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/ Gateway User Manual

Model: SR515ac

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Welcome!

Thank you for purchasing this SmartRG product.

SmartRG offers solutions that simplify the complex Internet ecosystem. Our solutions include hardware, software, applications, enhanced network insights, and security delivered via a future-proof operating system. Based in the USA, SmartRG provides local, proactive software development and customer support. We proudly offer the best, most innovative broadband gateways available. Learn more at www.SmartRG.com.

Purpose & Scope

This User Manual provides SmartRG customers with installation, configuration and monitoring information for their gateways.

Intended Audience

The information in this document is intended for Network Architects, NOC Administrators, Field Service Technicians and other networking professionals responsible for deploying and managing broadband access networks. Readers of this manual are assumed to have a basic understanding of computer operating systems, networking concepts and telecommunications.

Getting Assistance

Frequently asked questions are provided at the bottom of the Support page of the SmartRG Web site.

- **Subscribers:** If you require further help with this product, please contact your service provider.
- **Service providers:** if you require further help with this product, please open a support request.

Copyright and Trademarks

Disclaimer

SmartRG does not assume any liability arising out of the application or use of any products, or software described herein. Neither does it convey any license under its patent rights nor patent rights of others. SmartRG further reserves the right to make changes to any products described herein without notice. This publication is subject to change without notice.

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Getting Familiar with your Gateway

This section contains a quick description of the SR515ac Gateway's lights, ports, and buttons.

LED Status Indicators

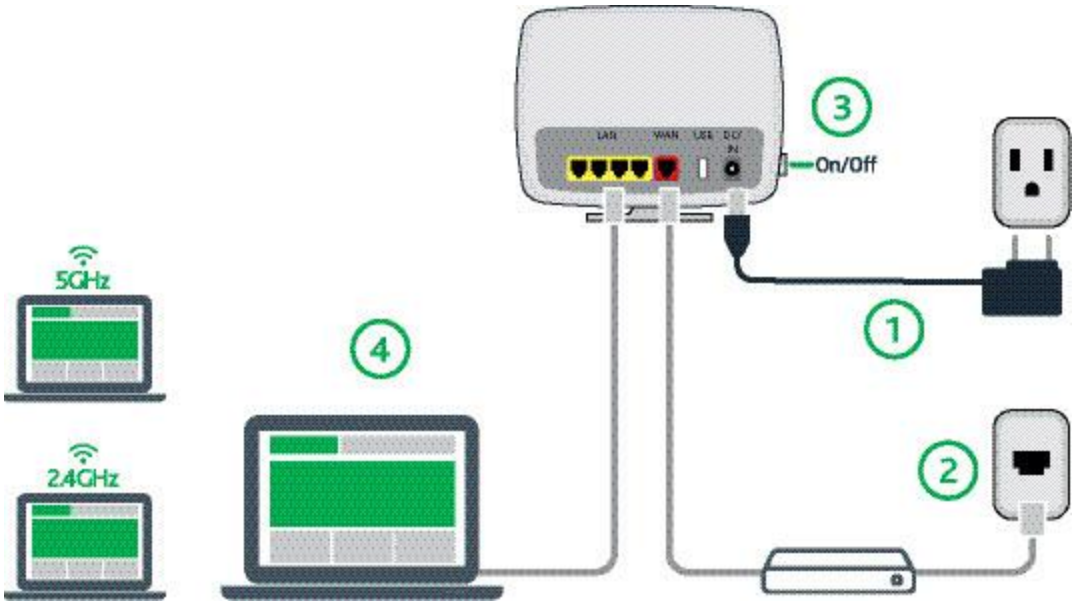
The LEDs on the SR515ac can assist you in better understanding the current state of your gateway.

Legend: ● On ○ Off ⚙ Blinking

	POWER	LAN 1-4	WLAN	DSL	INTERNET
DSL sync in progress	●			⚙	
DSL sync acquired and gateway online	●			●	●
Gateway online and data transfer in progress	●			●	⚙
IP connection failure	●				○
WiFi enabled on modem	●		●		
PC / network activity / data transfer	●	●/⚙	●/⚙		●/⚙
WPS Setup procedure in progress	●		●		
WPS Connection completed successfully	●		●		

Connections

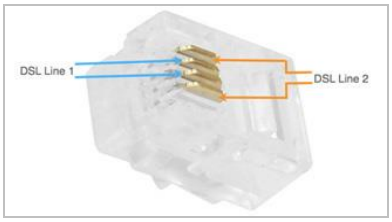
Below is a generic representation of a SmartRG gateway. Refer to the Installing Your Gateway section of this manual for specific instructions.



The ports depicted in this example are described below.

DSL

The grey RJ12 port labeled DSL is specifically intended for connection to an internet provider via a DSL (Digital Subscriber Line) service. The center pair carries the first DSL line.



WAN

A stand-alone RJ45 port labeled WAN enables your SmartRG gateway to be hard-wired to another network device with a RJ45/Ethernet output such as a cable, fiber, or DSL modem.

For models with a stand-alone, RJ45, WAN port and a DSL port, the WAN port can be re-purposed to function as an additional LAN port when your internet connection is via DSL.

For instructions to enable this SmartPort™ feature, see the Ethernet Configuration section in this manual.

LAN

The four (yellow) RJ45 ports across the back of your gateway labeled LAN1, LAN2, LAN3, LAN4 are the means to connect client devices such as computers and printers to your gateway.

On some models, one of these four ports may be labeled as WAN indicating SmartPort™ support. SmartPort allows a LAN port to be re-purposed to function as an Ethernet WAN port (described above). When this port is serving as a LAN port, the corresponding LED on the face of the unit is labeled "WAN"

For instructions to enable this SmartPort™ feature, see the Ethernet Configuration section in this manual.

USB

USB ports on SmartRG products currently provide +5 DC volts.

POWER

Use only the power supply included with your gateway. Intended for indoor use only.

External Buttons

Smart RG gateways provide push-button controls on the exterior for critical features. These buttons provide a convenient way to trigger WPS mode, toggle the WiFi radio on and off, or reset the gateway.

The following describes each of these controls.

WPS Button

The WPS button triggers WPS (Wi-Fi Protected Setup™) mode. WPS is a standard means for creating a secure connection between your gateway and various wireless client devices. It is designed to simplify the pairing process between devices.

If you have client devices that support WPS, use this button to automatically configure wireless security for your network.

For specific instructions, refer to the Quick Start Guide included with your gateway. Also see the " Basic" section of this manual.

WPS configures one client device at a time. You can repeat the steps as necessary for each additional WPS-compliant device you wish to connect.

The WPS button is located on the left side of the unit.

WiFi Button

The WiFi button toggles the WiFi radio on and off. The 2.4GHz and 5GHz indicators on the gateway displays the current state of the WiFi radios.

The WiFi button s located on the left side of the unit.

To activate the WiFi radio, press and hold the WiFi button for 3-5 seconds and then release. Expect a 1-3 second delay before the WiFi LED turns on. Repeat this step to deactivate the WiFi radio.

Reset Button

The Reset button is a small hole in the gateway's enclosure with the actual button mounted behind the surface. This style of push-button prevents the gateway from being inadvertently reset during handling. Reset must be actuated with a paper clip or similar implement.

The Reset button is located on the rear of the unit.

This pin-hole sized reset button has three functions. The duration for which the button is held dictates which function is carried out.

Hold Duration	Effect
Less than 6 seconds	Performs a modem reset that is equivalent to the **Reboot** function in the gateway software.
6-20 seconds	Performs the software equivalent to the **Restore Defaults** function in the gateway software.
20 or more seconds	Changes the POWER LED to red and the gateway enters CFE mode which is a state associated with performing firmware updates via Internet browser.

Installing your SmartRG Gateway

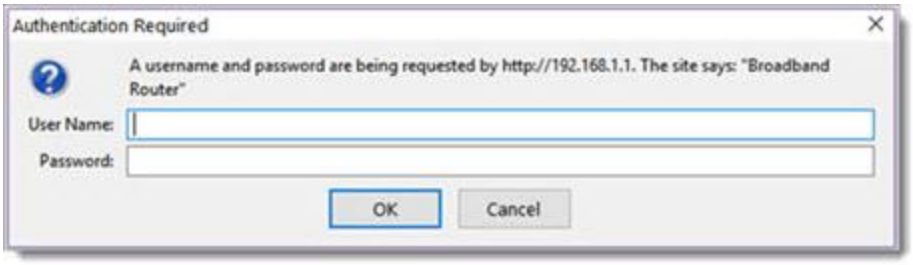
The following instructions explain all connection types offered for SmartRG gateways. For instructions specific to your gateway, follow the instructions in the Quick Start Guide included in the box.

1. Attach your computer's RJ45 connection to any of the SmartRG gateway's LAN ports (1-4).
2. If your computer is not already set up to acquire IP addresses using DHCP, configure your computer's IP interface to do so. (For instructions on logging in to a SmartRG gateway configured for "bridge mode" operation, see the Note in the Installing topic.)

Logging into your Gateway's UI

To manually configure the SmartRG Gateway, you must access the gateway's embedded web UI.

1. Open a browser and enter the gateway's default address (usually http://192.168.1.1) in the address bar. The Authentication Required dialog box appears.



2. Enter the username and password (usually admin/admin) and click **OK** . The Device Info > Summary page appears.

Note: The gateway's UI can be accessed via the WAN connection by entering the WAN IP address in your browser's address bar and entering the default username and password: support/support. WAN HTTP access control MUST be enabled to access the gateway's UI via the WAN connection. For more information, see the Default Passwords table in the Management > Access Control > Accounts section.

If your SmartRG gateway is configured for "bridge mode" (modem) operation, your PC will NOT be able to acquire an address via CPE DHCP. Instead, manually configure your PC's interface with an IP address on the default network (e.g., 192.168.1.100).

The remainder of this guide is dedicated to a sequential walk-through of the gateway user interface. Screen captures are provided along with descriptions of the options available on the pictured page. Where applicable, valid values are provided.

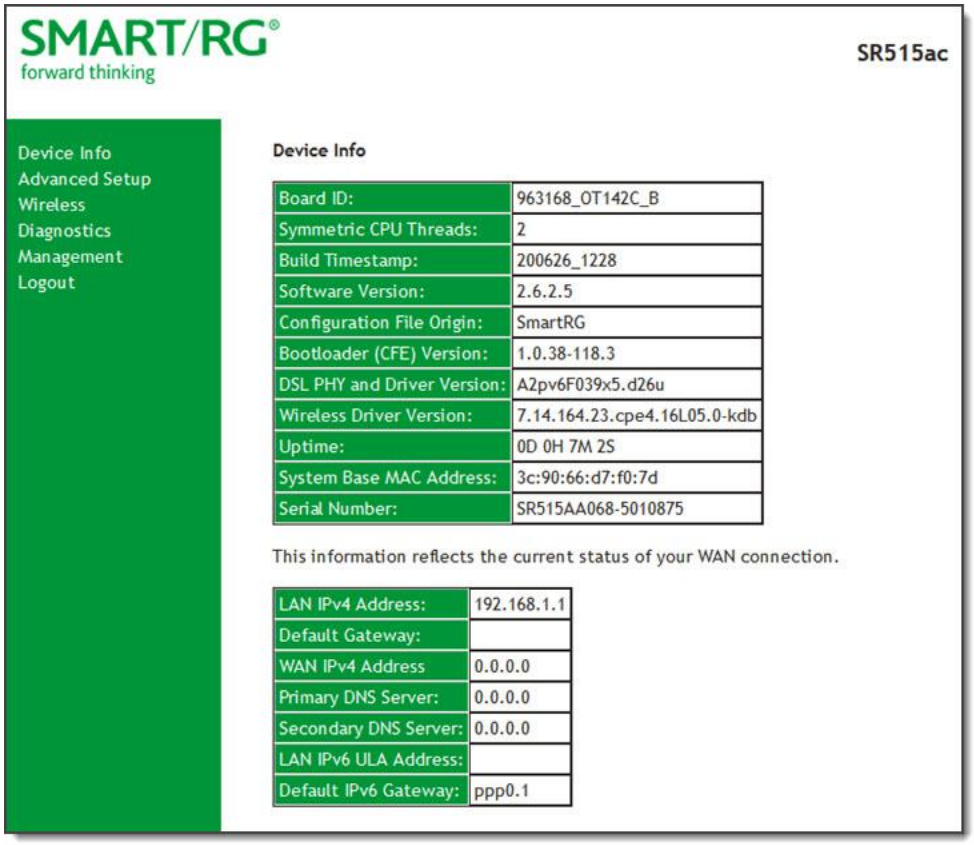
For in-depth "how-to" information for specific scenarios, go to the knowledge base found on our support web site. Access to this site is restricted to SmartRG customers and partners. Do not share links to this site with your subscribers.

Device Info

There are several selections under Device Info in the left navigation bar. Each of them shows a different element of the gateway's setup, status or nature of its connection with the provider and also with LAN devices. Device Info pages are read-only. You cannot interact with or change the settings in this section.

Summary

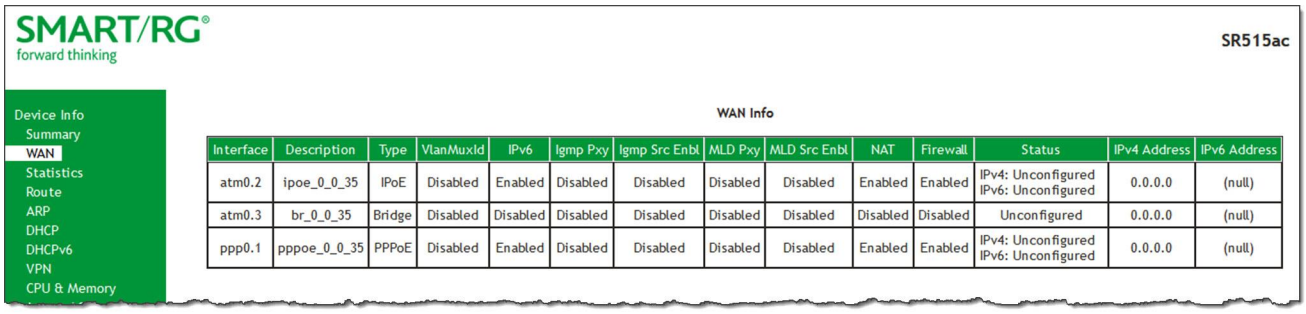
When you log into the gateway interface, the **Device Info** is the first page to appear. This page displays details about the hardware and software associated with your gateway. In addition, the current status of the WAN connection (if present) is shown.



WAN

On this page, you can view information about the connection between your ISP and your gateway. The WAN interface can be DSL or Ethernet and supports a number of Layer 2 and above configuration options (explained later in this document). Some features are supported only on specific SmartRG models. Those exceptions are specified in this guide.

In the left navigation bar, click **Device Info** > **WAN**. The following page appears.



The fields on this page are explained in the following table.

Field Name	Description
Interface	The connection interface (Layer 2 interface) through which the gateway handles the traffic.
Description	The service description such ipoe_0_0_1, showing the type of WAN and its ID.
Type	The service type. Options are **PPPoE**, **IPoE**, and **Bridge**.
VlanMuxId	The VLAN ID. Options are **Disabled** or **0-4094**.
IPv6	The state of IPv6. Options are **Enabled** and **Disabled**.
Igmp Pxy	The IGMP proxy.
Igmp Src Enbl	The IGMP source option is enabled for this connection.
MLD Pxy	(*Not available on SR515ac gateways*) The state of MLD. Options are **Enabled** and **Disabled**.
MLD Src Enbl	The MLD source option is enabled for this connection.
NAT	The state of NAT. Options are **Enabled** and **Disabled**.
Firewall	The state of the Firewall. Options are **Enabled** and **Disabled**.
Status	The status of the WAN connection. Options are **Disconnected**, **Unconfigured**, **Connecting**, and **Connected**.
IPv4 Address	The obtained IPv4 address.
IPv6 Address	The obtained IPv6 address.

Statistics

In this section, you can view network interface information for LAN, WAN Service, xTM, xDSL, and wireless. All data is updated in 15-minute intervals.

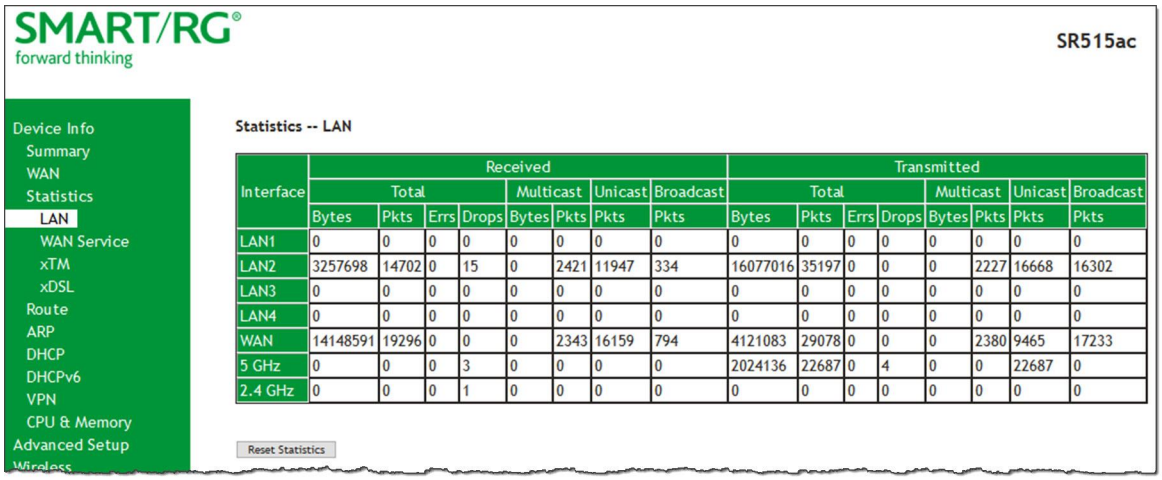
LAN

On this page, you can view the received and transmitted bytes, packets, errors and drops for each LAN interface configured on your gateway. All local LAN Ethernet ports, Ethernet WAN ports and wireless Interfaces are included. For some models, statistics are

provided for multicast, unicast and broadcast traffic.

In the left navigation bar, click **Device Info** > **Statistics**. The Statistics - LAN page appears where you can view detailed information about the status of your LAN.

To reset the counters, click **Reset Statistics** near the bottom of the page.



Interface	Received								Transmitted							
	Total				Multicast		Unicast	Broadcast	Total				Multicast		Unicast	Broadcast
	Bytes	Pkts	Errs	Drops	Bytes	Pkts	Pkts	Pkts	Bytes	Pkts	Errs	Drops	Bytes	Pkts	Pkts	Pkts
LAN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAN2	3257698	14702	0	15	0	2421	11947	334	16077016	35197	0	0	0	2227	16668	16302
LAN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAN4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WAN	14148591	19296	0	0	0	2343	16159	794	4121083	29078	0	0	0	2380	9465	17233
5 GHz	0	0	0	3	0	0	0	0	2024136	22687	0	4	0	0	22687	0
2.4 GHz	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

The fields on this page are explained in the following table.

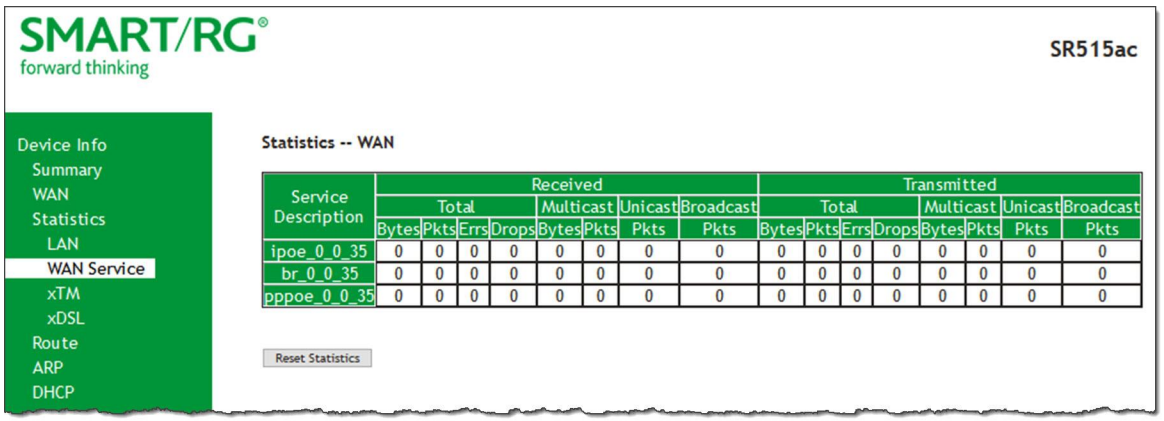
Field Name	Description
Interface	Available LAN interfaces. Options are **LAN1 - LAN4**, **WAN** (if configured on your device), and **2.4 GHz** and **5 GHz**.
Received & **Transmitted** columns	
Bytes	Total number of packets in bytes.
Pkts	Total number of packets.
Errs	Total number of error packets.
Drops	Total number of dropped packets.

WAN Service

On this page, you can view the received and transmitted bytes, packets, errors and drops for each WAN interface for your SmartRG Gateway. All WAN interfaces configured for your gateway are included.

In the left navigation bar, click **Device Info** > **Statistics** > **WAN Service**. The Statistics - WAN page appears where you can view detailed information about the status of your WAN.

To reset the counters, click **Reset Statistics** near the bottom of the page.



The fields on this page are explained in the following table.

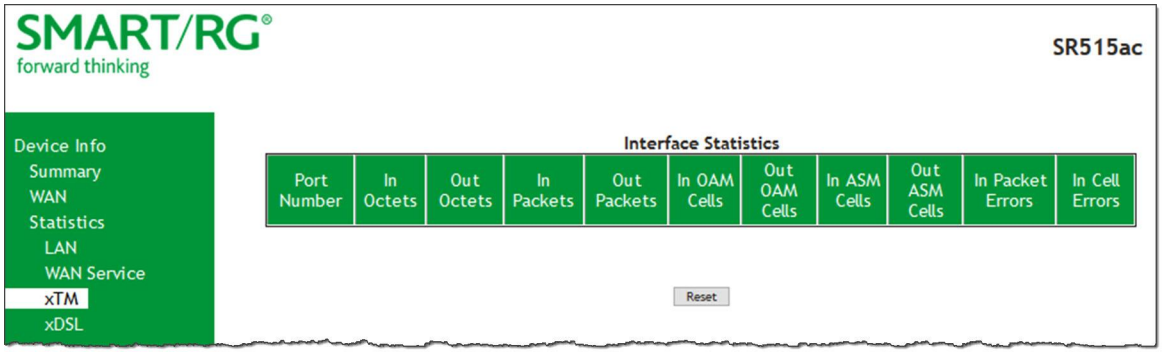
Field Name	Description
Service Description	Service description. Options are: **pppoe**, **ipoe**, and **br**.
Received & **Transmitted** columns	
Bytes	Total quantity of packets in bytes.
Pkts	Total quantity of packets.
Errs	Total quantity of error packets.
Drops	Total quantity of dropped packets.

xTM

On this page, you can view the ATM/PTM statistics for your gateway. All WAN interfaces configured for your SmartRG gateway are included.

In the left navigation bar, click **Device Info** > **Statistics** > **xTM**. The Interface Statistics page appears.

To reset these counters, click **Reset** near the bottom of the page.



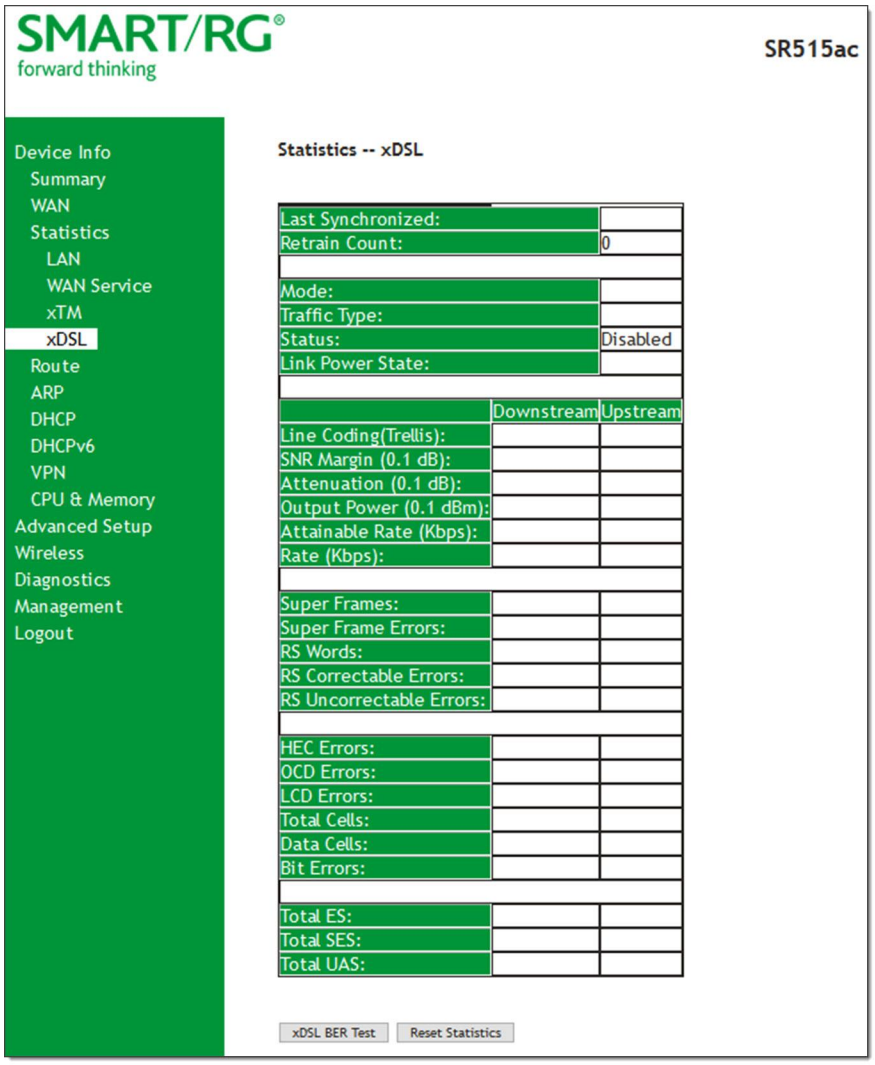
The fields on this page are explained in the following table.

Field Name	Description
Port Number	Statistics for Port 1, or both ports if Bonded.
In Octets	Total quantity of received octets.
Out Octets	Total quantity of transmitted octets.
In Packets	Total quantity of received packets.
Out Packets	Total quantity of transmitted packets.
In OAM Cells	Total quantity of received OAM cells.
Out OAM Cells	Total quantity of transmitted OAM cells.
In ASM Cells	Total quantity of received ASM cells.
Out ASM Cells	Total quantity of transmitted ASM cells.
In Packet Errors	Total quantity of received packet errors.
In Cell Errors	Total quantity of received cell errors.

xDSL

On this page, you can view the DSL statistics for your gateway. All xDSL (VDSL or ADSL) interfaces configured for your SmartRG gateway are included. The terms and their explanations are derived from the relevant ITU-T standards and referenced accordingly.

1. In the left navigation bar, click **Device Info** > **Statistics** > **xDSL**. The Statistics - xDSL page appears.



2. To run an xDSL Bit Error Rate (BER) test (to determine the quality of the xDSL connection):
   a. Scroll to the bottom of the page and click **xDSL BER Test**. The ADSL BER Test - Start dialog box appears.
   b. In the **Tested Time** field, select the duration in seconds and click **Start**. Options range from **1** second to **360** seconds. The test transfers idle cells containing a known pattern and compares the received data with this known pattern. Comparison errors are tabulated and displayed. To stop the test, click **Stop**.
3. To reset the counters, click **Reset Statistics** at the bottom of the page.

The fields on this page are explained in the following table.

Field Name	Description
Last Synchronized	The date and time that the gateway was last synchronized.
Retrain Count	The number of times the gateway was synchronized.
Mode	xDSL mode that the modem has trained under, such as ADSL2+, G.DMT, etc.
Traffic Type	Connection type. Options are: **ATM**, **PTM** and **ETH**.
Status	Status of the connection. Options are: **Up**, **Disabled**, **NoSignal**, and **Initializing**.
Link Power State	Current link power management state (e.g., L0, L2, L3).
Downstream and **Upstream** columns	
Line Coding (Trellis)	State of the Trellis Coded Modulation. Options are **On** and **Off**.
SNR Margin (0.1 dB)	The signal-to-noise ration margin (SNRM) is the maximum increase (in dB) of the received noise power, such that the modem can still meet all of the target BERs over all the frame bearers. [2]
Attenuation (0.1 dB)	The signal attenuation is defined as the difference in dB between the power received at the near-end and that transmitted from the far-end. [2]
Output Power (0.1 dBm)	Transmit power from the gateway to the DSL loop relative to one Milliwatt (dBm).
Attainable Rate (Kbps)	The typically obtainable sync rate, i.e., the attainable net data rate that the receive PMS-TC and PMD functions are designed to support under the following conditions: • Single frame bearer and single latency operation • Signal-to-Noise Ratio Margin (SNRM) to be equal or above the SNR Target Margin • BER not to exceed the highest BER configured for one (or more) latency paths • Latency not to exceed the highest latency configured for one (or more) latency paths • Accounting for all coding gains available (e.g., trellis coding, RS FEC) with latency bound • Accounting for the loop characteristics at the instant of measurement [2]
PhyR Status	(*Visible only for gateways connected via DSL*) Physical Layer Retransmission feature status. Options are **Inactive** and **Active**.
G. inp Status	(*Visible only for gateways connected via DSL*) The status of video data retrieval from the buffer. Options are **Inactive** and **Active**.
Rate (Kbps)	The current net data rate of the xDSL link. Net data rate is defined as the sum of all frame bearer data rates over all latency paths. [2]

Field Name	Description
Downstream and **Upstream** columns for DSL-specific fields only	
B (# of bytes in Mux Data Frame)	The nominal number of bytes from frame bearer #n per Mux Data Frame at Reference Point A in the current latency path.
M (# of Mux Data Frames in FEC Data Frame	The number of Mux Data Frames per FEC Data Frame in the current latency path.
T (Mux Data Frames over sync bytes)	The ratio of the number of Mux Data Frames to the number of sync bytes in the current latency path.
R (# of check bytes in FEC Data Frame)	The number of Reed Solomon redundancy bytes per code-word in the current latency path. This is also the number of redundancy bytes per FEC Data Frame in the current latency path.
S (# of data symbols over which the RS code word spans)	The number of data symbols over which the RS code word spans.
L (# of bits transmitted in each data symbol)	The number of bits transmitted in each data symbol.
D (interleaver depth)	The interleaving depth in the current latency path.
I (Interleaver block size in bytes)	(*Available for SR515ac models only*) The block size used for interleaving data transmissions.
N (RS codeword size)	(*Available for SR515ac models only*) The size of the Reed-Solomon (RS) codeword used for managing error cor-rection.
Delay (msec)	The PMS-TC delay in milliseconds of the current latency path (or the lowest latency path when running dual-latency paths).
INP (DMT symbol)	The input level for DMT-managed DSL environments.
OH Frames	The number of xDSL OH Frames transmitted/received.
OH Frame Errors	The number of xDSL OH Frames transmitted/received with errors.
(End of DSL-specific field group)	
Super Frames	(*Not applicable for SR515ac models*) The number of xDSL Super Frames transmitted/received.
Super Frame Errors	(*Not applicable for SR515ac models*) The number of xDSL Super Frames transmitted/received with errors.
RS Words	The number of Reed-Solomon-based Forward Error Cor-rection (FEC) codewords transmitted/received.
RS Correctable Errors	The number of Reed-Solomon-based FEC codewords received with errors that have been corrected.
RS Uncorrectable Errors	The number of Reed-Solomon-based FEC codewords received with errors that were not correctable.
RS Codewords Received	(*Visible only for gateways connected via DSL*) Total num-ber of Reed-Solomon Codewords received.
RS Codewords Corrected	(*Visible only for gateways connected via DSL*) Total num-

Field Name	Description
	ber of Reed-Solomon Codewords corrected.
RS Codewords Uncorrected	(*Visible only for gateways connected via DSL*) Total number of Reed-Solomon Codewords Uncorrected
HEC Errors	A count of ATM HEC errors detected. As per ITU-T G.992.1 and G.992.3, a1-byte HEC is generated for each ATM cell header. Error detection is implemented as defined in ITU-T I.432.1 with the exception that any HEC error shall be considered as a multiple bit error, and therefore, HEC Error Correction is not performed. [1],[2]
OCD Errors	Total number of Out-of-Cell Delineation errors. ATM Cell delineation is the process which allows identification of the cell boundaries. The HEC field is used to achieve cell delineation. [4] An OCD Error is counted when the cell delineation process transitions from the SYNC state to the HUNT state. [2]
LCD Errors	Total number of Loss of Cell Delineation errors. An LCD Error is counted when at least one OCD error is present in each of four consecutive overhead channel periods and SEF (Severely Errored Frame) defect is present. [2]
Total Cells	The total number of cells (OAM and Data cells) transmitted/received.
Data Cells	The total number of data cells transmitted/received.
Bit Errors	The total number of Idle Cell Bit Errors in the ATM Data Path. [3]
Total ES	Total number of Errored Seconds. This parameter is a count of 1-second intervals with one or more CRC-8 anomalies. [4]
Total SES	Total number of Severely Errored Seconds. An SES is declared if, during a 1-second interval, there are 18 or more CRC-8 anomalies in one or more of the received bearer channels, or one or more LOS (Loss of Signal) defects, or one or more SEF (Severely Errored Frame) defects, or one or more LPR (Loss of Power) defects. [4]
Total UAS	Total number of Unavailable Seconds. This parameter is a count of 1-second intervals for which the xDSL line is unavailable. The xDSL line becomes unavailable at the onset of 10 contiguous SES's. These 10 SES's shall be included in the unavailable time. Once unavailable, the xDSL line becomes available at the onset of 10 contiguous seconds with no SES's. These 10 seconds with no SES's shall be excluded from unavailable time. [4]

References

[1] ITU-T Recommendation G.992.1 (1999), Asymmetric digital subscriber line (ADSL) transceivers.

[2] ITU-T Recommendation G.992.3 (2005), Asymmetric digital subscriber line transceivers 2 (ADSL2).

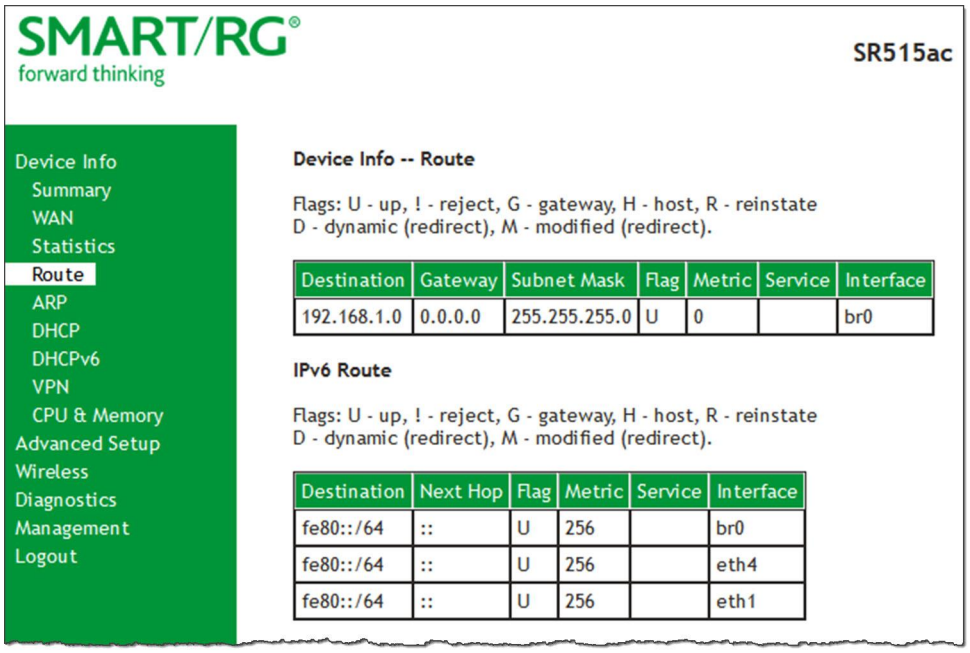
[3] ITU-T Recommendation G.997.1 (2006), Physical layer management for digital subscriber line (DSL) transceivers.

[4] ITU-T Recommendation I.432.1 (1999), B-ISDN user-network interface – Physical layer specification: General characteristics.

Route

On this page, you can view the LAN and WAN route table information configured in your SmartRG Gateway for both IPv4 and IPv6 implementation.

In the left navigation bar, click **Device Info** > **Route**. The following page appears.



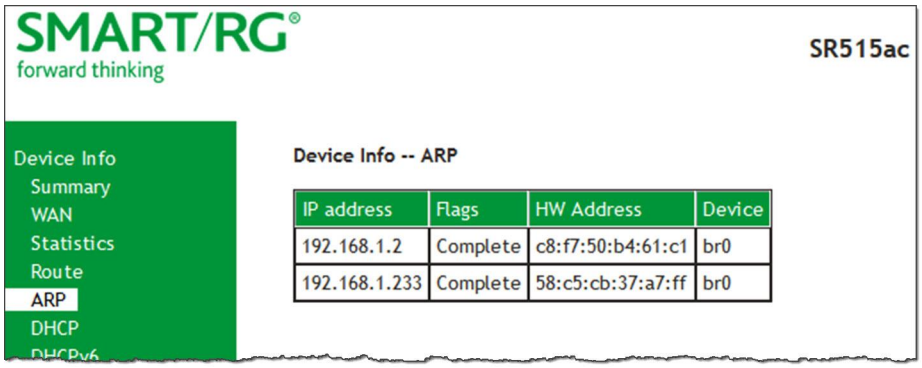
The fields on this page are explained in the following table.

