NOTE

1. To enable the decryption function, multi-functional authorization must be enabled.

2. This function may impose some pressure on the device's performance. Do not enable it arbitrarily.

3. By default, the encrypted emails of LAN users accessing the WAN are decrypted. You only need to enable a policy for decrypting data accessing sites. The rest of the operations only need to be set in the content security policy.

4. Security of encrypted emails, HTTPS antivirus, HTTPS webpage filtration, and the filtration of HTTPS uploads and downloads rely on the decryption of data accessing sites.

7.5 Bandwidth Management

Bandwidth management is to control the traffic sizes of various web applications by building bandwidth management channels.

The bandwidth management system provides the functions of bandwidth guarantee and limitation. The former ensures the access bandwidths of important applications, whereas the latter restricts the total inbound and outbound bandwidths of user groups/users and those of various applications.

The bandwidth management system also provides the traffic sub-channel function, which allows for a more refined allocation of channel traffic by building traffic sub-channel as required.

Basic Concepts

Bandwidth Channel: Divides the bandwidth of the whole line into several parts by percentage, and allocates different bandwidth resources by application type or user group. By their functions, the bandwidth channels are divided into the guaranteed channel and the limited channel.

Limited channel: Set the maximum flow rate of the channel. In the case of a busy network, the bandwidth occupied by the channel does not exceed the preset maximum bandwidth.

Guaranteed channel: Set both the maximum and minimum bandwidths of the channel. In the case of a busy network, this channel ensures that the bandwidth’s channel is not smaller than the preset minimum bandwidth.

Link: Establishes a correspondence between the device's physical network interfaces and the "Links" in bandwidth channels, specifying the interface for outbound data that can match the bandwidth management channel.

Bandwidth Channel Matching and Priority

If the status of the bandwidth management system is **Enabled**, data going through the device is matched to a bandwidth channel based on data details. The rules for matching involve user group/user, IP address, application category, effective time, and destination IP, group. Data packets that meet all the rules will match the channel.

Data with the same details will only be matched to a bandwidth management policy. The matching sequence of the flow channel is matched from top to bottom, so you need to put the channel with more detailed matching conditions on the top when setting.

7.5.1 Channel Configuration

7.5.1.1 Guaranteed Channel

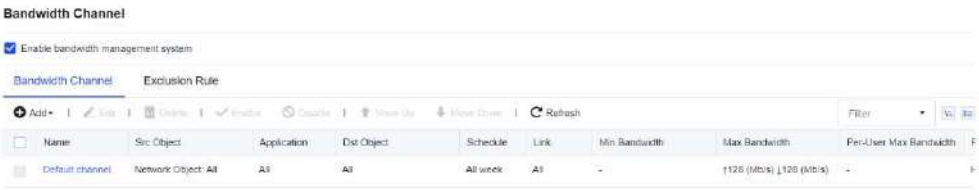
These channels guarantee the use of important applications. By setting the minimum bandwidth, they ensure that the bandwidth occupied by the specified type of data is not smaller than a particular value to ensure that important applications can use the bandwidth properly in a busy line.

Guaranteed Channel Setting

A company leased a 10Mb/s telecommunications line, and there are 1,000 Internet users on its LAN.

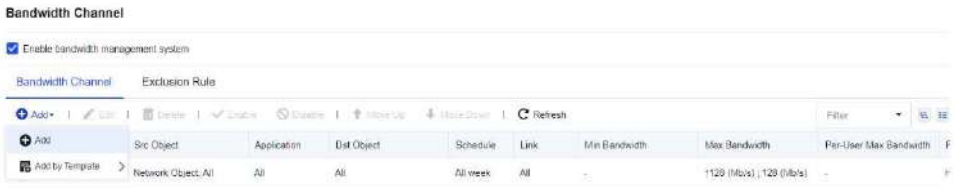
They need to ensure that the data of the Finance Department's access to online banking websites and sending and receiving emails will occupy bandwidth not less than 2Mb/s when the line is busy and cannot exceed 5Mb/s.

Step 1. Go to Bandwidth Management > Bandwidth Channel, and select Enable bandwidth management system to enable bandwidth management.

