Grandstream Networks, Inc.

Policy Routes Guide

As the demand for reliable internet connectivity continues to grow, businesses increasingly turn to multi-WAN solutions to manage their connections and ensure uninterrupted productivity, even during internet outages.

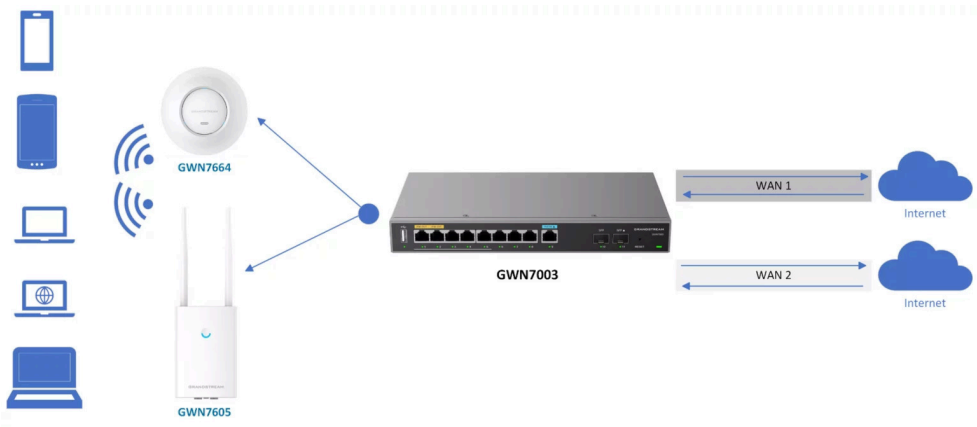
This guide explains how to configure **Load Balancing**, **Backup**, and **Standby** using multiple WAN or VPN interfaces on Grandstream routers. These features are essential for maintaining stable and redundant internet connections, especially when sourced from multiple ISPs, ensuring consistent and reliable access to the internet.

Overview

The **Policy Routes** feature empowers network administrators to define advanced routing rules for efficient traffic management across multiple WAN/VPN interfaces. This feature offers three modes: **Load Balance**, **Backup**, and **Standby**. Each mode plays a vital role in improving network performance, ensuring uninterrupted connectivity, and providing granular traffic control. Additionally, these policies can be applied to specific VLANs, enabling tailored traffic management for diverse network requirements.

> **Note:**
>
> It's possible to implement **Load Balance**, **Backup**, and **Standby** between WAN and VPN interfaces.

To follow this guide, users should ensure a network topology similar to the one shown below. Ideally, the router should be connected to two different uplinks, such as connections from separate ISPs. The **router** will manage both uplinks using the **Multi-WAN** feature, as illustrated in the accompanying diagram:



Multi WAN Deployment

Prerequisites

Supported Models

The models listed below are compatible with the Route Policy feature. To follow the configuration steps in this guide, ensure you are using one of the supported devices.

Model	Supported
GCC6000 Series	Yes
GWN70xx Series	Yes
GWN7062/GWN7052(F) Series	Yes

Supported models

Multi-WAN Ports Configuration

When implementing **Load Balance** on the router, both WAN Ports will be used and will share the bandwidth of both Internet connections, instead of using only one single uplink.

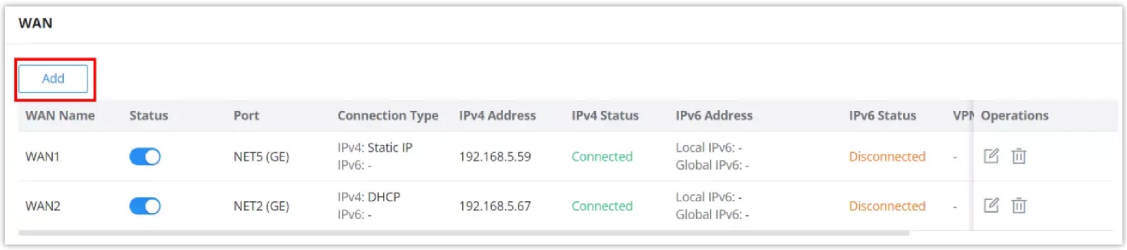
In the case of **Backup or Standb**y, one WAN will be used. If it goes down, then the router will switch to the other WAN port automatically.