Field Name	Description
Destination	Destination IP addresses.
Gateway	Gateway IP address.
Subnet Mask	(*For IPv4 only*) Subnet Masks.
Next Hop	(*For IPv6 only*) Next hop IP address.
Flag	Status of the flags.
Metric	Number of hops required to reach the default gateway.
Service	Service type.
Interface	WAN/LAN interface.

ARP

On this page, you can view the host IP addresses and their hardware (MAC) addresses for each LAN Client connected to the gateway via a LAN Ethernet port or wireless LAN.

In the left navigation bar, click **Device Info** > **ARP**. The following page appears.



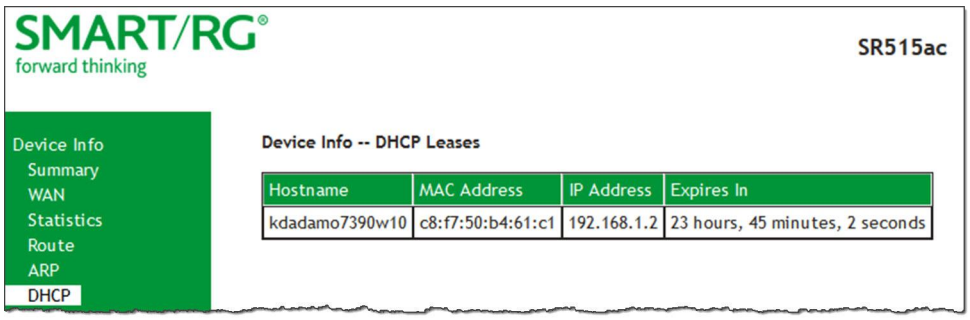
The fields on this page are explained in the following table.

Field Name	Description
IP address	The IP address of the host.
Flags	Each entry in the ARP cache will be marked with one of these flags. Options are: **Complete**, **Permanent**, and **Published**.
HW Address	The hardware (MAC) address of the host.
Device	The system level interface by which the host is connected. Options are: **br(n)**, **atm(n)**, **eth(n)**, and **atm(n)**.

DHCP

The DHCP page displays a list of locally connected LAN hosts and their DHCP lease status, which are directly connected to the SmartRG Gateway via a LAN Ethernet port or Wireless LAN.

In the left navigation bar, select **Device Info** > **DHCP**. The following page appears.



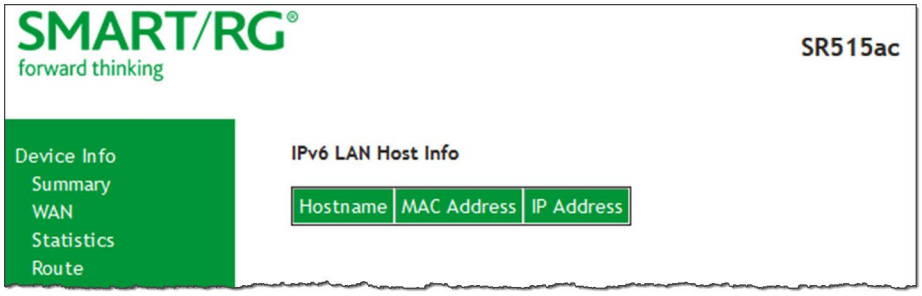
The fields on this page are explained in the following table.

Field Name	Description
Hostname	The host name of each connected LAN device.
MAC Address	The MAC Address for each connected LAN device.
IP Address	The IP Address for each connected LAN device
Expires In	The time until the DHCP lease expires for each LAN device.

DHCPv6

On this page, you can view the host name, the IP address assigned by the DHCPv6 server, the MAC address corresponding to the IP address, and the DHCP lease time.

In the left navigation bar, select **Device Info** > **DHCPv6**. The following screen appears.



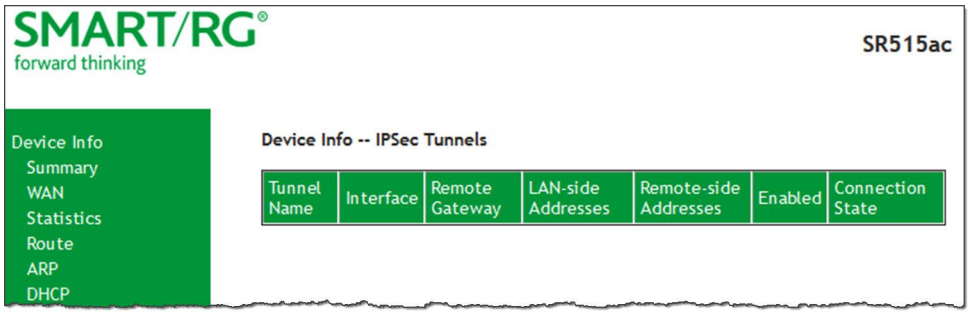
The fields on this page are explained in the following table.

Field Name	Description
Hostname	Host name of each connected LAN device.
MAC Address	MAC address for each connected LAN device.
IP Address	IP address for each connected LAN device.

VPN

On this page, you can view details about the IPSec tunnels configured for your gateway.

In the left navigation bar, select **Device Info** > **VPN**. The following screen appears.



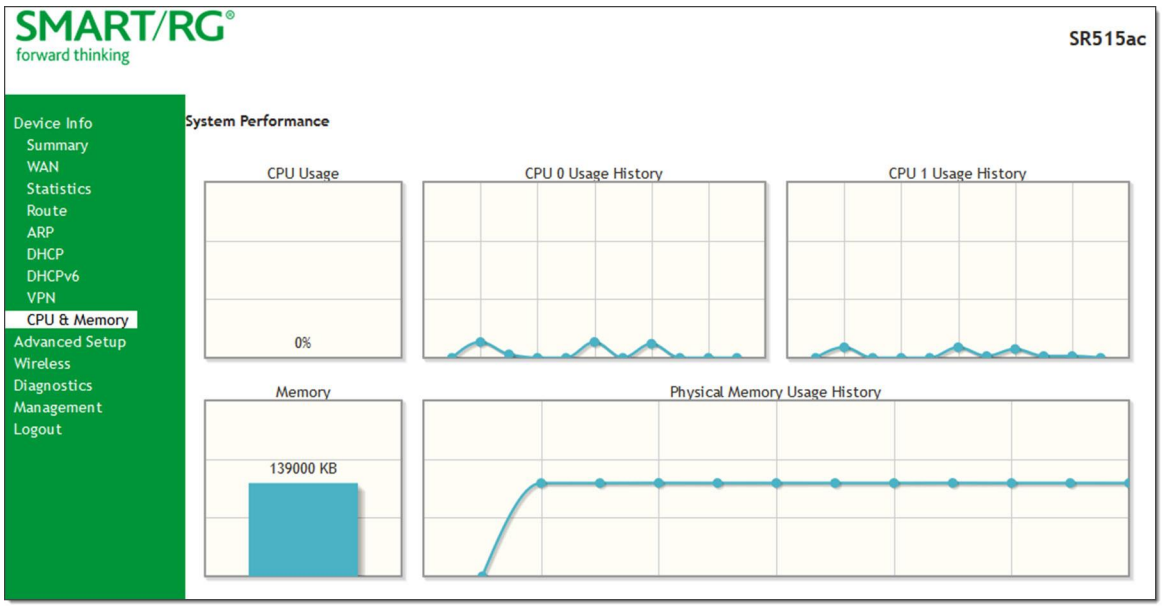
The fields on this page are explained in the following table.

Field Name	Description
Tunnel Name	Name of the IPSec tunnel.
Interface	WAN interface used by the tunnel.
Remote Gateway	WAN IP address for the tunnel.
LAN-side Addresses	Acceptable IP addresses defined for the LAN side.
Remote-side Addresses	Acceptable IP addresses defined for the WAN side.
Enabled	Indicates whether the tunnel is enabled or disabled.
Connection State	Indicates whether the tunnel connection is active or inactive.

CPU & Memory

On this page, you can view the CPU and memory data for the gateway.

In the left navigation bar, click **Device Info** > **CPU & Memory**. The following page appears, showing the current usage and history. The information refreshes automatically.



Advanced Setup

In this section, you can configure network interfaces, security, quality of service settings, and many other settings for your gateway and network.

Layer2 Interface

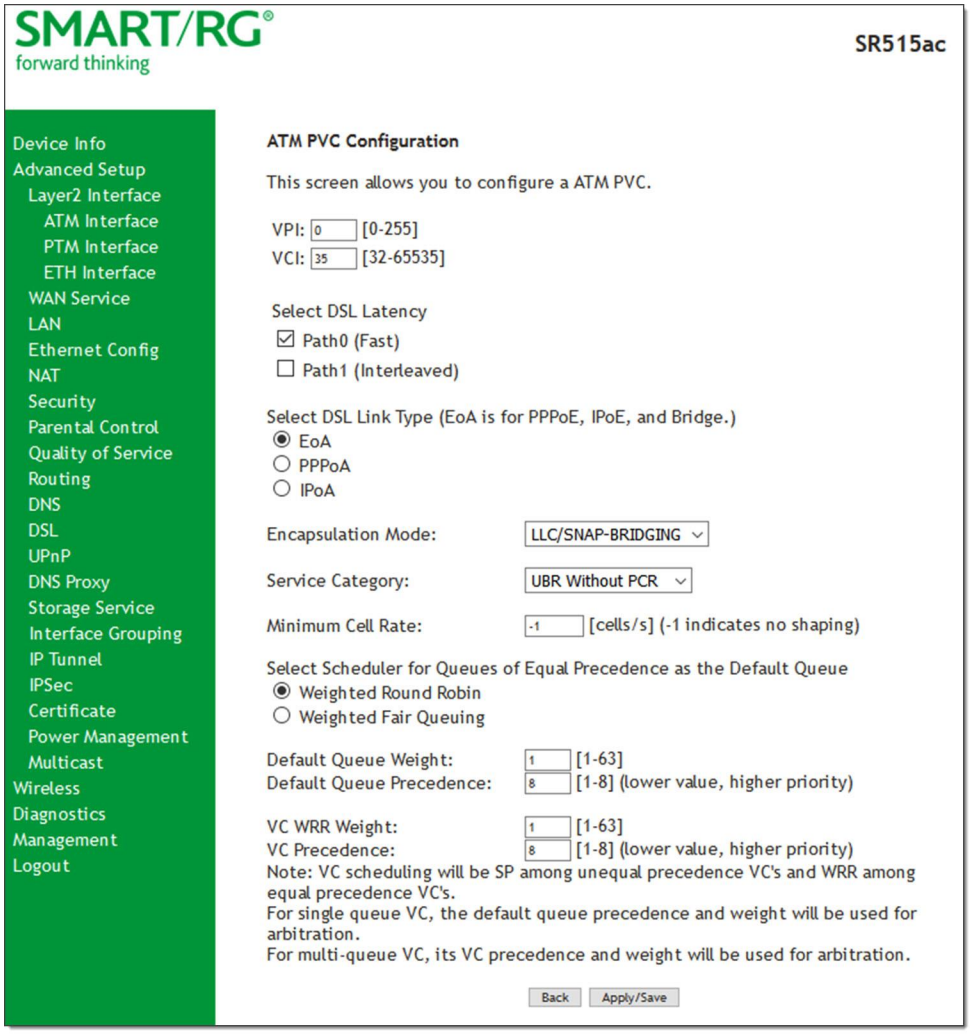
In this section, you can configure interfaces for ATM, PTM and Ethernet interfaces. Generally you can accept the settings configured by default. If your network is highly customized, you may need to modify some of the settings, such as **Username** and **Password**.

ATM Interface

On this page, you can configure Asynchronous Transfer Mode / Permanent Virtual Conduit (ATM/PVC) settings for your gateway. You can customize latency options, link type, encapsulation mode and more.

Note: Devices (routers) on both ends of the connection must support ATM / PVC.

1. In the left navigation bar, click **Advanced Setup** > **Layer2 Interface** > **ATM Interface** and then click **Add**. The following page appears.



2. Modify the settings as desired, using the information provided in the table below.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
VPI	Enter a Virtual Path Identifier. A VPI is an 8-bit identifier that uniquely identifies a network path for ATM cell packets to reach its destination. A unique VPI number is required for each ATM path. This setting works with the VCI. Each individual DSL circuit must have a unique VPI/VCI combination. Options are: **0-255**. The default is **0**.
VCI	Enter a Virtual Channel Identifier. A VCI is a 16-bit identifier that has a unique chan-

Field Name	Description
	nel. Options are: **32-65535**. The default is **35**.
Select DSL Latency	Select the level of DSL latency. Options are: • **Path0 Fast:** No error correction and can provide lower latency on error free lines. • **Path1 Interleaved:** Error checking that provides error free data which increases latency.
Select DSL Link Type	Select the linking protocol. Options are: • **EoA:** Ethernet over ATM. • **PPPoA:** Point-to-Point Protocol over ATM. • **IPoA:** Internet Protocol over ATM.
Encapsulation Mode	Select whether multiple protocols or only one protocol is carried per PVC (Permanent Virtual Circuit). Options are: • **LLC/ENCAPSULATION:** (*Available when **PPPoA** is selected as the **Link Type***) Logical Link Control (LLC) encapsulation protocols used with multiple PVCs. • **LLC/SNAP-BRIDGING:** (*Available when **EoA** is selected as the **Link Type***) LLC used to carry multiple protocols in a single PVC. • **LLC/SNAP-ROUTING:** (*Available when **IPoA** is selected as the **Link Type***) LLC used to carry one protocol per PVC. • **VC/MUX:** Virtual Circuit Multiplexer creates a virtual connection used to carry one protocol per PVC.
Service Category	Select the bit rate protocol. Options are: • **UBR without PCR:** Unspecified Bit Rate with no Peak Cell Rate, flow control or time synchronization between the traffic source and destination. Commonly used with applications that can tolerate data / packet loss. • **UBR with PCR:** Same as above but with a Peak Cell Rate. • **CBR:** Constant Bit Rate relies on timing synchronization to make the network traffic predictable. Used commonly in Video and Audio traffic network applications. • **NON Realtime VBR:** Non Realtime Variable Bit Rate used for connections that transport traffic at a Variable Rate. This category requires a guaranteed bandwidth and latency. It does not rely on timing synchronization between the destination and source. • **Realtime VBR:** Realtime Variable Bit Rate. Same as the above option but relies on timing and synchronization between the destination and source. This category is commonly used in networks with compressed video traffic.

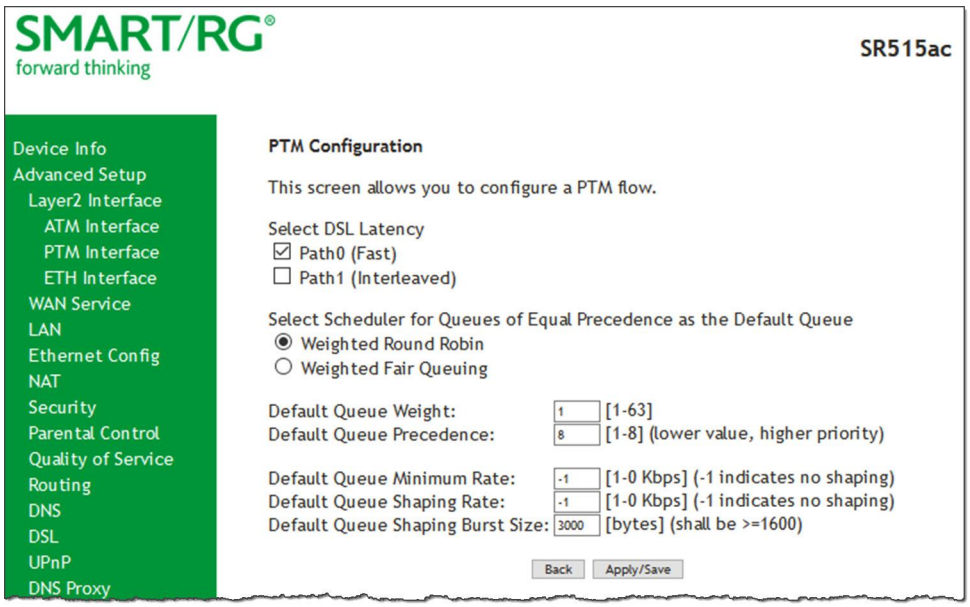
Field Name	Description
Minimum Cell Rate	Minimum allowable rate (cells per second) at which cells can be sent on a ATM network. For no shaping, enter **-1**.
Scheduler for Queues of Equal Precedence as the Default Queue	The algorithm used to schedule the queue behavior. VC scheduling is unique from Default Queues. Options are: • **Weighted Round Robin:** Packets are accessed in a round robin style and classes can be assigned. • **Weighted Fair Queuing:** Packets are assigned in a specific queue.
Default Queue Weight	The default weight of the specified queue. Options are: **1**-**63**. The default is **1**.
Default Queue Precedence	The precedence of the specified group. Options are: **1**-**8**. The default is **8**.
VC WRR Weight	Enter the weight of the VC queue. Options are: **1**-**63**. The default is **1**.
VC Precedence	Enter the precedence of the VC group. The lower the value, the higher the priority. Options are: **1**-**8**. The default is **8**.

PTM Interface

The SmartRG gateway's VDSL2 standards support Packet Transfer Mode (PTM). An alternative to ATM mode, PTM transports packets (IP, PPP, Ethernet, MPLS, and others) over DSL links. For more information, refer to the IEEE802.3ah standard for Ethernet in the First Mile (EFM). Some 500 series gateways have a PTM interface configured by default.

On this page, you can configure a PTM interface for your gateway.

1. In the left navigation bar, click **Advanced Setup** > **Layer2 Interface** > **PTM Interface** and then click **Add**. The following page appears.



2. Modify the settings as desired.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
Select DSL Latency	Select the level of DSL latency. Options are: • **Path0 Fast:** No error correction and can provide lower latency on error-free lines. • **Path1 Interleaved:** Error checking that provides error-free data which increases latency.
Select Scheduler for Queues of Equal Precedence as the Default Queue	Select an algorithm for applying queue data priority. Options are: • **Weighted Round Robin:** Time slices are assigned to each process in equal portions and in circular order, handling all processes without priority (also known as cyclic executive). • **Weighted Fair Queuing:** A data packet scheduling technique allowing different scheduling priorities to be assigned to statistically multiplexed data flows. Since each data flow has its own queue, an ill-behaved flow (that sent larger packets or more packets per second than the others since it became active) will only affect itself and not other sessions.
Default Queue Weight	Enter a default weight of the specified queue. Options are: **1-63**.

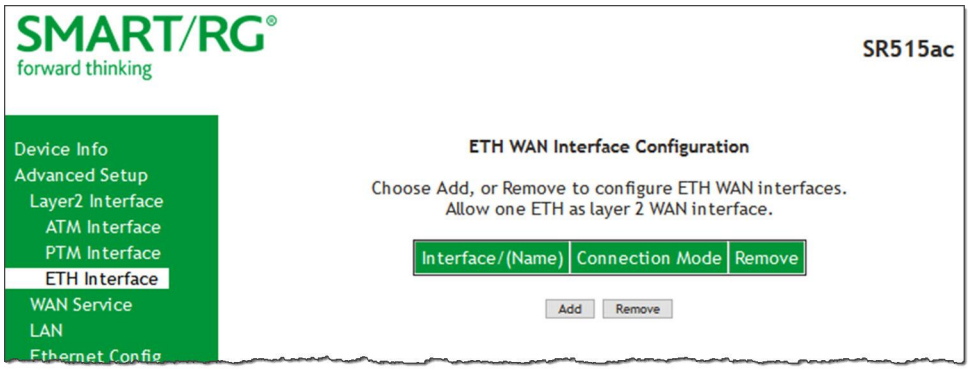
Field Name	Description
Default Queue Precedence	Enter a precedence for the specified queue. Options are: **1**-**8**.
Default Queue Minimum Rate	The default minimum rate at which traffic can pass through the queue. For no shaping, enter **-1** (disabled). Options are: **1**-**0** Kbps.
Default Queue Shaping Rate	The shaping rate for the specified queue. For no shaping, enter **-1** (disabled). Options are: **1**-**0** Kbps.
Default Queue Shaping Burst Rate	The maximum rate at which traffic can pass through the queue. Options are **1600** or greater.

ETH Interface

If you are using a gateway that is Ethernet-specific (non-DSL), you may want to configure an ETH interface to manage communication. Most models support Ethernet and can be configured for Ethernet and DSL at the same time. Your gateway has four LAN ports. One of them can be re-purposed to become an RJ45 WAN port when needed.

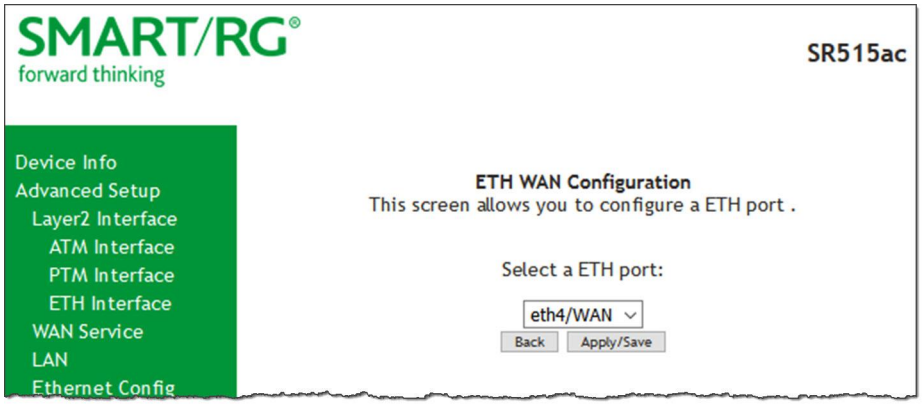
On this page, you can configure an Ethernet interface for your gateway.

1. In the left navigation bar, click **Advanced Setup** > **Layer2 Interface** > **ETH Interface**. The following page appears.



2. If no WAN port is configured, the **Add** button appears. Click **Add**.

3. If a WAN port is already configured or you clicked **Add**, the following page appears.



Note: If a WAN port it is already configured, you must remove it before you can define a new one. Before you can remove the WAN port, you must first modify or delete any WAN service that uses it. The **Add** button does not appear until the existing port is removed.

4. Select the LAN port you wish to act as a WAN port.
5. Click **Apply/Save** to commit your changes.
6. To remove the WAN interface, click the **Remove** checkbox and then click the **Remove** button.

WAN Service

In this section, you can configure WAN services for:

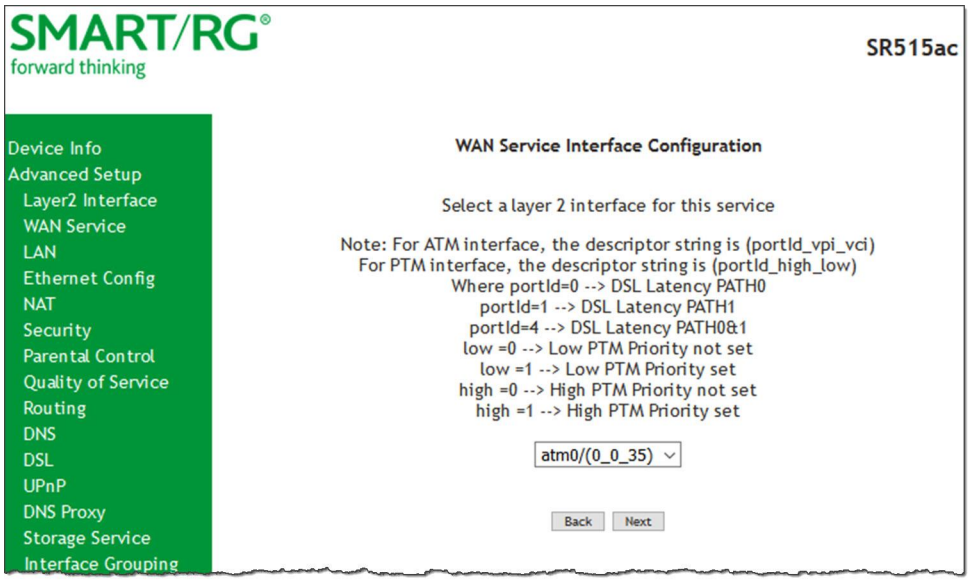
- "PPP over Ethernet"
- "IP over Ethernet"
- "Bridging"

Instructions are provided for each variation.

PPP over Ethernet

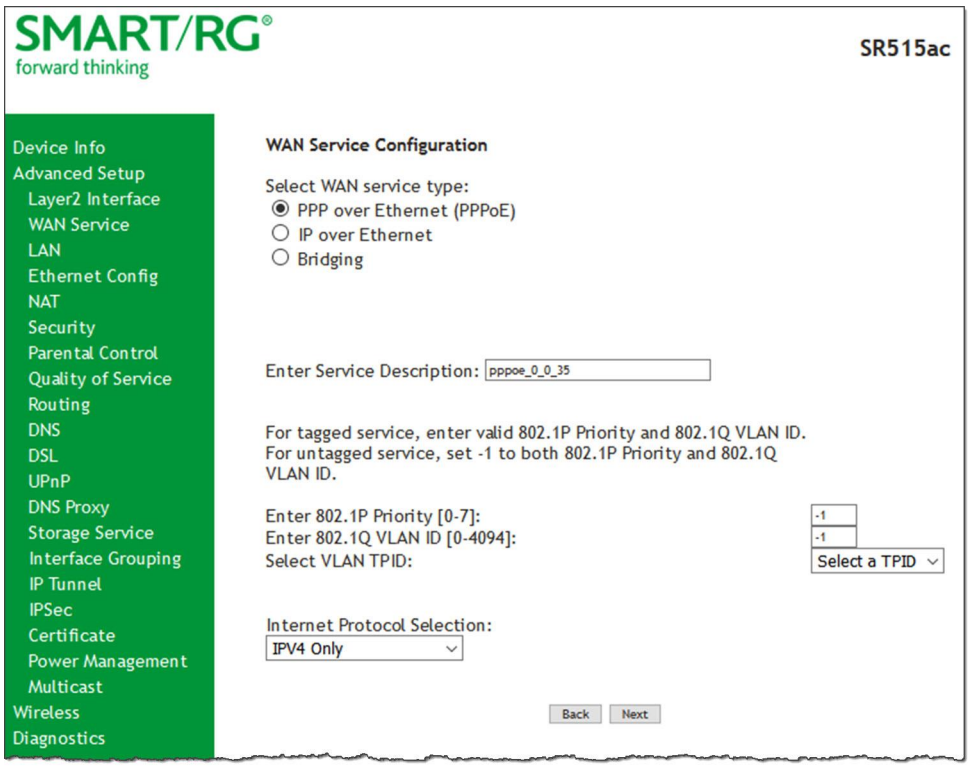
There are several parts to configuring a PPP over Ethernet WAN service. You will progress through several pages to complete the configuration.

1. In the left navigation bar, click **Advanced Setup** > **WAN Service** and then click **Add**. The following page appears.



2. Select the Layer2 interface to use for the WAN service.

3. Click **Next**. The following page appears.



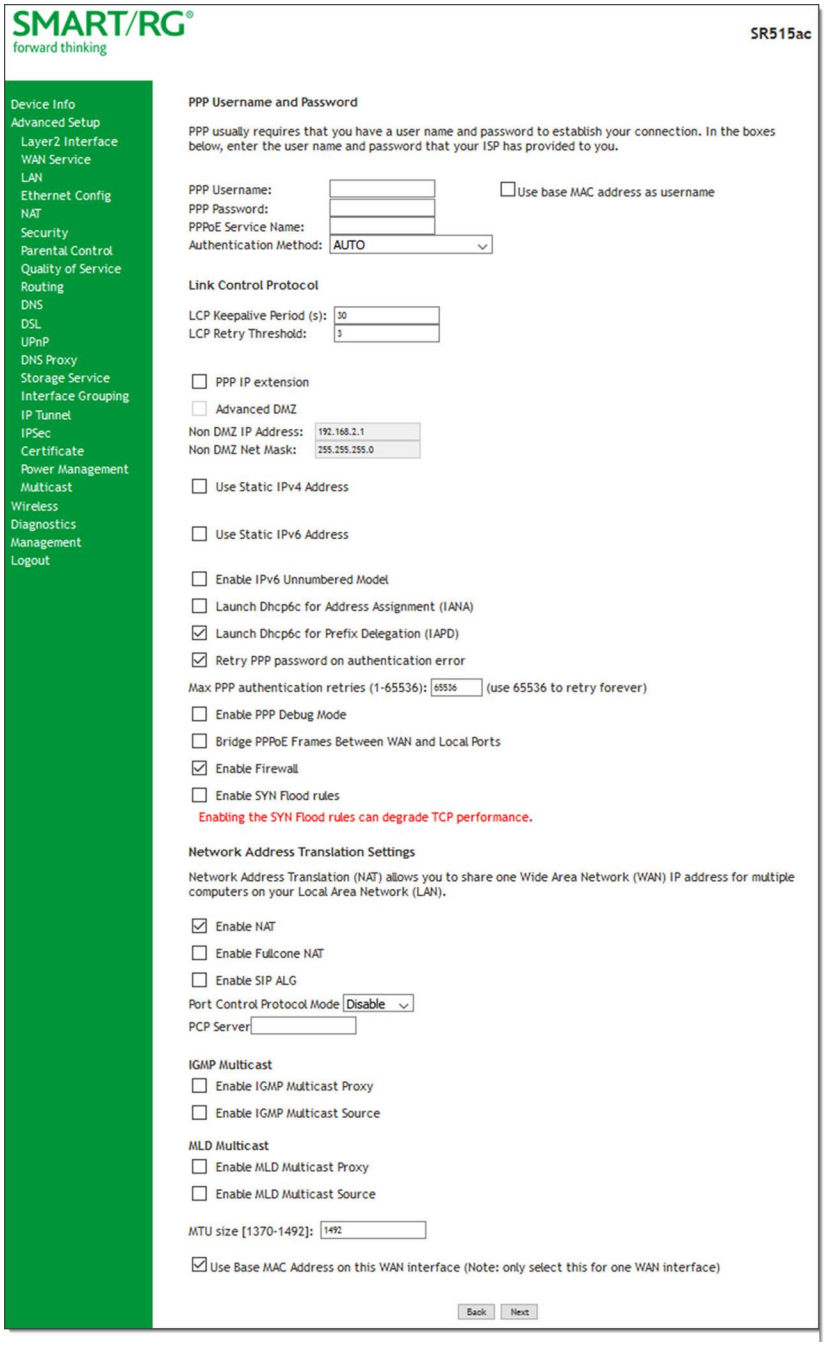
4. Select the **PPP over Ethernet (PPPoE)** WAN service type.
5. Modify the other settings as needed.

The fields on this page are explained in the following table.

Field Name	Description
Enter Service Description	Enter a name to describe this configuration.
Enter 802.1P Priority	Options are **0** - **7**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1Q VLAN ID** field. For untagged service, enter **-1** (disabled) in this field and the **802.1Q VLAN ID** field.
Enter 802.1Q VLAN ID	Options are **0** - **4094**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1P Priority** field. For untagged service, enter **-1** (disabled) in this field and the **802.1P Priority** field.
Select VLAN TPID	(*Optional*) Select the TPID for this VLAN. Options are: **0x8100**, **0x88A8**, and **0x9100**.
Internet Protocol Selection	Different scheduling priorities can be applied to statistically multiplexed data flows. Since each data flow has its own queue, an ill-behaved flow (which has sent larger packets or more packets per

Field Name	Description
	second than the others) will only punish itself and not other sessions. Options are **IPv4 Only**, **IPv4&IPv6** (Dual Stack), and **IPv6 Only**. **Note:** When you select **IPV4&IPV6** or **IPV6**, the options presented will change accordingly.

6. Click **Next**. The following page appears where you will configure the PPP Username, Password and related information.



7. Modify the fields as needed.

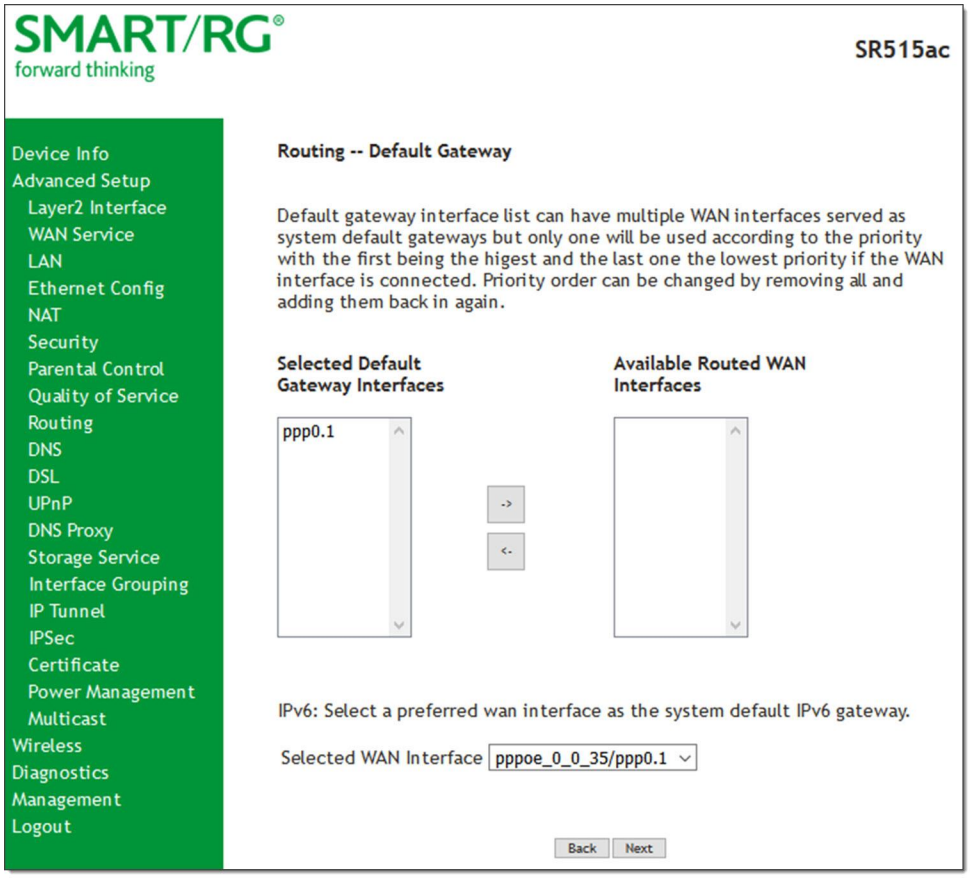
   The fields on this page are explained in the following table.

Field Name	Description
PPP Username and Password section	
PPP Username	Enter the username required for authentication to the PPP server.
Use base MAC address as username	Click this checkbox to use the base MAC address of the gateway as the PPP user name.
PPP Password	Enter the password required for authentication to the PPP server.
PPPoE Service Name	(*Optional*) Enter a description for this service.
Authentication Method	Select a means for authentication. Options are: • **AUTO:** Attempt to automatically detect handshake protocol. This is the default. • **PAP:** Password Authentication Protocol (plaintext passwords). • **CHAP:** Challenge Handshake Authentication Protocol. (MD5 hashing scheme on passwords). • **MSCHAP:** Microsoft Challenge Handshake Authentication Protocol. (Microsoft encrypted password authentication protocol).
Link Control Protocol section	
LCP Keepalive Period (s)	The frequency with which the keepalive packet is sent by the gateway to the PPP server. The default is **30**.
LCP Retry Threshold	Enter the number of additional attempted packets that the gateway will send (in the event that the PPP server does not respond to the Keepalive) before giving up and declaring the connection as Failed. The default is **3**.
PPP IP Extension	Select whether to forward all traffic to the specified advanced DMZ IP. When you select this option, the **Advanced DMZ** checkbox becomes available.
Advanced DMZ	(*Available only when **PPP IP Extension** is selected*) Specify the IP address and net mask to which PPPoE traffic is forwarded.
Use Static IPv4 Address	Click to use a static IPv4 address for this WAN service. The **IPv4 Address** field appears. Enter the static IPv4 address for this WAN service.
Use Static IPv6 Address	Click to use a static IPv6 address for this WAN service. The **IPv6 Address** field appears. Enter the static IPv6 address for this WAN service.
Enable IPv6 Unnumbered Model	(*Available only for IPv6 environments*) Click to enable IP processing on a serial interface without assigning it an explicit IP address. The IP address of another interface can "borrow" the IP address of another interface already configured on the router, which conserves network and address space.
Launch Dhcp6c for Address Assignment (IANA)	(*Available only for IPv6 environments*) Click to enable the gateway to receive the WAN IP from the ISP.