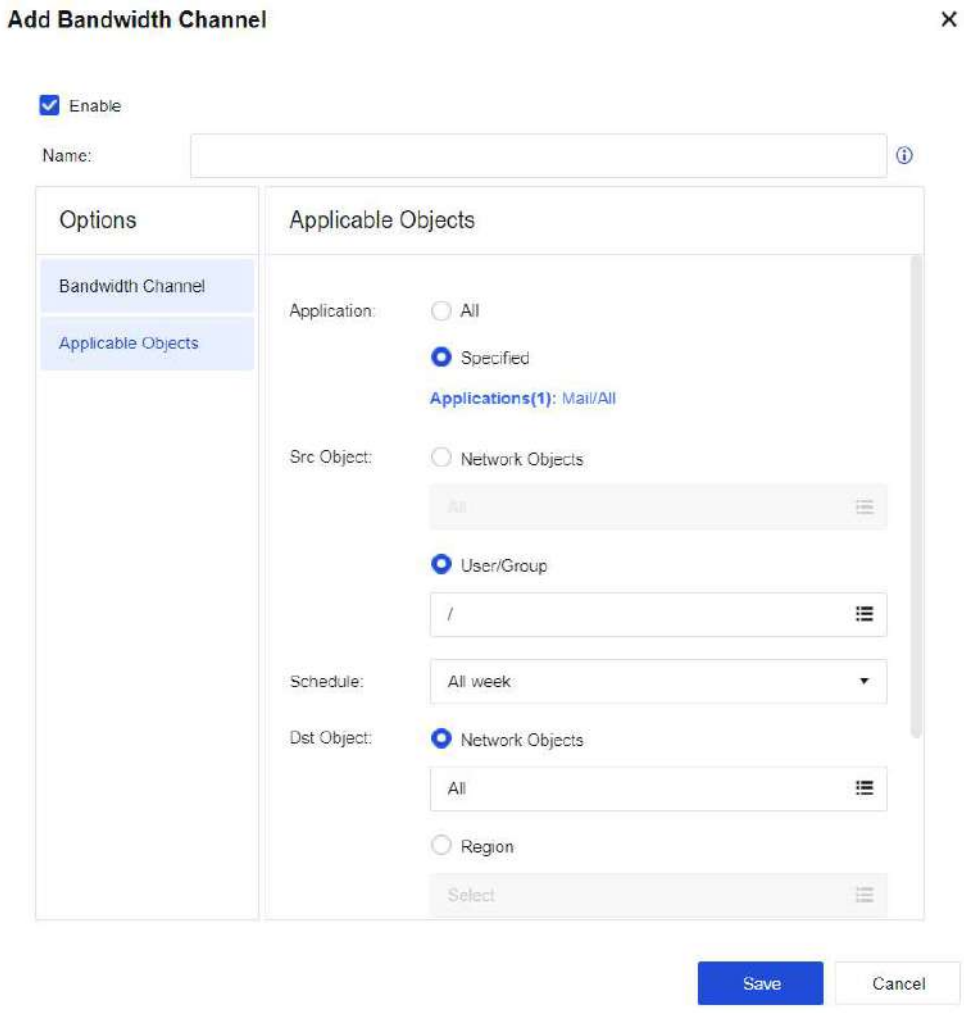


Step 2. Go to Bandwidth Management > Link Settings to configure the link list and link rules. For more information about how to configure a virtual line, see Section 7.5.2 Link Configuration.

Step 3. Configure the guaranteed channel. In this example, the channel is used to ensure the bandwidth for the data the staff in the Finance Department use to access online banking websites and receive and send emails.



Step 4. On the Bandwidth Channel page, click Add and select Add. Then, the Add Bandwidth Channel dialog box appears.



Step 5. Select Enable to enable this channel. Otherwise, the channel is disabled and the bandwidth management function does not take effect.

Name: Enter the name of the channel.

In the **Options** pane, select **Bandwidth Channel**, and set relevant attributes of the channel in the right window.

Bandwidth Channel: Set the target line, channel type, bandwidth of the limited or guaranteed channel, and maximum bandwidth per single user, etc.

Link: Select the line applicable for the channel. In this case, the channel is matched only when the data goes through this line. The lines listed in the **Link** drop-down list need to be set on the **Link** page in advance. For more information about how to set a link, see Section 7.5.2 Link Configuration.

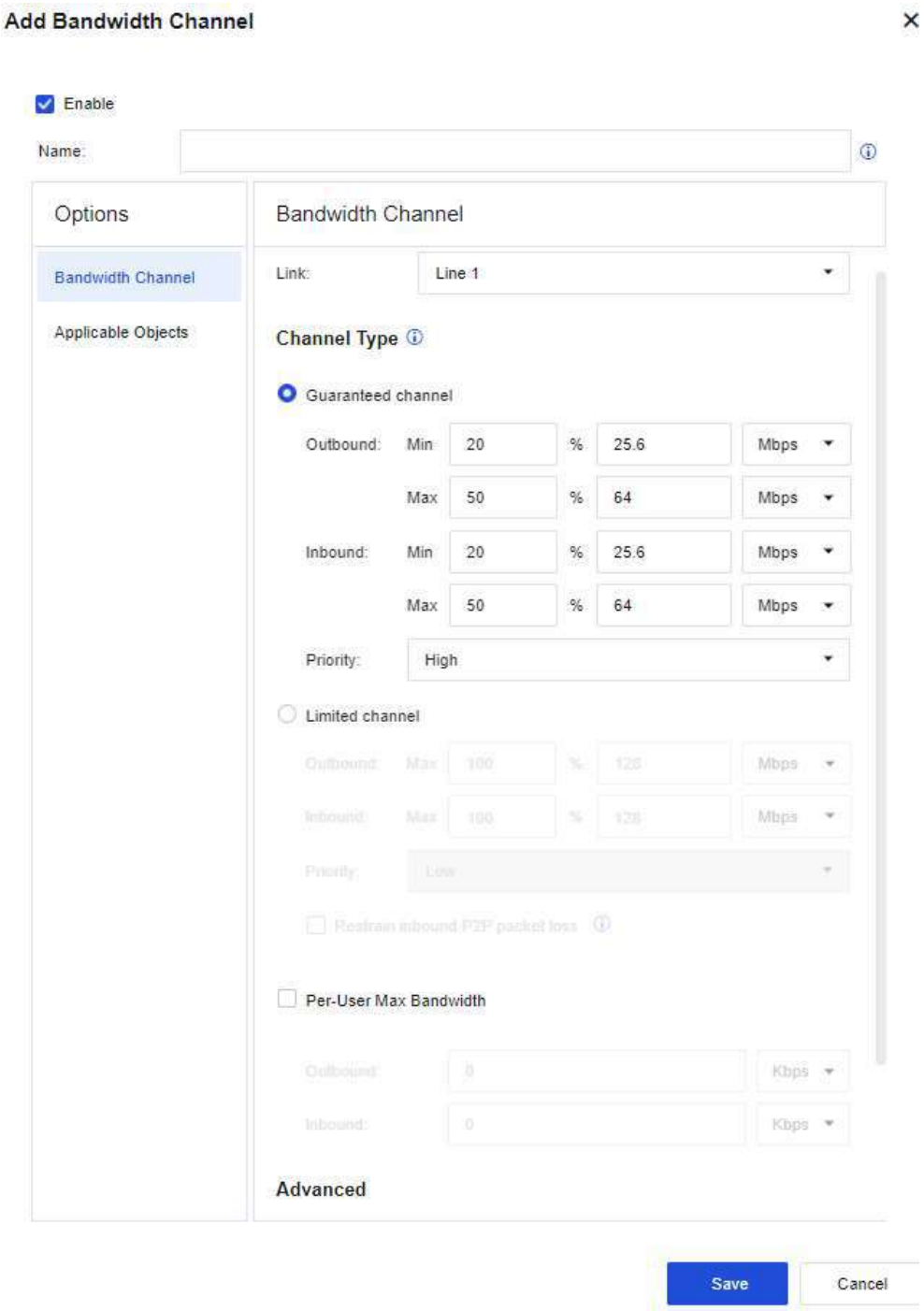
Channel Type: Select the channel type and specify the bandwidth value. In this example, the bandwidth for the data of the Finance Department staff accessing the online banking websites and sending and receiving emails should be guaranteed at 2 Mb/s (Min) and 5 Mb/s (Max). Select **Guaranteed channel**, and set the minimum and maximum values of both outbound bandwidth and inbound bandwidth to 20% and 50% of the total bandwidth respectively. The total bandwidth is 10 Mb/s, so the minimum bandwidth is 2 Mb/s and the maximum bandwidth is 5 Mb/s.

