancing, the Failover is using one port as a primary WAN port, meaning that only the bandwidth offered by the connection over this port is used, and traffic will be redirected to secondary port when the primary is failed.

User can also specify Failover conditions to indicate when the failed gateway is to be detected.



FAILOVER

WAN Ports Configuration

When enabling the Failover mode on the GWN7000 router, the secondary WAN port will only be used when the connection through the primary WAN port has failed. The expected scenario in this case is as follow:

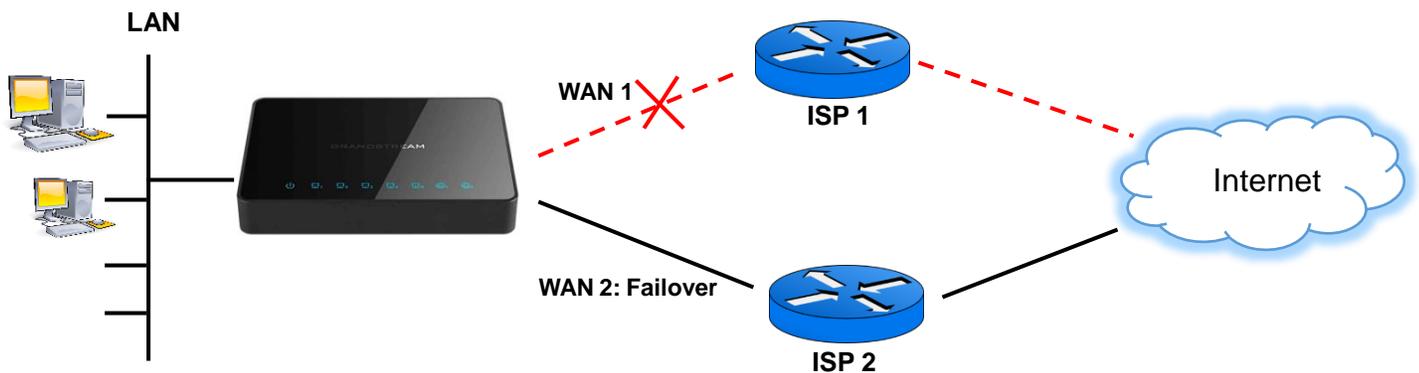


Figure 9 : Failover Schema

The advantage of failover in this case is to ensure that all traffic is going through a single path, which is helpful for path-sensitive connections such as VPN traffic. But the disadvantage is the bandwidth of the backup connection being unused, which is not the case for Load Balancing using the bandwidth of both Internet connections.

The main internet failure on GWN7000 is detected by using some tracking details, the failure detection method used in this case is pinging a host elsewhere on the Internet (8.8.8.8 by default), pinging the ISP's default gateway, a host on the ISP's network or any other IP Address redirected through the WAN Port.

As mentioned previously, by default only the WAN port 1 is enabled on the router, make sure the WAN Port 2 is enabled as well.

Then you can proceed for Multi-WAN configuration in Failover mode, below are the steps to follow:

Policy Routing Configuration

1. Proceed to Routing page → Policy Routing → Member, add First member for interface WAN 1 with metric set to 1 and weight set to 1,
2. Add a second member for interface WAN 2 with metric set to 2 and weight set to 1. Then click on Save then Apply.

In this example we have named both members as “fail_wan1” and “fail_wan2”.