Field Name	Description
Launch Dhcp6c for Prefix Delegation (IAPD)	(*Available only for IPv6 environments*) This option is enabled by default and enables the gateway to generate the WAN IP's prefix from the server's REST by MAC address. To *disable* this options, clear the checkbox.
Retry PPP password on authentication error	In the **Max PPP authentication retries** field, enter the maximum number of PPP authentication retries on failure. Options are **1** - **65536**. Entering **65536** sets the maximum to unlimited.
Enable PPP Debug Mode	Select to have the system put more PPP connection information into the system log of the device. This is for debugging errors and not for normal usage.
Bridge PPPoE Frames Between WAN and Local Ports	Select to enable PPPoE passthrough to relay PPPoE connections from behind the modem. Also known as Half-Bridged mode.
Enable Firewall	This option is enabled by default. To disable functions in the **Security** submenu, click the checkbox to clear it.
Enable SYN Flood rules	Click to enable SYN flood rules. Enabling this feature may degrade TCP performance.
Network Address Translation settings	
Enable NAT	Select to enable sharing the WAN interface across multiple devices on the LAN. Additional NAT and PPPoE NAT features appear.
Enable Fullcone NAT	(*Appears when **Enable NAT** is selected*) Click to enable what is known as one-to-one NAT.
Enable SIP ALG	(*Appears when **Enable NAT** is selected*) Click to enable Session Initiation Protocol (SIP) pass-through NAT. Used for Voice over IP (VOIP) applications.
Port Control Protocol Mode	(*Available for SR515ac models only*y) This option is disabled by default. Select a protocol to allow the PCP server to control how incoming packets are processed for NAT or packet filtering. Options are **DS-Lite** and **NAT444**.
PCP Server	(*Available for SR515ac models only*y) Enter the server IP address for the port control protocol.
IGMP Multicast section	
Enable IGMP Multicast Proxy	(*Appears when **Enable NAT** is selected*) Click to enable Internet Group Membership Protocol (IGMP) multicast. Used by IPv4 hosts to report multicast group memberships to any neighboring multicast routers.
Enable IGMP Multicast Source	(*Available for SR515ac models only*y) Select to enable this service to act as an IGMP multicast source.
MLD Multicast section	
Enable MLD Multicast	(*Available only for IPv6 environments*) Click to enable MLD multicast. Used

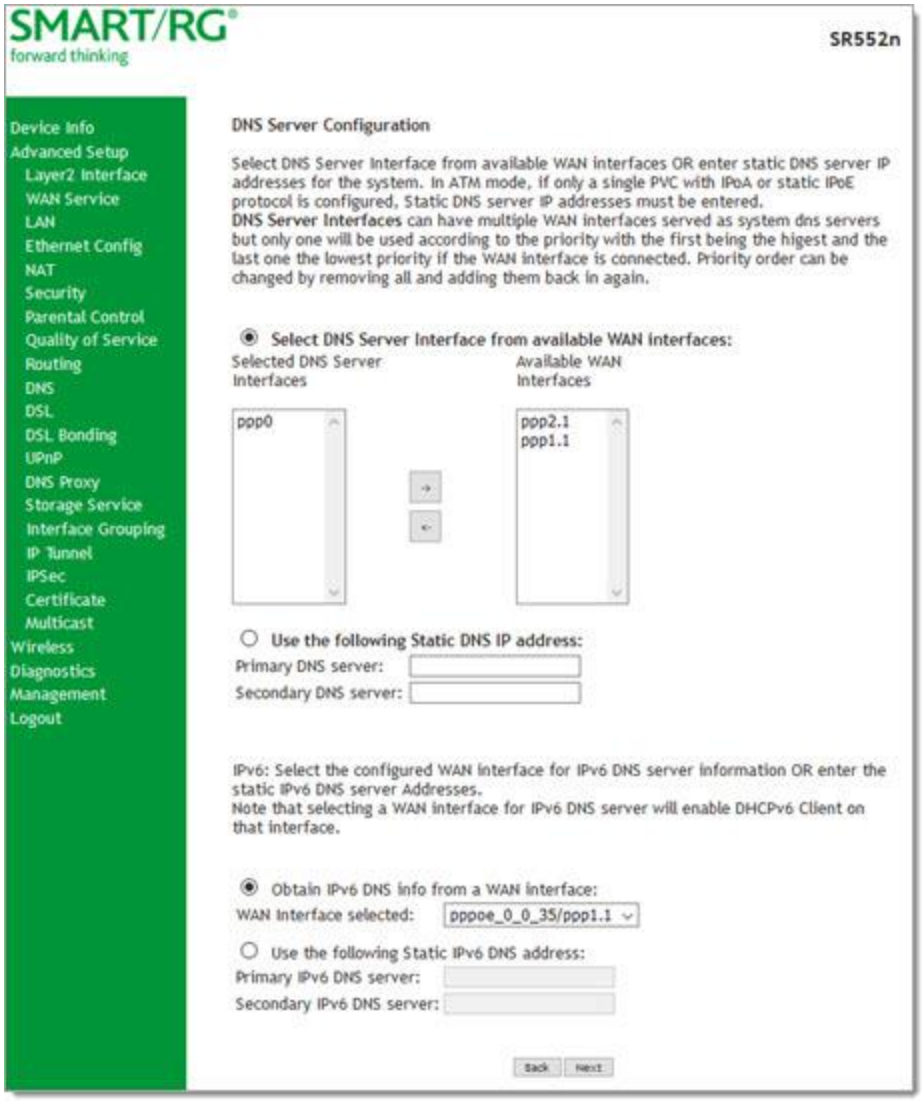
Field Name	Description
Proxy	by IPv4 hosts to report multicast group memberships to any neighboring multicast routers.
Enable MLD Multicast Source	(*Available only for IPv6 environments*) Click to enable this service to act as an MLD multicast source.
MTU size	Enter the MTU (Maximum Transmission Unit) size for SmartRG gateways supporting a gigabit-capable WAN interface. Options are **1370** - **1492 bytes**. The default is **1492** bytes.
Use Base MAC Address on this WAN interface	Use the SmartRG Devices Base (Primary) MAC address. When unchecked, a unique MAC is assigned for each service.

8. Click **Next**. The following page appears where you will select the interface used as a default gateway used for the PPP service being created.



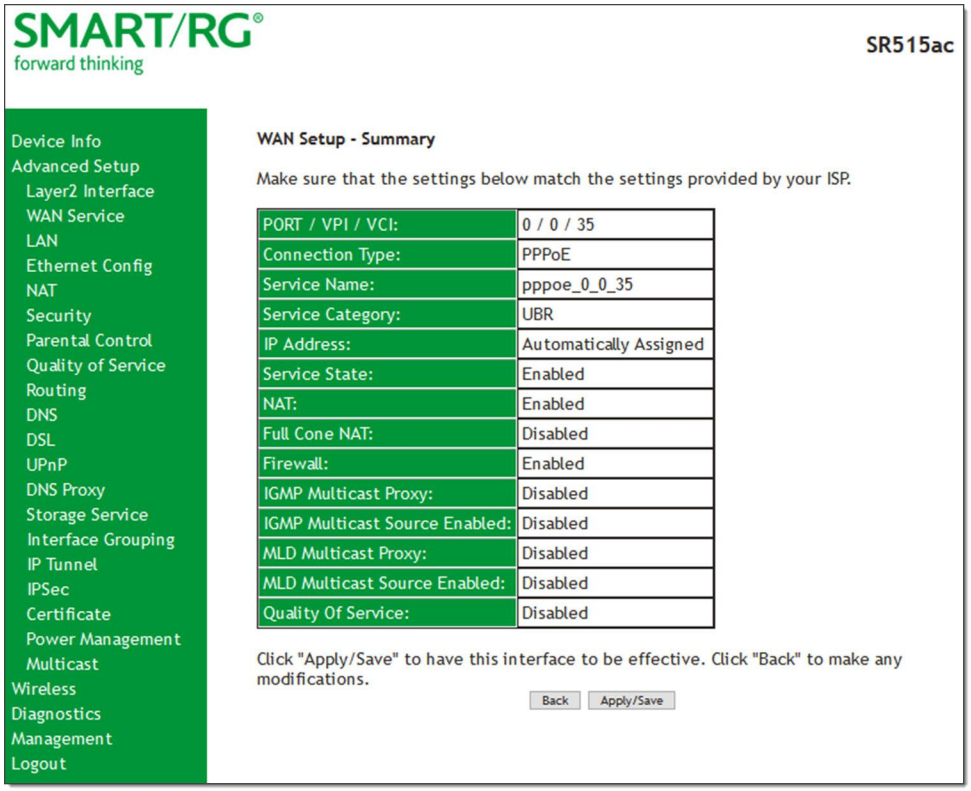
9. Click the **arrows** to move your selection from left to right or from right to left.

10. Click **Next**. The following page appears where you will select DNS Server settings.



11. Select the DNS Server Interface from available WAN interfaces.
12. Click the **arrows** to move your selection from left to right or from right to left.
13. Alternatively, you can enter static DNS IP addresses in the **Use the following Static DNS IP address** section.

14. Click **Next**. The summary page appears indicating that your PPPoE WAN setup is complete.

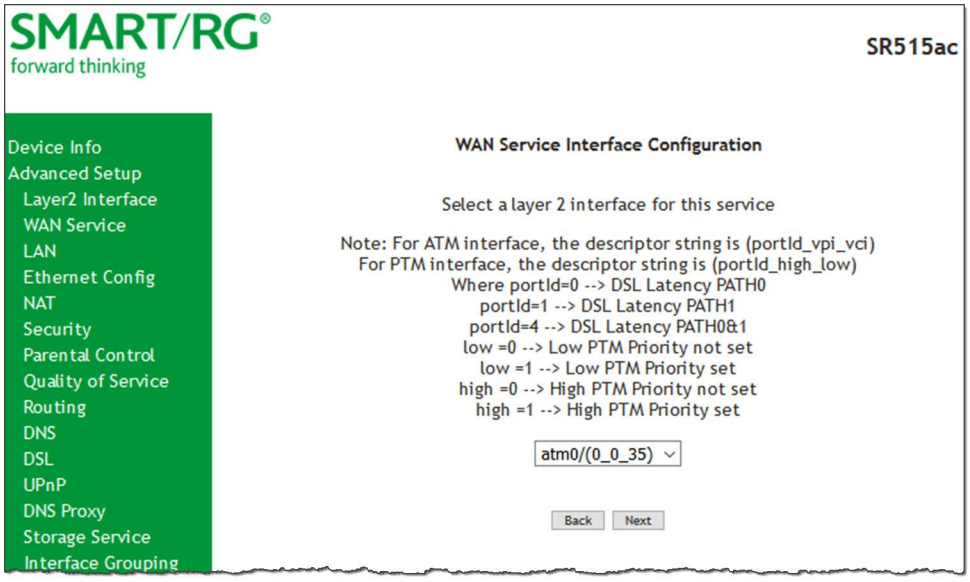


15. Review the summary and either click **Apply/Save** to commit your changes or click **Back** to step through the pages in reverse order to make any necessary alterations.

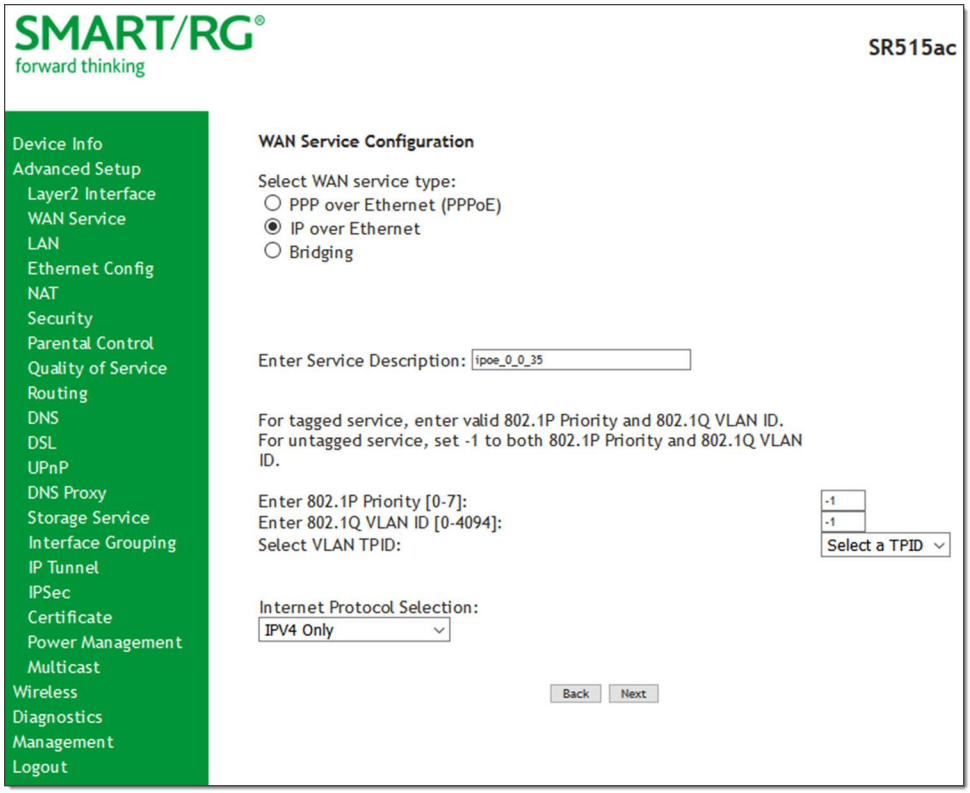
IP over Ethernet

There are several parts to configuring a IP over Ethernet WAN service. You will progress through several pages to complete the configuration.

1. In the left navigation bar, click **Advanced Setup** > **WAN Service** and then click **Add**. The following page appears.



2. Select the Layer2 interface to use for the WAN service and click **Next**. The following page appears.

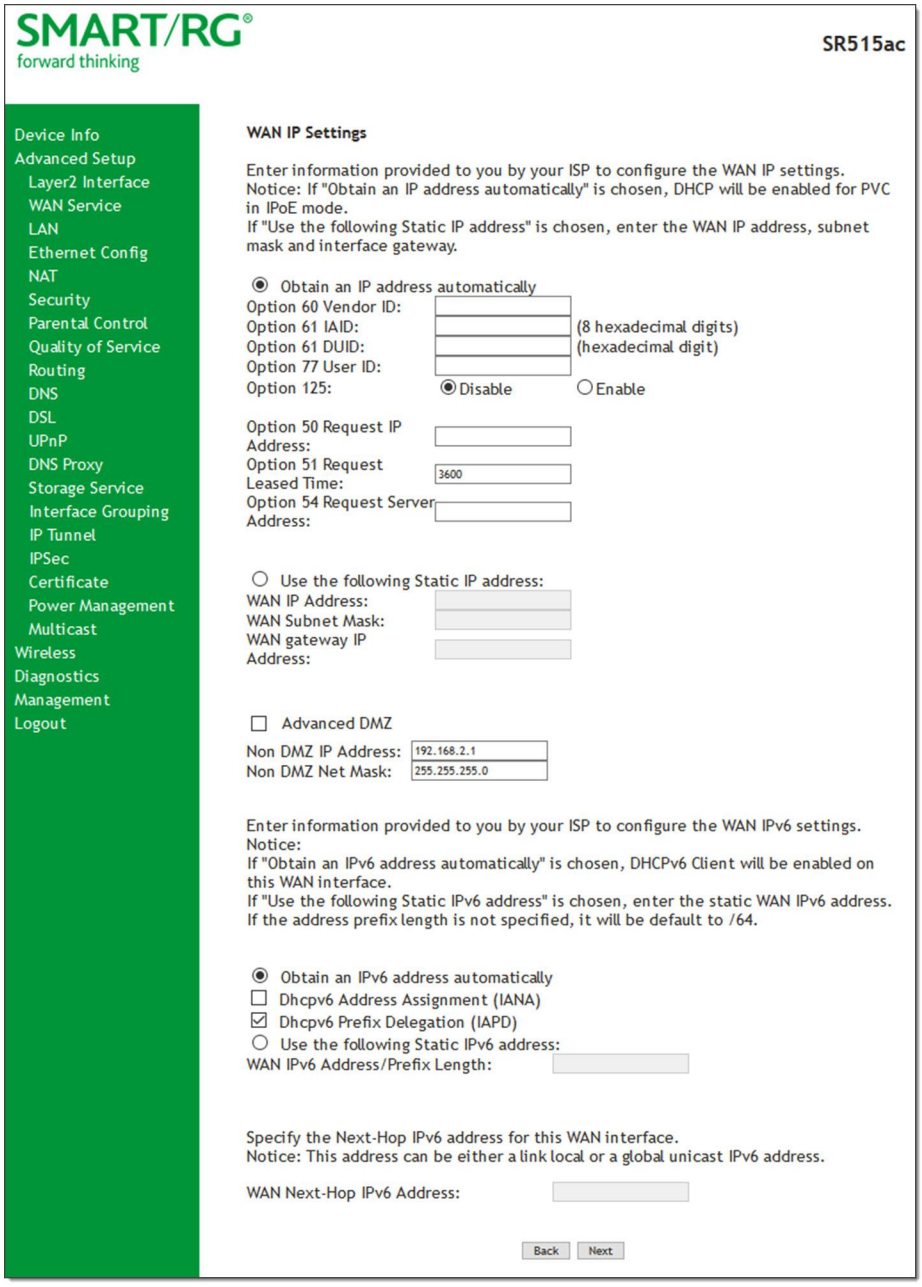


3. Select the **IP over Ethernet** WAN service type.
4. Modify the other fields as needed.

   The fields on this page are explained in the following table.

Field Name	Description
Enter Service Description	(*Optional*) Enter a name to describe this configuration.
Enter 802.1P Priority	Options are **0** - **7**. The default is **0**. For tagged service, enter values in this field and the **802.1Q VLAN ID** field. For untagged service, enter **-1** (disabled) in this field and the **802.1Q VLAN ID** field.
Enter 802.1Q VLAN ID	Options are **0** - **4094**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1P Priority** field. For untagged service, enter **-1** (disabled) in this field and the **802.1P Priority** field.
Select VLAN TPID	Select the TPID for this VLAN. Options are **0x8100**, **0x88A8**, and **0x9100**.
Internet Protocol Selection	This data packet scheduling technique allows different scheduling priorities to be applied to statistically multiplexed data flows. Since each data flow has its own queue, an ill-behaved flow (which has sent larger packets or more packets per second than the others since it became active) will only punish itself and not other sessions. Options are **IPv4 Only**, **IPv4&IPv6 (Dual Stack)**, and **IPv6 Only**. The default is **IPv4 Only**. **Note:** When selecting **IPV4&IPV6** or **IPV6**, the options presented will change accordingly.

5. Click **Next**. The following page appears.



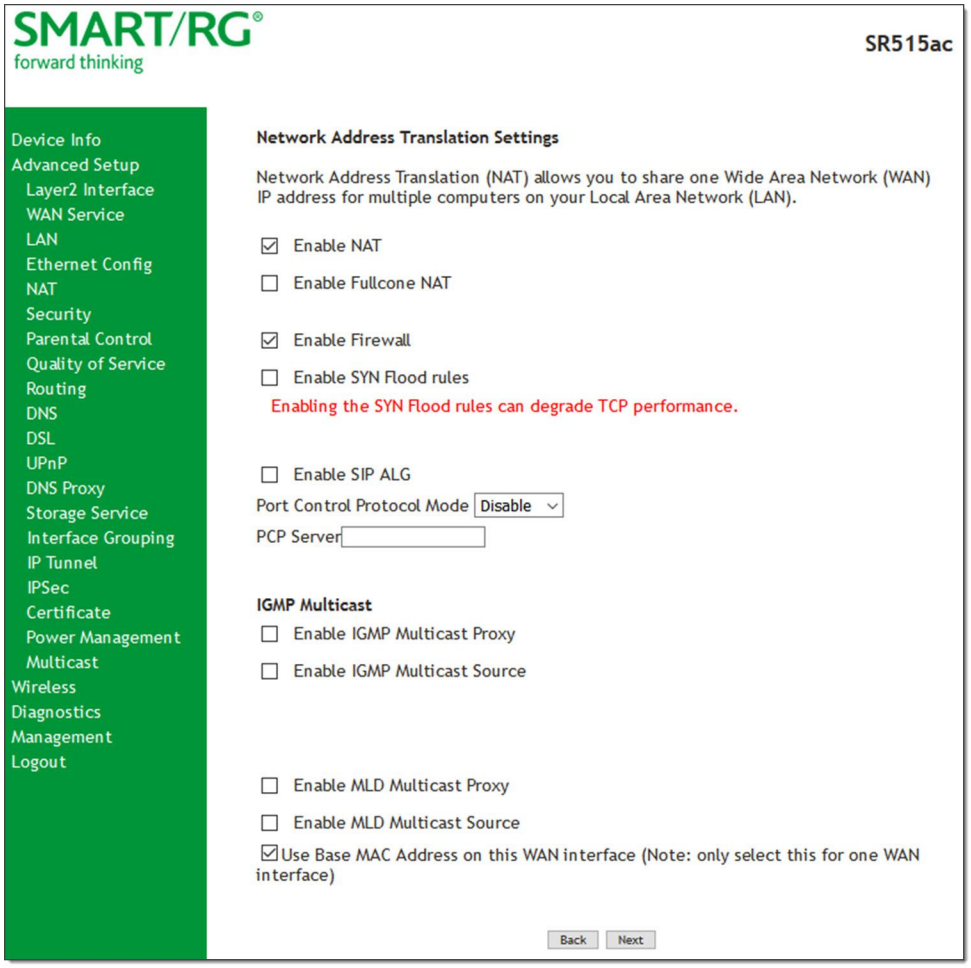
6. Enter the relevant WAN IP Settings.

   The fields on this page are explained in the following table.

Field Name	Description
Obtain an IP address automatically	When you wish the ISP to automatically assign the WAN IP to the gateway.
Option 60 Vendor ID	(*Optional*) Broadcast a specific vendor ID for the DHCP server to accept the device.
Option 61 IAID	(*Optional*) Interface Association Identifier (IAID). A unique identifier for an IA, chosen by the client.
Option 61 DUID	(*Optional*) DHCP Unique Identifier (DUID) is used by the client to get an IP address from the DHCP server.
Option 77 User ID	Enter the user class ID that should be used to filter traffic.
Option 125	(*Optional*) Select whether to enable local devices to automatically receive DHCP options from the server.
Option 50 Request IP Address	Select to request a specific IP address when sending messages. If the address is not available, the DHCP server assigns the next allowed IP address.
Option 51 Request Leased Time	Select to request the maximum lease time defined for the client.
Option 54 Request Server Address	Select to request the IP address of the source server.
Use the following Static IP address	Use this section to manually declare the static IP information provided by your ISP.
WAN IP Address	If using a static IP address, enter the static WAN IPV4 Address.
WAN Subnet Mask	If using a static IP address, enter the static Subnet Mask.
WAN gateway IP Address	If using a static IP address, enter the static Gateway IP address.
Advanced DMZ	(*Optional*) Select this option to enable Advanced DMZ on the WAN service. Enter the IP address and net mask to which PPPoE traffic is forwarded.
IPv6 settings section The following fields appear when either **IPv6 Only** or **IPv4&IPv6 (Dual Stack)** network protocol values is selected on the WAN Service Configuration page.	

Field Name	Description
Obtain an IPv6 address automatically	Enables the DHCPv6 Client on this WAN interface. Select this option when you want the ISP to automatically assign the WAN IP to the gateway.
Dhcpv6 Address Assignment (IANA)	Select this option for the CPE to receive WAN IP from ISP.
Dhcpv6 Prefix Delegation (IAPD)	Select this option for the CPE to generate the WAN IP's prefix from the server's REST by MAC address.
Use the following Static IPv6 address	Select this option to manually declare the v6 Static IP information provided by your ISP.
WAN IPv6 Address/Prefix Length	If entering a static IP address, enter the IP address / prefix length. If you do not specify a prefix length, the default of **/64** is used.
WAN Next-Hop IPv6 address	Enter the IP address of the next WAN in the group. This address can be either a local link or a global unicast IPv6 address.

7. Click **Next**. The following page appears.



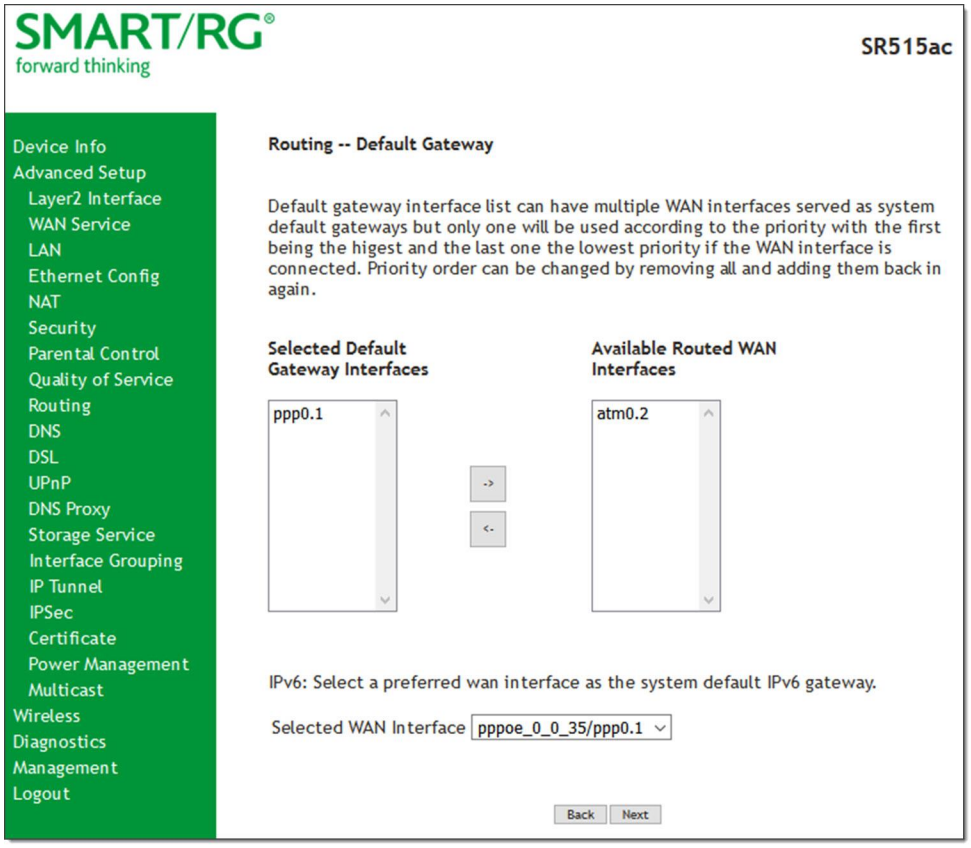
8. Modify the settings as needed for your environment.
Network Address Translation (NAT) allows you to share one Wide Area Network (WAN) IP address for multiple computers on your Local Area Network (LAN). If you do not want to enable NAT (atypical) and wish the user of this gateway to access the Internet normally, you need to add a route on the uplink equipment. Failure to do so will cause access to the Internet to fail.

   The fields on this page are explained in the following table.

FIELD NAME	DESCRIPTION
Enable NAT	This option is selected by default. Click to disable sharing the WAN interface across multiple devices on the LAN. This setting also enables the functions in the NAT sub-menu and addition PPPoE NAT features to select.
Enable Fullcone NAT	Click to enable one-to-one NAT. All requests from the same internal IP address and port are mapped to the same external IP address and port. In addition, any external host can send a packet to the internal

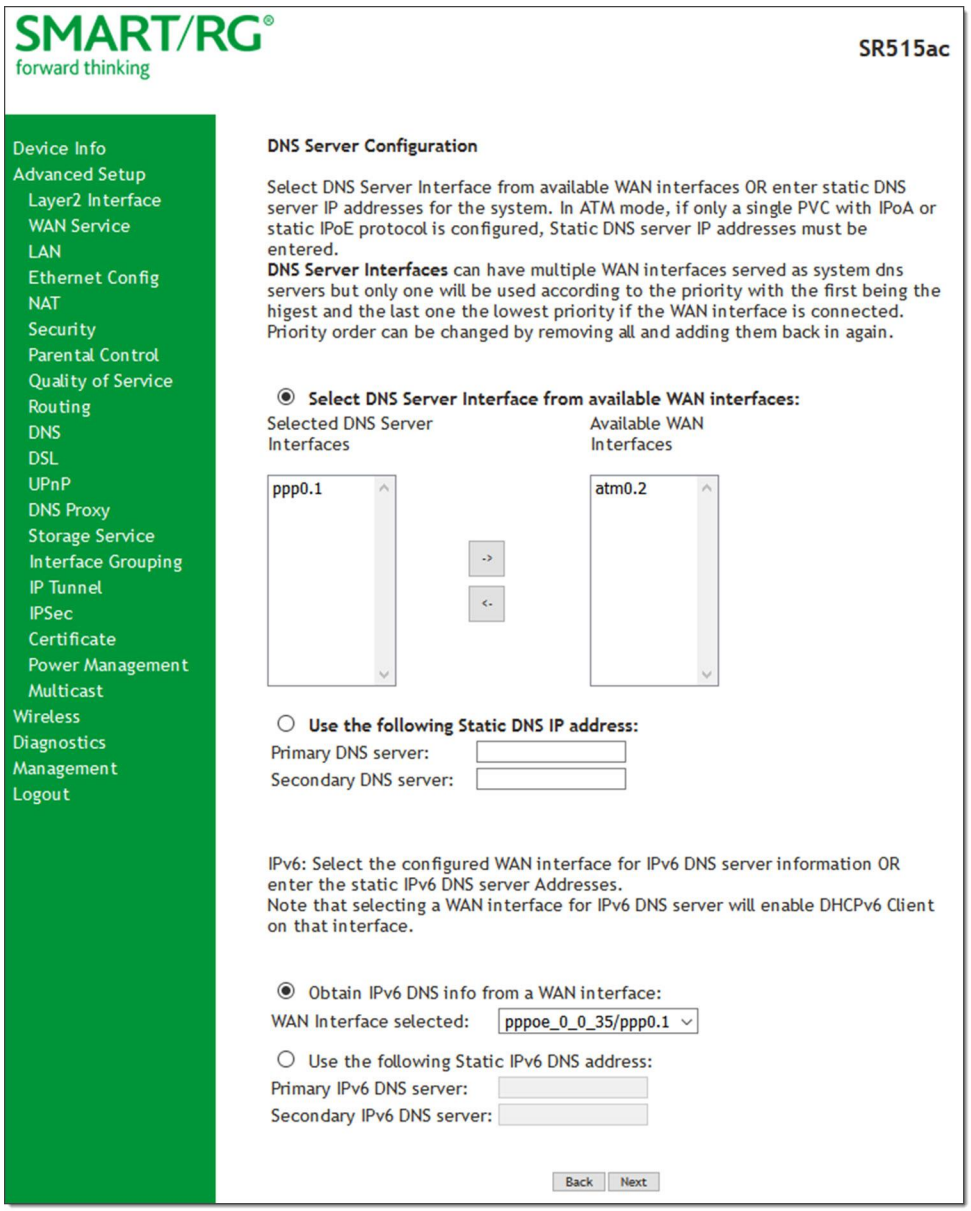
FIELD NAME	DESCRIPTION
	host by sending a packet to the mapped external address. **Warning**: Enabling this option will disable network acceleration and some security settings.
Enable Firewall	This option is selected by default. Click to disable functions in the Security sub-menu.
Enable SYN Flood rules	Select to enable rules for preventing SYN flood distributed denial of service attacks.
Enable SIP ALG	Select to enable SIP ALG (Session Initiation Protocol Application Layer Gateway). Enabling this option may slow traffic transfer.
Port Control Protocol Mode	PCP is a computer networking protocol that allows hosts on IPv4 or IPv6 networks to control how the incoming IPv4 or IPv6 packets are translated and forwarded by an upstream router that performs network address translation (NAT) or packet filtering. Options are Disable,DS-Lite, and NAT444. The default is Disable.
PCP Server	Enter the server name to be used with PCP.
Enable IGMP Multicast Proxy	Select to enable Internet Group Membership Protocol (IGMP) multicast. Used by IPv4 hosts to report multicast group memberships to any neighboring multicast routers.
Enable IGMP Multicast Source	Select to enable this service to act as an IGMP multicast source.
Enable MLD Multicast Proxy	Click to enable multicast filtering. Used by IPv4 hosts to report multicast group memberships to any neighboring multicast routers.
Enable MLD Multicast Source	Select to enable this service to act as a multicast source.

9. Click **Next**. The following page appears.



10. Select a WAN interface to act as the system default gateway or accept the default interface.
11. (*Optional*) For IPv6 environments, in the **Selected WAN Interface** field, select the preferred WAN interface for the default IPv6 gateway.

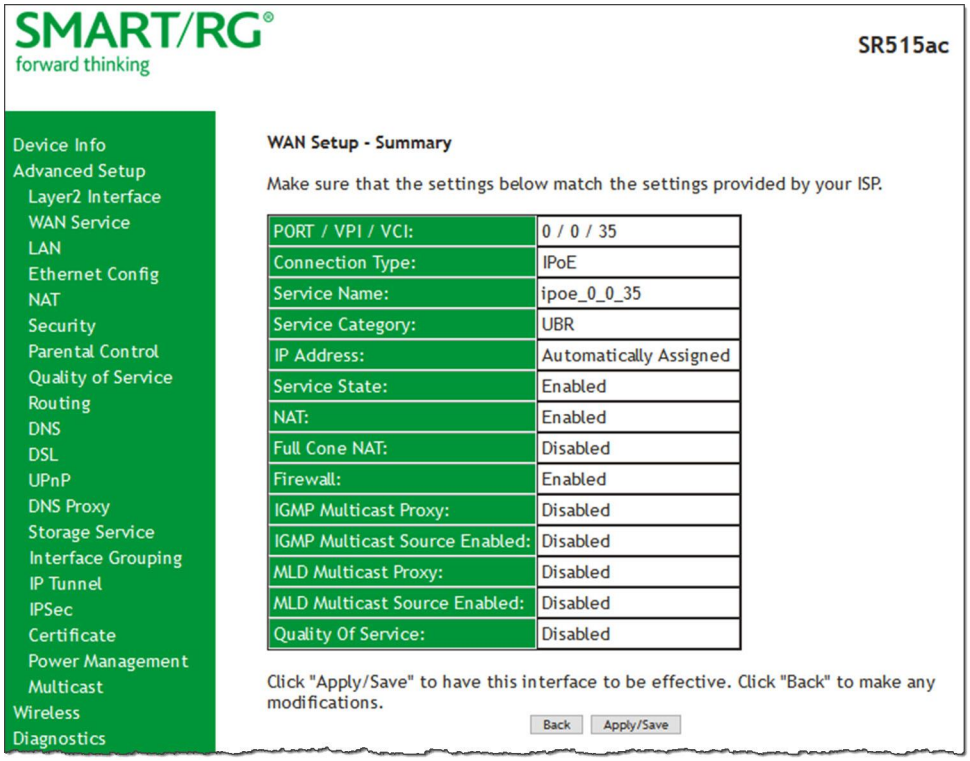
12. Click **Next**. The following page appears.



13. Do one of the following to configure the DNS:
    - **Select the DNS server interface:** Select interface entries and click the arrows to move the entries right or left.
    - **Define a static DNS IP address:** Click Use the following Static DNS IP address and enter the DNS server IP addresses.
    - **Obtain IPv6 DNS info from a WAN interface:** In the Obtain IPv6 DNS info from a WAN interface field, select a WAN interface.

- **Define a static IPv6 DNS IP address:** Click Use the following Static IPv6 DNS address and enter the DNS server IP addresses.

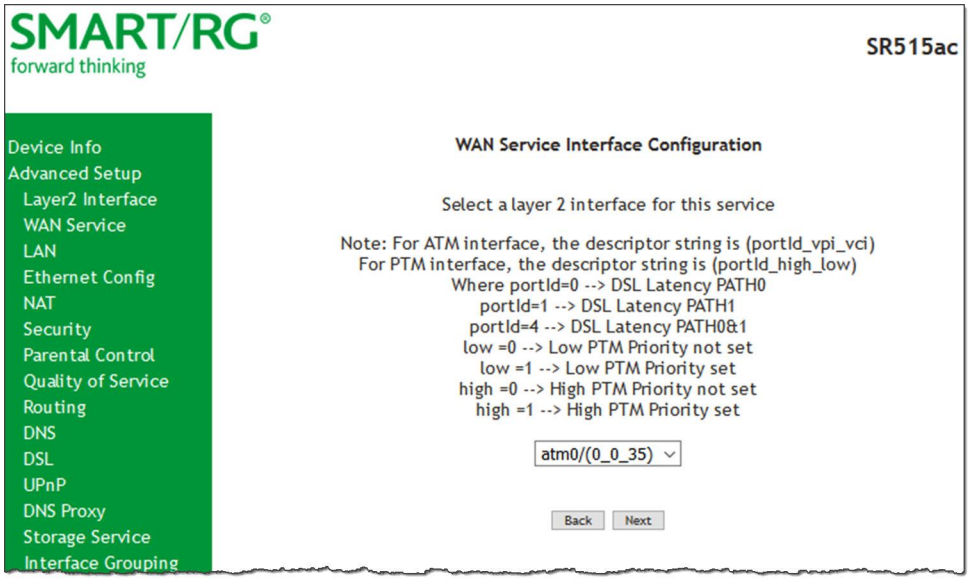
14. Click **Next**. The following page appears.



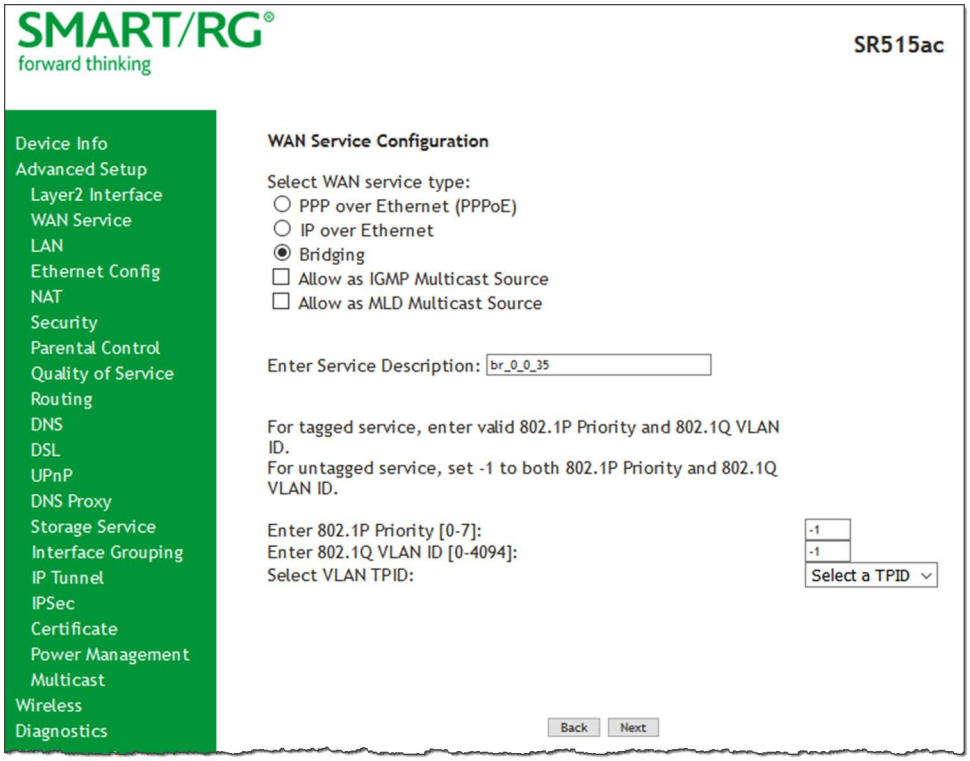
Bridging

Before you can configure a bridge WAN service, you must create the related ATM interface.