Priority: Includes **High**, **Medium** and **Low**, and indicates the priority for the channel to occupy the idle bandwidth when other channels are idle.

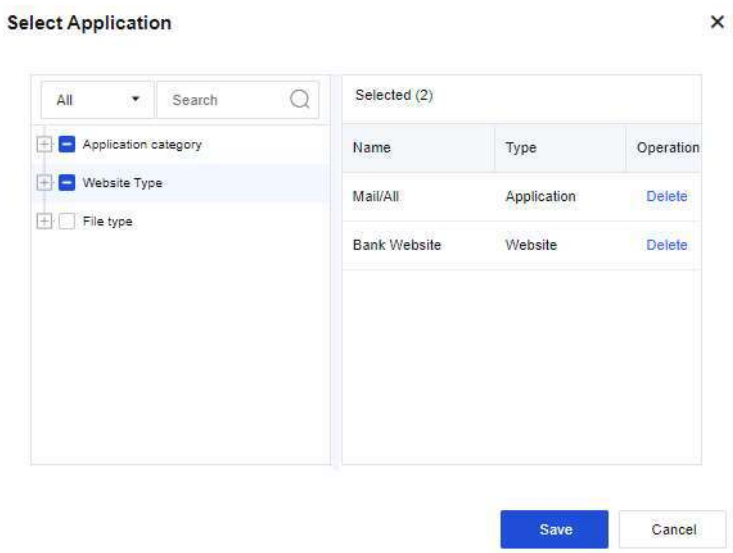
Per-User Max Bandwidth: Limits the bandwidth occupied by a single IP address matched to this channel. In this example, there is no need to limit the maximum bandwidth per user, so the option is not selected.

Advanced: If you select this option, each WAN IP address is considered a user in the channel so that the bandwidth is evenly allocated among channel users. Single-user maximum bandwidth' attribute is made available for WAN IP address. (This option is usually used for servers providing external services. Proceed with caution.)

Channel Usage Range: Set the types of data that can be matched to the channel, i.e., the usage range of the channel. The setting range includes app category, applicable object, effective time, destination IP group, subinterface, VLAN. Data should meet all these rules to be matched to the channel.

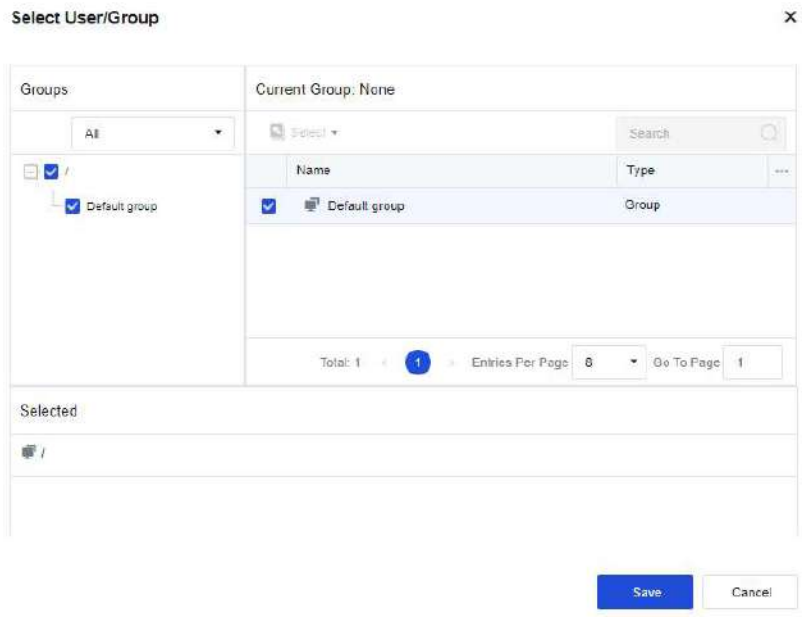


Applicable Application: Set the app category. If you select **All**, it is valid for all data types. If you select **Custom**, select specific app categories and click **Select Application**. In the **Select Application** dialog box that appears, select **Application category** and **Website Type**. In this example, to guarantee the bandwidth for the data of receiving and sending emails and accessing online banking websites, select **Mail/All** for the **Application category** and **Bank Website** for **Website Type**.



In addition, **File Type** is used to control the types of files downloaded via HTTP and FTP protocols. Confirm whether the range selected in **Selected** is correct. Click **Save** to complete the settings of applicable applications.

Applicable Objects: Set the network objects and user groups for which the channel is valid. The applicable object can be either IP address-based or user-based. In this example, to guarantee the bandwidth for all users in the Finance Department, select User. In the **Groups** section, select the required group path. In the **Current Group** section, select **Group** and **User**. In the **Selected** section, view the list of selected users and user groups. After you select **Applicable Objects**, click **Save** to complete the settings.