Note

- It is recommended that each Internet connection is acquired from different ISPs to avoid losing both connections in case of a major ISP outage.
- It's also possible to do policy routes between more than 2 WAN/VPN interfaces, depending on the number of ports on the router.
- For the Weight: The default is 1, and the value can be from 1~10 with 10 being the highest weight.
- The number of WAN ports depends on the device model.

To enable or add another WAN, please do the following:

1. Access the device's Web GUI from a computer connected to a LAN port, and navigate to **Network Settings → WAN.** (*This path may vary depending on the device model.*)
2. Click on the "Add" button to add another WAN or enable the WAN if it's already added, as shown below:

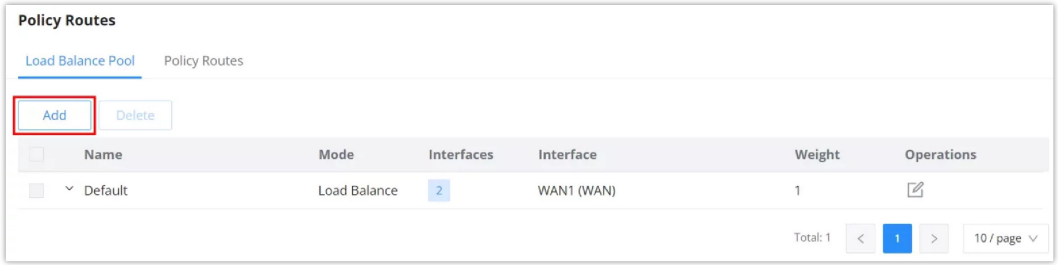


Add WAN

Load Balance Mode

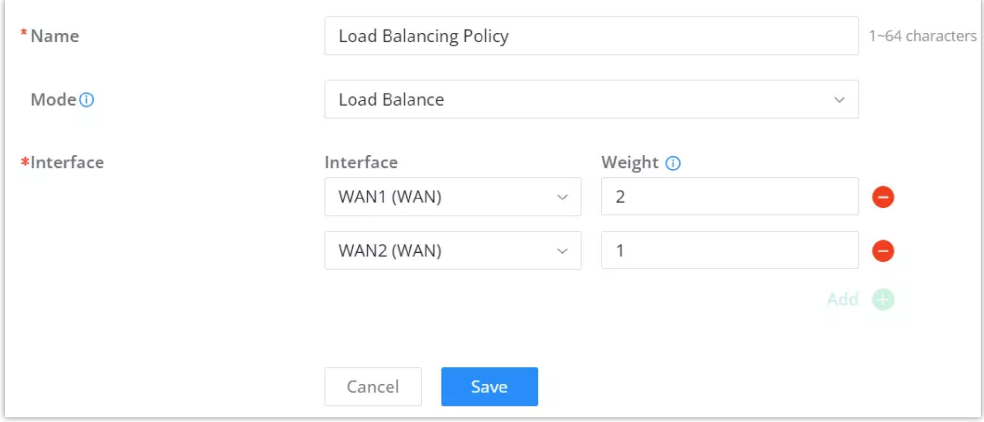
- **Purpose**: Distribute traffic evenly or proportionally across multiple WAN interfaces based on bandwidth capacity or network requirements.
- **How It Works**:
  - Configure weights for each WAN interface. For instance, if two WAN ports have weights of 1 and 2, traffic will be divided in a 1:2 ratio. Similarly, setting weights to 1 and 1 will evenly distribute traffic in a 1:1 ratio across both WAN interfaces.
  - Suitable for scenarios where bandwidth optimization and redundancy are required.
- **Advantages**:
  - Efficiently uses all available bandwidth.
  - Provides redundancy across multiple WAN connections.

In this step, we will create a rule for the policy routing, which will enable load balancing. To create a load balance rule, navigate to Routing → Policy Routes page → Load Balance Pool tab, click onthe "**Add**" button, then select the mode (Load Balance), after that select the WAN ports from the drop-down list and specify the Weight for each port added. Please refer to the figures below:



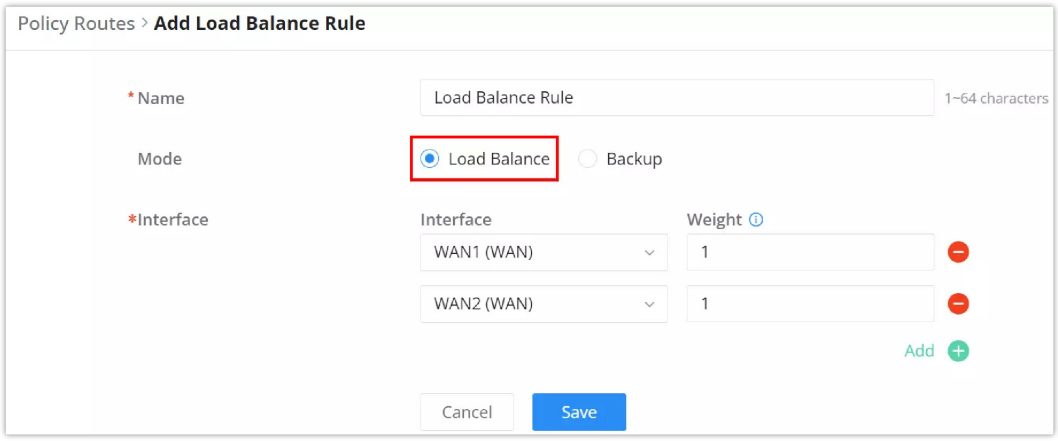
Load Balance Pool page

Example 1: If you have WAN1 (100 Mbps) and WAN2 (50 Mbps), set weights as 2 and 1, respectively, to ensure balanced utilization proportional to bandwidth.



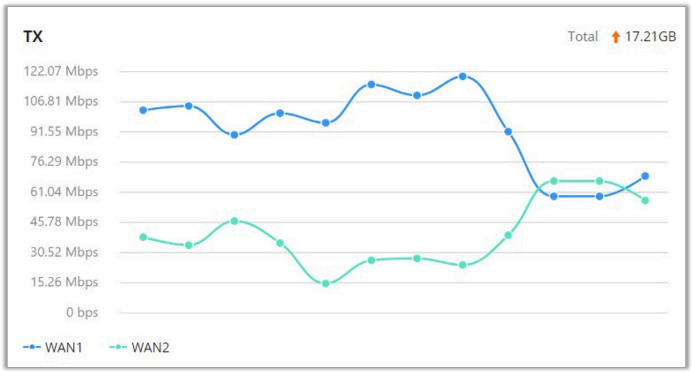
Load Balance mode Example 1

Example 2: If you have WAN1 (100 Mbps) and WAN2 (100 Mbps), set their weights to 1 and 1, respectively, to ensure balanced utilization proportional to their bandwidth. In this configuration, the bandwidth will be evenly distributed between the two connections.



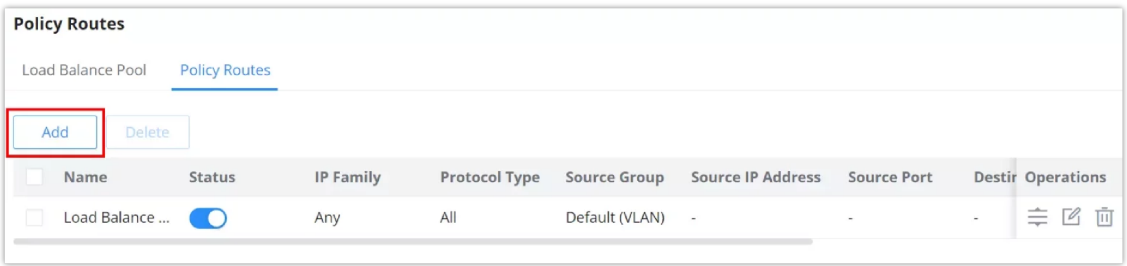
Load Balance Rule Example 2

As shown below, both WANs will be active, and the utilization will depend on the weight of each WAN.