1. In the left navigation bar, click **Advanced Setup** > **WAN Service** and then click **Add**. The following page appears.



2. Select an ATM interface for the WAN service and then click **Next**. The following page appears.

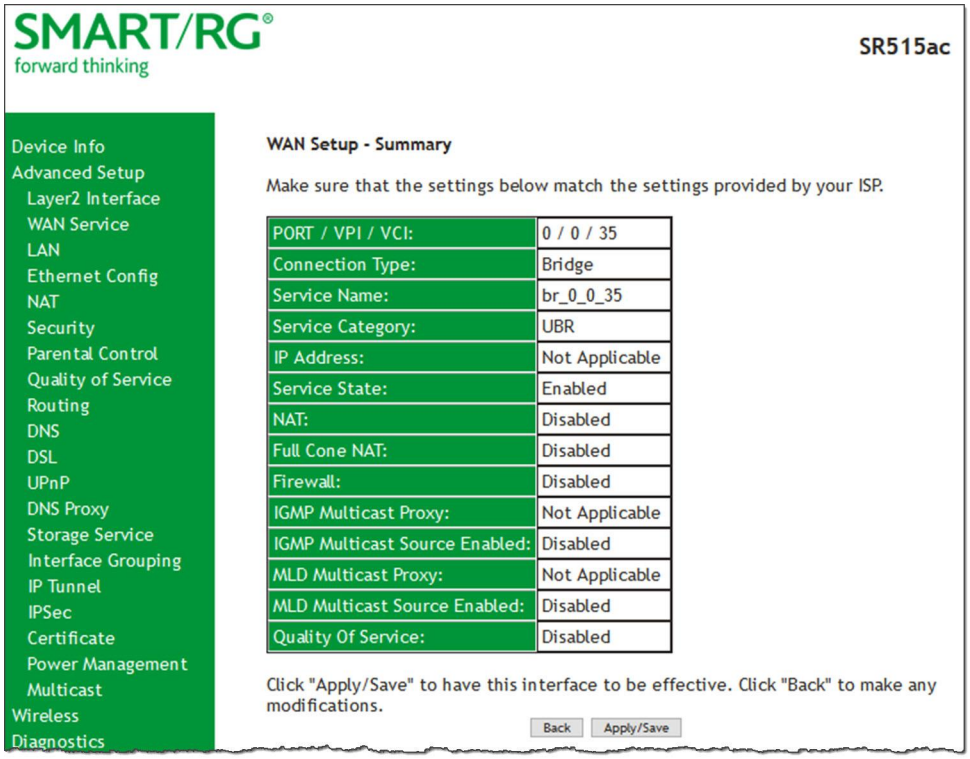


3. Select **Bridging**. The Multicast Source fields appear.

4. Modify the fields as needed, using the information in the following table.

Field Name	Description
Allow as IGMP Multicast Source	Select to enable this service to act as an IGMP multicast source.
Allow as MLD Multicast Source	Select to enable this service to act as an MLD multicast source.
Enter Service Description	(*Optional*) Enter a name to describe this configuration.
Enter 802.1P Priority	Options are **0** - **7**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1Q VLAN ID** field. For untagged service, accept the default of **-1** in this field and in the **802.1Q VLAN ID** field.
Enter 802.1Q VLAN ID	Options are **0** - **4094**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1P Priority** field. For untagged service, enter **-1** (disabled) in this field and in the **802.1P Priority** field.
Select VLAN TPID	(*Optional*) Select the TPID for this VLAN. Options are **0x8100**, **0x88A8**, and **0x9100**.

5. Click **Next**. The summary page appears indicating that your Bridging WAN setup is complete.

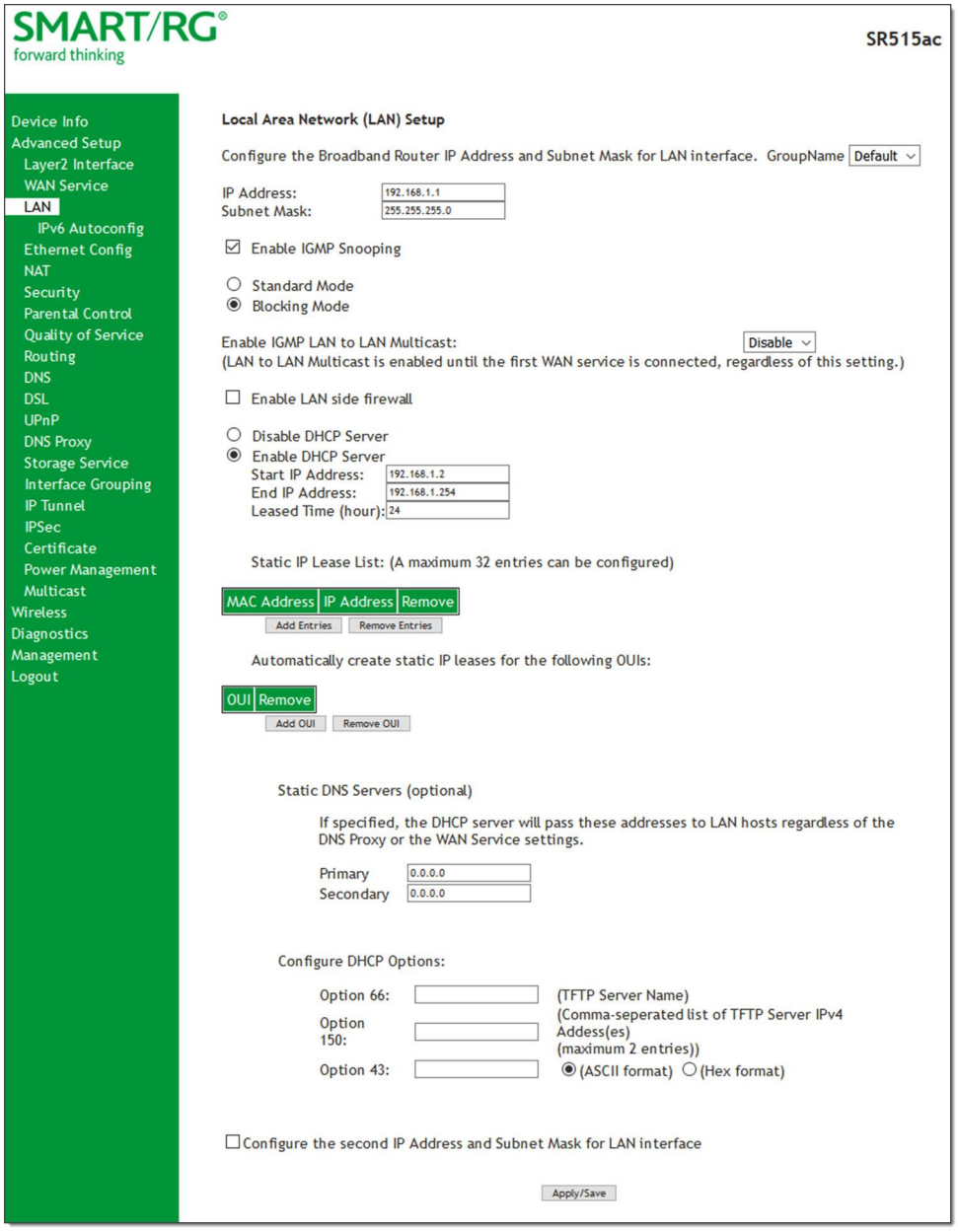


6. Review the summary and either click **Apply/Save** to commit your changes or click **Back** to step through the pages in reverse order to make any necessary alterations.

LAN

On the Local Area Network (LAN) Setup page, you can configure the router's local IP addresses, subnet mask, DHCP behavior and other related LAN side settings for your gateway.

1. In the left navigation bar, click **Advanced Setup** > **LAN**. The following page appears.



2. Customize the fields as desired.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

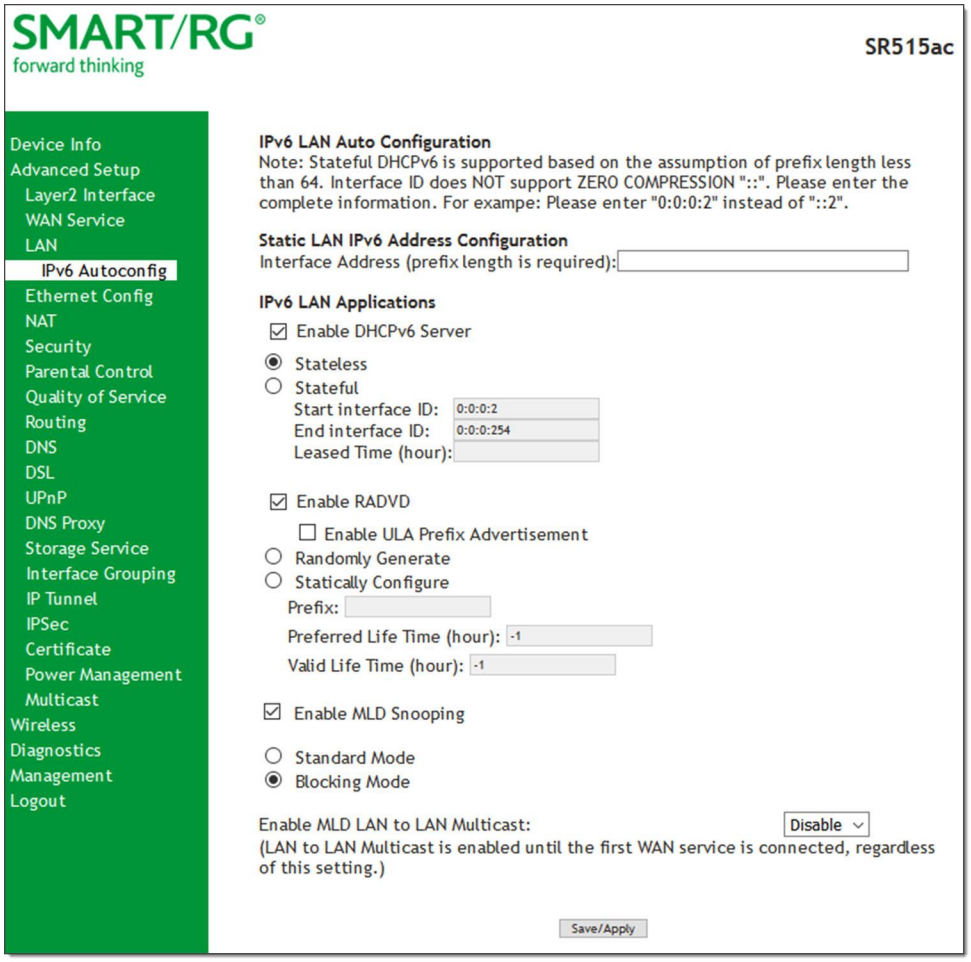
Field Name	Description
GroupName	Select an interface group from the list of available groups (defined on the Interface Grouping page).
IP Address	(*Optional*) Enter the LAN IP address by which LAN devices will connect to this gateway.
Subnet Mask	(*Optional*) Enter the subnet mask to be used by LAN devices connecting to this gateway.
Enable IGMP Snooping	This option is *enabled* by default. Click to *disable* your gateway to listen to IGMP network traffic between hosts and routers. By listening to these conversations, the gateway maintains a map of which links need which IP multicast streams.
Standard Mode	(*Available when **Enable IGMP Snooping** is selected*) Allows multicast traffic will flood to all bridge ports when there is no client subscribed to any multicast group.
Blocking Mode	(*Available when **Enable IGMP Snooping** is selected*) Blocks multicast data traffic, preventing it from flooding to all bridge ports when no client subscriptions to a multicast group are present.
Enable IGMP LAN to LAN Multicast	(*Available when **Enable IGMP Snooping** is selected*) Allows multicast traffic between LANs.
Enable LAN Side Firewall	Enables the restriction of traffic between LAN hosts.
Disable DHCP Server	Prevents the DHCP functionality of your gateway from automatically assigning LAN IP addresses to host devices as they connect with the gateway.
Enable / Disable DHCP Server	Allows the DHCP functionality of your gateway to automatically assign LAN IP addresses to host devices as they connect with the gateway. Fill in the next three fields to configure this action.
Start IP Address	(*Available when **Enable DHCP Server** is selected*) Enter the beginning of the class C, IP address range to be assigned by the DHCP server.
End IP Address	(*Available when **Enable DHCP Server** is selected*) Enter the end of the class C, IP address range to be assigned by the DHCP server.
Leased Time (hour)	(*Available when Enable DHCP Server is selected*) Enter the number of hours for which an IP address will be leased.
Static IP Lease List	Specify a literal, static **IP address** to be associated with a **specific MAC Address** of one of your LAN host devices. Click **Add Entries**. Enter the

Field Name	Description
	MAC address and IP address and click **Apply/Save**. Repeat this step to create any additional entries that you need.
Automatically create static IP leases from the following OUIs	For LAN hosts, IP addresses can be assigned manually or by using DHCP. Click **Add OUI**. Enter the OUI and click **Apply/Save**. Repeat this step to create any additional entries that you need.
Static DNS Servers	(*Optional*) Enter the IP addresses for the **Primary** and **Secondary** DNS Servers.
Configure DHCP Options section	
Option 66	For some devices that also require access to a TFTP server (device configuration name files are in .cnf file format), which enables the device to communicate with other infrastructure, select this option to specify the name of the TFTP server. Option 66 is an IEEE standard.
Option 150	A Cisco proprietary methodology for pointing to one or two TFTP servers.
Option 43	A Cisco proprietary methodology for providing the Cisco Aironet Wireless Controller address to your access point.
Configure the second IP address and subnet mask for LAN interface	When you select this option, the **IP Address** and **Subnet Mask** fields appear where you can enter a second IP address and Subnet mask to support a second, simultaneous LAN, i.e., the primary LAN might be defined as 192.168.0.1 and this secondary LAN defined as 192.168.2.1.

IPv6 Autoconfig

On this page, you can configure your gateway's IPv6 environment.

1. In the left navigation bar, click **Advanced Setup** > **LAN** > **IPv6 Autoconfig**. The following page appears.



2. Modify the fields as needed, using the information in the table below.
3. Click **Save/Apply** to commit your changes.

The fields on this page are explained in the following table.

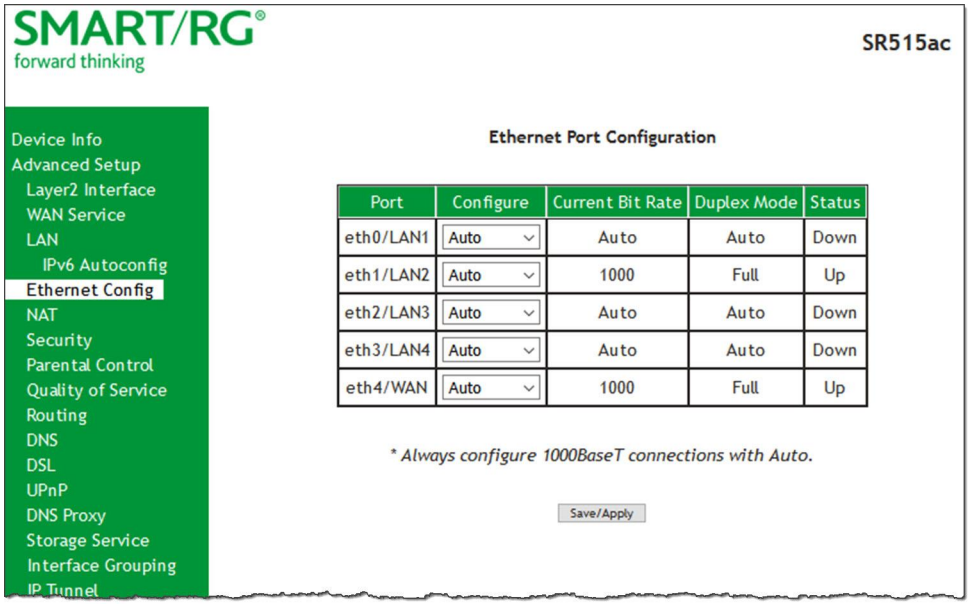
Field Name	Description
Interface Address	IPV6 address to assign as the gateways Local LAN IPV6 address and prefix length. Prefix length is required.
IPv6 LAN Applications section	
Enable DHCPv6 Server	This option is selected by default. Click to *disable* the DHCP v6 feature on the LAN.
Stateless	This option is selected by default. Click to *stop* inheritance of IPV6 address assignments from the WAN IPV6 interface.

Field Name	Description
Stateful	Identifies the DHCPv6 server given by the LAN IPV6 network as configured with additional options. Zero compression is not supported. Make sure to enter zeros between the colons, that is, do not use shorthand notation (::2). Options are: • **Start interface ID**: Enter the beginning IPv6 available addresses for DHCP to assign to LAN devices. • **End interface ID**: Enter the ending IPv6 available addresses for DHCP to assign to LAN devices. • **Leased Time (hour):** Amount of time before a new IPv6 lease is requested by the LAN client.
Enable RADVD	(*Optional*) This option is enabled by default. It enables Router Advertisement Daemon (RADVD) service that sends router advertisements to LAN clients. Clear the check box to disable RADVD. Options are: • **Enable ULA Prefix Advertisement:** Check this option to enable unique local address (ULA) advertisement on the LAN. When you select this option, the **Randomly Generate** option is selected and the gateway can generate a random IPv6 prefix. • **Statically Configure Prefix:** Select this option to configure the IPv6 prefix. Enter the prefix and then enter values in the **Preferred Life Time** and **Valid Life Time** fields (in hours). The default value for these fields is **-1** (no limit).
Enable MLD Snooping	(*Optional*) This option is enabled by default. It enables Multicast Listener Discovery (MLD) snooping to manage IPV6 multicast traffic. Options are: • **Standard Mode:** Multicast traffic will flood to all bridge ports when no client subscribes to a multicast group even if IGMP snooping is enabled. • **Blocking Mode:** The multicast data traffic will be blocked and not flood to all bridge ports when there are no client subscriptions to any multicast group. This is the default.
Enable MLD LAN to LAN Multicast	(*Optional*) This option is enabled by default. It enables LAN-to-LAN Multicast until the first WAN service is connected. Options are **Disable** and **Enable**.

Ethernet Config

On this page, you can set the speed and duplex mode for the Ethernet ports and the WAN port, if configured,

1. In the left navigation bar, click **Advanced Setup** > **Ethernet Config**. The following page appears.



2. In the **Configure** column, select an option (**Auto**, **100 Full**, **100 Half**, **10 Full** or **10 Half**) for each of the four Ethernet ports on your gateway. The default is **Auto**.

   These options represent 100 megabits or 10 megabits using half or full duplex transmission protocols. When you have a specific device with a known limited transmission speed capability, select one of the latter four options. If you select **Auto**, your gateway will automatically select an appropriate setting based on Ethernet auto negotiation with the NIC of the LAN host.

   Note: For 1000 BaseT connections, always select **Auto**.

3. Click **Apply/Save** to commit your changes.

NAT

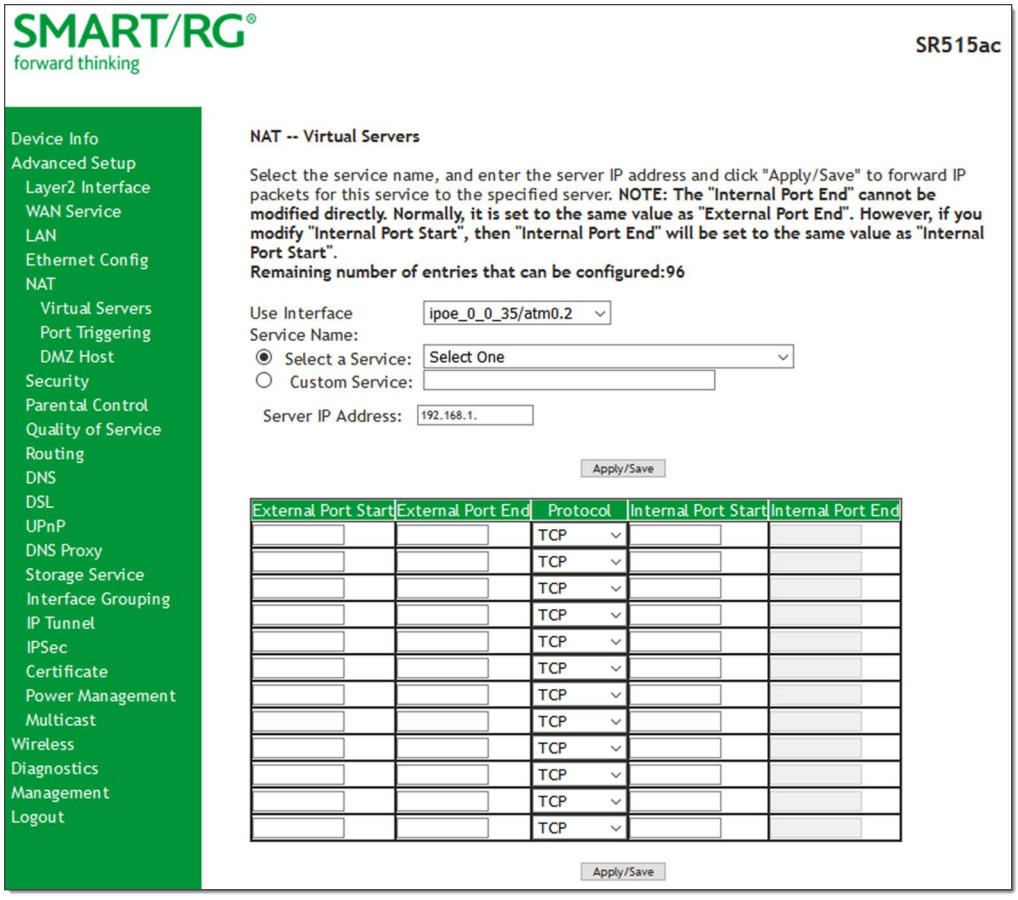
In this section, you can configure the settings for Network Address Translation including setting up virtual servers, port triggering and a DMZ host. There is seldom need to customize these settings as the default settings manage the related features sufficiently for most environments.

Virtual Servers

Virtual Servers (more commonly known as Port Forwards) is a technique used to facilitate communications by external hosts with services provided within a private local area network.

On this page, you can configure the virtual server settings for your gateway.

1. In the left navigation bar, select **Advanced Setup > NAT** and then click **Add**. The following page appears.



2. Modify the fields as needed, using the information in the table below.
3. Click **Apply/Save** to commit your changes.

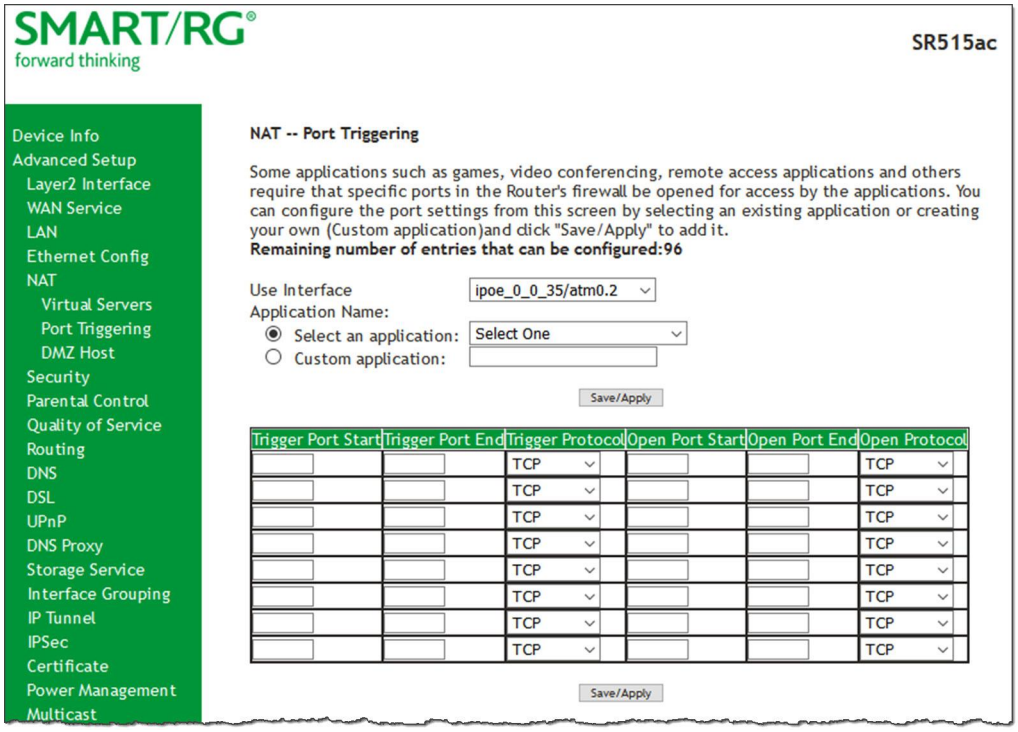
The fields on this page are explained in the following table.

Field Name	Description
Use Interface	Select the WAN interface to which this NAT rule will apply.
Service Name	Select or enter the service for which you want to forward IP packets. Options are: • **Select a Service:** Select from services defined for your network. The port table at the bottom of the page is updated with the default port ID defined for the service. • **Custom Service:** Enter a new service name to establish a user service type. You must enter the ports and select a protocol in the table at the bottom of the page.
Server IP Address	Enter the final octet of the IP address of the LAN client where the service is hosted.
External Port Start External Port End	When you select a service, the external port start and end numbers display automatically. Modify them if necessary.
Protocol	Select the protocol to be used with this range of ports. Options are: **TCP**, **UDP**, or **TCP/UDP**. The default is **TCP**.
Internal Port Start Internal Port End	When you select a service, the internal port start and end numbers display automatically. Modify them if necessary.

Port Triggering

Some applications require that specific ports in the gateway's firewall be opened for access by remote parties. The Port Trigger feature dynamically opens up the open ports in the firewall when an application on the LAN initiates a TCP/UDP connection to a remote party using the triggering ports. The gateway allows the remote party from the WAN side to establish new connections back to the application on the LAN side using the Open Ports.

1. In the left navigation bar, click **Advanced Setup** > **NAT** > **Port Triggering** and then click **Add**. The following page appears.



2. Customize the fields as needed for the firewall pinholes you wish to establish. A maximum of 96 entries can be configured.
3. Click **Save/Apply** to commit your changes.

The fields on this page are explained in the following table.

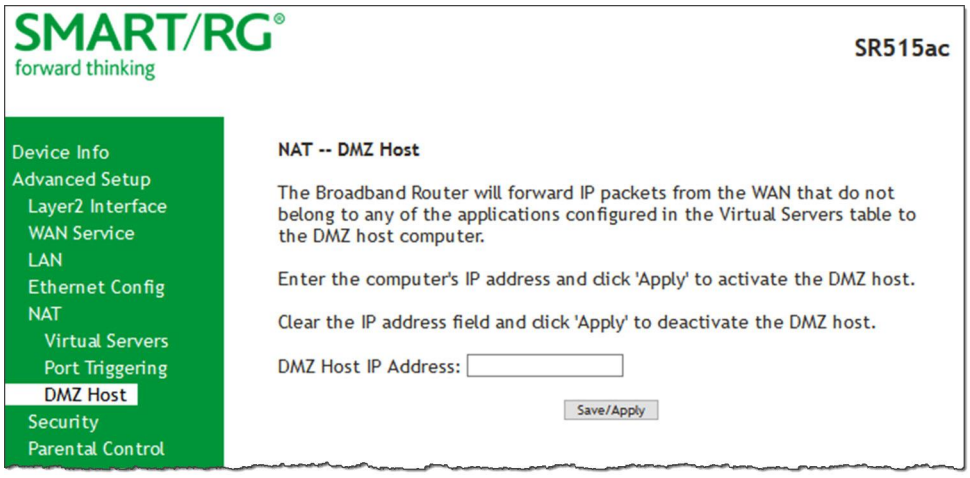
Field Name	Description
Use Interface	Select the interface for which the port triggering rule will apply.
Application Name	Select or enter the application that requires a port trigger. Options are: • **Select an Application:** Select an available application. The Port and Protocol table is populated with the related values. • **Custom Application**: Enter a unique name for the application for which you are creating a port trigger entry. You must enter the ports and select a protocol in the table at the bottom of the page.
Trigger Port Start Trigger Port End	Enter the starting and ending numbers of the range of available outgoing trigger ports. Options are **1 - 65535**. **Note:** You can use a single port number, several port numbers separated by commas, port blocks consisting of two port numbers separated by a dash, or any combination of these, for example 80, 90-140, 180.

Field Name	Description
Trigger Protocol	Select the protocol required by the application that will be using the ports in the specified range. Options are **TCP**, **UDP**, and **TCP/UDP**. The default is **TCP**.
Open Port Start Open Port End	Enter the starting and ending numbers of the range of available incoming ports. Options are **1 - 65535**.
Open Protocol	Select the protocol for the open port. Options are **TCP**, **UDP**, and **TCP/UDP**. The default is **TCP**.

DMZ Host

The Broadband Router will forward IP packets from the WAN that do not belong to any of the applications configured in the Virtual Servers table to the DMZ host computer. If you want to route all internet traffic to a specific LAN device with no filtering or security, add the IP address of that device to this page.

1. In the left navigation bar, click **Advanced Setup** > **NAT** > **DMZ Host**. The following page appears.



2. Enter the **DMZ Host IP Address**.
3. Click **Apply/Save** to commit the new or changed address.

Security

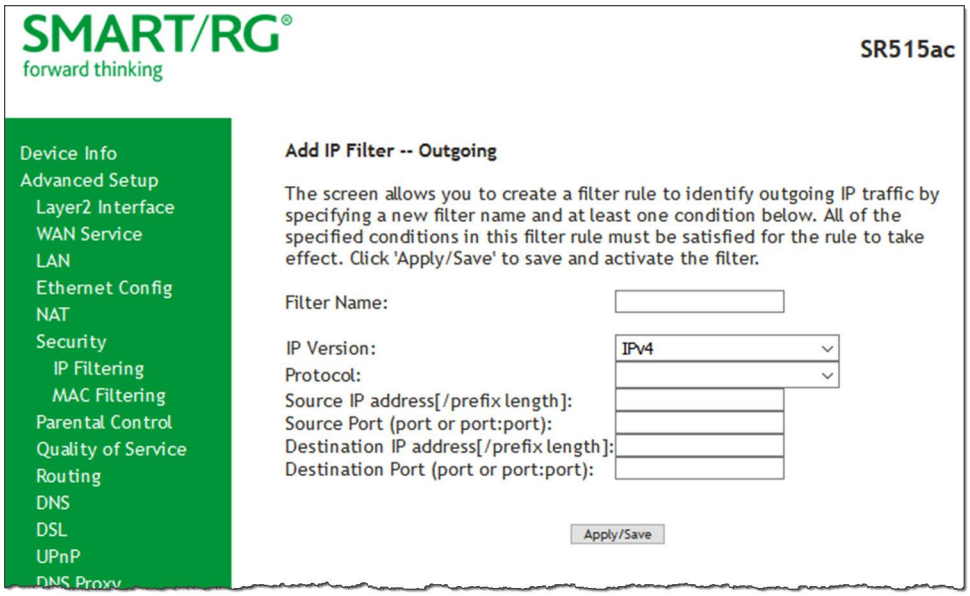
In this section, you can configure filtering for IP and MAC.

IP Filtering - Outgoing

On this page, you can add an outgoing filter when refusal of data from the LAN to the WAN is desired.

You can define up to 32 outgoing IP filters.

1. In the left navigation bar, click **Advanced Setup** > **Security** and then click **Add**. The following page appears.



2. Fill in the fields, using the information in the table below.
3. Click **Apply/Save** to commit the completed entry.

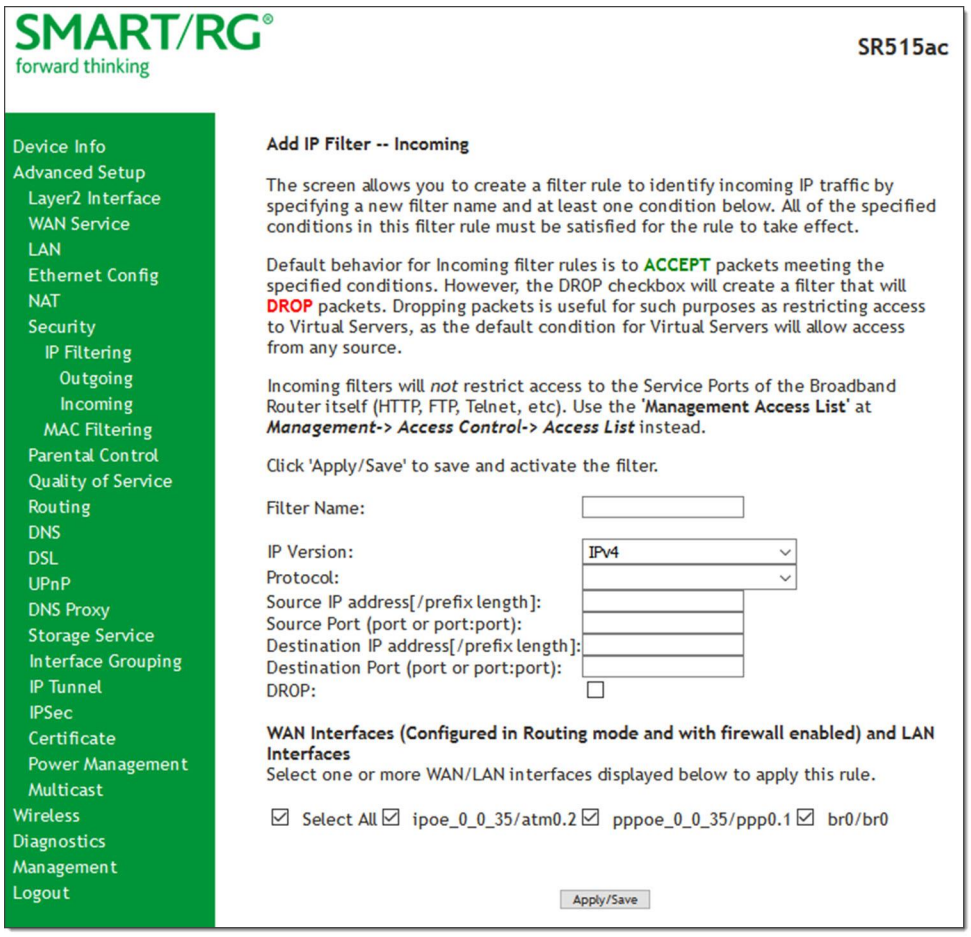
Field Name	Description
Filter Name	Enter a descriptive name for this filter. This is a free-form text field.
IP Version	For the filter to be configured and effective for IPV6 , the gateway must be installed on a network that is either a pure IPV6 network (with that protocol enabled) or is both IPV4 and IPV6 dual protocol enabled/configured. Options are **IPv4** and **IPv6**. The default is **IPv4**. If you select **IPV6**, both the Source and Destination IP address must be specified in IPV6 format. The following is an IPV6-compliant, hexadecimal address: 2001:0DB8:AC10:FE01:0000:0000:0000:0001.

Field Name	Description
Protocol	Select the protocol profile for the filter you are defining. TCP/UDP is most commonly used. The options are **TCP/UDP**, **TCP**, **UDP**, and **ICMP**].
Source IP address [/prefix length]	Enter the source IP address of a LAN side host for which you wish to filter/block outgoing traffic for the specified protocol(s). **Note:** The address specified here can be a particular address or a block of IP addresses on a given network subnet. This is done by appending the associated routing "/prefix" length decimal value (preceded with the slash) to the addresses. A valid decimal routing prefix is required for defining the subnet mask per CIDR notation.
Source Port (port or port:port)	Set the outgoing host port (or range of ports) for the above host (or range of hosts defined by optional routing "/prefix" subnet mask) to define the ports profile for which egress traffic will be filtered from reaching the specified destination(s).
Destination IP address	Enter the destination IP address of a LAN side host for which you wish to filter/block outgoing traffic for the specified protocol(s). **Note:** The address specified here can be a particular address or a block of IP address on a given network subnet. This is done through appending the address with the routing " /prefix " length decimal value (preceded with the slash) associated. A valid decimal routing prefix is required for defining the subnet mask per CIDR notation.
Destination Port (port or port:port)	Set the destination host port (or range of ports) for the above host (or range of hosts) to define the destination port profile for which the filtered host egress traffic will be filtered from reaching the otherwise intended destination(s), e.g., to block the traffic to those ports on, say, a computer external to the local network.

IP Filtering - Incoming

On this page, you can add an incoming filter when refusal of data from the WAN to the LAN is desired.

1. In the left navigation bar, click **Advanced Setup** > **Security** > **IP Filtering** > **Incoming** and then click **Add**. The following page appears.