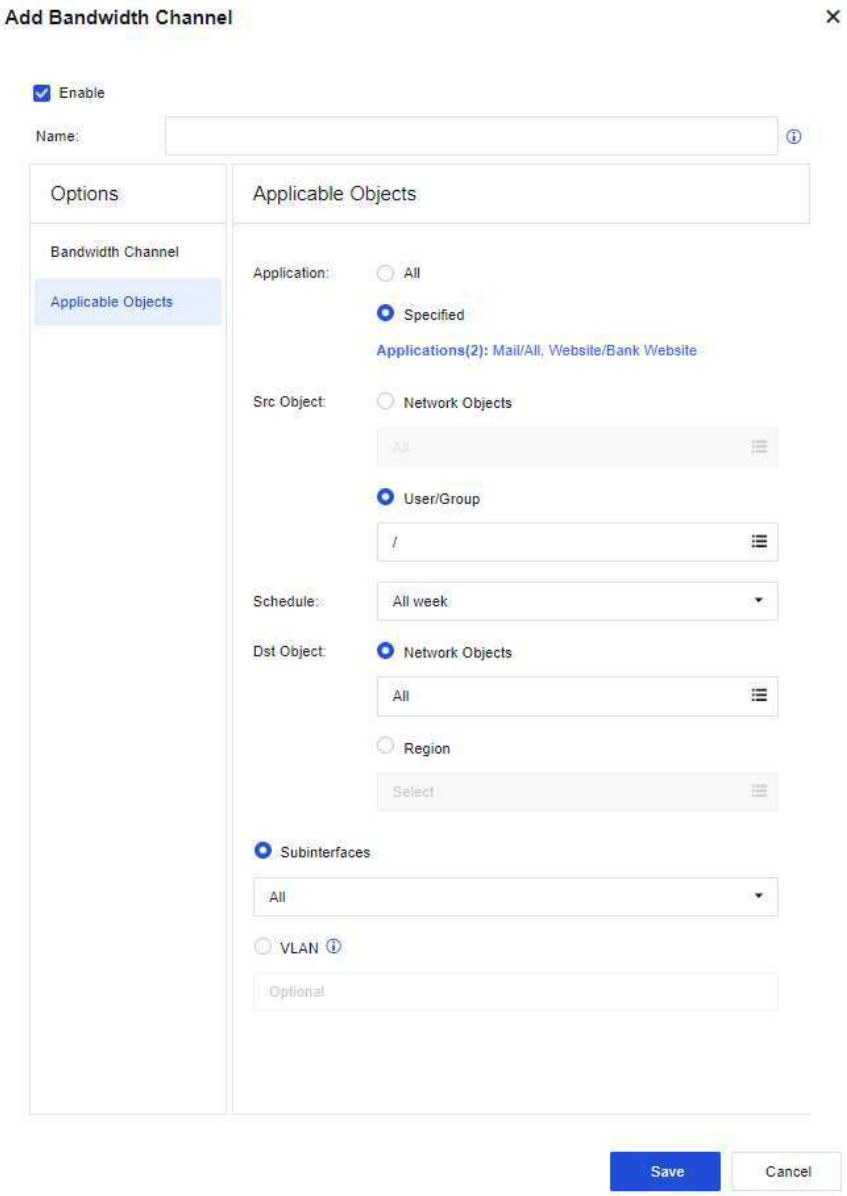
Schedule: Set the effective time of this channel.

Network Objects: Set the rules for the destination IP address.

Region: Set the destination IP address.

Subinterfaces: Set the subinterface to which the traffic channel is applicable.

VLAN: Set the VLAN to which the traffic channel is applicable.



After you set these parameters, click **Save** to complete the setting for a guaranteed channel.

Step 6. After you click Save, the set channel will appear in the bandwidth allocation, and the guaranteed channel configuration will be completed.

NOTE

1. The total percentage of the guaranteed bandwidth channels may exceed 100%. In that case, the minimum bandwidth of each guaranteed channel will be decreased proportionately. For example, you have set two channels, including the first with a guaranteed bandwidth of 30% and the second with a guaranteed bandwidth of 90%. So, 30/(90+30)% (i.e., 25%) is allocated to the first channel and 90/(90+30)% (i.e., 75%) to the second channel.

2. Priority: When there is actual idle bandwidth, channels with higher priorities will occupy the idle bandwidth first.

7.5.1.2 Limited Channel

If you select **Limited channel**, you need to set the maximum channel bandwidth to control the traffic for the data matched to the limited channel and control the occupied bandwidth which shall not exceed the set maximum bandwidth.

Limited Channel Configuration

A company leases a 10 Mb/s China Telecom line and has 1,000 users on its LAN. It is found that many Marketing Department staff often use downloading tools such as Thunder and P2P to download, occupying most of the bandwidth and affecting the normal office business of other departments. We can set the bandwidth occupied by downloading to be limited to 2 Mb/s for the Marketing Department and 30 KB/s for each user via the traffic control system.

Step 1. Navigate to Bandwidth Management > Bandwidth Channel, and enable the bandwidth management system.

Step 2. Select Enable bandwidth management system to enable bandwidth management.

Step 3. Navigate to Bandwidth Management > Link to configure the virtual line list and virtual line rules.

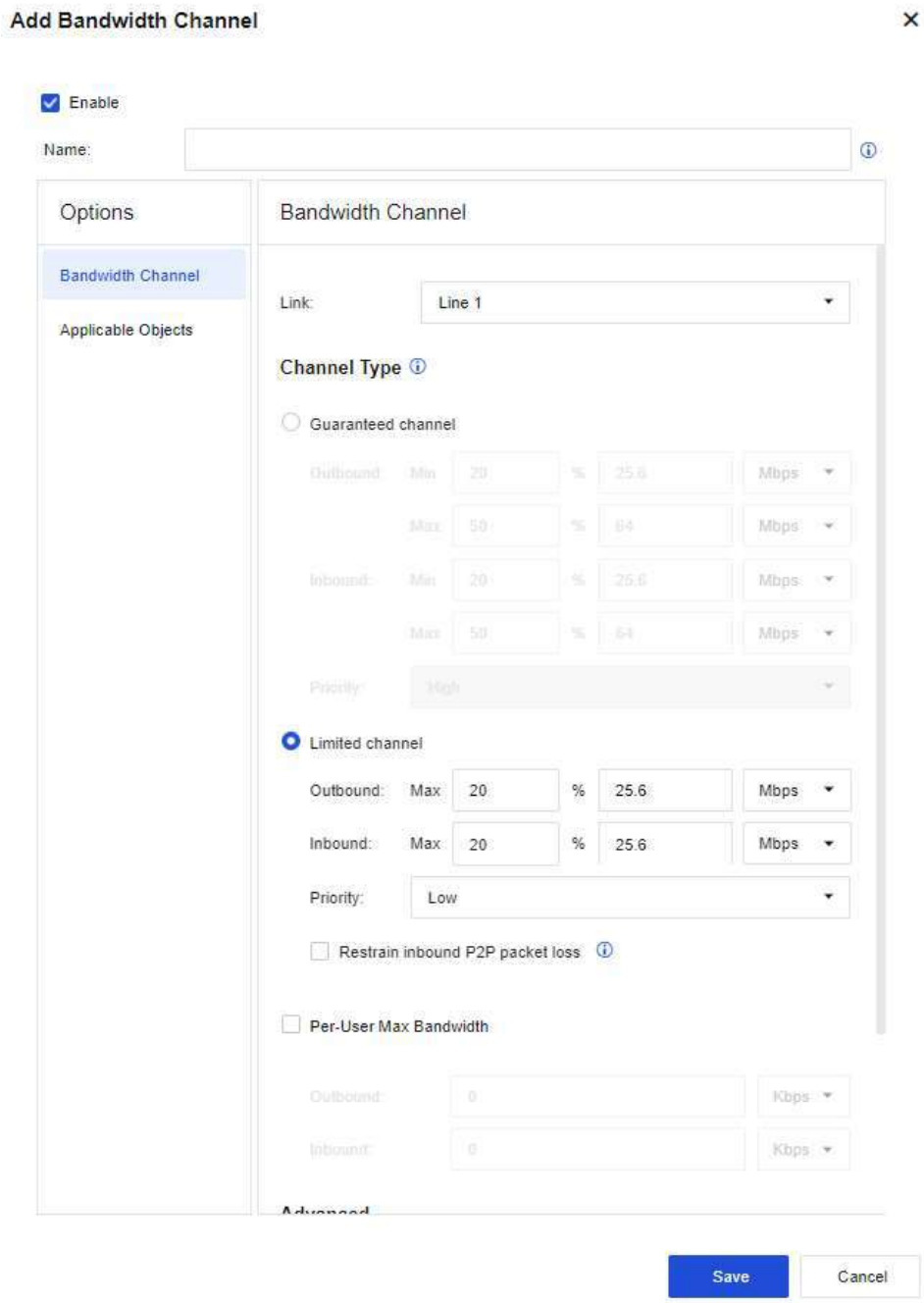
Step 4. Configure the limited channel.