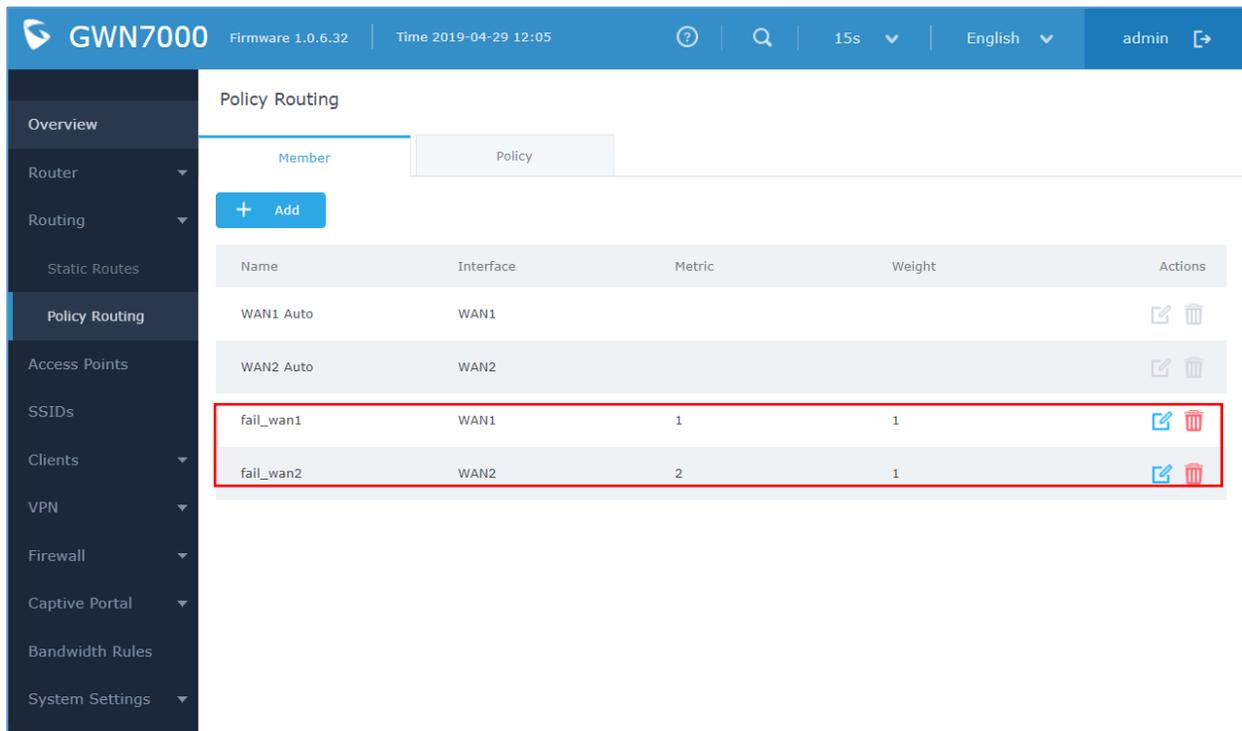


Figure 10 : Add Members

Note:

- Metric: Members within one Policy with a lower metric have precedence over higher metric members.
 - Weight: Members with same metric will distribute load based on this weight value.
3. Go to Routing Policy, and add a new policy with name “failover” as example and make sur to add the two members we recently created fail_wan1 and fail_wan2 then Save an Apply.

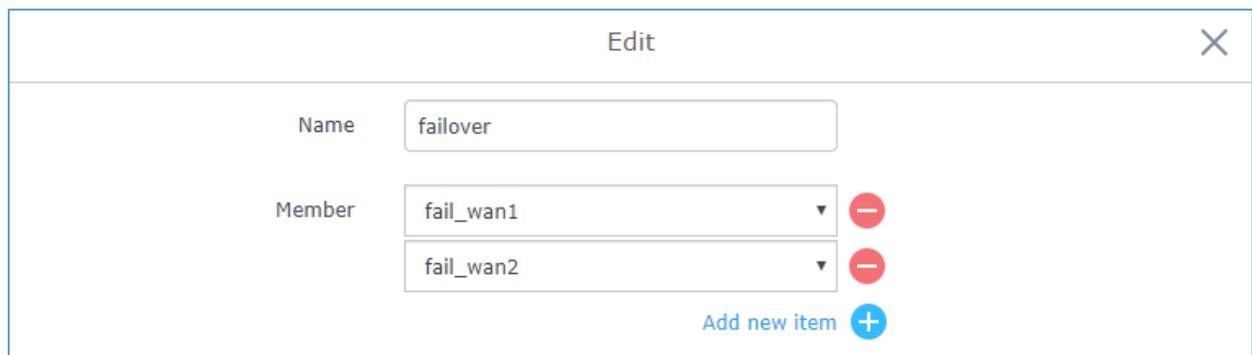


Figure 11 : Add failover policy

4. Access Routing page → LAN → edit the LAN configuration by setting Routing Policy to “failover” previously created to be applied for this specific local network, and make sure on Destination that both WAN1 and WAN2 port are checked, then click on Save then Apply.



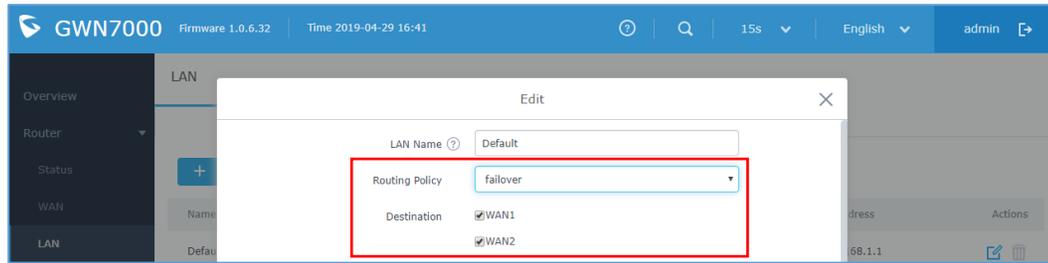


Figure 12 : LAN configuration

Status and Overview

Once the Multi-WAN and WAN Membership are correctly configured, the ports should show a valid status, and only the WAN port 1 should be used for downstream / upstream before Failover is occurred, this can be displayed under **Web GUI→Router→Status**:

WAN Status						
WAN	Enable WAN	IP Address	Uptime	Throughput	Aggregate	
WAN Port 1	✓	192.168.6.231 fe80::20b:82ff:fe9c:f1e8	1m 27s	TX:37.12KB/s RX:1.43MB/s	TX:688.62KB RX:24.45MB	
WAN Port 2	✓	192.168.2.101 fe80::20b:82ff:fe9c:f1e8	1m 22s	TX:18B/s RX:18B/s	TX:13.06KB RX:2.65KB	

Figure 13 : WAN Ports Status before Failover

The **Overview** page also illustrates the unique usage of WAN port 1:



Figure 14 : WAN Ports Overview before Failover

Once tracking the failure of WAN port 1 based on the provided tracking details, only the WAN Port 2 should be active, this can be displayed on **Status** page when refreshed:

WAN Status						
WAN	Enable WAN	IP Address	Uptime	Throughput	Aggregate	
WAN Port 1	✓			TX:0b/s RX:0b/s	TX:1.26MB RX:48.40MB	
WAN Port 2	✓	192.168.2.101 fe80::20b:82ff:fe9c:f1e8	2m 31s	TX:34.12KB/s RX:1.34MB/s	TX:469.35KB RX:17.20MB	

Figure 15 : WAN Ports Status after Failover

The WAN port 1 failure can be displayed also on the **Overview** page:

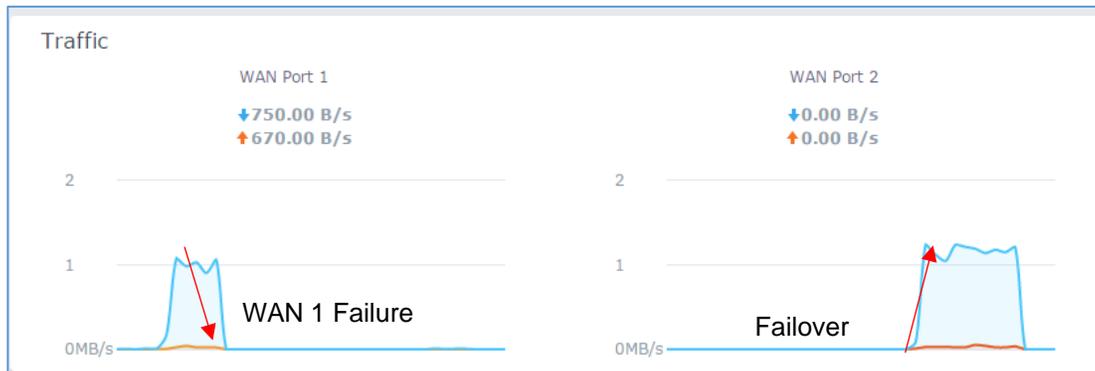


Figure 16 : WAN Port 1 / WAN Port 2 Failover

Notes:

- The router will keep using WAN Port 2 until the connection through WAN Port 1 is retrieved.
- After 3 successful ping tests, the WAN Port is marked as up again. The primary WAN Port will again be utilized once it's detected as up.
- If the WAN Port 1 is detected as up and WAN Port 2 is being used for a current task (e.g. Download), only this task will be continued on WAN Port 2, and the primary WAN will be used for all upcoming tasks.

The following overview screenshot shows the phase where the WAN Port 1 is marked as up again, the router switches from WAN Port 2 to WAN Port 1:

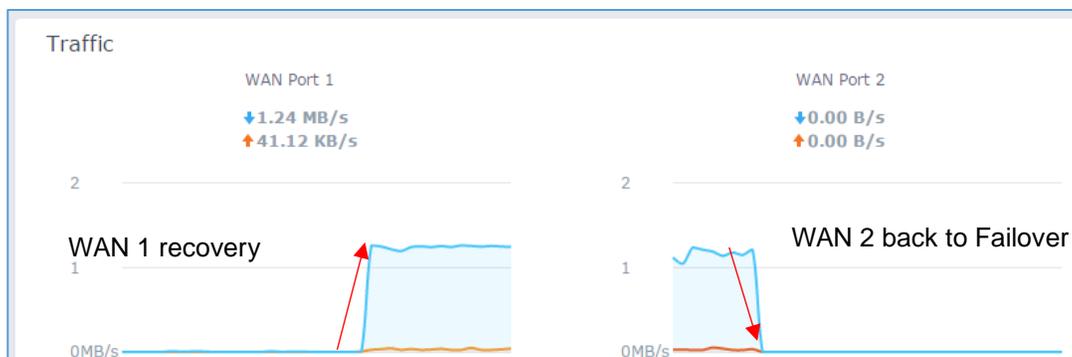


Figure 17 : WAN Port 1 recovery