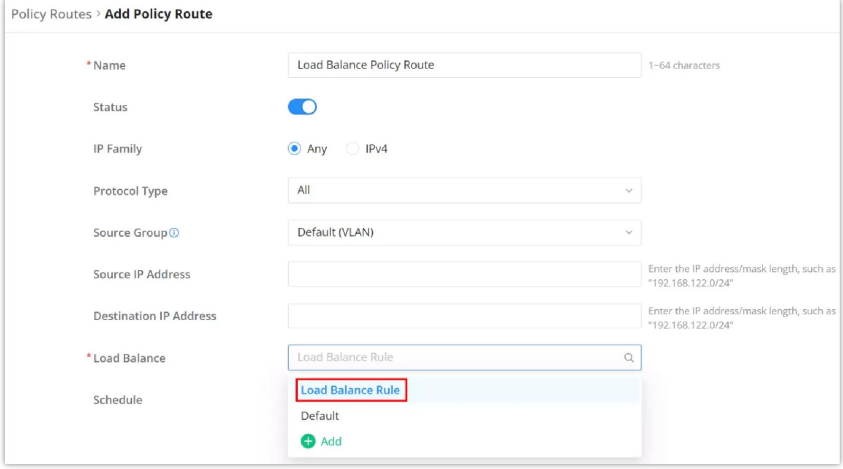
Load Balance graph

To create a Policy Route, please navigate to **Routing → Policy Routes page → Policy Routes tab**, then click on the "**Add**" button as shown below:



Policy Routes page

Then, under the **Load Balance** option, select the previously created load balance rule, and under **Source Group**, the user can select which network will use this policy route (in this case, it's the default VLAN).



Add Policy Route

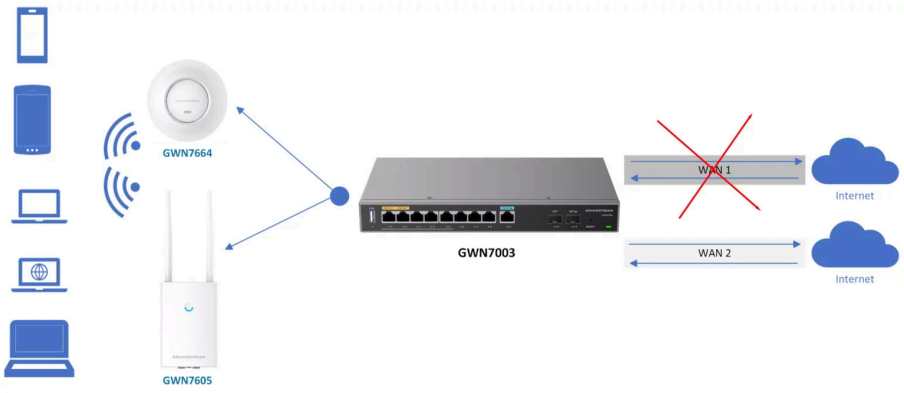
Note:

If the Destination IP Address field is left empty, the policy route will apply to the entire VLAN, affecting all IP addresses.

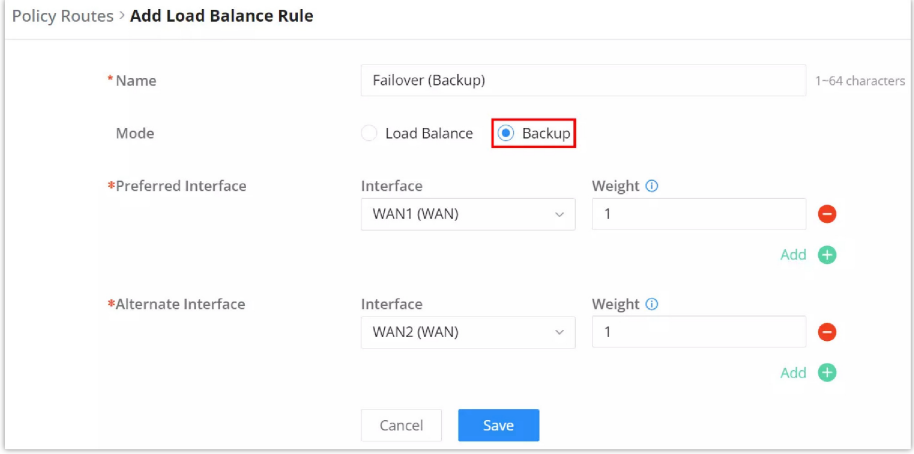
Backup Mode

- **Purpose**: Provide failover support by routing traffic to alternate interfaces when all preferred WAN interfaces fail.
- **How It Works**:
  - In backup mode, the backup interfaces remain active and ready to handle traffic if a failure is detected **on all preferred interfaces**. However, the alternate interfaces only become active when all preferred interfaces are down. Once activated, traffic is distributed across the alternate interfaces based on their assigned weights.
  - The status of the interfaces is monitored using ICMP replies to a tracking IP, which determines when the interface is up or down. For more details, refer to the WAN section. If the preferred interfaces come back online, traffic will revert to the primary interface after five consecutive tracking intervals (typically 60 seconds).
- **Key Features**:
  - Backup interfaces are always active.
  - Traffic can be distributed proportionally between preferred and backup interfaces if weights are configured.