In this example, the bandwidth management is performed for the P2P and downloaded data of Marketing Department personnel. The total bandwidth occupied by these applications is limited to no more than 2 Mb/s.

On the **Bandwidth Channel** tab, click **Add** to add a Level 1 channel. In the **Add Bandwidth Channel** dialog box, if you select **Enable**, the channel is enabled. Otherwise, the channel is disabled and does not take effect temporarily.

Enter the name of the channel in the **Name** field. The channel level indicates the level of the channel and the slash (/) means that the channel is a Level 1 channel.

In the **Options** pane, select **Bandwidth Channel**, and set relevant attributes of the channel in the right window.



Bandwidth Channel: Set the target line, channel type, bandwidth of the limited or guaranteed channel, and maximum bandwidth per single user, etc.

Link: Select the line applicable for the channel. In this case, the channel is matched only when the data goes through this line.

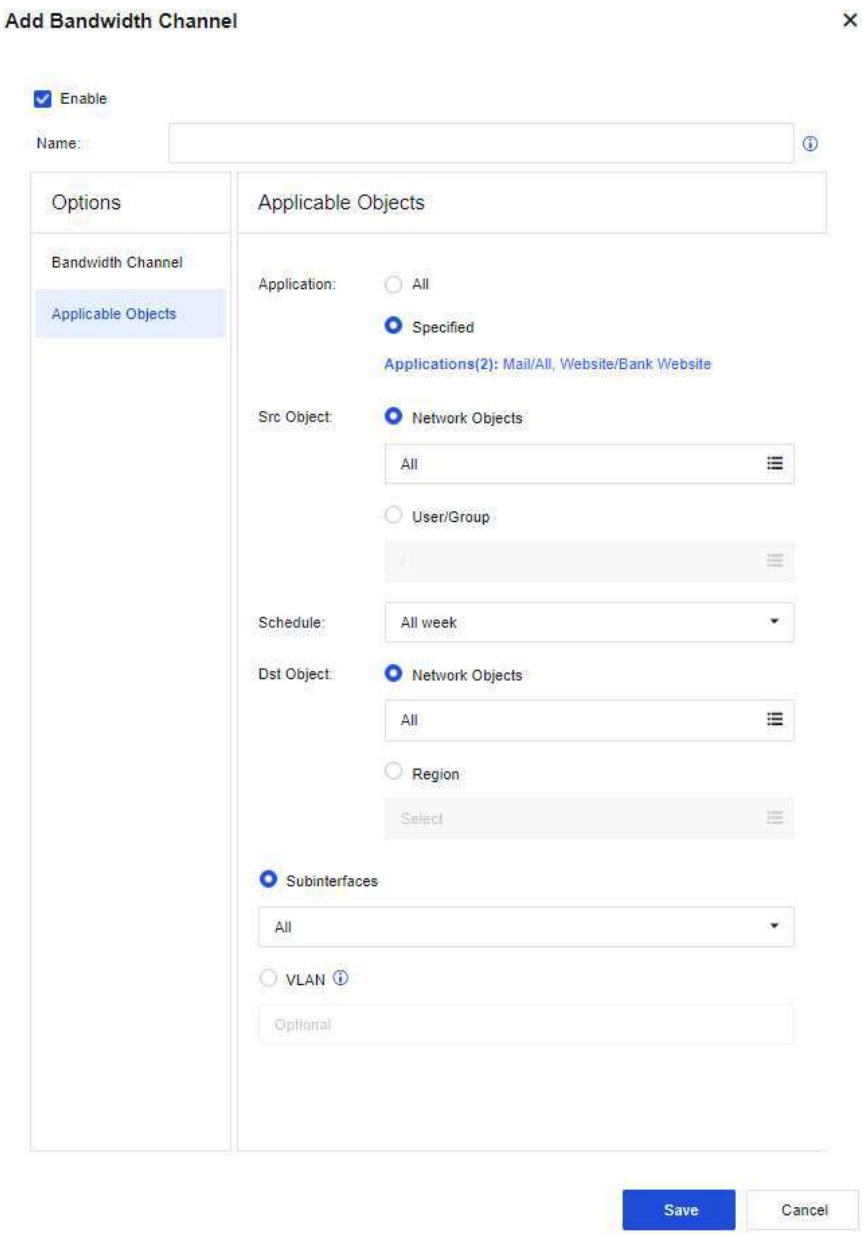
Channel Type: Select the channel type and specify the bandwidth value. In this example, the bandwidth for the data of the Marketing Department staff accessing the online banking websites and sending and receiving emails should be guaranteed. In this case, select **the Limited channel** and set the **Outbound** and **Inbound** parameters to 20% and 50% of the total bandwidth. The total bandwidth is 10 Mb/s, so the maximum bandwidth is 2 Mb/s. Priority: Includes High, Medium and Low, and indicates the priority for the channel to occupy the idle bandwidth when other channels are idle.