2. Fill in the fields, using the information in the table below.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

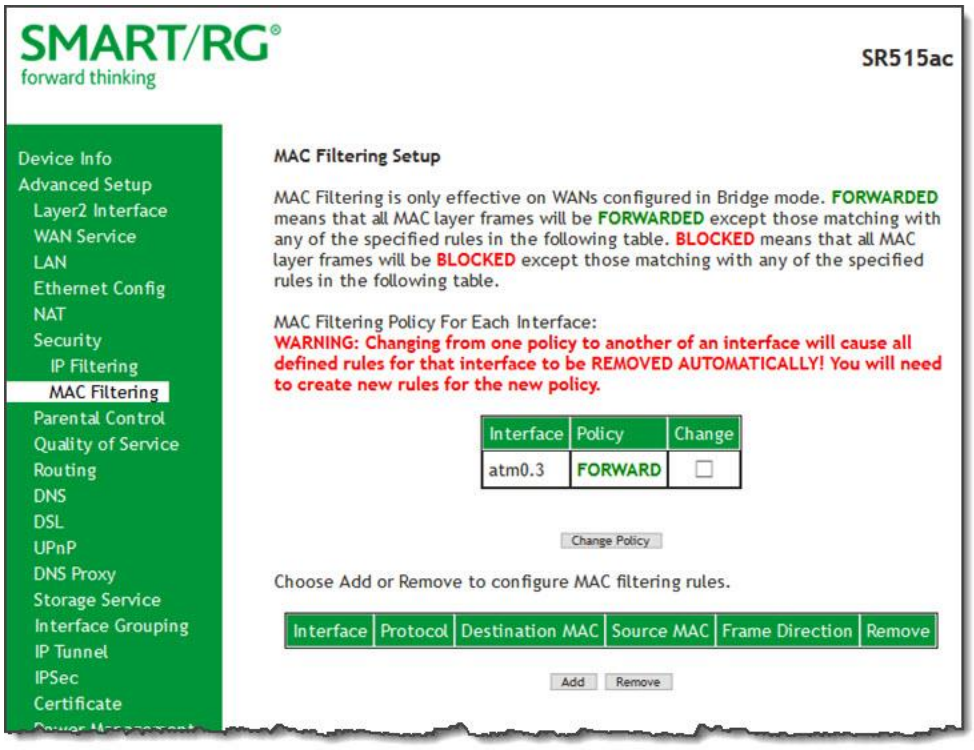
Field Name	Description
Filter Name	A free-form text field. Enter a descriptive name for this filter.
IP Version	Select the IP version for this filter. Options are **IPv4** and **IPv6**. The default is **IPv4**.
Protocol	Select the protocol to be associated with this incoming filter. Options are: **TCP/UDP**, **TCP**, **UDP**, or **ICMP**.
Source IP address [/prefix length]	Enter the source IP address for rule. For IPv6, enter the prefix as well.

Field Name	Description
Source Port (port or port:port)	Enter source port number or range (xxxxx:yyyyy).
Destination IP address [/prefix length]	Enter the destination IP address for rule. For IPv6, enter the prefix as well.
Destination Port (port or port:port)	Enter destination port number or range (xxxxx:yyyyy).
DROP	Select this option to drop packets that meet this filter's requirements. The packets are deleted.
WAN Interfaces	Click to apply this rule to all WAN interfaces or only certain types. Options are **Select All** or the types defined for your network. The default is **Select All**.

MAC Filtering

Your SmartRG gateway can block or forward packets based on the originating device. This MAC filtering feature is available only in Bridge mode. For other modes, similar functionality is available via IP Filtering. On this page, you can manage MAC filtering for your gateway.

1. In the left navigation bar, click **Advanced Setup** > **Security** > **MAC Filtering**. The following page appears.

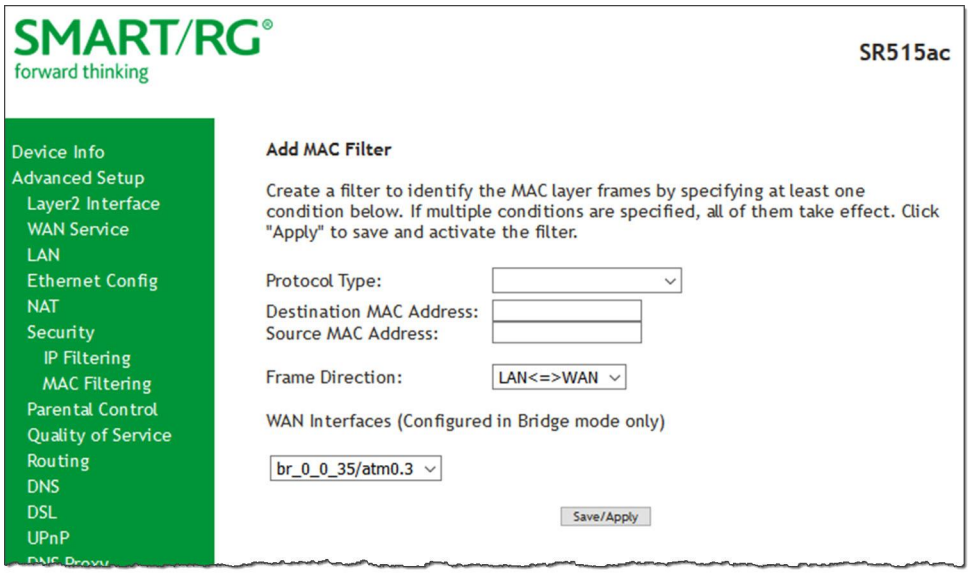


2. To modify policy settings:
    a. Review the information on the page.
    b. Once you understand the consequences of changing the policy, click the **Change** checkbox, and then click **Change Policy**. The policy is switched to **FORWARD** or **BLOCKED**.
3. To add a rule, follow the instructions in "MAC Filtering".
4. To remove a rule, click the **Remove** checkbox next to the rule and click the **Remove** button.
5. When your changes are completed, click **Apply/Save** to commit your changes.

Add a MAC Filtering Rule

You cannot edit rules but you can add new ones and then remove the obsolete ones.

1. On the MAC Filtering page, click **Add**. The following page appears.



2. Fill in the fields, using the information provided in the following table.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
Protocol Type	Select the protocol associated with the device at the destination MAC address. Options are **PPPoE**, **IPv4/IPv6**, **AppleTalk**, **IPX**, **NetBEUI**, and **IGMP**.
Destination MAC Address	Enter the MAC address of the hardware you wish to associate with this filter.
Source MAC Address	Enter the MAC address of the device that originates requests intended for the device associated with the **Destination MAC address**.

Field Name	Description
Frame Direction	Select the incoming/outgoing packet interface. Options are **LAN<=>WAN**, **WAN-N=>LAN**, and **LAN=>WAN**. The default is **LAN<=>WAN** (both directions).
WAN Interfaces	Select the WAN interface(s) for which the filter should apply. Only interfaces configured for Bridge mode are available.

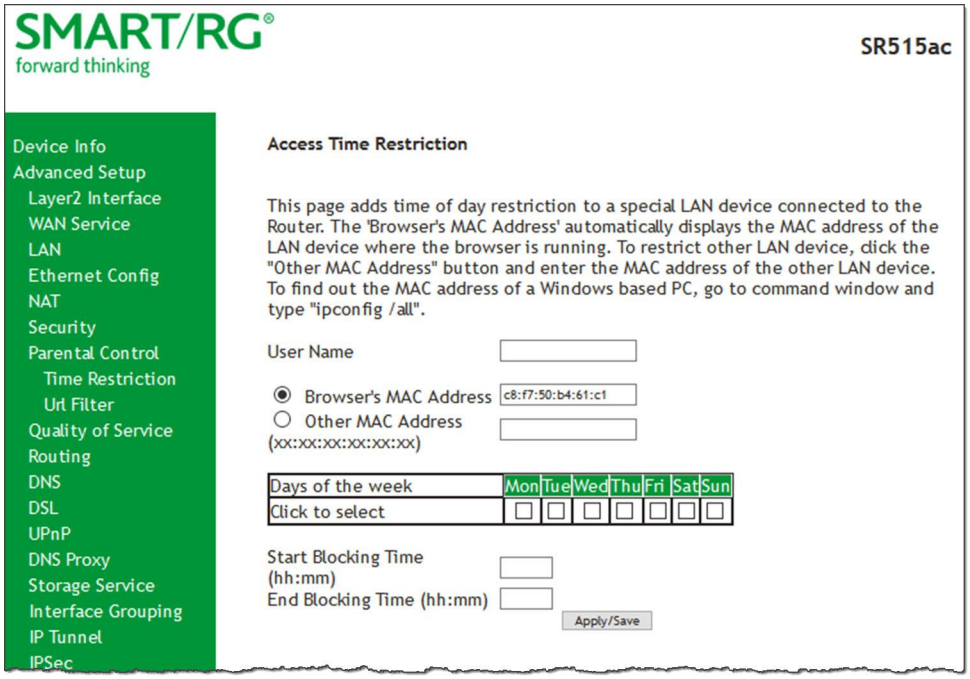
Parental Control

In this section, you can configure the Parental Control features of your SmartRG gateway to restrict Internet access to certain hours and to certain URLS.

Time Restriction

On this page, you can restrict Internet access to particular days and specific times for each device that accesses your gateway.

1. In the left navigation bar, click **Advanced Setup** > **Parental Control** > **Time Restriction** and then click **Add**. The following page appears.



2. Fill in the fields using the information in the table below.
3. Click **Apply/Save**.

The fields on this page are explained in the following table.

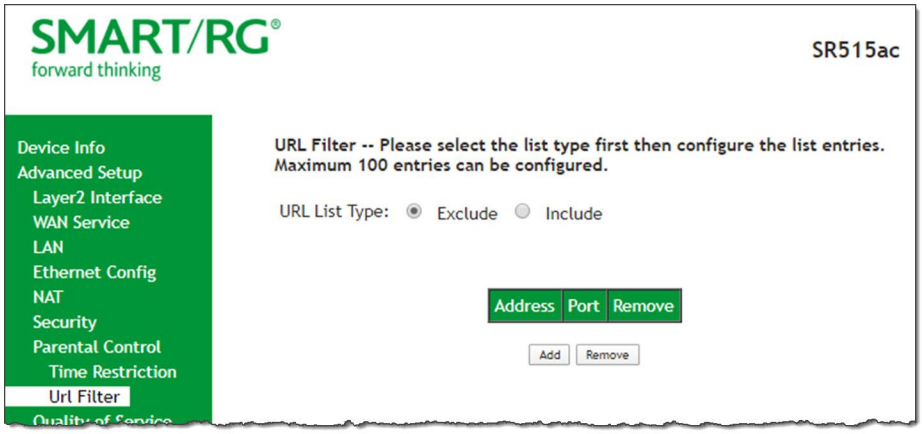
Field Name	Description
User Name	Enter a descriptive name for this restriction. This is a free-form text field.
Browser's MAC Address	The MAC address of the connected device. This option is selected by default.
Other MAC Address	Select this option to restrict access to another device. You can view a list of the connected devices and MAC addresses on the Device Info > ARP page.
Days of the week	Select the days (**Mon** - **Sun**) for which the restrictions apply.
Start Time Blocking End Time Blocking	Enter the range of time that the devices listed above are restricted from access to the Internet. Use 24-hour clock notation (**00:00** - **24:00**).

URL Filter

The other side of Parental Controls is URL filtering. On this page, you can exclude and include URLs as desired. Each list can include up to 100 addresses.

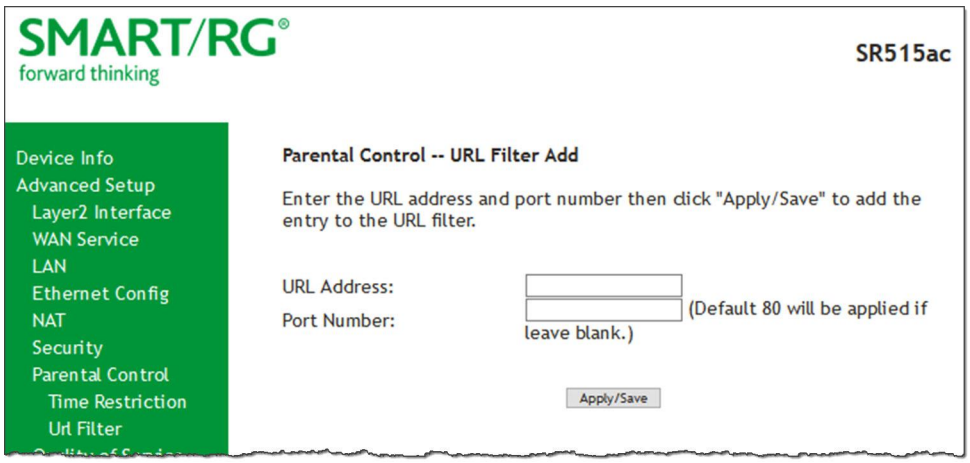
Note: Only one **Exclude** list and one **Include** list are supported for each gateway. Unique lists are not supported for connecting devices.

1. In the left navigation bar, click **Advanced Setup** > **Parental Control** > **Url Filter**. The following page appears.



2. Select whether to exclude or include the URLs in the list you are going to create. If you select **Exclude**, users cannot access the URLs in the list. If you select **Include**, users can access the URLs in the list.

3. To create the list of URLs, click **Add**. The following page appears.



4. Enter the URL address and its corresponding port number. For example, enter http://www.google.com as the URL address and 80 as the port number. If you leave the **Port Number** field blank, the default port number of **80** is used.
5. Click **Apply/Save** to save your changes. You are returned to the Parental Control > URL Filter page

Quality Of Service

Quality of Service (QoS) enables prioritization of Internet content to help ensure the best possible performance. This is particularly useful for streaming video and audio content with minimized potential for drop-outs. QoS becomes significant when the sum of all traffic (audio, video, data) exceeds the capacity of the line.

In this section, you can configure QoS settings including traffic queues, classifications (rules) and port shaping.

QoS Config

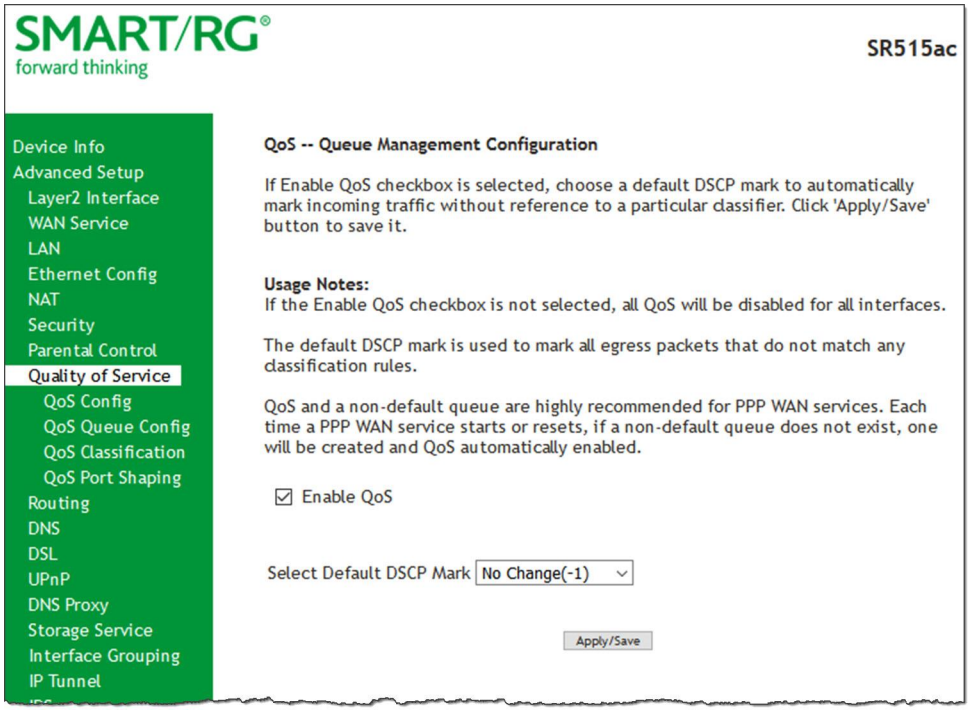
On this page, you can enable QoS and set the DSCP Mark classification.

The maximum number of queues that can be configured vary by mode, as shown below.

Mode	Maximum # of queues
ATM	16
Ethernet	4 per interface
PTM	8

Note: Queues for Wireless (e.g., WMM Voice Priority for wl0 interface) are shown only when wireless is enabled. If the **WMM Advertise** function on the Wireless Basic Setup page is disabled, assigning classifications to wireless traffic has no effect.

1. In the left navigation bar, click **Advanced Setup** > **Quality Of Service** > **QoS Config**. The following page appears.



2. If not already selected, click **Enable QoS**.

   Warning: If this option was already enabled and you clear the checkbox, QoS will be disabled for ALL interfaces.

3. (*Optional*) In the **Select Default DSCP Mark** field, select the default Differentiated Services Code Point (DSCP) Mark classification value to be used. For a list of supported values, see "Supported DSCP Values".
4. Click **Apply/Save** to save your settings.

Supported DSCP Values

The DSCP marking QoS Queue Management Configuration marking on ingress packets is based on the selection you make in the **Select Default DSCP Mark** field. The selected default marking is applied automatically to all incoming packets without reference to a particular classification.

Note: A default DSCP mark value of **Default(000000)** will mark all egress packets that do NOT match any classification.

The following values are supported. For more information about commonly used DSCP values, refer to RFC 2475.

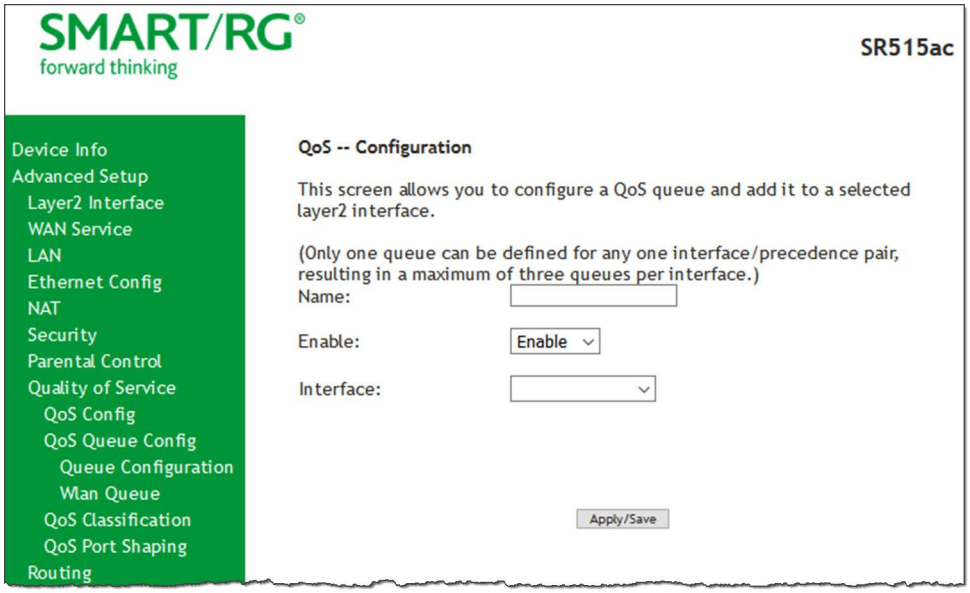
No Change(-1)	CS1(001000)	AF32(011100)	CS4(100000)
Auto Marking(-2)	AF23(010110)	AF31(011010)	EF(101110)
Default(000000)	AF22(010100)	CS3(011000)	CS5(101000)
AF13(001110)	AF21(010010)	AF43(100110)	CS6(110000)

AF12(001100)	CS2(010000)	AF42(100100)	CS7(111000)
AF11(001010)	AF33(011110)	AF41(100010)	

QoS Queue Config

On this page you can configure a queue and add it to a selected Layer2 interface.

1. In the left navigation bar, click **Advanced Setup** > **Quality Of Service** > **QoS Queue Config** and then click **Add**. The following page appears.



2. Fill in the fields, using the information in the table below.
   Note: For Dynamic WAN interfaces, the Queue Priority settings appear twice - once for ATM WAN QoS configuration and once for PTM WAN QoS configuration.
3. Click **Apply/Save** to save your settings.

The fields on this page are explained in the following table.

Field Name	Description
Name	Enter a descriptive name for this configuration. This is a free-form text field.
Enable	Select to enable or disable a given QoS queue configured on the selected interface. **Note:** Only one queue can be defined for any one interface/precedence pair, resulting in a maximum of three queues per interface.
Interface	Select the Layer 2 interface to be associated with the defined QoS queue, e.g., eth0 or eth4.

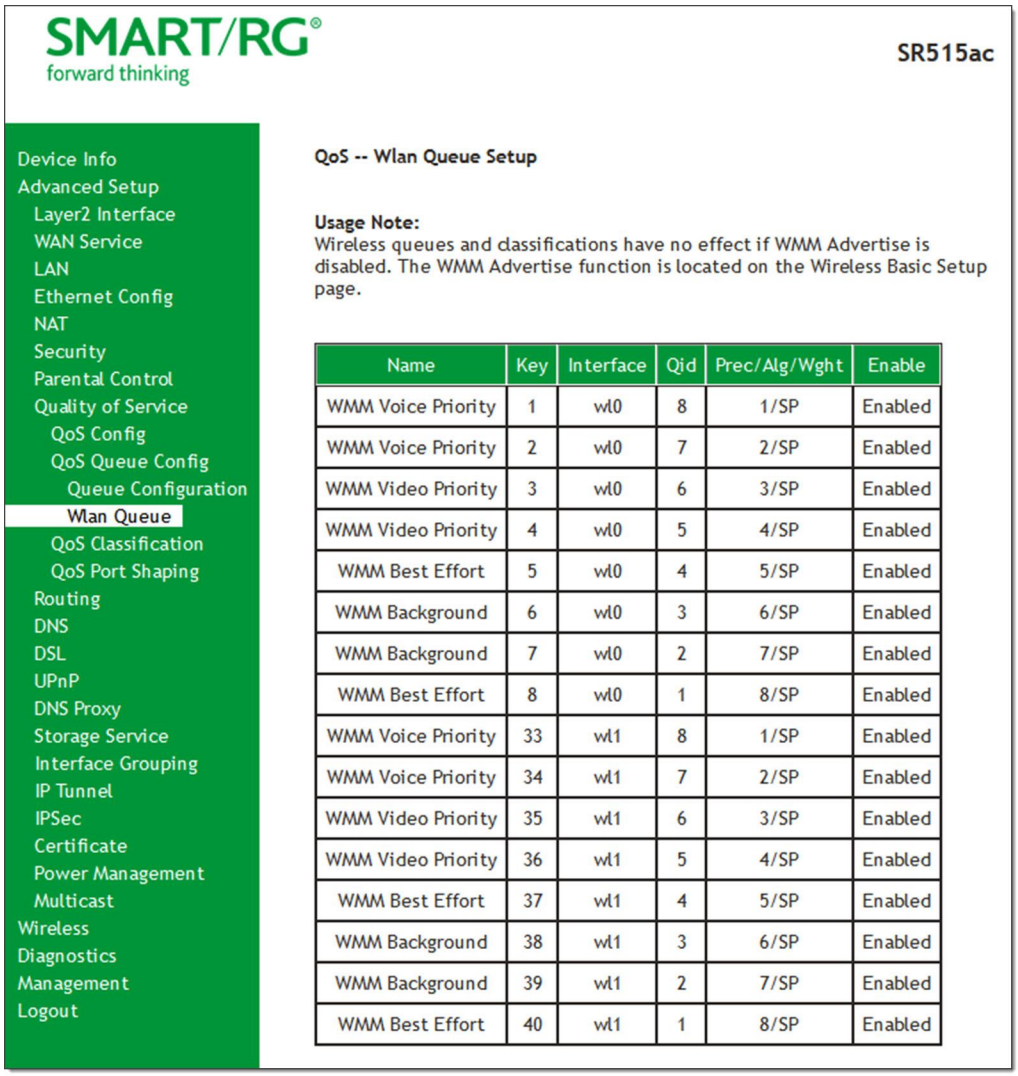
Field Name	Description
Queue Precedence	(*Appears when you select an interface*) Select the priority value to be associated with QoS queue defined. Options include levels for **SP** and **SP|WRR|WFQ**. **Note:** Lower value = higher priority.
Scheduler Algorithm	(*Appears when you select 1-7(WRR|WFQ) in the Queue Precedence field*) Select an algorithm for data priority in queues. Options are: • **Strict Priority:** Allows shaping of rate and burst size for packets in queue. • **Weighted Round Robin:** Applies a fair round robin scheme weighting that is effective for networks with fixed packet sizes, e.g., ATM networks. • **Weighted Fair Queuing:** Applies a fair queuing weighting scheme via allowing different sessions to have different service shares for improved data packets flow in networks with variable packet size, e.g., PTM/IP networks.
The following options appear only when the Queue Precedence field is set to **SP|WRR|WFQ** and the Scheduler Algorithm field is set to **Strict Priority**.	
Minimum Rate	Enter the minimum shaping rate for packets in QoS queues. Options are **1** - **100000** Kbps. To specify no minimum shaping, enter **-1** .
Shaping Rate	Enter the shaping rate for packets in QoS queues. Options are **1** - **100000** Kbps. To specify no minimum shaping, enter **-1** .
Shaping Burst Size	Enter the shaping burst size to be applied to packets in the defined queue. Options are **1600 bytes** or greater.
Queue Weight	(*Appears when you select an ATM interface*) Enter the queue weight for scheduling. Options are **1** - **63**.
PTM Priority	(*Appears when you select a PTM interface*) This field is set to **Low** and cannot be changed.
DSL Latency	(*Appears when you select an ATM or PTM interface*) This field is set to **Path0** and cannot be changed.

WLAN Queue

On this page, you can view the wireless queues and classifications.

Note: The **WMM Advertise** option must be enabled before these classifications will function. This option is enabled by default. If you have disabled it, go to the Wireless > Basic page and clear the **Disable WMM Advertise** checkbox.

In the left navigation bar, click **Advanced Setup** > **Quality Of Service** > **QoS Queue Config** > **Wlan Queue**. The following page appears.

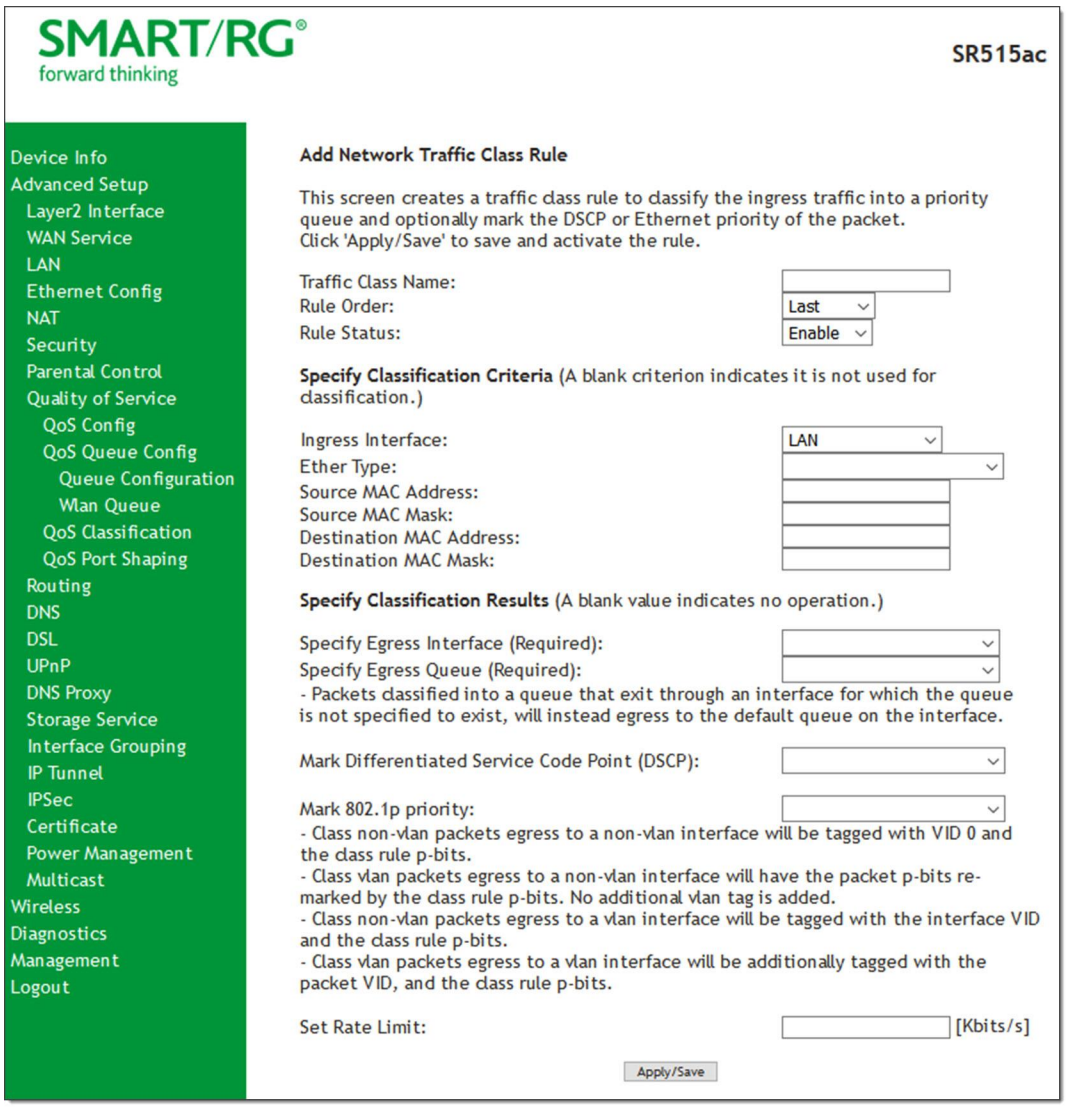


Name	Key	Interface	Qid	Prec/Alg/Wght	Enable
WMM Voice Priority	1	wl0	8	1/SP	Enabled
WMM Voice Priority	2	wl0	7	2/SP	Enabled
WMM Video Priority	3	wl0	6	3/SP	Enabled
WMM Video Priority	4	wl0	5	4/SP	Enabled
WMM Best Effort	5	wl0	4	5/SP	Enabled
WMM Background	6	wl0	3	6/SP	Enabled
WMM Background	7	wl0	2	7/SP	Enabled
WMM Best Effort	8	wl0	1	8/SP	Enabled
WMM Voice Priority	33	wl1	8	1/SP	Enabled
WMM Voice Priority	34	wl1	7	2/SP	Enabled
WMM Video Priority	35	wl1	6	3/SP	Enabled
WMM Video Priority	36	wl1	5	4/SP	Enabled
WMM Best Effort	37	wl1	4	5/SP	Enabled
WMM Background	38	wl1	3	6/SP	Enabled
WMM Background	39	wl1	2	7/SP	Enabled
WMM Best Effort	40	wl1	1	8/SP	Enabled

QoS Classification

On this page, you can create traffic class rules for classifying the ingress traffic into a priority queue. You can also mark the DSCP or Ethernet priority of the packet.

1. In the left navigation bar, click **Advanced Setup** > **Quality Of Service** > **QoS Classification** and then click **Add**. The following page appears. A maximum of 32 entries can be configured.



2. Fill in the fields, using the information in the table below.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
Traffic Class Name	Enter a descriptive name for this rule. This is a free-form text field.
Rule Order	This option is set to **Last** and cannot be changed. Every rule is set as the very last classification rule to be pro-

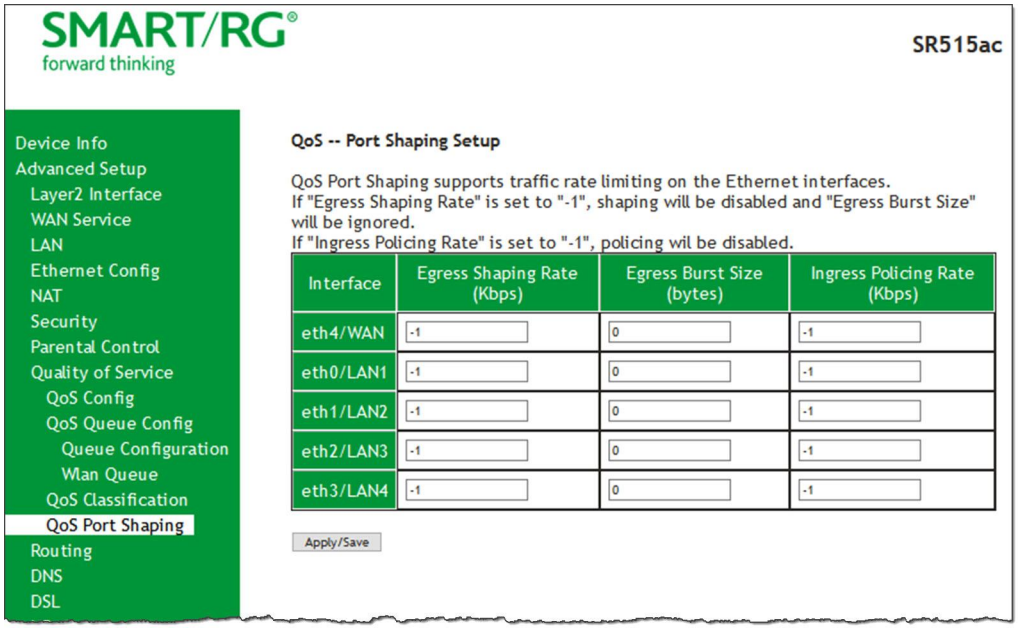
Field Name	Description
	cessed.
Rule Status	Select whether this rule is active or inactive. Options are: **Enable** and **Disable**. The default is **Enable**.
Specify Classification Criteria section	
Ingress Interface	Select an interface. Options are **LAN**, **WAN** and any interface already configured for your gateway.
Ether Type	Select the Ethernet interface type for this classification. Options are **IP**, **ARP**, **IPV6**, **PPPoE_DISC**, **PPPoE_SES**, **8865**, **8866**, and **8021Q**.
Source MAC Address Source MAC Mask	(*Available for LAN, ATM, ETH, PPP-Routed and wireless interfaces only*) Enter the source MAC address and source MAC mask for this classification.
Destination MAC Address Destination MAC Mask	(*Available for LAN, ETH and wireless interfaces only*) Enter the destination MAC address and destination MAC mask for this classification.
Source IP Address [/Mask] or Vendor Class ID or User Class ID	(*Available for WAN, ATM and PPP-Routed interfaces only*) Select the source for this classification. Options are: • **Source IP Address[/Mask]:** Enter the source IP address and source IP mask. • **Vendor Class ID (DHCP Option 60):** Enter the vendor class ID. • **User Class ID (DHCP Option 77):** Enter the user class ID.
Destination IP Address [/ Mask]	(*Available for WAN and ATM interfaces only*) Enter the destination IP address and source IP mask for this classification.
IP Length Check (Min/Max)	(*Available for Local, ATM interfaces only*) Enter the minimum and maximum number of digits required for IP addresses.
Differentiated Service Code Point (DSCP) Check	(*Available for WAN, Local, ATM, and PPP-Routed interfaces only*) Select the DSCP check protocol. Options include default and a range of protocol IDs.
Protocol	(*Available for WAN, Local, and ATM interfaces only*)Select the protocol specified for this classification. Options are **TCP**, **UDP**, **ICMP**, and **IGMP**.

Field Name	Description
UDP/TCP Source Port	(*Appears when **TCP** or **UDP** is selected in the Protocol field*) Enter the source port to be used for this classification. You can enter a range (port:port) or a single port.
UDP/TCP Destination Port	(*Appears when **TCP** or **UDP** is selected in the Protocol field*) Enter the destination port to be used for this classification. You can enter a range (port:port) or a single port.
Specify Classification Results section	
Specify Egress Interface	Select the egress interface for this rule. Options are the interfaces already configured.
Specify Egress Queue	Select the egress queue for this rule. Options are the queues already configured. **Note:** Make sure to select a queue that is defined for the interface that you selected. If you select a queue that is not defined for the selected interface, any packets classified into that queue are processed by the default queue for the interface.
Mark Applied Differentiated Service Code Point	Select the desired DSCP code.
Mark 802.1P priority	(*Available for LAN, bridged and wireless interfaces only*) This value is inserted into the Ethernet frame and used to differentiate traffic. Lower values assign higher priorities. Options are: **0 - 7**.
Set Rate Limit	Enter the data traffic rate limit applied for this classification.

QoS Port Shaping

QoS Port Shaping facilitates setting a fixed rate (Kbps) for each of the Ethernet ports.

1. In the left navigation bar, click **Advanced Setup** > **Quality Of Service** > **QoS Port Shaping**. The following page appears.



2. (*Optional*) For each interface in the table, enter an **Egress Shaping Rate (in Kbps)**, an **Egress Burst Size (in bytes)**, and an **Ingress Policing Rate (in Kbps)**. The default settings work for most scenarios.
3. Click **Apply/Save** to commit your changes.

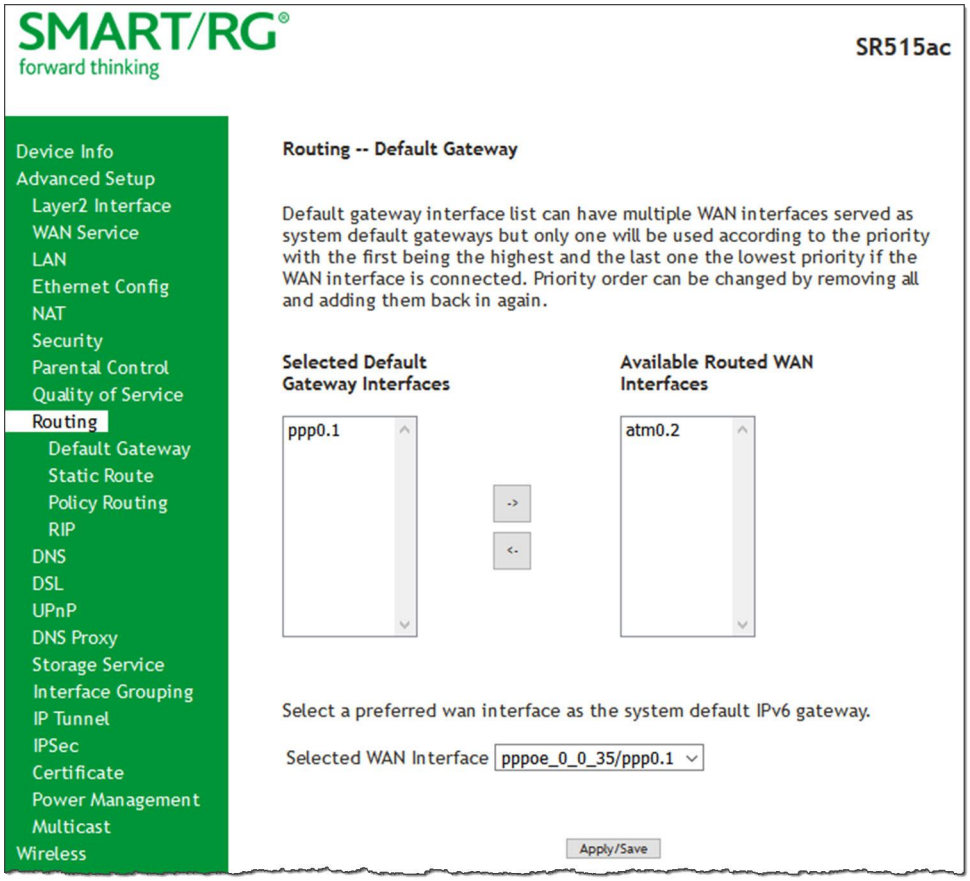
Routing

In this section, you can configure default gateways, static routing, policy routing and RIP settings.