To configure backup, we will follow the same steps above. However, we will set a different type of policy that ensures that one WAN port is used, while the other link will be a backup. Once one link goes down, the other link will automatically take over.



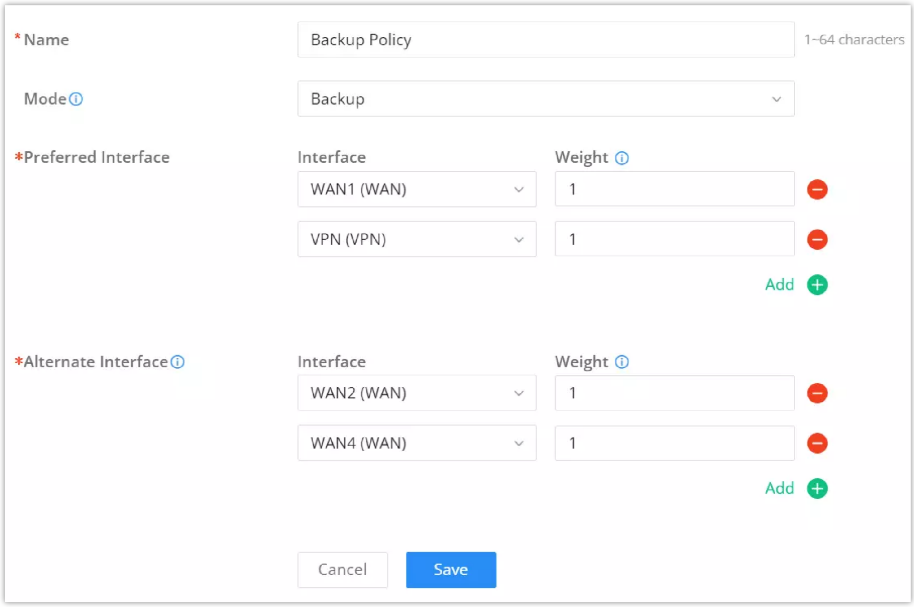
Backup Topology



Backup rule with two WANs

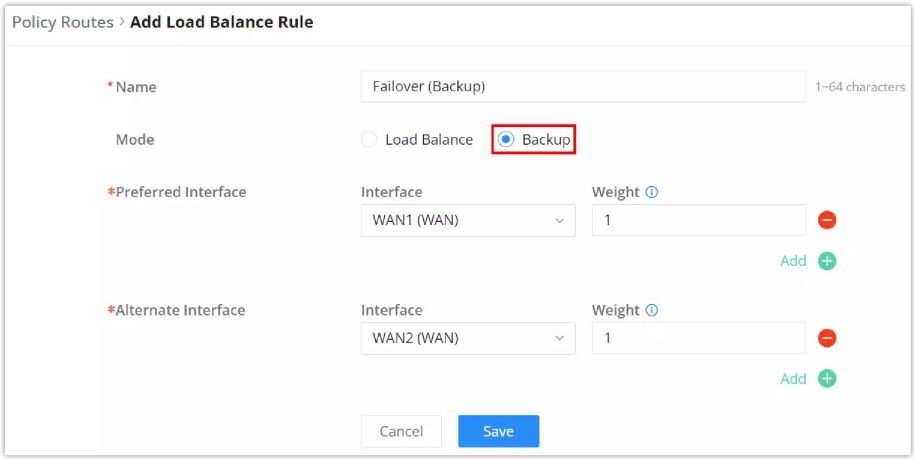
The users can click on the "**+**" icon to add an interface or the "**–**" icon to delete an interface.

Example 1: If both the preferred interfaces, **WAN1 and VPN**, are down, only then will the alternate interfaces, **WAN2 and WAN4**, become active, with traffic distributed according to their assigned weights.