Per-User Max Bandwidth: Limits the bandwidth occupied by a single IP address matched to this channel. In this example, you need to limit the bandwidth occupied by the P2P and download data of each Marketing Department user to 30 KB/s. In this case, set the Outbound and Inbound parameters to 30 KB/s.

Among-User Bandwidth Allocation Policy: Set how the bandwidth is allocated among the users matched to this channel. By default, **Average allocation** is selected. In this case, the bandwidth is evenly allocated among users. Note that the users here refer to those with traffic matched to this channel. Users selected for **Channel Usage Range** but do not have such application traffic do not participate in the average allocation.

Advanced: If you select this option, each WAN IP address is considered a user in the channel so that the bandwidth is evenly allocated among channel users. Single-user maximum bandwidth' attribute is made available for WAN IP address. (This option is usually used for servers providing external services. Proceed with caution.)

Applicable Object: Set the types of data that will be matched to the channel, i.e., the usage range of the channel. The setting range includes app category, applicable object, effective time, and destination IP group. Data should meet all these rules to be matched to the channel.



Application: Set the app category.

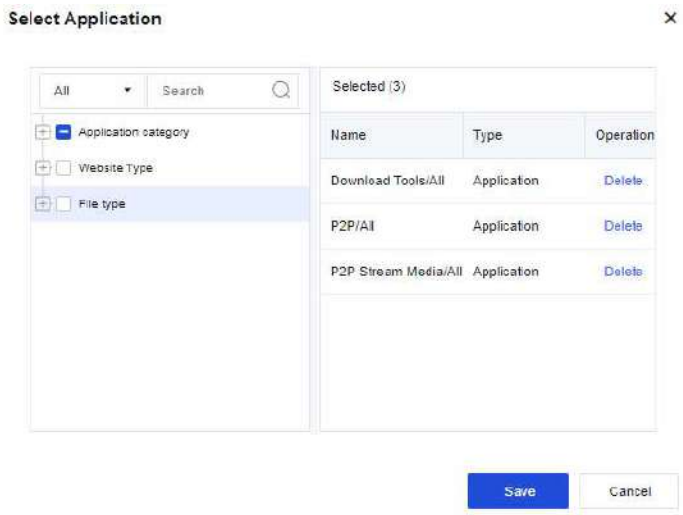
All: Indicates that it is valid for all data types.

Custom: Select a specific app category.

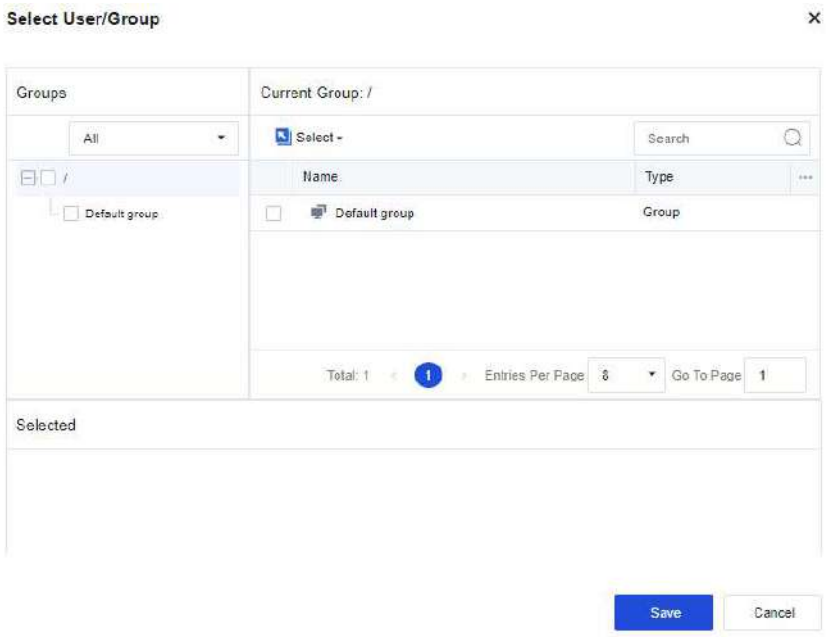
Click Select Application. In Select Application dialog box that appears, select the Application category.

In this example, the P2P-related data and the download data of downloading tools shall be subject to bandwidth management, and you can select **Download Tools/All**, **P2P/All**, and **P2P Stream Media/All**. In addition, you may also select **Website Type** and **File Type**. The former controls the data access to certain types of websites, whereas the latter controls the types of files downloaded via HTTP and FTP protocols. Confirm whether

the range selected in Selected is correct. Click Save to complete the settings of applicable applications.



Src Objects: Set the network objects and user groups for which the channel is valid. The applicable object can be either IP address-based or user-based. In this example, to guarantee the bandwidth for all users in the Marketing Department, select **User**. In the **Groups** section, select the required group path. In the **Current Group** section, select **Group** and **User**. In the **Selected** section, view the list of selected users and user groups. After you select **Applicable Objects**, click **Save** to complete the settings.