Default Gateway

On this page, you can configure the default gateway interface list to establish access priority, that is, interfaces are accessed in the order listed in the **Selected Default Gateway Interfaces** column.

1. In the left navigation bar, select **Advanced Setup** > **Routing**. The following page appears.

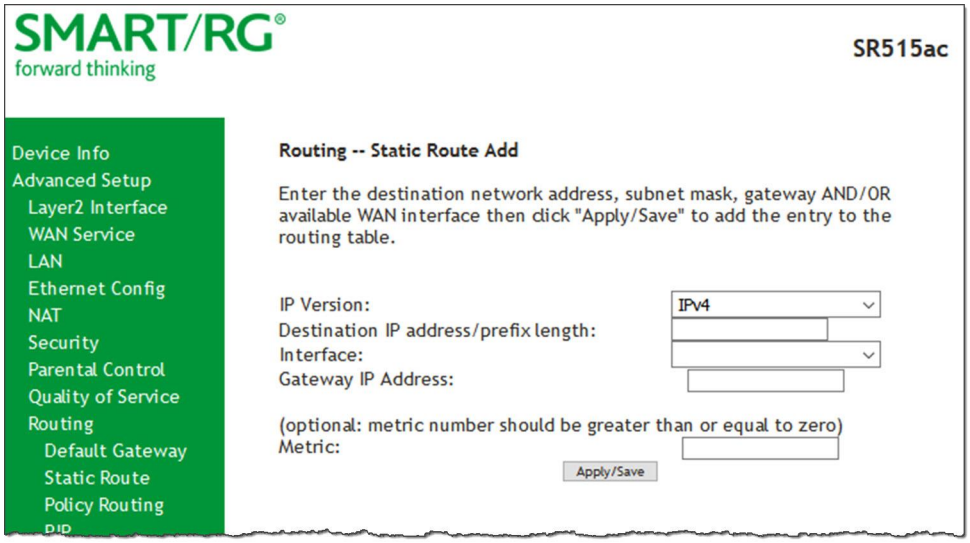


2. Select the interfaces that you want used as default gateway interfaces. Click the arrows to move your selection between the columns. Move the highest priority interface first, followed by the next highest priority interface, and so on.
3. (*Optional*) In the **Selected WAN Interface** field, select an IPv6 interface. You must configure the IPv6 interface before it appears in this field.
4. Click **Apply/Save** to commit your changes.

Static Route

On this page, you can configure static routes for your network. A static route is a manually configured, fixed route for IP data. You can enter a ma maximum of 32 entries.

1. In the left navigation bar, click **Advanced Setup** > **Routing** > **Static Route** and then click **Add**. The following page appears.



2. Fill in the fields, using the information in the table below.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

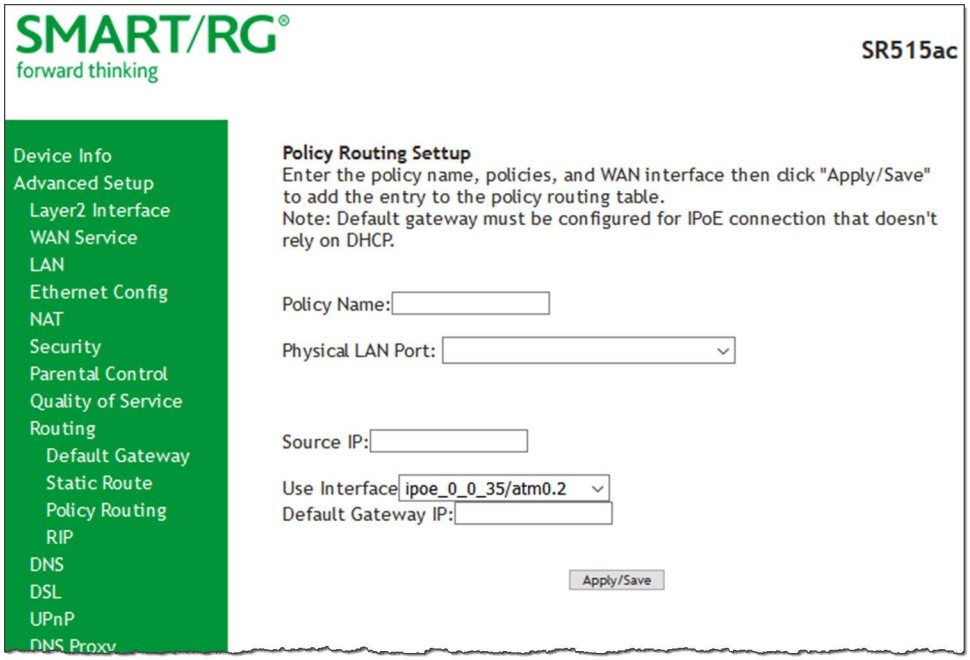
Field Name	Description
IP Version	Select the IP version associated with the static route you wish to create. Options are: **IPv4** and **IPv6**. The default is **IPv4**.
Destination IP address/-prefix length	Enter the destination network address / subnet mask for route.
Interface	Select the WAN Interface for this route. This list filtered by the selected IP version.
Gateway IP Address	Enter the destination IP address for this route. If needed, include the /prefix length.
Metric	(*Optional*) Establishes traffic priority/weighting. Must be equal to or greater than **zero** (≥ 0).

Policy Routing

Policy routing makes somewhat automated routing choices based on policies defined by a network administrator. For example, a network administrator might want to deviate from standard routing based on destination markers in the packet and, instead, forward a packet based on the source address.

On this page, you can configure similar policies.

1. In the left navigation bar, click **Advanced Setup** > **Routing** > **Policy Routing** and then click **Add**. The following page appears.



2. Fill in the fields, using the information in the table below.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
Policy Name	Enter a descriptive name for this entry to the policy routing table. This is a free-form text field.
Physical LAN Port	Select a physical LAN interface for the policy route. Options include **LAN1-4** and the wireless ports available on your gateway.
Source IP	Enter the IP address for the source of this policy route.
Use Interface	Select the WAN Interface for this policy route

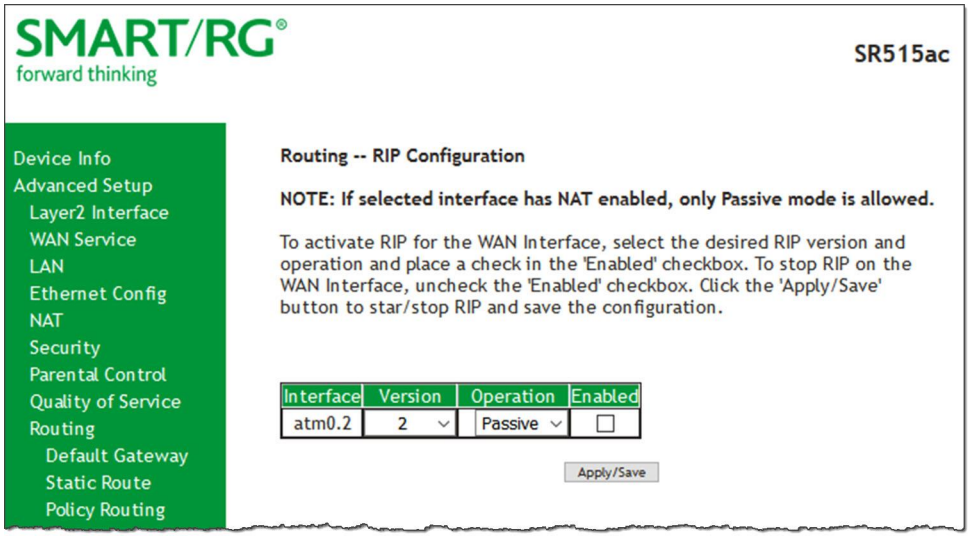
Field Name	Description
Default Gateway IP	Enter the IP address of the default gateway.

RIP (Routing Information Protocol)

RIP is a type of distance-vector routing protocol, which leverages hop count as a metric for routing. RIP puts a limit on the number of hops (maximum of 15) allowed in order to prevent routing loops. This can sometimes limit the size of networks where RIP can be successfully employed.

On this page, you can configure the RIP settings.

1. In the left navigation bar, click **Advanced Setup** > **Routing** > **RIP,** and then click **Add**. The following page appears.



2. For the interface that you want to modify, select values using the information in the table below.
3. To enable a configuration, click the **Enabled** checkbox next to the interface.
4. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
Interface	Displays a list of available WAN interfaces. Complete the line item(s) associated with the interface where you wish to employ RIP.
Version	Select the version of Routing Interface Protocol you desire. Options are: **1**, **2**, and **Both**. The default is **2**. For detailed information on RIP versions, refer to RFC 1058 and RFC 1453 .

Field Name	Description
Operation	This option is set to **Passive** and cannot be changed. This mode listens only. It does not advertise routes.

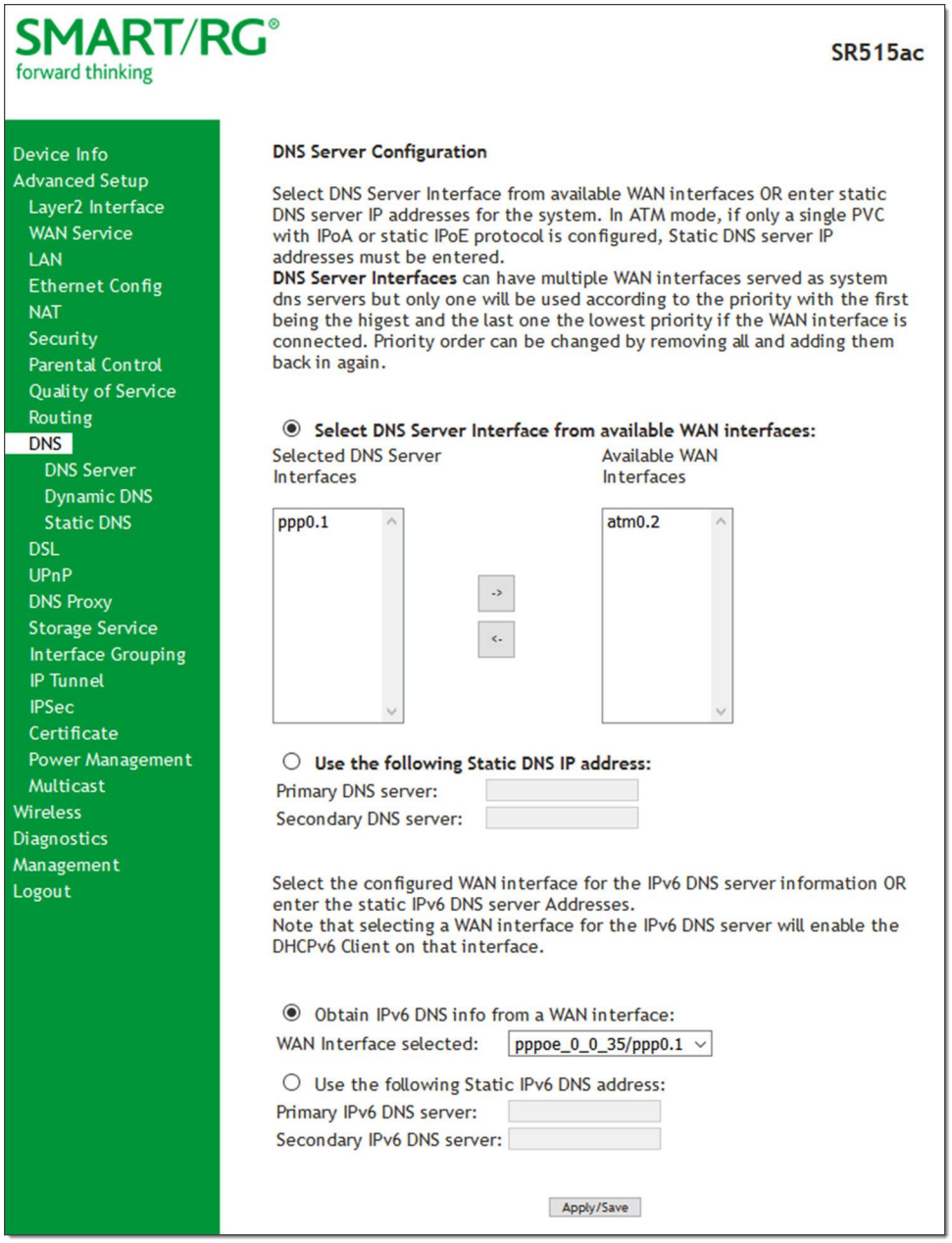
DNS

In this section, you can configure a DNS server, dynamic DNS and static DNS.

DNS Server

On this page, you can input the Domain Name Server (DNS) information supplied by your service provider.

1. In the left navigation bar, click **Advanced Setup** > **DNS**. The following page appears.



2. Enter your desired settings. Click **Apply/Save** to commit changes.

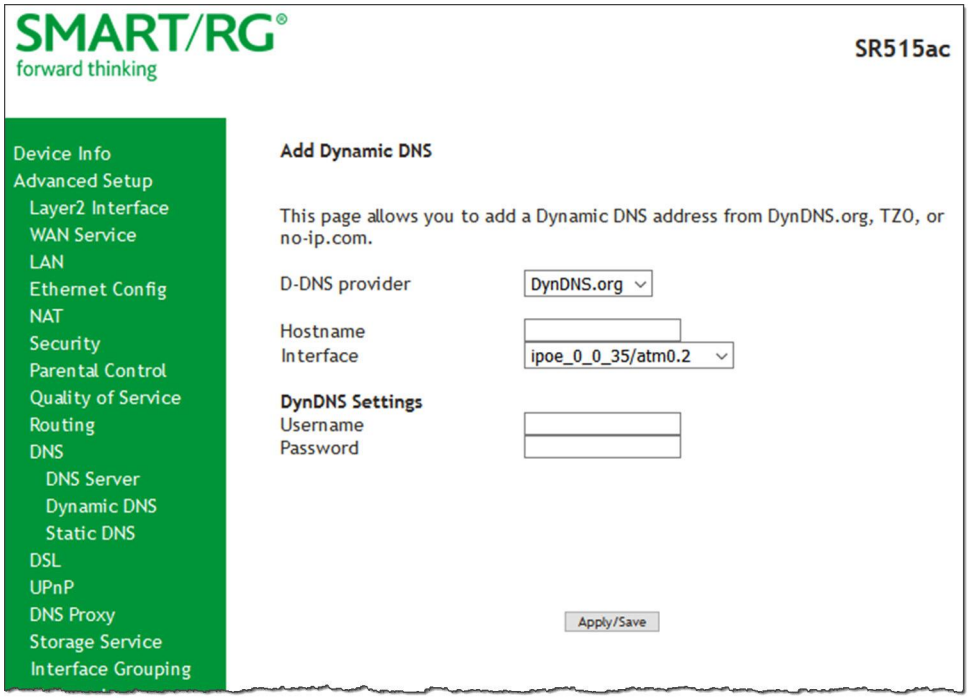
The fields on this page are explained in the following table.

Field Name	Description
Selected DNS Server Interfaces	WAN service(s) selected to be your primary DNS server.
Available WAN Interfaces	WAN services available to be selected for the DNS server.
Primary DNS Server	Enter the IP address of the primary DNS server.
Secondary DNS Server	Enter the IP address of the secondary DNS server.
WAN Interface Selected	Select the WAN interface for the IPv6 server. field. If no WAN interface is configured for your gateway, this field is disabled.
Primary IPv6 DNS Server	Enter the IP address of the primary IPv6 primary DNS.
Secondary IPv6 DNS Server	Enter the IP address of the primary IPv6 primary DNS.

Dynamic DNS

Dynamic DNS (DDNS) automatically updates a name server in the DNS with the active DNS configuration of its configured hostnames, addresses or other data. Often this update occurs in real time. On this page, you can configure the settings for this feature.

1. In the left navigation bar, click **Advanced Setup** > **DNS** > **Dynamic DNS** and then click **Add**. The following page appears.



2. Modify the fields as needed, using the information in the table below.
3. Click **Apply/Save** to commit your changes.

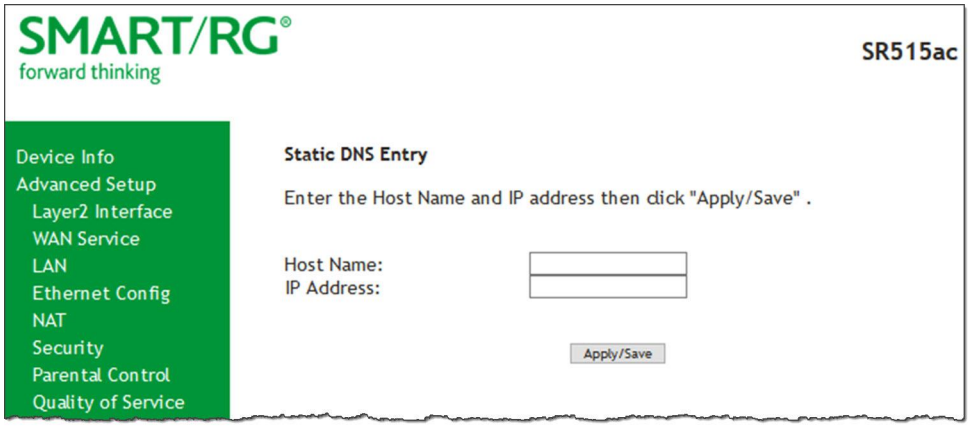
Field Name	Description
D-DNS provider	Select a dynamic Domain Name Server provider. The default is **DynDNS.org**.
Hostname	Enter the hostname of the dynamic DNS server.
Interface	Select the gateway WAN interface whose traffic will be pointed at the specified Dynamic DNS provider.
DynDNS Settings section	
Username	Enter the username for the dynamic DNS server .
Password	Enter the password for the dynamic DNS server.

Static DNS

The Static DNS service allows you to resolve DNS queries on the Broadband Router by adding a static host name to the IP Address mappings.

On this page, you can configure up to 10 static DNS entries.

1. In the left navigation bar, click **Advanced Setup** > **DNS** > **Static DNS** and then click **Add**. The following page appears.



2. Modify the fields as needed, using the information in the table below.
3. Click **Apply/Save** to commit your changes.

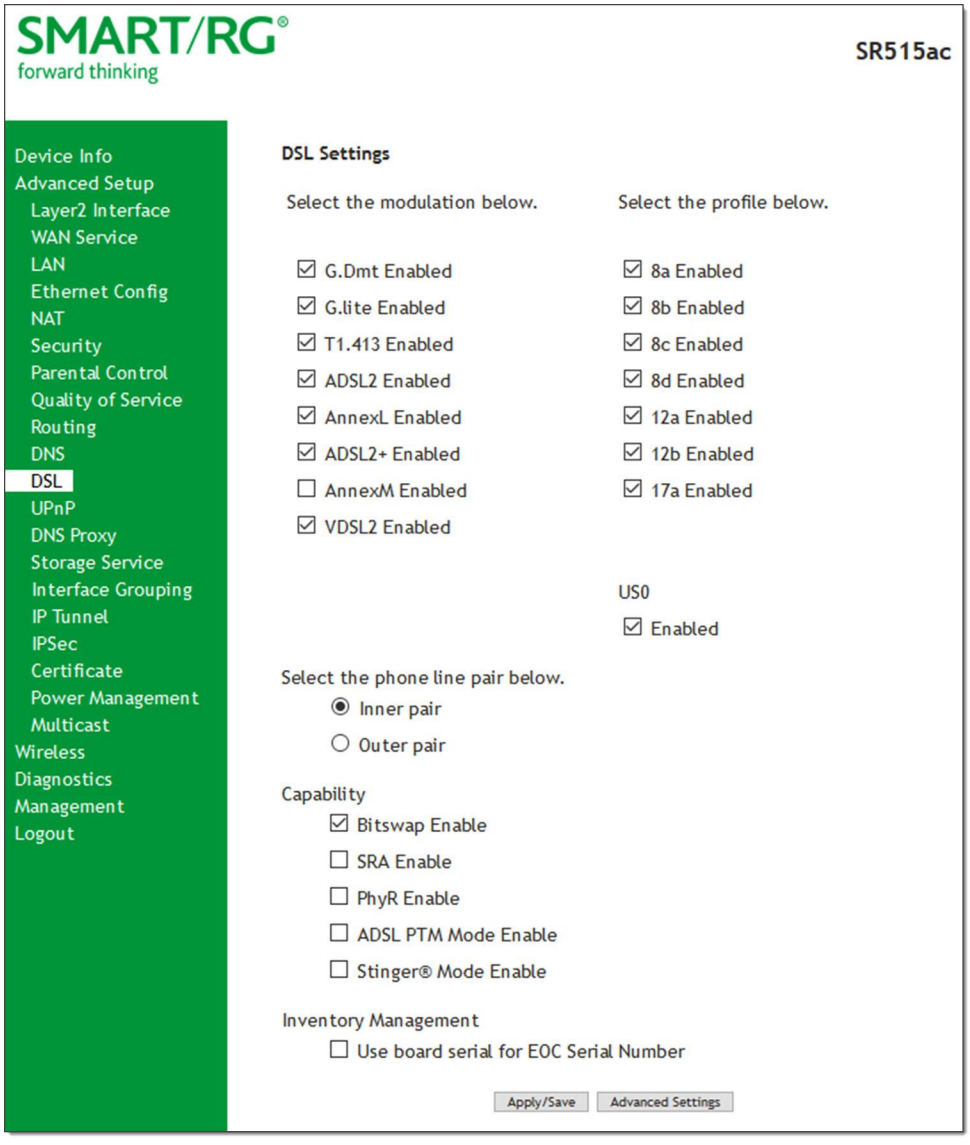
Field Name	Description
Hostname	Enter the hostname of the client computer.
IP Address	Enter the IP address of the DNS server client uses to assist in resolving domain names.

DSL

On this page, you can configure settings for the DSL interface.

Warning: Altering these settings unnecessarily can result in the gateway being unable to attain DSL synchronization.

1. In the left navigation bar, click **Advanced Setup** -> **DSL**. The following page appears.



2. Modify the fields as needed, using the information in the table below.

3. To configure advanced settings, see "Advanced settings".
4. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Modulation	Data Transmission Rate	Max Downstream (Mbps)	Max Upstream (Mbps)
G.Dmt	ITU-T G.992.1 standard.	12	1.3
G.lite	ITU-T G.991.2 standard.	4	0.5
T1.413	ANSI T1.413 Issue 2 standard.	8	1.0
ADSL2	ITU-T G.992.3 standard.	12	1.0
AnnexL	Annex L of ITU-T G.992.3 standard which supports longer loops but with reduced transmission rates.		
ADSL2+	ITU-T G.992.5 standard.	28	1.0
AnnexM	Annex L of ITU-T G.992.5 standard which supports extended upstream bandwidth.	24	3
VDSL2	ITU-T G.993.2 standard.	100	60

The following table explains the maximum transaction power for each profile supported for SmartRG gateways.

Parameter	8a	8b	8c	8d	12a	12b	17a
Max DS Tx Power (dBm)	+17.5	+20.5	+11.5	+14.5			
Max US Tx Power (dBm)	+14.5						
Min bidirectional net data rate	50Mbps				68Mbps	100Mbps	

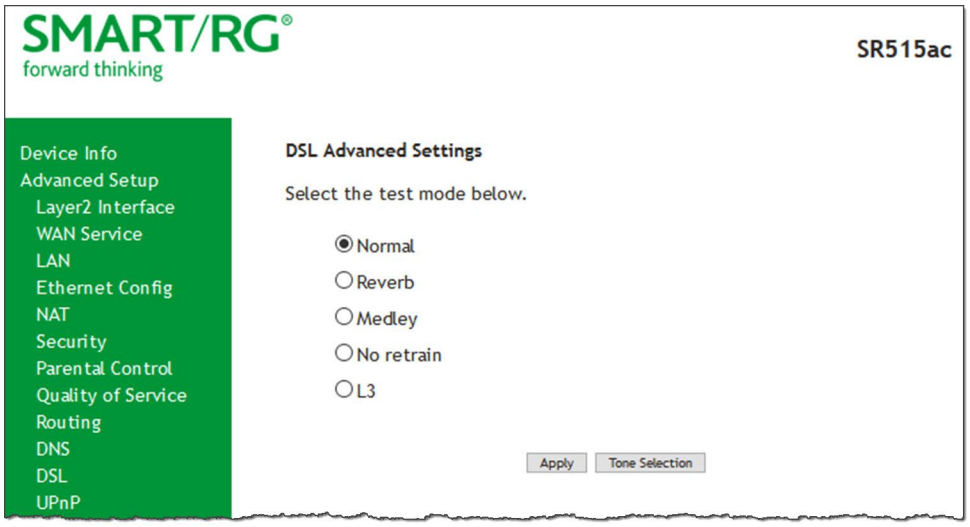
Other Settings	
Field Name	Description
Inner Pair/Outer Pair	The RJ11 connector has four contacts. The center pair of pins is DSL1. The outer pair pins are the contacts for DSL2. Select which pair should be used.

Other Settings	
Field Name	Description
Capability	• **Bitswap Enable**: Enables adaptive handshaking functionality. • **SRA Enable**: Enables Seamless Rate Adaptation. • **PhyR Enable**: Enables Physical Layer Retransmission. • **ADSL PTM Mode Enable**: Enables Asymmetric Digital Subscriber Line in Packet Transfer Mode. • **Stinger® Mode Enable:** (*Available for SR515ac models only*) Enables communication with Stinger type equipment.
Inventory Management	Select whether to use the gateway serial number as the EOC serial number in your inventory management database.

Advanced settings

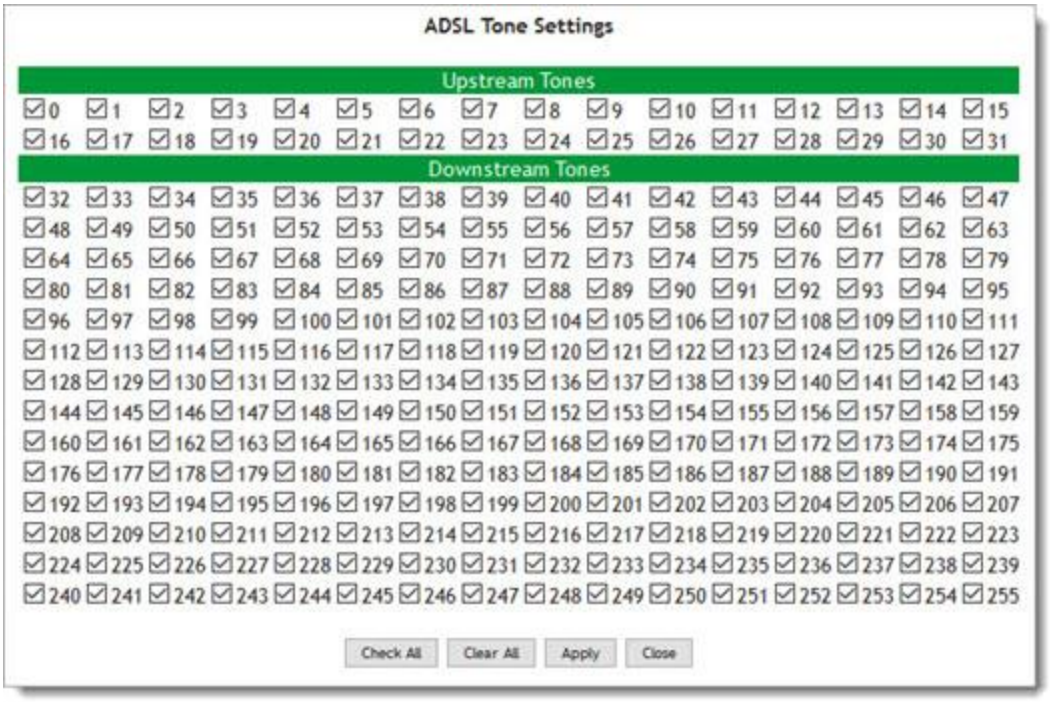
Note: This option is not available for the SR515ac model.

1. To configure the test mode, click **Advanced Settings** on the **Advanced** > **DSL** page. The following page appears.



2. Click **Apply** to place the gateway in test mode.

3. To view the ADSL tone settings, click **Tone Selection**. TADSL Tone Settings page appears.



Caution: Do not modify the tones selected unless under explicit instruction from a telecommunications professional.

4. Click **Apply** to commit your changes or **Close** to return to the previous page.

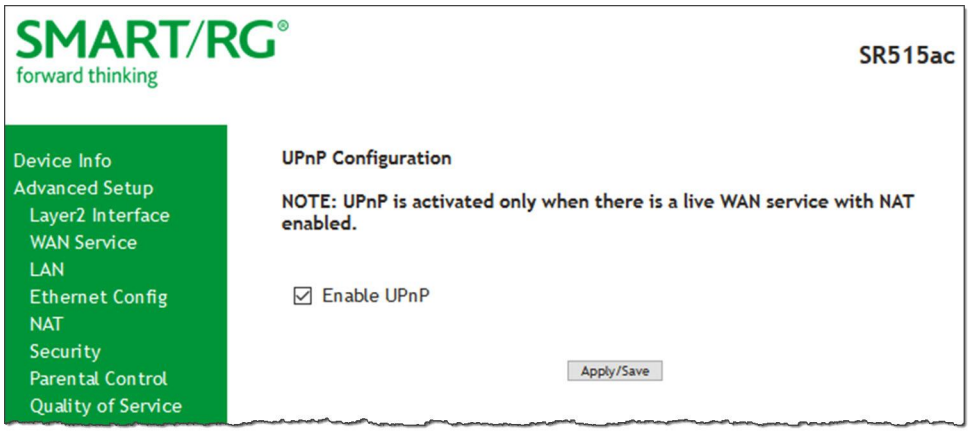
The fields on this page are explained in the following table.

Mode	Description
Normal	Puts the DSL PHY in test mode, sending only a Normal signal.
Reverb	Puts the DSL PHY in test mode, sending only a REVERB signal.
Medley	Puts the DSL PHY in test mode, sending only a MEDLEY signal.
No Retrain	The DSL PHY attempts to establish a connection as in Normal mode, but once the connection is up, it does not retrain even if the signal is lost.
L3	Puts the DSL modem in the L3 power state.

UPnP

On this page, you can enable UPnP when 3rd party devices on your LAN support this Universal Plug and Play standard. Common client devices include gaming consoles, IP cameras, printers and others. This feature is enabled by default.

1. In the left navigation bar, select **Advanced Setup** > **UPnP**. The following page appears.

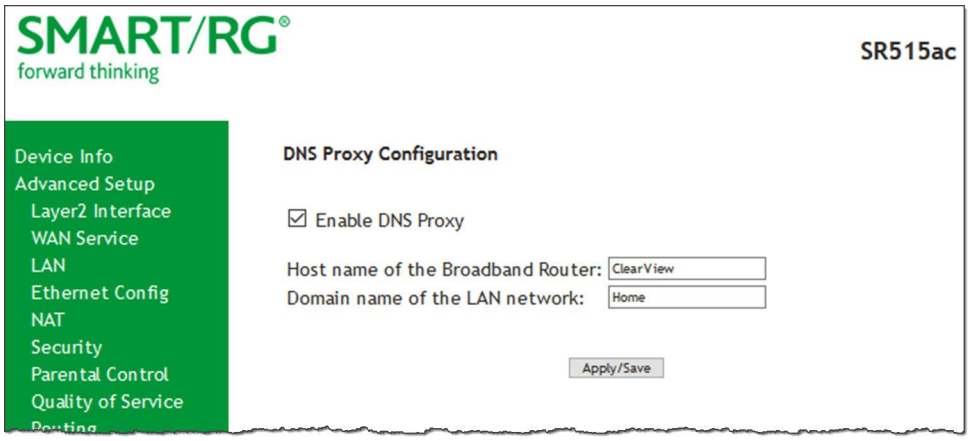


2. To *disable* this option, click **Enable UPnP** to clear the box.
3. Click **Apply/Save** to commit your changes.

DNS Proxy

On this page, you can configure the DNS proxy settings. A DNS proxy improves domain look-up performance for clients by creating a historical cache of look-ups.

1. In the left navigation bar, click **Advanced Setup** > **DNS Proxy**. The following page appears.



2. If not already selected, click **Enable DNS Proxy**.
3. Enter the host name of the broadband router and the domain name of the LAN network.
4. Click **Apply/Save** to commit your changes.

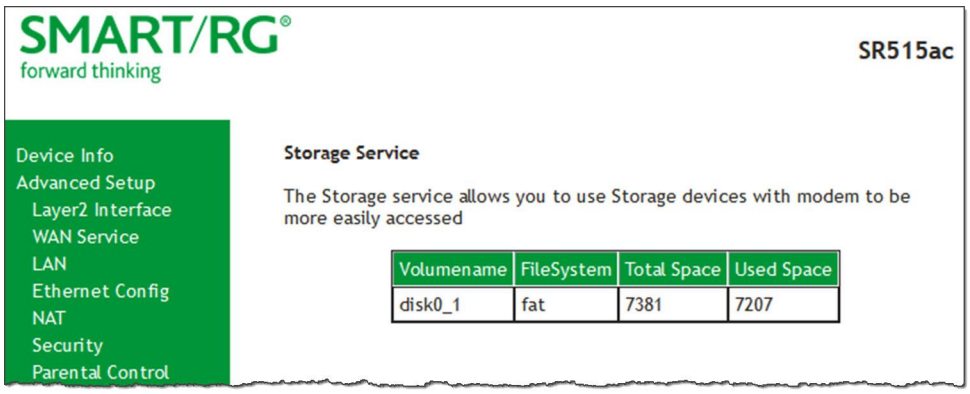
Storage Service

In this section, you can view information about the storage devices connected to the gateway and manage the user accounts that can access them.

Storage Device Info

On this page, you can view information about storage devices that connect to the gateway and manage the related user accounts.

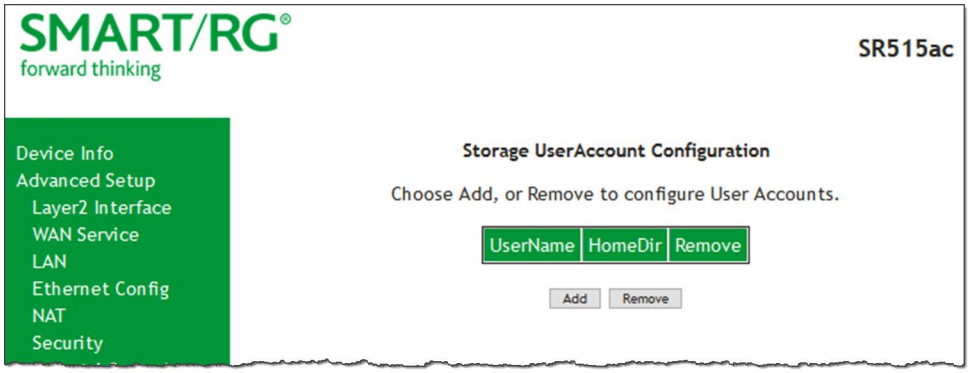
In the left navigation menu, click **Advanced Setup** > **Storage Service**. The following page appears, showing information about the connected storage device.



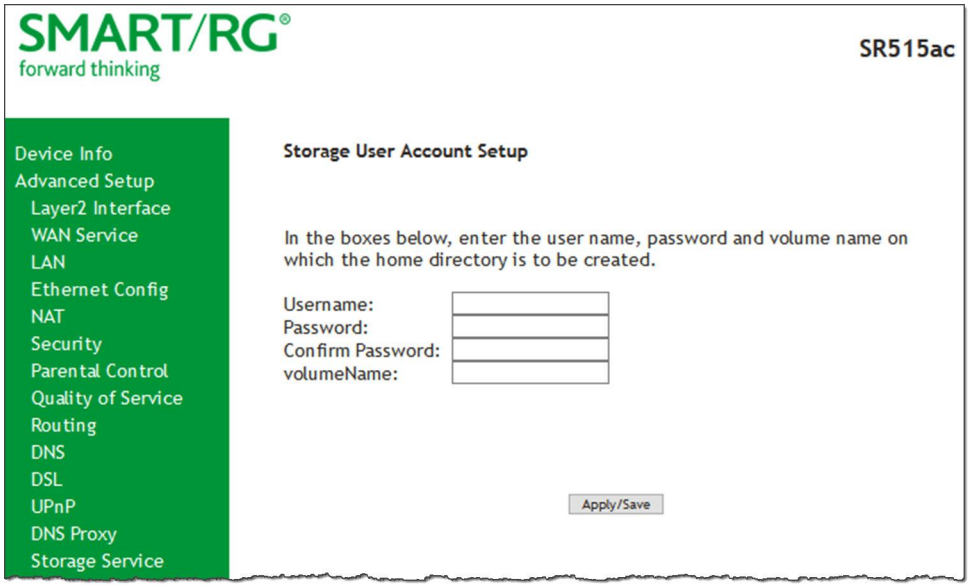
User Accounts

On this page, you can manage user accounts for the storage devices.