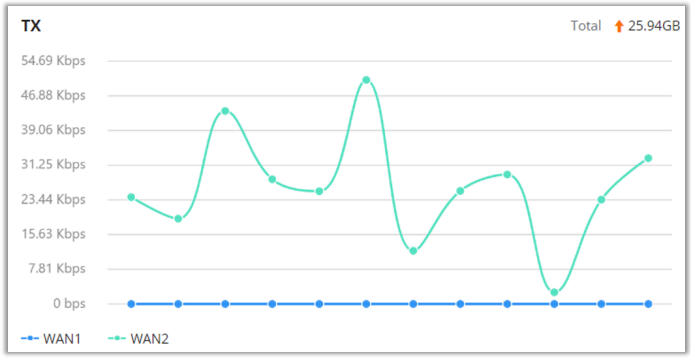


Backup mode Example 1

Example 2: In this Scenario when the **WAN1** is down or disconnected the **WAN 2** will be active and all the outgoing requests will be using **WAN 2**. Please refer to the example below:

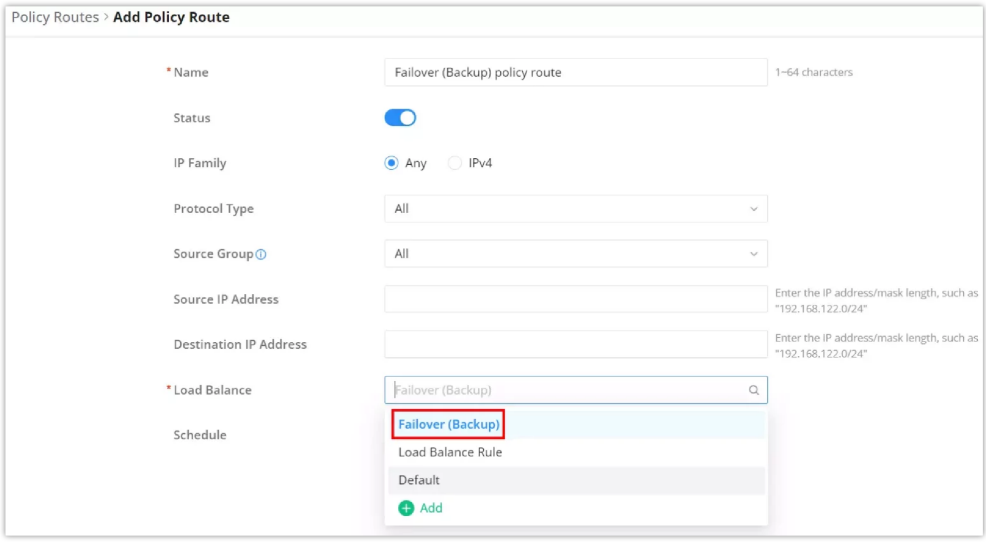


Backup mode Example 2



Backup mode graph

Under the **Policy Routes tab**, add a policy route and under **Load Balance** select the previously created Backup rule as shown below:



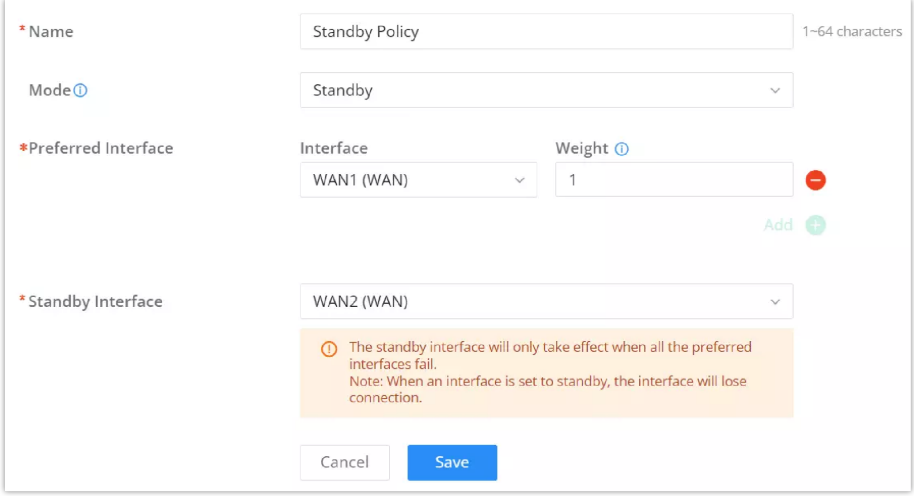
Backup mode Policy routing

Standby Mode

- **Purpose**: maintain a **single standby interface**, which is only activated when **all the primary interfaces fail**. This is especially useful in cases like PPPoE authentication conflicts, where multiple active sessions can cause issues.
- **How It Works**:
  - The standby interface remains inactive until all preferred (primary) interfaces fail. A Tracking IP Address (such as 1.1.1.1 or 8.8.8.8) is configured to monitor the status of the primary interface. The router pings this IP to check if the primary interface is up or down. If the pings fail continuously, the router switches to the standby interface.
  - For PPPoE, authentication occurs only when the standby interface is activated, preventing simultaneous session conflicts.
  - Failback occurs when the primary interface recovers, after five consecutive successful tracking intervals (typically 60 seconds), where the router pings a configured Tracking IP Address to check if the interface is back online. For PPPoE, failback may take up to 400 seconds due to session lock delays and the time required for PPPoE authentication to complete.
- **Key Features**:
  - Standby interface remains inactive to conserve resources, activating only when needed.
  - Resolves PPPoE authentication conflicts when the same account is configured across multiple WAN ports.
  - Ensures smooth failback after the primary interface recovers, with an extended failback period for PPPoE sessions.

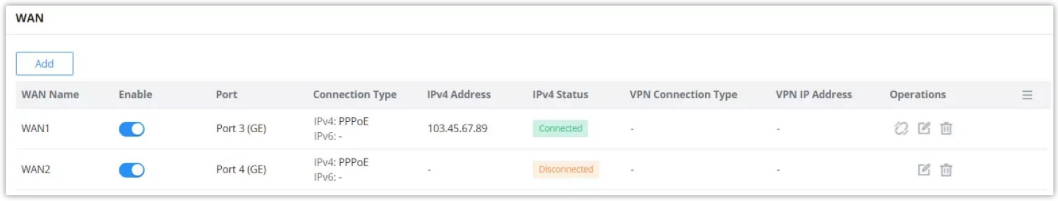
Example:

Use Standby Mode when two WAN ports require PPPoE with the same ISP credentials to prevent conflicts and maintain redundancy. For instance, WAN2 will store the PPPoE credentials but remain inactive. If WAN1, using the same credentials, fails or goes offline for any reason, WAN2 will automatically authenticate with the saved credentials and activate, ensuring seamless connectivity.

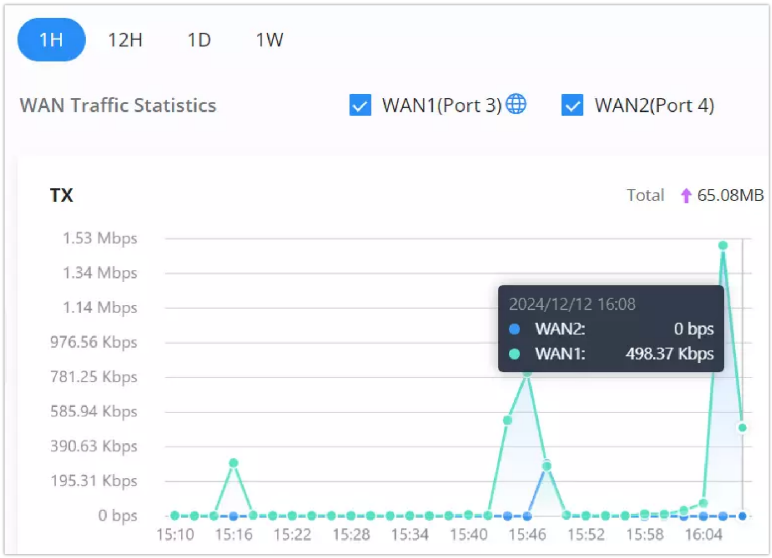


Policy Pool Standby mode

Since **WAN2** is on **Standby**, it will not establish a connection until **WAN1** goes down or fails to connect.



WAN page GWN700x



Standby graph

Comparison Table

Feature/Mode	Load Balancing	Backup Mode	Standby Mode
Purpose	Distribute traffic across **multiple interfaces.**	Failover with **active backup**.	Failover with **inactive standby**.
Traffic Behavior	Balanced based on weights (Ratio).	When all preferred interfaces fail or become unavailable, the alternate interfaces will automatically take over. Traffic will be distributed proportionally between the alternate interfaces based on their configured weights, ensuring seamless failover	Activate the standby interface only when all preferred interfaces have failed**.**
Resource Usage	Utilizes all interfaces actively.	Backup interfaces are always active, and more than one interface can be configured as a backup.	The standby interface remains inactive, and only one interface can be designated as standby.

Policy Routes Modes Comparison