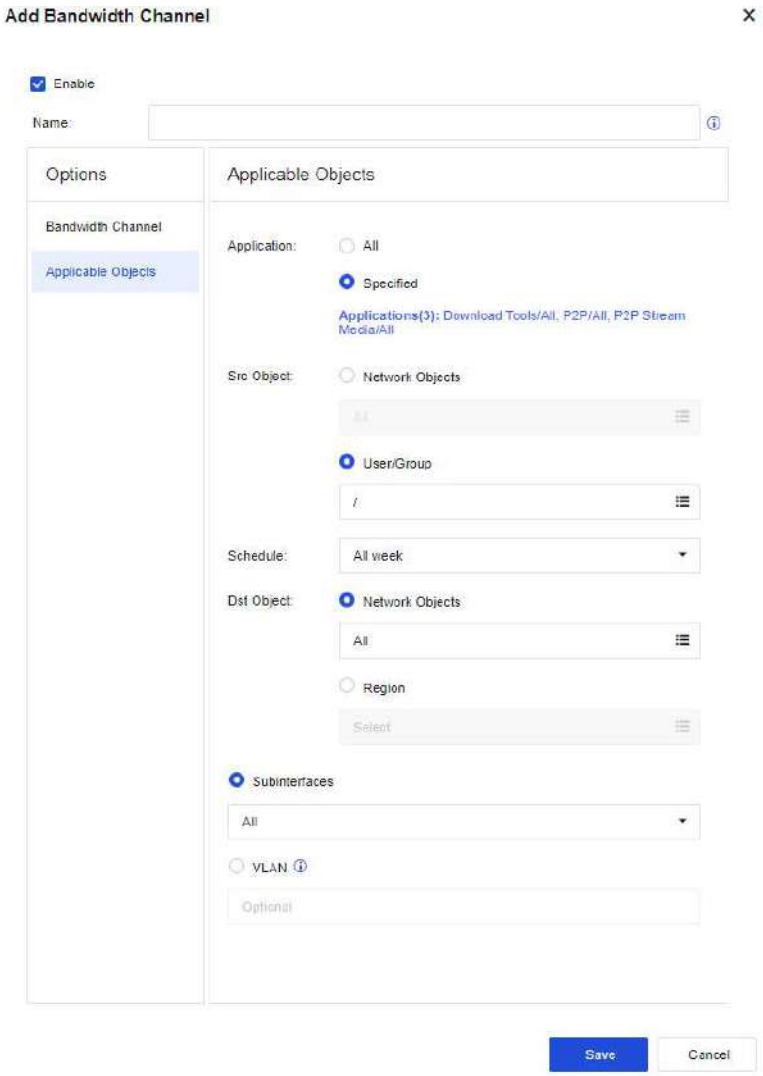
Schedule: Set the effective time of this channel.

Dst Object: Set the rules for the destination IP address.

Subinterfaces: Set the subinterface to which the traffic channel is applicable.

VLAN: Set the VLAN to which the traffic channel is applicable.

After the preceding parameters are set, the following page is displayed.



After setting, click **Save** to complete the setting for the limited channel.

Step 5. After you click **Save**, the set channel will appear on the **Bandwidth Channel** tab. The limited channel is configured.

7.5.1.3 Exclusion Policy

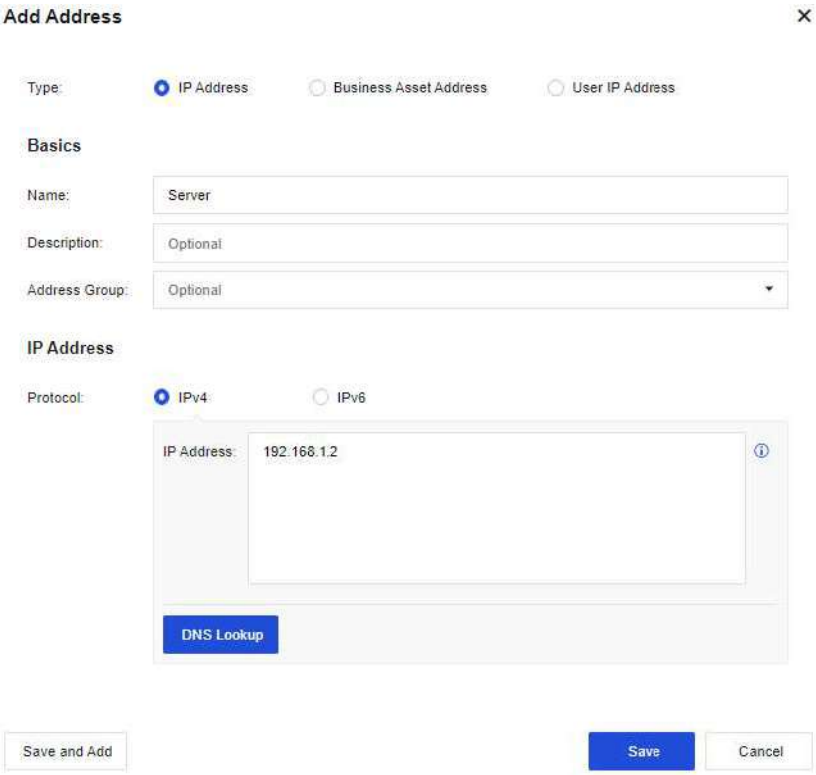
The exclusion policy sets some types of data that do not match any traffic control channels. The purpose is to exclude part of the data from the traffic control policy. For example, when the device is deployed in network bridge mode and the DMZ of the front-end firewall is connected to some servers, there is no need to control the traffic of data accessing this part of servers on the LAN. This is because the data does not go

through the internet and does not to be subject to the limit on the internet bandwidth. In that case, set an exclusion policy for the applications and IP addresses of these servers.

Exclusion Policy User Setting

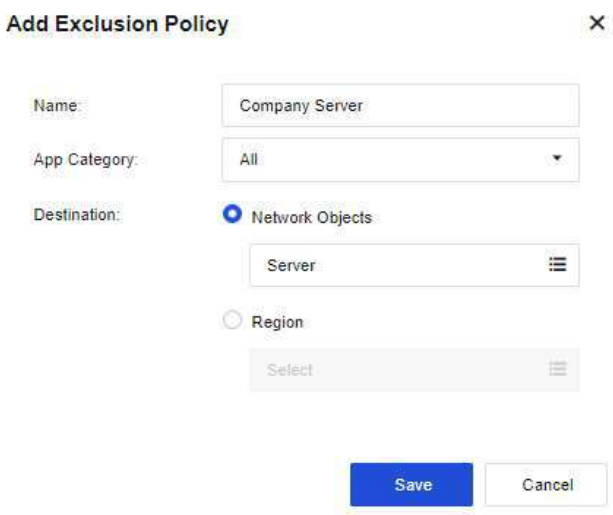
For example, the device is deployed in network bridge mode, and the DMZ of the front-end firewall is connected to some servers. In this case, exclude the data accessing the servers.