1. In the left navigation menu, click **Advanced Setup** > **Storage Service** > **User Accounts**. The following page appears.



2. To add a new account:
   a. Click **Add**. The following page appears.

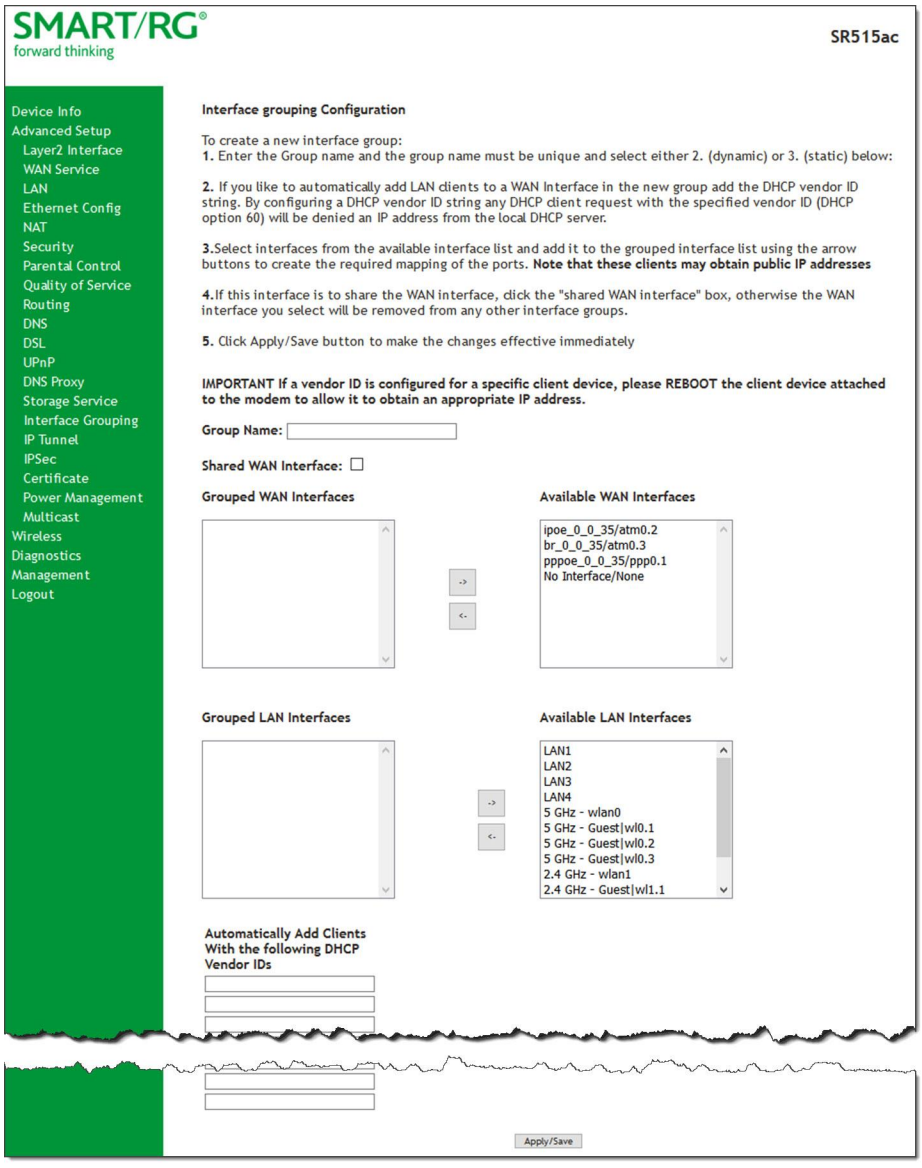


   b. Enter a user name and enter the password twice. The password cannot contain spaces.
   c. (*Optional*) In the **Volume Name** field, enter a volume name where the home directory should be created.
   d. Click **Apply/Save** to save your settings. You are returned to the User Accounts page.
3. To remove a user account, click the **Remove** checkbox next to the account entry and then click the **Remove** button. The list refreshes to show your changes were applied.

Interface Grouping

On this page, you can create an interface group to map local interfaces to WAN interfaces. A typical application for this feature is assigning IPTV set-top boxes to a WAN interface.

1. In the left navigation bar, click **Advanced Setup** > **Interface Grouping** and then click **Add**. The following page appears.



2. To create a new interface group, enter a unique **Group Name**, then proceed with either step 3 (dynamic) or step 4 (static) below.

3. If this new grouped interface is to share the WAN interface, click **Shared WAN Interface**. *Not* selecting this option this will cause the WAN interface you select to be removed from any other interface groups.
   Important: If a vendor ID is configured for a specific client device, make sure to reboot the client device attached to the gateway to allow it to obtain an appropriate IP address.
4. Map the ports for the WAN or LAN interface:
   a. Select an interface from the applicable **Available Interface** list.
   b. Add it to the **Grouped Interface** list by clicking the arrow to create the required mapping of the ports. Hold down the Shift key to select multiple interfaces.
      Note: Depending on the WAN interface configuration, these clients may obtain public IP addresses.
5. To automatically add LAN clients (such as set-top boxes) to a WAN Interface in the new group, enter the **DHCP vendor ID** string. You can add up to 16 vendor IDs.
   When you configure a DHCP vendor ID string, any DHCP client request that includes this vendor ID is denied an IP address from the local DHCP server (DHCP option 60).
6. Click **Apply/Save**. Your changes take effect immediately.
7. To remove a grouping, select the grouping and click **Remove**. You can only remove groupings that you create.

IP Tunnel

IP Tunneling is typically used as a means to establish a path between two independent networks. Your SmartRG gateway supports connecting islands of IPv6 networks across the IPv4 internet or IPv4 in IPv6 as well.

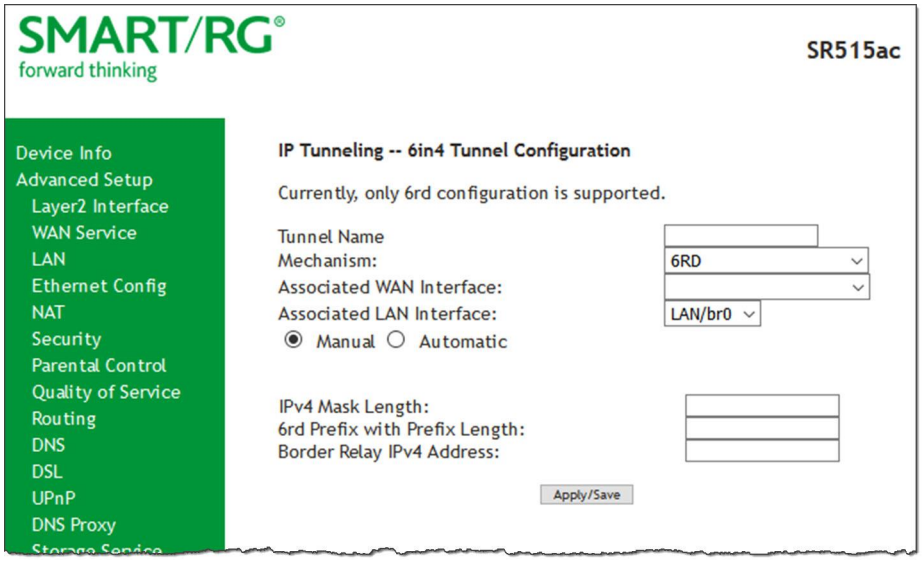
In this section, you can configure IP tunnel settings.

Note: For IPv6inIPv4, only 6rd configuration is supported. For IPv4inIPv6, only DS-Lite configuration is supported.

IPv6inIPv4

On this page, you can configure the IPv6inIP4 settings.

1. In the left navigation bar, click **Advanced Setup** > **IP Tunnel** > **IPv6inIPv4** and then click **Add**. The following page appears.

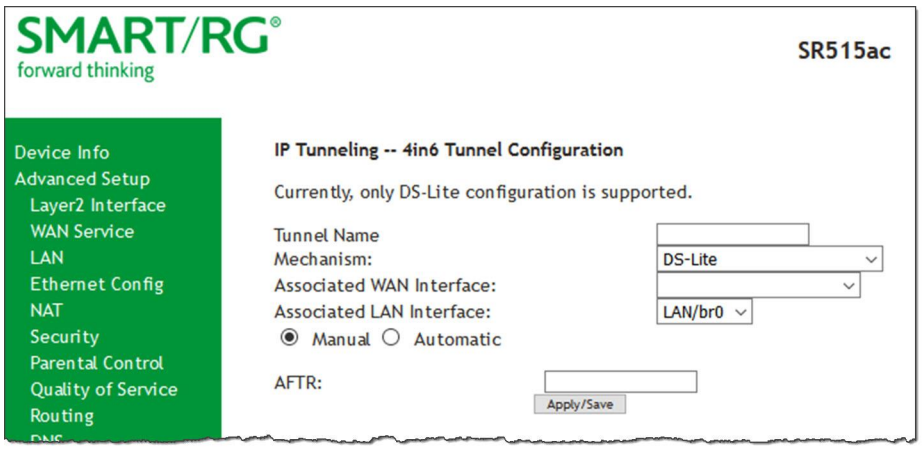


2. Enter a **Tunnel Name**.
3. Select the WAN and LAN interfaces associated with the tunnel you wish to establish.
4. The **Manual** button is selected by default. Enter appropriate values in the **IPv4 Mask Length, 6rd Prefix with Prefix Length** and **Border Relay IPv4 Address** fields. To configure these settings automatically, select **Automatic** under **Associated LAN Interface**.
5. Click **Apply/Save** to commit your changes.

IPv4inIPv6

On this page, you can configure the IPv4inIP6 settings.

1. In the left navigation bar, click **Advanced Setup** > **IP Tunnel** > **IPv4inIPv6** and then click **Add**. The following page appears.



Note: Currently, only the DS-Lite Mechanism is supported. For more information about DS-Lite, consult RFC6333.

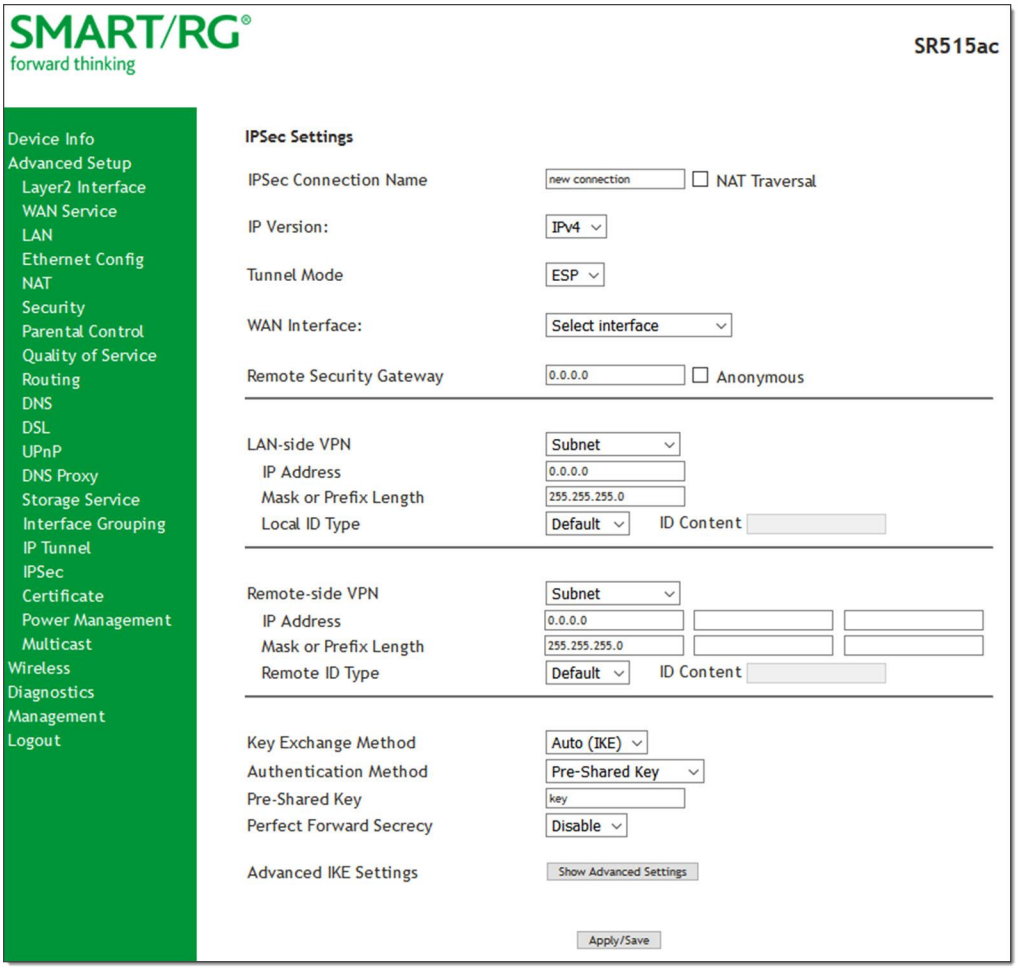
2. Enter a **Tunnel Name**.
3. Select the **LAN** and **WAN** interfaces associated with the tunnel you wish to establish.
4. **AFTR** (Address Family Transition Router) may be configured automatically. To configure **AFTR** manually, select **Manual** under **Associated LAN Interface** and enter the appropriate values.
5. Click **Apply/Save** to commit your changes.

IPSec

IPSec (Internet Protocol Security) is a protocol for securing communications by packet level encryption and authentication.

On this page, you can create, enable, edit and remove connections. A maximum of 40 IPSec connections is allowed.

1. In the left navigation bar, click **Advanced Setup** > **IP Sec** and then click **Add**. The following page appears.



2. Modify the fields as needed, using the information in the table below.
3. Click **Apply/Save** to commit your changes.

Field Name	Description
IPSec Connection Name	A free form text field. Enter a descriptive name for this connection

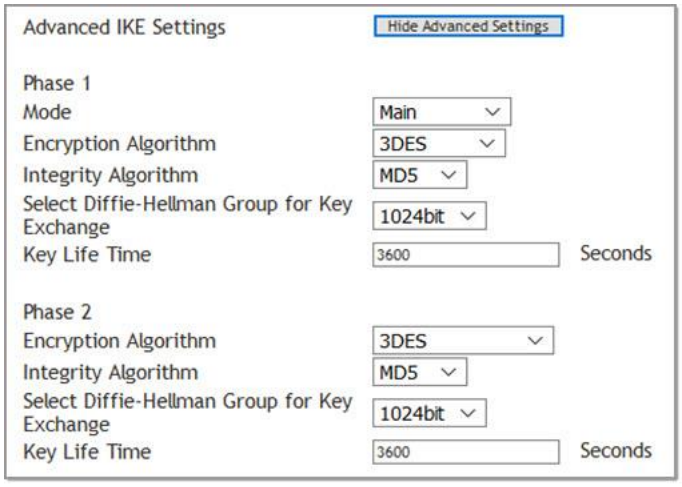
Field Name	Description
NAT Traversal	Click to enable the NAT traversal protocol.
IP Version	Select the IP version environment associated with your infra-structure. Options are **IPv4** and **IPv6**. The default is **IPv4**.
Tunnel Mode	Select the encapsulation method to be used. Options are: • **AH:** Use this mode to encapsulate a packet with AH and IP headers. For authentication, the entire packet is signed. • **ESP:** Use this mode to encapsulate a packet with ESP and IP headers. An ESP trailer is added to the packet for authentication and integrity. This is the default.
WAN Interface	Select the WAN connection for this tunnel.
Remote Security Gateway	Enter the WAN IP for this tunnel.
Anonymous	Click to enable anonymity protection on this connection.
LAN-side VPN	Select whether to allow access to the entire LAN or a single host for local IP addresses. Options are: • **Subnet:** Allows access to the entire LAN. Enter the IP address and mask or prefix length for the VPN. This is the default. • **Single Address:** Allows access to a single host. Enter the IP address for the host.
IP Address	Enter the IP address for local access.
Mask or Prefix Length	Enter the subnet mask or prefix length for IP address entered for local access, e.g., 255.255.255.0.
Local ID Type	Select the type of ID for the local VPN. Options are **Default**, **Domain**, and **E-Mail**. The default is **Default**. When you select **Domain** or **E-Mail**, the **ID Content** field becomes available. Enter the ID.
Remote-side VPN	Select whether to allow access to the entire LAN or a single host for local IP addresses. Options are: • **Subnet:** Allows access to the entire LAN. Enter up to three IP addresses and masks or prefix lengths for the VPN. This is the default. • **Single Address:** Allows access to a single host. Enter the IP address for the host.
IP Address	Enter the IP address for remote access.
Mask or Prefix Length	Enter the subnet mask or prefix length for IP address entered for remote access, e.g., 255.255.255.0.

Field Name	Description
Remote ID Type	Select the type of ID for the remote VPN. Options are **Default**, **Domain**, and **E-Mail**. The default is **Default**. When you select **Domain** or **E-Mail**, the **ID Content** field becomes available. Enter the ID.
Key Exchange Method	The key-exchange method to be used for IPSec. Options are: • **Auto(IKE):** This method uses the negotiated key-exchange method for IPSec. This is the default and recommended for best results. • **Manual:** This method requires that you configure the details. Additional fields appear.
Authentication Method	(*Available when **Auto(IKE)** is selected in the **Key Exchange Method** field*) Select the method by which the remote end will authenticate. • **Pre-Shared Key:** A key is distributed to authorized users for logging into the system. Enter the key in the **Pre-shared Key** field. • **Certificate (x.509):** A certificate is used for authentication. Select the certificate file in the **Certificate** field that appears.
Perfect Forward Secrecy	(*Available when **Auto(IKE)** is selected in the **Key Exchange Method** field*) This setting determines whether a session key derived from a set of long-term keys is compromised if one of the long-term keys in the set is compromised. • **Enable:** Prevents long-term key from being compromised. • **Disable:** Permits long-term keys to be compromised.
The following fields appear below **Advanced IKE Settings** when **Manual** is selected in the **Key Exchange Method** field.	
Encryption Algorithm	Select the encryption algorithm. Options are **DES**,**3DES** and **AES**.
Encryption Key	Enter the hex value for the selected encryption algorithm.
Authentication Algorithm	Select the authentication algorithm. Options are **MD5** and **SHA1**.
Authentication Key	Enter the hex value for the selected authentication algorithm.

Advanced IKE Settings

You can configure advanced IKE settings if desired.

1. On the IPSec Settings page, click **Show Advanced IKE Settings** to display the Phase 1 and Phase 2 fields.



2. Fill in the fields, using the information in the table below.

Field Name	Description
Mode	(*Appears in the Phase 1 section only*) Select whether to protect information about your network. Options are: • **Main:** Protect the identity of the peers. This is the default. • **Aggressive:** Do not protect the identity of the peers.
Encryption Algorithm	Select the encryption algorithm. Options are **3DES** , **AES -128**, **AES-192**, and **AES-256**. The default is **3DES**.
Integrity Algorithm	Select the integrity algorithm. Options are **MD5** and **SHA1**. The default is **MD5**.
Select Diffie-Hellman Group for Key Exchange	Select the D-H group. Options are **768bit - 8192bit**. The default is **1024bit**.
Key Life Time	Enter the number of seconds that a key is valid. The default is **3600** seconds.

3. Click **Apply/Save** to commit your changes.

Certificate

On this page, you can configure certificates for the gateway. You can use Local and Trusted CA certificates on this gateway.

Local

Local certificates are used to identify the gateway to other users.

On this page, you can create a new certificate request locally and have it signed by a certificate authority, or you can import an existing certificate.

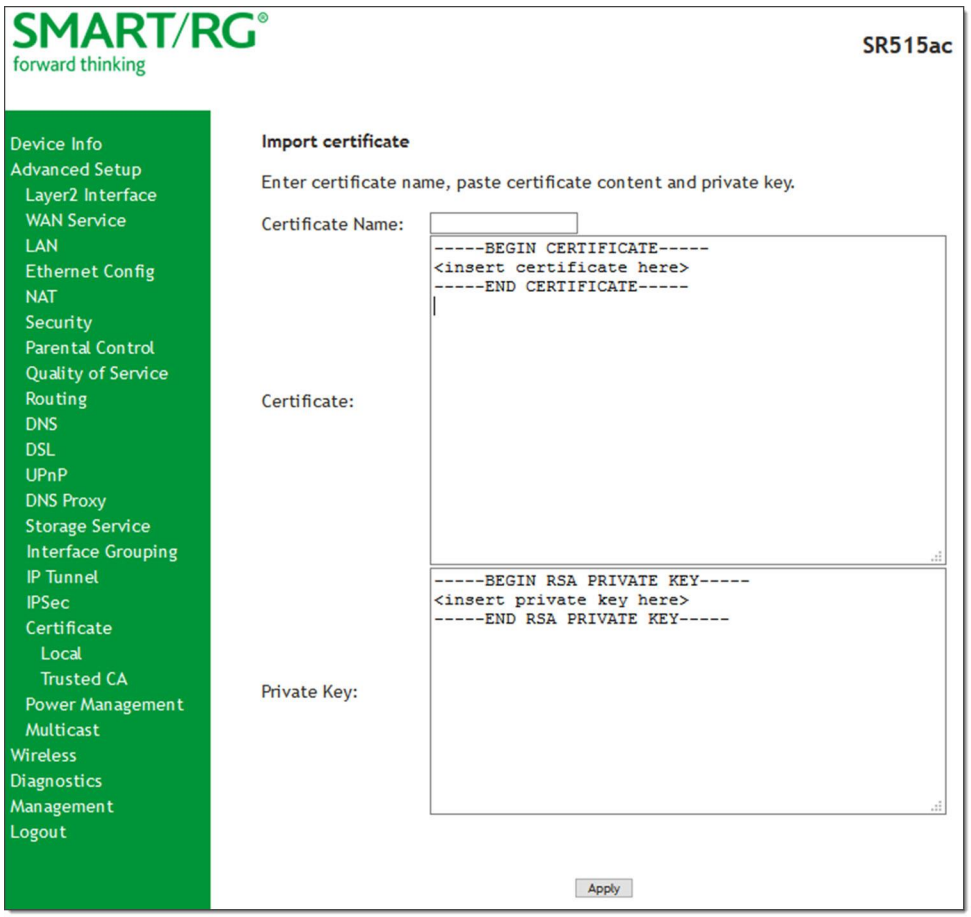
1. In the left navigation bar, click **Advanced Setup** > **Certificate** > **Local** and then click **Create Certificate Request**. The following page appears.

2. Enter your connection details by completing the appropriate fields. For more information about certificates, refer to the ITU X.509 standard.
3. Click **Apply** to complete the request.

   The fields on this page are explained in the following table.

Field Name	Description
Certificate Name	A free-form text field used to describe the intended use of the certificate.
Common Name	Enter the IP address (in dotted decimal notation), domain name or email address in the field provided. The domain name or email address is for identification purposes and is a free-form text field.
Organization Name	A free form text field. Typically, this is the name of the company creating the request.
State/Province Name	Enter the state or province where this certificate will be used.
Country/Region	Select the country or region where this certificate will be used.

4. To import a certificate and the corresponding private key, click **Import Certificate**. The following page appears.

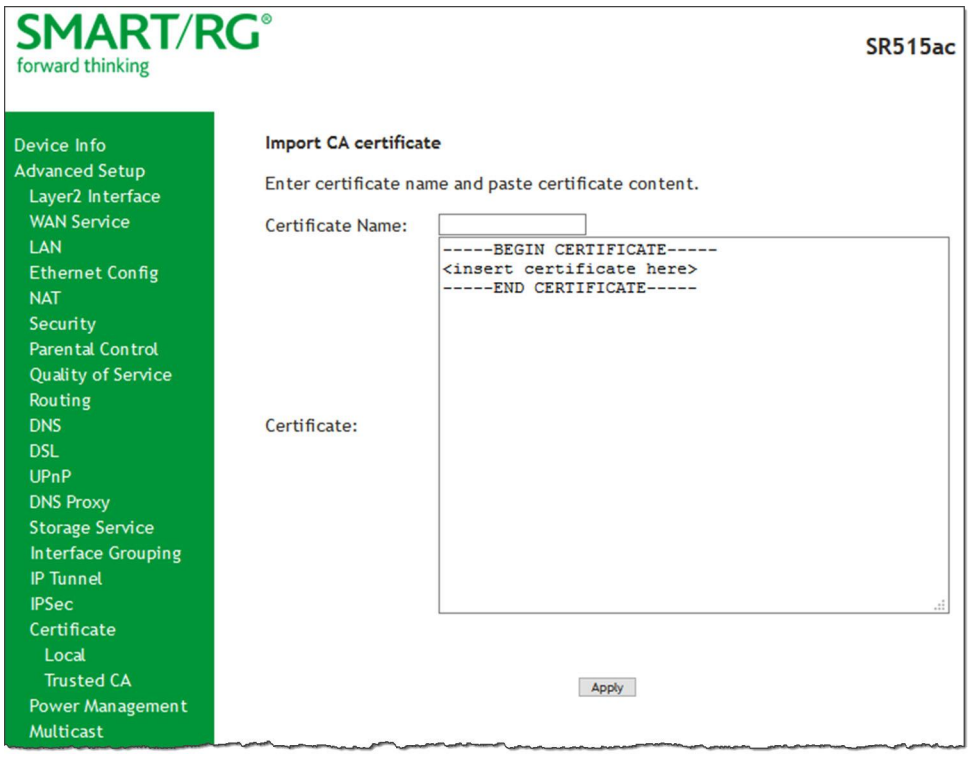


5. In the **Certificate Name** field, type "cpecert".
6. Paste the **Certificate** details between the **BEGIN** and **END** markers.
7. Paste the **Private Key** information between the **BEGIN** and **END** markers.
8. Click **Apply** to implement this certificate.

Trusted CA

On this page, you import and store up to four trusted certificates. Trusted Certificates are used to identity other gateways to your gateway as a trusted source.

1. In the left navigation bar, click **Advanced Setup > Certificate > Trusted CA** and then click **Import Certificate**. The following page appears.



2. In the **Certificate Name** field, type "acscert", and then paste the certificate details between the **BEGIN** and **END** markers.
3. Click **Apply** to commit this certificate.

After you add one certificate, a **Remove** button appears on the **Trusted CA** landing page. Click this button to remove the current certificate and replace it with a new one.

Power Management

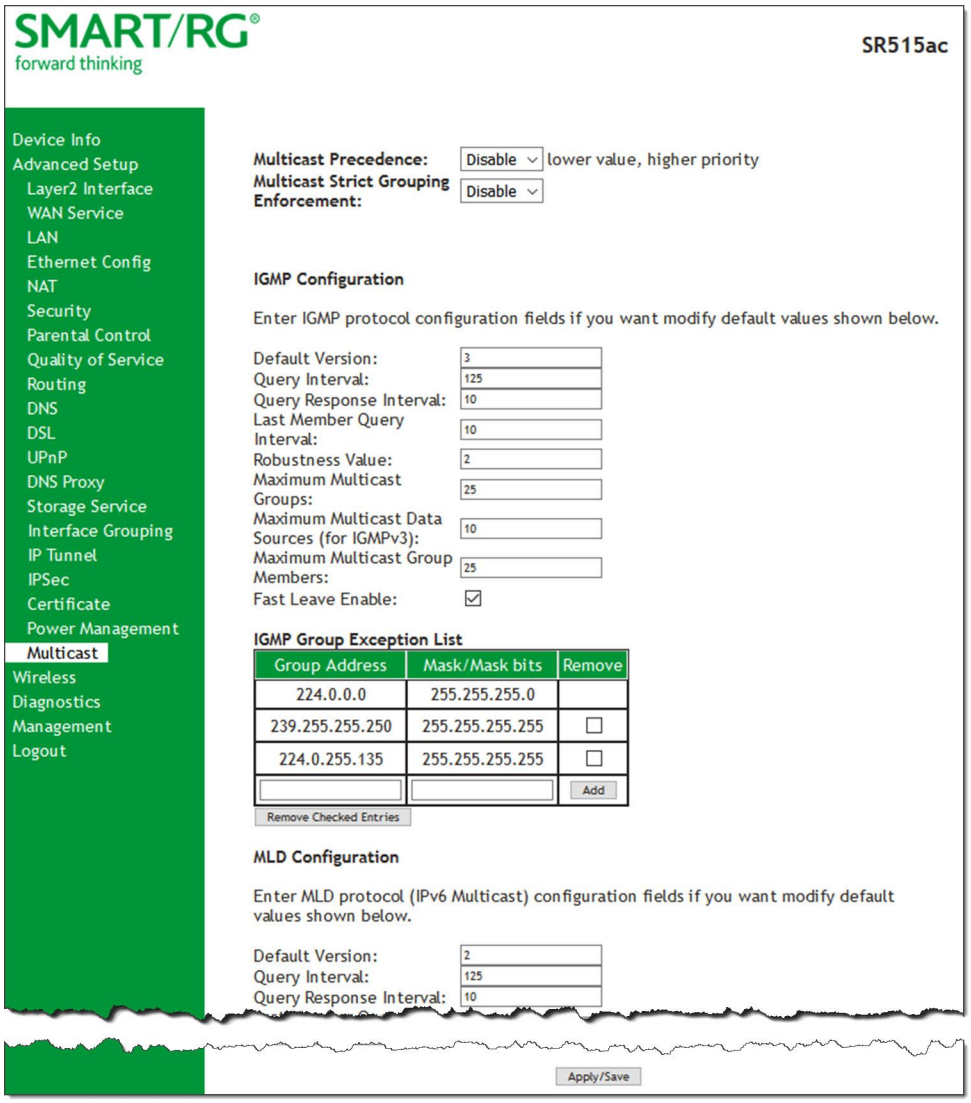
Note: This feature is not currently supported.

Multicast

Multicast methodology is used for applications shipping information simultaneously to multiple destinations. The most common scenario is Internet television and other streaming media. In IP Multicast, the implementation occurs at the IP routing level, where routers create the most efficient distribution paths for packets sent to a destination.

On this page, you can configure the multicast settings.

1. In the left navigation bar, select **Advanced Setup** > **Multicast**. The following page appears.



2. Modify the fields as needed, using the information in the table below. The same fields are provided for both IGMP and MLD configuration.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
Multicast Precedence	Select whether IGMP packets are given priority handling and at what level. Options are: • **Enable:** IGMP packets are prioritized using the multicast precedence value. The lower the multicast precedence value, the higher that IGMP packets will be placed in the queue. • **Disable:** IGMP packets are not prioritized. This is the default.
Multicast Strict Grouping Enforcement	Select whether grouping is strictly enforced. Options are **Disable** and **Enable**. The default is **Disable**.
IGMP Configuration section **MLD Configuration** section	
Default Version	Enter the supported IGMP version. Options are: **1** - **3**. The default is **3**.
Query Interval	The interval at which the multicast router sends a query messages to hosts, expressed in seconds. The default is **125** seconds. If you enter a number below 128, the value is used directly. If you enter a number greater than 128, it is interpreted as an exponent and mantissa.
Query Response Interval	Upon receiving a query packet, a host begins counting down seconds, from a random number. When the timer expires, the host sends its report. Enter the maximum number of seconds that a host can pick to count down from. The value must be greater than the **Query Interval**. If using IGMP v1, this value is fixed at **10** seconds.
Last Member Query Interval	Enter the maximum response time within which the host must respond to the Out of Sequence query from the router. The default is **10** seconds. IGMP uses this value when the router receives an IGMPv2 Leave report indicating at least one host wants to leave the group. Upon receiving the Leave report, the router verifies whether the interface is configured for IGMP Immediate Leave. If not, the router sends the out-of-sequence query.
Robustness Value	Enter the value representing the complexity of the query. The greater the value, the more robust the query. Options are: **2** - **7**. The default is **2**.
Maximum Multicast	Enter the maximum number of groups allowed. The default is **25**.

Field Name	Description
Groups	
Maximum Multicast Data Sources (for IGMP v3)	Enter the maximum number of data sources allowed. Options are: **1** - **24**. The default is **10**.
Maximum Multicast Group Members	Enter the maximum number of multicast groups that can be joined on a port or group of ports. The default is **25**.
Fast Leave Enable	Select whether the IGMP proxy removes group members immediately without sending a query. Options are: • **Enabled:** Group members are removed immediately. This is the default. • **Disabled:** Group members are removed after a query is sent and a response received.

Wireless

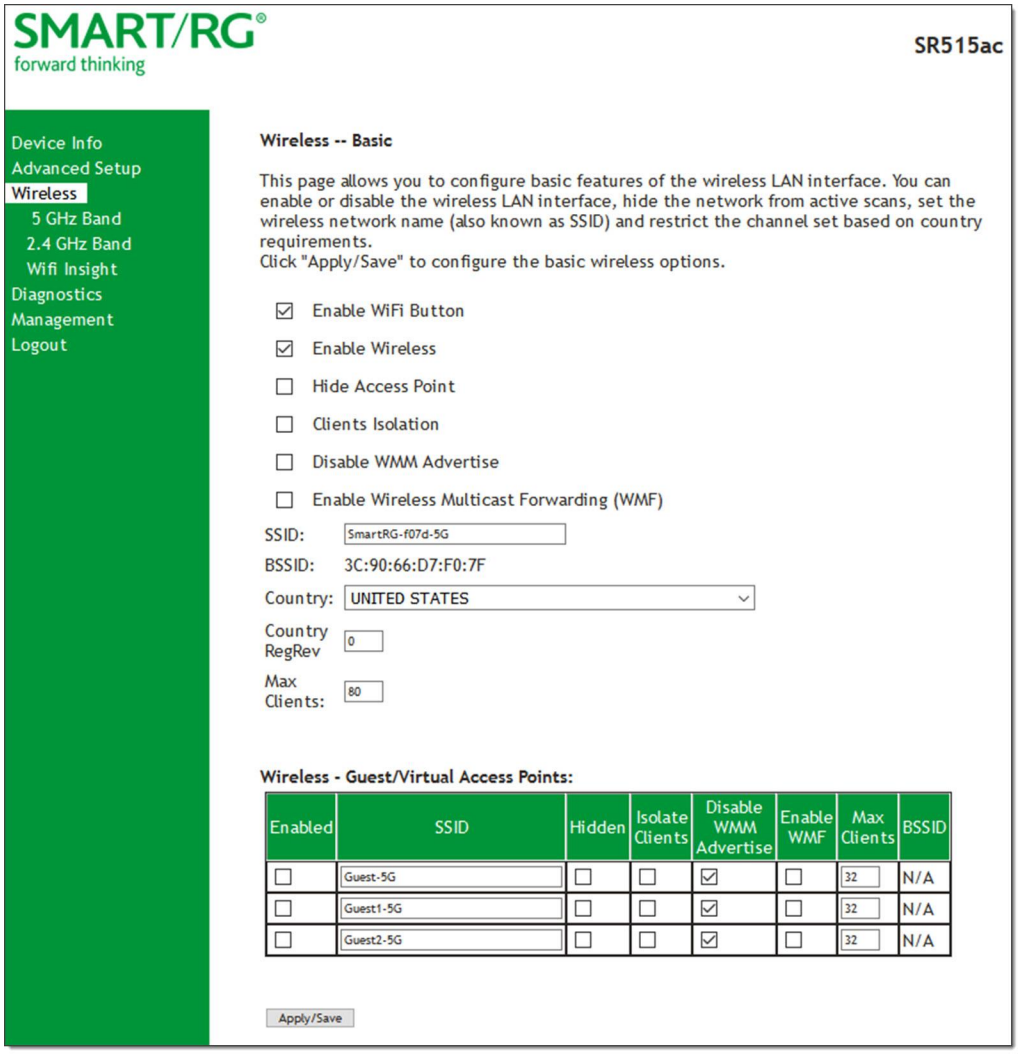
In this section, you can configure the wireless interface settings for your gateway, including basic and advanced settings, MAC filtering, and wireless bridging.

Note: The pages in this section explain the fields for both wireless bands. The fields are the same for both bands.

Basic

On this page, you can configure basic features of the Wi-Fi LAN interface. You can enable or disable the Wi-Fi LAN interface, hide the network from active scans, set the Wi-Fi network name (also known as SSID) and restrict the channel set based on country requirements.

1. In the left navigation bar, click **Wireless**. The following page appears.



2. Modify the settings as desired, using the information provided in the table below. The table at the bottom of the page lists the guest/virtual access points defined for your gateway. If desired, you can define up to three virtual access points for guest use.
3. Click **Apply/Save** to commit your settings.

The fields on this page are explained in the following table.

Field Name	Description
Enable WiFi Button	This option is enabled by default. To *disable* the gateway's Wi-Fi button, click the checkbox to clear it.

Field Name	Description
Enable Wireless	This option is enabled by default. To *disable* the gateway's Wi-Fi radio, click the checkbox to clear it.
Hide Access Point	Click to hide the access point SSID from end users.
Clients Isolation	Click to prevent LAN client devices from communicating with one another on the wireless network.
Disable WMM Advertise	Click to stop the wireless from advertising Wireless Multimedia (WMM) functionality. WMM provides basic Quality of Service (QOS) for applications.
Enable Wireless Multicast Forwarding	Click to enable Wireless Multicast Forwarding (WMF). Multicast traffic is forwarded across wireless clients.
SSID	Enter the Wi-Fi SSID. If your gateway is connected to an ACS, it is recommended that SSID names be 1 - 32 characters long. Special characters are accepted.
BSSID	Enter the Basic Service Set Identifier (BSSID) to provide the MAC address assigned to the wireless router.
Country	Select the country in which the gateway is deployed.
Country RegRev	Enter the revision number of the regulations being followed for the selected country. The default is **0**.
Max Clients	Enter the maximum number of clients that can access the route wirelessly. Options are **1** through the value set in the Global Max Clients field on the Wireless > Advanced page.
Wireless - Guest/Virtual Access Points table	
Enabled	Click to enable a virtual wireless access point for guest access.
SSID	Enter your wireless SSID.
Hidden	Click to hide the SSID from being broadcast publicly.
Isolate Clients	Click to prevent client PCs from communicating with one another.
Disable WMM Advertise	Click to stop the wireless from advertising Wireless Multimedia (WMM) functionality.
Enable WMF	Click to enable Wireless Multicast Forwarding (WMF).
Max Clients	Enter the maximum number of clients allowed for this wireless channel.