Step 1. Go to Objects > Network Objects, create a new IP group, and add the IP address to be excluded.



Step 2. Go to Bandwidth Management > Bandwidth Channel > Exclusion Rule, and click Add to add the exclusion policy.

Step 3. Set the exclusion policy. Enter the name of the policy, select All for the App Category, parameter and select Server set in Step 1 for the Destination parameter.



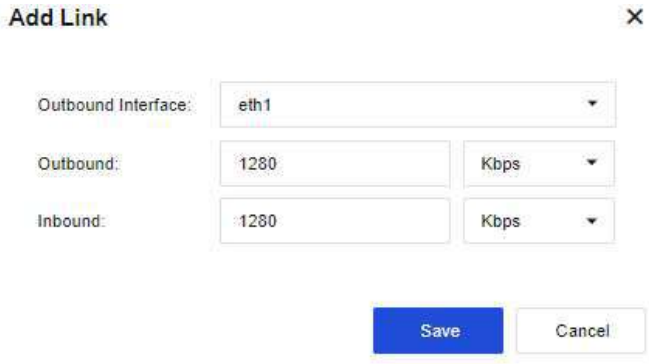
Step 4. Click Save to complete the setting.

The exclusion policy can also exclude those going to certain regions from bandwidth management.

7.5.2 Link Settings

7.5.2.1 Links

The link shows the current virtual lines. It is used to establish a correspondence between the device's physical network interfaces and the target lines to be called on the **Bandwidth Channel** tab, specifying the interface (target line) for outgoing data that can match the traffic control channel. Click **Add**, and set the following parameters in the **Add Link** dialog box that appears.



Outbound Interface: Specify the interface for outbound data that can match the virtual line. You can only select a WAN interface.

Outbound: Set the outbound bandwidth of the physical line according to the actual bandwidth of the interface. Otherwise, the bandwidth management result may be unsatisfactory.

Inbound: Set the inbound bandwidth of the physical line according to the actual bandwidth of the interface. Otherwise, the bandwidth management result may be unsatisfactory.

If there are multiple WAN interfaces requiring bandwidth management, you need to define multiple virtual lines. Click **Add** to continue to add other virtual lines.

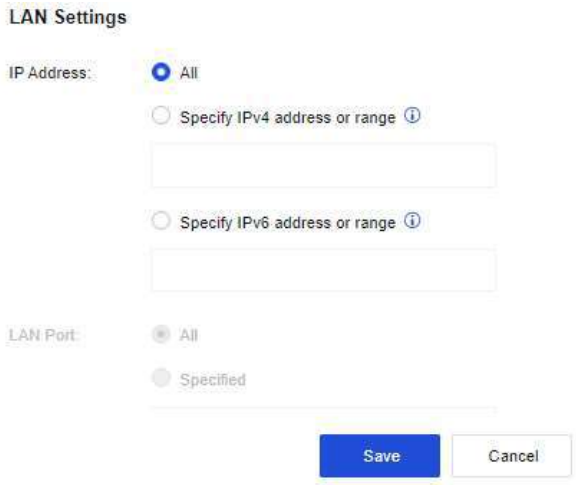
NOTICE

After defining the virtual line(s), set the corresponding virtual line rules to call the virtual line(s). Otherwise, the settings of the bandwidth channel will be invalid.

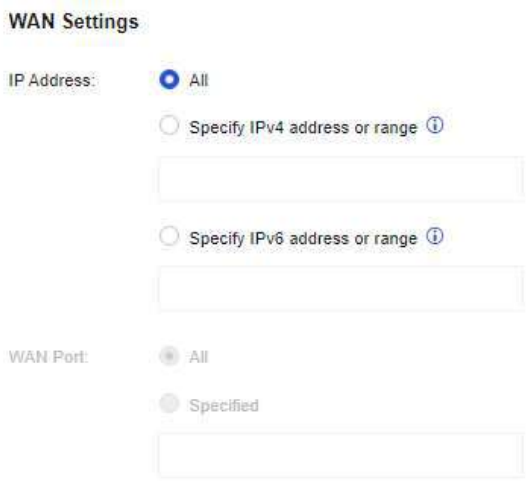
7.5.2.2 Link Policy

Link Policy are necessary for bandwidth channels to be effective. Different link policies can be matched based on different protocols, LAN and WAN ranges, and outbound interfaces.

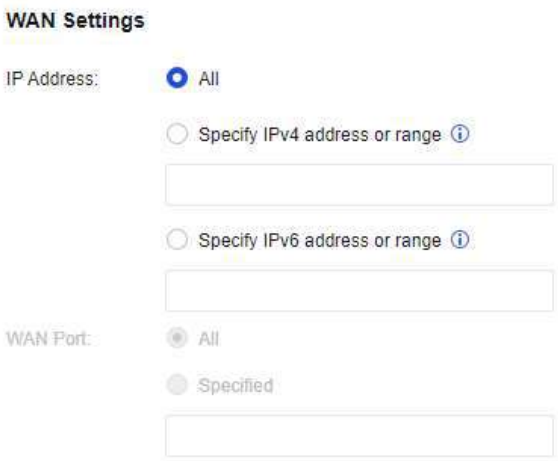
Go to P**olicies > Bandwidth Management > Link Settings > Link Policy**, and click **Add**. Then, the **Add Link Policy** dialog box appears, as shown in the following figure.



Protocol Setting: Specify the protocol for packets. The protocol types include TCP, UDP, and ICMP. If there are other types, select others, and enter the protocol number range in the **Protocol Number** field.



LAN Settings: Set the rules for source IP address and source port of packets, including IP address and LAN port. The IP address includes IPV4 and IPV6. Enter the specific IP address or IP range.



WAN Settings: Set the rules for the destination IP address and destination port of packets, including IP address and LAN port. The IP address includes IPV4 and IPV6. Enter the specific IP address or IP range. All ports or specified ports or ranges can be selected.

Destination Line: Set the virtual line to which the packets matching this virtual line rule will match, i.e., the interface from which the packets will be forwarded.

The bandwidth channel for a virtual line will be valid only when the virtual line becomes the destination line of a virtual line rule.

7.6 Authentication

The section describes the definition, authentication method, and usage of user management and user authentication.