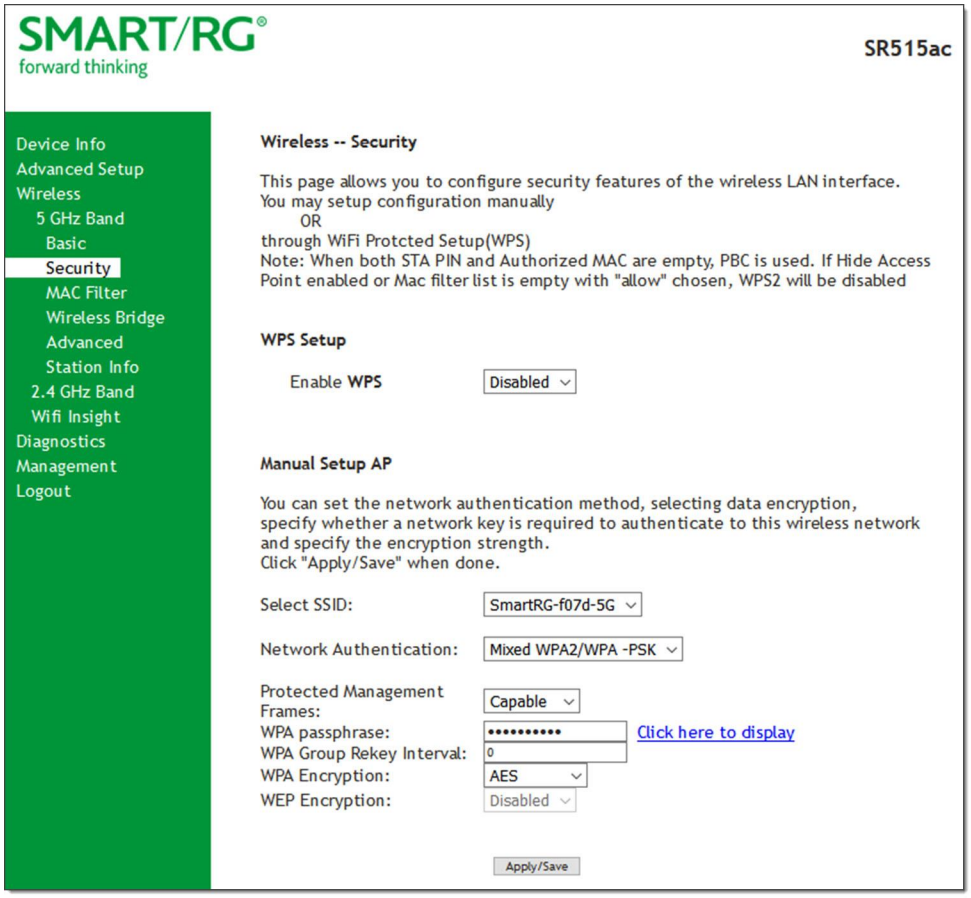
Field Name	Description
BSSID	Displays the Basic Service Set Identifier or **N/A**.

Security

On this page, you can configure security features of the wireless LAN interface, either manually or via Wi-Fi Protected Setup (WPS).

Note: When WPS is enabled, the **STA PIN** and **Authorized MAC** fields appear. If both of these fields are empty, **PBC** becomes the default value. If **Hide Access Point** is enabled or the MAC filter list is empty with "Allow" selected, WPS2 will be disabled.

1. In the left navigation bar, click **Wireless** > **5 GHz Band** *or* **2.4 GHz Band** > **Security**. The following page appears.



2. Modify the settings as needed, using the information provided in the field description table.
3. Click **Apply/Save** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
Enable WPS	This option is enabled by default. To *disable* Wi-Fi Protected Setup, select **Disabled**.
Add Client	(*Appears when* ***Enable WPS*** *is set to* ***Enabled***) Select the method for generating the WPS PIN. Options are: **Enter STA PIN** and **Use AP PIN**. To add an enrollee station, click **Add Enrollee**. **Note:** If the **PIN** and **Set Authorized Station MAC** fields are left blank, the **PBC** (push-button) mode is automatically made active.
Set Authorized Station MAC	(*Appears when* ***Enable WPS*** *is set to* ***Enabled***) When manually pairing via WPS, enter the MAC address of the client device you are trying to connect.
Set WPS AP Mode	(*Appears when* ***Enable WPS*** *is set to* ***Enabled***) Select how security is assigned to clients. Options are: • **Configured:** The gateway assigns security settings to clients. • **Unconfigured:** An external client assigns security settings to the gateway.
Device PIN	(*Appears when* ***Enable WPS*** *is set to* ***Enabled***) This value is generated by the access point.
Manual Setup AP section	
Select SSID	Select the SSID of the wireless network to which this security configuration will apply.
Network Authentication	Select the desired network security authentication type. Options are: **Open**, **Shared**, **802.1X**, **WPA2**, **WPA2-PSK**, **Mixed WPA2/WPA**, and **Mixed WPA2/WPA-PSK**.

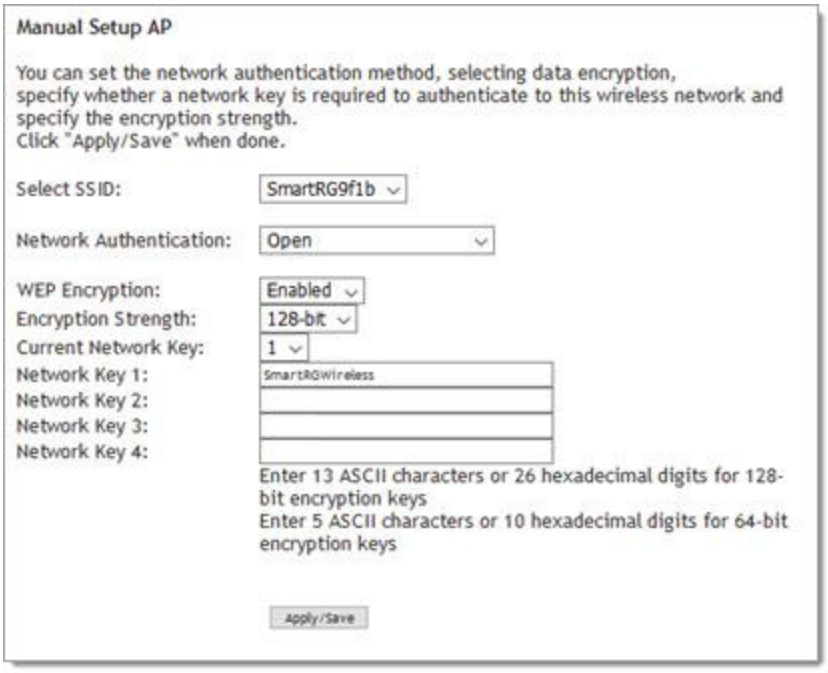
The fields shown in the **Manual Setup AP** section of the page vary based on the network authentication method that you select. The variations are explained in the following sections:

- "Open & Shared Authentication"
- "802.1X Authentication"
- "WPA2 & Mixed WPA2/WPA Authentication"
- "WPA2-PSK & Mixed WPA2/WPA-PSK Authentication"

Open & Shared Authentication

The same configuration fields apply for both **Open** and **Shared** authentication types.

1. On the Wireless > Security page, select **Open** or **Shared** in the **Network Authentication** field. When you select **Enabled** in the **WEP Encryption** field, additional fields appear.



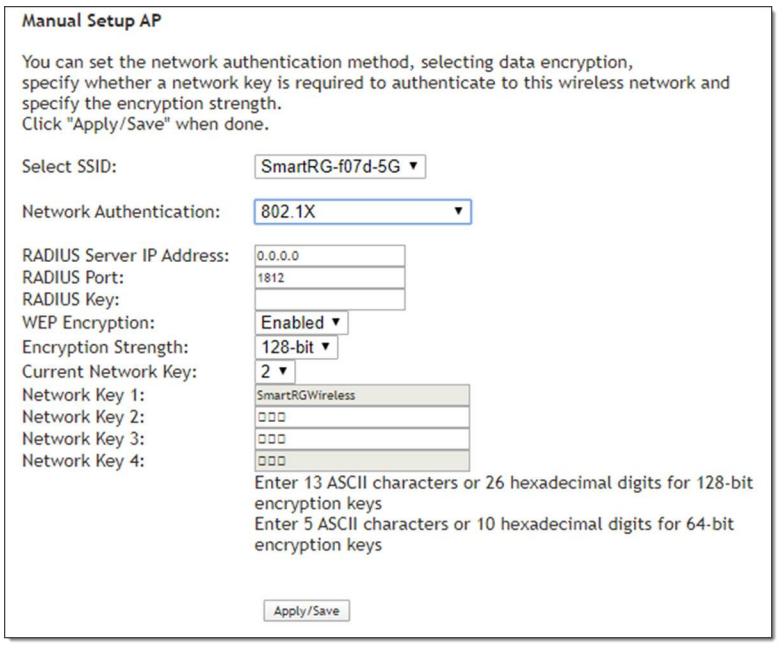
2. Fill in the fields, using the information in the field description table below.
3. Click **Apply/Save** to save the settings.

The fields on this page are explained in the following table.

Field Name	Description
Encryption Strength	(*Appears when **WEP Encryption** is set to **Enabled***) Select the length of the encryption method. Options are **128-bit** and **64-bit**. 128-bit is the more robust option for security.
Current Network Key	(*Appears when **WEP Encryption** is set to **Enabled***) Select which of the four keys is presently in effect.
Network Key 1-4	(*Appears when **WEP Encryption** is set to **Enabled***) Enter up to four encryption keys using the on-screen instructions to achieve the desired security strength (128-bit or 64-bit).

802.1X Authentication

1. On the Wireless > Security page, select **802.1X** in the **Network Authentication** field. When you select **Enabled** in the **WEP Encryption** field, additional fields appear.



2. Fill in the fields, using the information in the field description table below.
3. Click **Apply/Save** to save the settings.

The fields on this page are explained in the following table.

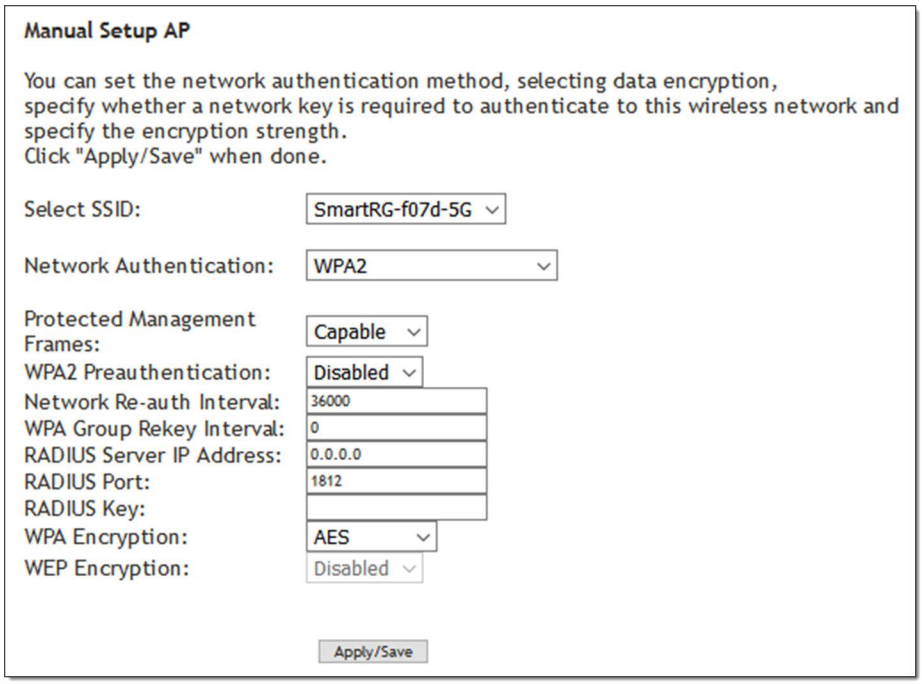
Field Name	Description
RADIUS Server IP address	Enter the IP address of the RADIUS (Remote Authentication Dial In User Service) server associated with your network.
RADIUS Port	Enter the port number for the RADIUS server. Port **1812** is the current standard for RADIUS authentication per the IETF RFC 2865. Older servers may use port **1645**. Options are **1** - **65535**. The default is **1812**.
RADIUS Key	(*Optional*) Enter the encryption key (if required) needed to authenticate to the specified RADIUS Server.
WEP Encryption	Select to enable Wired Equivalent Privacy (WEP) mode. Options are **Enabled** and **Disabled**. The default is **Enabled**.
Encryption Strength	(*Appears when **WEP Encryption** is set to **Enabled***) Select the length of the encryption method. Options are **128-bit** and **64-bit**. 128-bit is the more robust option for security.
Current Network Key	(*Appears when **WEP Encryption** is set to **Enabled***) Select which of the four keys is presently in effect.

Field Name	Description
Network Key 1-4	(*Appears when **WEP Encryption** is set to **Enabled***) Enter up to four encryption keys using the on-screen instructions to achieve the desired security strength (128-bit or 64-bit).

WPA2 & Mixed WPA2/WPA Authentication

The same configuration fields apply for both WPA2 and Mixed WPA2/WPA authentication methods.

1. On the Wireless > Security page, select **WPA2** or **Mixed WPA2/WPA** in the **Network Authentication** field. The following fields appear.



2. Modify the fields as needed, using the information in the table below.
3. Click **Apply/Save** to save the settings.

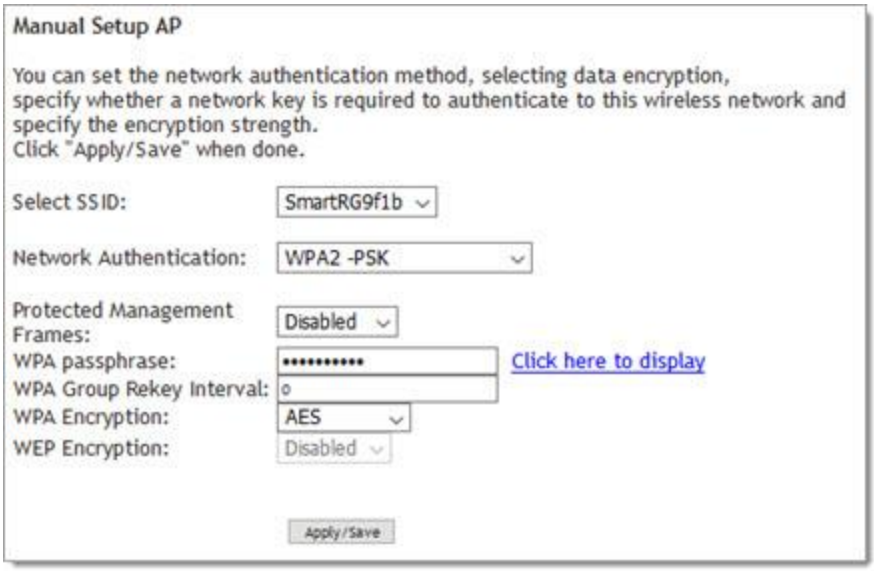
Field Name	Description
Protected Management Frames	Select whether to enable this option. Options are **Enabled** and **Disabled**. The default is **Disabled**.
WPA2 Preauthentication	Select whether clients can pre-authenticate with the gateway while still connected to another AP. Options are **Enabled** and **Disabled**. The default is **Disabled**.
Network Re-Auth Interval	Enter the interval at which the client must re-authenticate with the gateway. Options are: **0-2**,**147**,**483**, and **647** seconds. The default is **36000** seconds (10

Field Name	Description
	hours).
WPA Group Rekey Interval	The frequency at which the gateway automatically updates the group key and sends it to connected LAN client devices. Options are: **1** - **65535** seconds.
RADIUS Server IP address	Enter the IP address of the RADIUS (Remote Authentication Dial In User Service) server associated with your network.
RADIUS Port	Enter the port number for the RADIUS server. Port **1812** is the current standard for RADIUS authentication per the IETF RFC 2865. Older servers may use port **1645**. Options are **1** - **65535**.
RADIUS Key	(*Optional*) Enter the encryption key (if required) needed to authenticate to the specified RADIUS Server.
WPA Encryption	Select the encryption standard. This field displays the option most compatible with the selected network authentication method. Options are: • **AES:** Advanced Encryption Standard. • **TKIP+AES:** AES combined with TKIP (Temporary Key Integrity Protocol).
WEP Encryption	This option is set to **Disabled** and cannot be changed.

WPA2-PSK & Mixed WPA2/WPA-PSK Authentication

The same configuration fields apply for both WPA2-PSK and Mixed WPA2/WPA-PSK authentication methods.

1. On the Wireless > Security page, select **WPA2-PSK** or **Mixed WPA2/WPA-PSK** in the **Network Authentication** field. The fields shown below appear.



2. Fill in the fields, using the information in the field description table below.
3. Click **Apply/Save** to save the settings.

The fields on this page are explained in the following table.

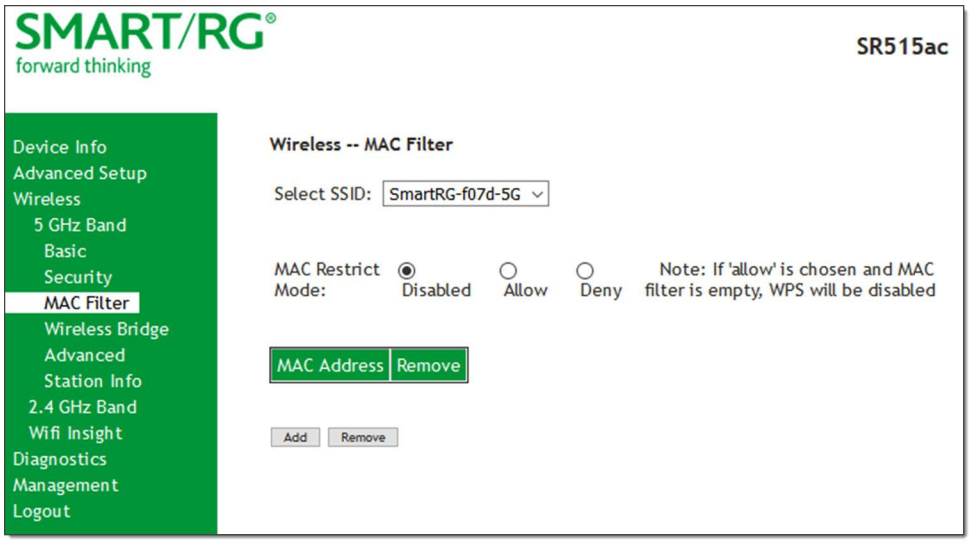
Field Name	Description
Protected Management Frames	Select whether to enable this option. Options are **Enabled** and **Disabled**. The default is **Disabled.**
WPA passphrase	Enter the security password to be used by this security configuration.
WPA Group Rekey Interval	The frequency at which the gateway automatically updates the group key and sends it to connected LAN client devices. Options are: **1 - 65535** seconds.
WPA Encryption	Select the encryption standard. This field displays the option most compatible with the selected network authentication method. Options are: • **AES:** Advanced Encryption Standard. • **TKIP+AES:** AES combined with TKIP (Temporary Key Integrity Protocol).
WEP Encryption	This option is set to **Disabled** and cannot be changed.

MAC Filter

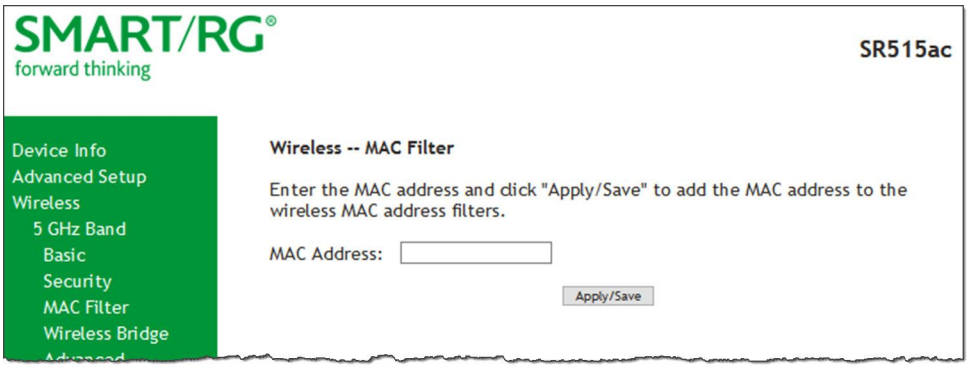
MAC Filtering refers to an access control methodology whereby the 48-bit address assigned to each LAN host NIC is used to determine access to the network. It is also known as Layer 2 address filtering.

On this page, you can configure the filter settings.

1. In the left navigation bar, click **Wireless** > **MAC Filter**. The following page appears.



2. Select the SSID to which this MAC filter rule should apply.
3. In the **MAC Restrict Mode** field, select whether to apply MAC filtering. Options are:
   - **Disabled**: MAC filtering is off.
   - **Allow**: Access for the specified MAC address is permitted.
   - **Deny**: Access for the specified MAC address is rejected.
4. To add a MAC address to the filter list:
   a. Click **Add**. The following page appears.



   b. Enter the **MAC Address** that you want to add.

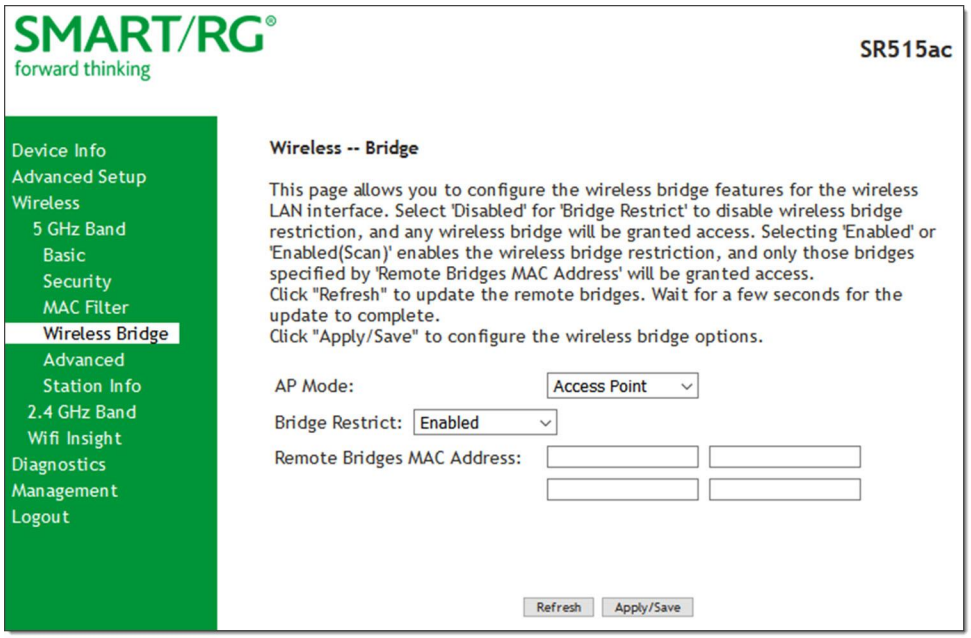
c. Click **Apply/Save**.
You are returned to the Wireless -- MAC Filter page.

5. Click **Apply/Save** to commit your changes.

Wireless Bridge

On this page, you can configure the wireless bridge features (also called wireless distribution system) of the wireless LAN interface.

1. In the left navigation bar, click **Wireless** > **Wireless Bridge**. The following page appears.



2. Modify the settings as needed, using the information in the following table.
3. Click **Apply/Save** to commit your changes.

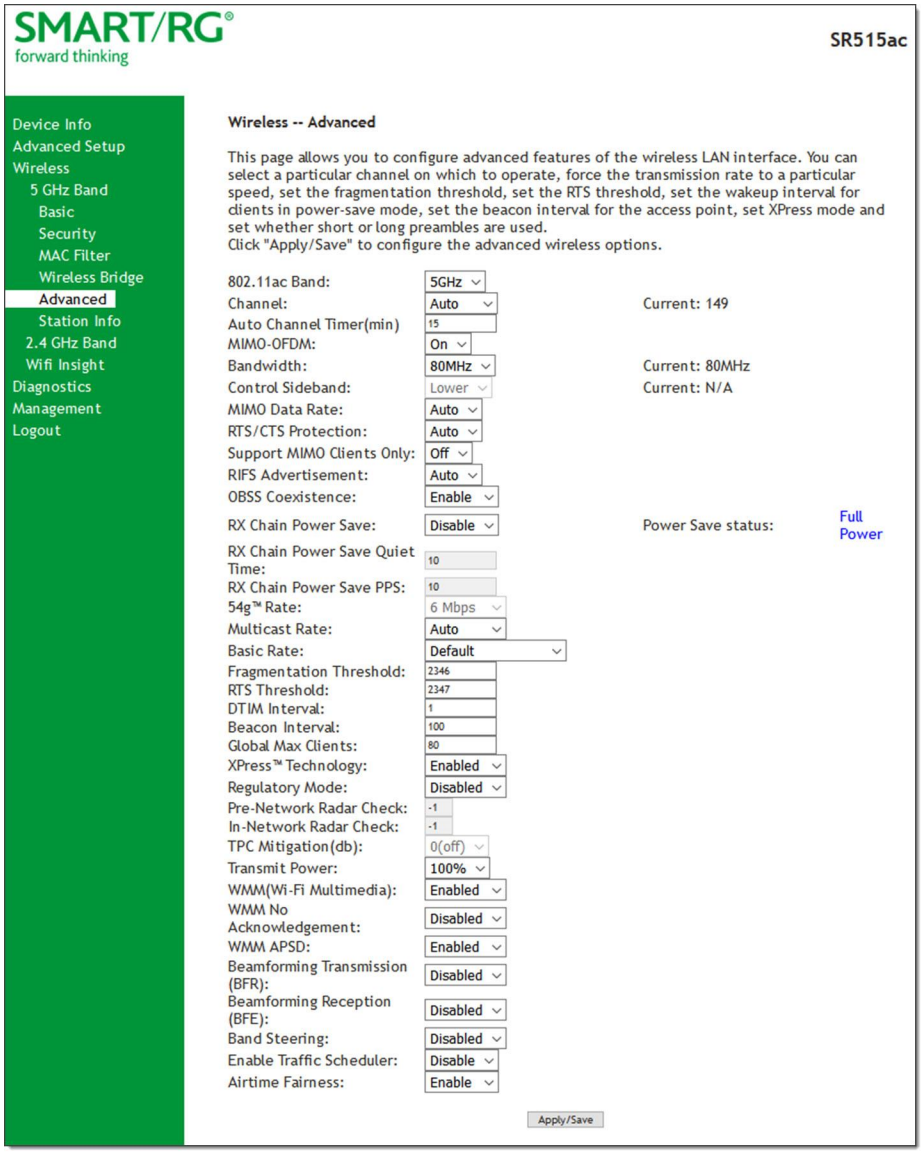
Field Name	Description
AP Mode	Select whether to enable or disable access point (AP) functionality. Options are: • **Wireless Bridge**: Disables AP functionality. • **Access Point**: Enables AP functionality. Wireless bridge functionality is still available and wireless stations can associate to the AP. This is the default.
Bridge Restrict	(*Optional*) Select to enable or disable wireless bridge restriction. Options are: • **Enabled or Enabled(Scan)**: Enables wireless bridge restric-

Field Name	Description
	tion. Only bridges specified in the **Remote Bridge MAC Address** field are granted access. Click **Refresh** to update the station list. The list takes a few seconds to update. This is the default. • **Disabled**: Disables wireless bridge restriction. Any wireless bridge is granted access.
Remote Bridges MAC Address	Enter up to four MAC addresses of remote bridges to be allowed access.

Advanced

On this page, you can configure the advanced features of the wireless LAN interface. You can select a particular channel on which to operate, force the transmission rate to a desired speed, set the fragmentation threshold, the RTS threshold, the wakeup interval for clients in power-save mode, and more.

1. In the left navigation bar, click **Wireless** > **Advanced**. The following page appears.



2. Modify the fields as needed, using the information in the field description table.
3. Click **Apply/Save** to commit your changes.

Field Name	Description
802.11ac Band	This option is set to the wireless band you are configuring for compatibility with IEEE 802.11x standards and cannot be changed.
Channel	Select the Wi-Fi channel you want to use. Options are **Auto** and the available chan-

Field Name	Description
	nels. The default is **Auto**.
Auto Channel Timer (min)	This options is set to **15** minutes and cannot be changed.
MIMO-OFDM	Select whether to enable Multiple-Input, Multiple-Output - Orthogonal Frequency-Division Multiplexing (MIMO-OFDM) interface. This field is set to **On** and cannot be changed.
Bandwidth	Select the operating bandwidth. Options are: • **20MHz:** Only one 20MHz band is utilized. • **40MHz:** Better throughput is provided by using two adjacent 20MHz bands. For the 2.4 GHz wireless band, this is the default. • **80MHz:** Better throughput is provided by using multiple adjacent 20MHz bands. For the 5 GHz wireless band, this is the default.
Control Sideband	(*Applies only to 40 MHz an 80MHz, 802.11n operation*) The control sideband is the 20 MHz channel on which the network is advertised, where client devices will find beacons. Options are: • **Lower:** The additional 20 MHz of bandwidth for data will be positioned *above* the control channel. • **Upper:** The additional 20 MHz of bandwidth for data will be positioned *below* the control channel. Also, selecting this option changes the channel choices displayed.
MIMO Data Rate	Select the desired physical transmission rate. This field is set to **Auto** and cannot be changed. The **Auto** setting enables the Auto-Fallback feature which allows the gateway to automatically use the fastest possible data rate. Auto-Fallback will negotiate the best possible connection speed between the gateway and a wireless client.
RTS/CTS protection	Select whether to enable RTS/CTS and legacy clients to both work effectively on the network. Options are: • **Auto:** Provides maximum security but there is a noticeable impact on throughput. With this option, RTS/CTS behavior permits legacy clients to become aware of 802.11n transmit times, but decreases overall throughput of the system. This is the default. • **Off:** Provides better throughput.
Support MIMO Clients Only	Select whether to restrict non-MIMO clients from accessing the gateway. Options are **On** and **Off**. The default is **Off**.

Field Name	Description
RIFS Advertisement	Reduced Inter-Frame Space (RIFS). Improves performance by reducing dead time required between OFDM transmissions. Options are **Auto** and **Off**. The default is **Auto**.
OBSS Coexistence	Coexistence of Overlapping Basic Service Sets (OBSS) prevents overlapping in the 20 MHz and 40 MHz frequencies. Options are: • **Enable:** The gateway automatically reverts to 20 MHz channel bandwidth when another WiFi network within 2 channels of its own channel is detected or when a client device with its 40 MHz Intolerant bit set is detected. This is the default. • **Disable:** The gateway advertises and operates in 40 MHz mode regardless of what other networks are configured nearby.
RX Power Chain Save	Select whether to turn on power-save mode. Options are **Enable** and **Disable**. The default is **Disable**.
RX Power Chain Save Quiet Time	(*Available when **RX Power Chain Save** is set to **Enable***) Sets the delay time (in seconds) between when system activity ceases and power-save mode engages. Options are: **0** - **2147483647** seconds. The default is **10** seconds.
RX Power Chain Save PPS	*Available when **RX Power Chain Save** is set to **Enable***) Sets a throughput threshold (in seconds) for when the router engages power-save mode after the quiet time seconds have elapsed. Options are: **0** - **2147483647** packets per second. The default is **10** seconds.
54g™ rate	This option is set to **1Mbps** for the 2.4GHz band and to **6Mbps** for the 5GHz band and cannot be changed.
Multicast rate	Select the desired packet transmit rate for multicast. Options are **Auto** and **1** - **54** Mbps. The default is **Auto**.
Basic Rate	Select the basic rate. Options are: • **2.4GHz: Default**, **1 & 2 Mbps**, and **1 & 2 & 5.5 & 6 & 11 & 12 & 24 Mbps.** • **5GHz: Default**, **All**, **6 & 12 Mbps**, and **6 & 12 & 24 Mbps.** The default is **Default**.
Fragmentation Threshold	Enter the size at which packets will be fragmented into smaller units. The primary consideration for this setting is the size/capability of the circuit. Options are **256** - **2346** bytes. The default is **2346** bytes. A high packet error rate is an indication that a slightly increased fragmentation threshold is needed. When possible, the default value of **2346** bytes should be

Field Name	Description
	maintained. Poor throughput is a likely result of setting this threshold too low.
RTS Threshold	Enter the RTS (Request to Send) packet size beyond which the WLAN client hardware invokes its RTS/CTS mechanism. Smaller packets will otherwise be sent not using RTS/CTS. Options are **256** - **2347** bytes. The default is **2347** (disabled).
DTIM Interval	Enter the Delivery Traffic Indication Message (DTIM or Beacon rate) countdown variable used to indicate when the next window is available to client devices for listening to buffered broadcast and multicast messages. Options are **1** and **65535**. The default is **1**.
Beacon Interval	Enter the time interval (in milliseconds) between beacon transmissions. Beacon transmissions make known the presence of an access point and convey to wireless NICs when to awake from power save mode to check for buffered frames at the access point. Options are **1** and **65535** ms. The default is **100** ms.
Global Max Clients	Enter the maximum number of client devices that can connect to the router. Options are **1** - **255**. The default is **128** for the 2.4 GHz band and **80** for the 5GHz band..
Xpress™ Technology	Select whether to enable Xpress Technology. This technology is compliant with draft specifications of two planned wireless industry standards. Options are **Enabled** and **Disabled**. The default is **Enabled**.
Regulatory Mode	(*For 5GHz band only*) Select the regulation to be used for this network. Options are **Disabled**, **802.11h**, and **802.11d**. The default is **Disabled**.
Pre-Network Radar Check	(*For 5GHz band only*) The radar check parameter setting for traffic trying to access your gateway from outside the network.
In-Network Radar Check	(*For 5GHz band only*) The radar check setting for traffic trying to access your gateway from inside your network.
TPC Mitigation	(*For 5GHz band only*) Select the TPC (transmitter power control) mitigation value in db. This option is set to **0 (Off)** and cannot be changed.
Transmit Power	Enter the desired output power (by percentage). The default is **100%**.
WMM (Wi-Fi Multimedia)	Select whether to enable this technology. It allows multimedia services (audio, video and voice packets) to get higher priority for transmission. Options are **Auto**, **Enabled**, and **Disabled**. The default is **Enabled**.
WMM No Acknowledgement	Select whether acknowledgements are sent (applied at the MAC level). Enabling this option allows better throughput but, in a noisy RF environment, higher error rates may result. Options are **Enabled** and **Disabled**. The default is **Disabled**.
WMM APSD	Select whether to enable Automatic Power Save Delivery, a power consumption saving feature. Options are **Enabled** and **Disabled**. The default is **Enabled**.

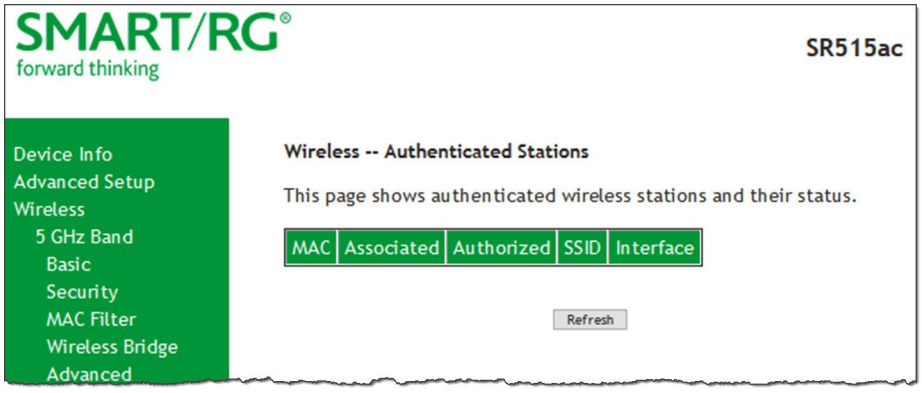
Field Name	Description
Beamforming Transmission (BFR)	(*For 5GHz band only*) Select to concentrate the transmission signal at the gateway location. This results in a better signal and potentially better throughput. Options are **Disabled**, **SU BFR**, and **MU BFR**. The default is **Disabled**.
Beamforming Reception (BFE)	(*For 5GHz band only*) Select to concentrate the transmission signal at the gateway location. Options are **Disabled**, **SU BFE**, and **MU BFE**. The default is **Disabled**.
Band Steering	Select whether to detect if the client has the ability to use two bands. When enabled, the less-congested 5GHz network is selected (by blocking the client's 2.4GHz network). Options are **Disabled** and **Enabled**. The default is **Disabled**.
Enable Traffic Scheduler	Select whether to enable scheduling of traffic to improve efficiency and increase usable bandwidth for some types of packets by delaying other types. Options are **Disable** and **Enable**. The default is **Disable**.
Airtime Fairness	Select how the gateway will manage the receiving signal with other devices. Options are **Disable** and **Enable**. The default is **Enable**.

Station Info

On this page, you can view authenticated wireless stations and their status.

In the left navigation bar, select **Wireless** > **Station Info**. The following page appears.

Click **Refresh** to update the information.



Wifi Insight

On this page, you can configure the WiFi Insight system.

1. In the left navigation menu, click **Wireless** > **Wifi Insight**. The following page appears. You can also reach this page by clicking **Wireless** > **Wifi Insight** > **Configure**.

2. In the **Sample Interval** section, select the number of seconds for sampling to occur. Options are **5**, **10**, **15**, and **20** seconds. The default is **5** seconds.
3. In the **Start/Stop Data Collection** section, configure the data sample:

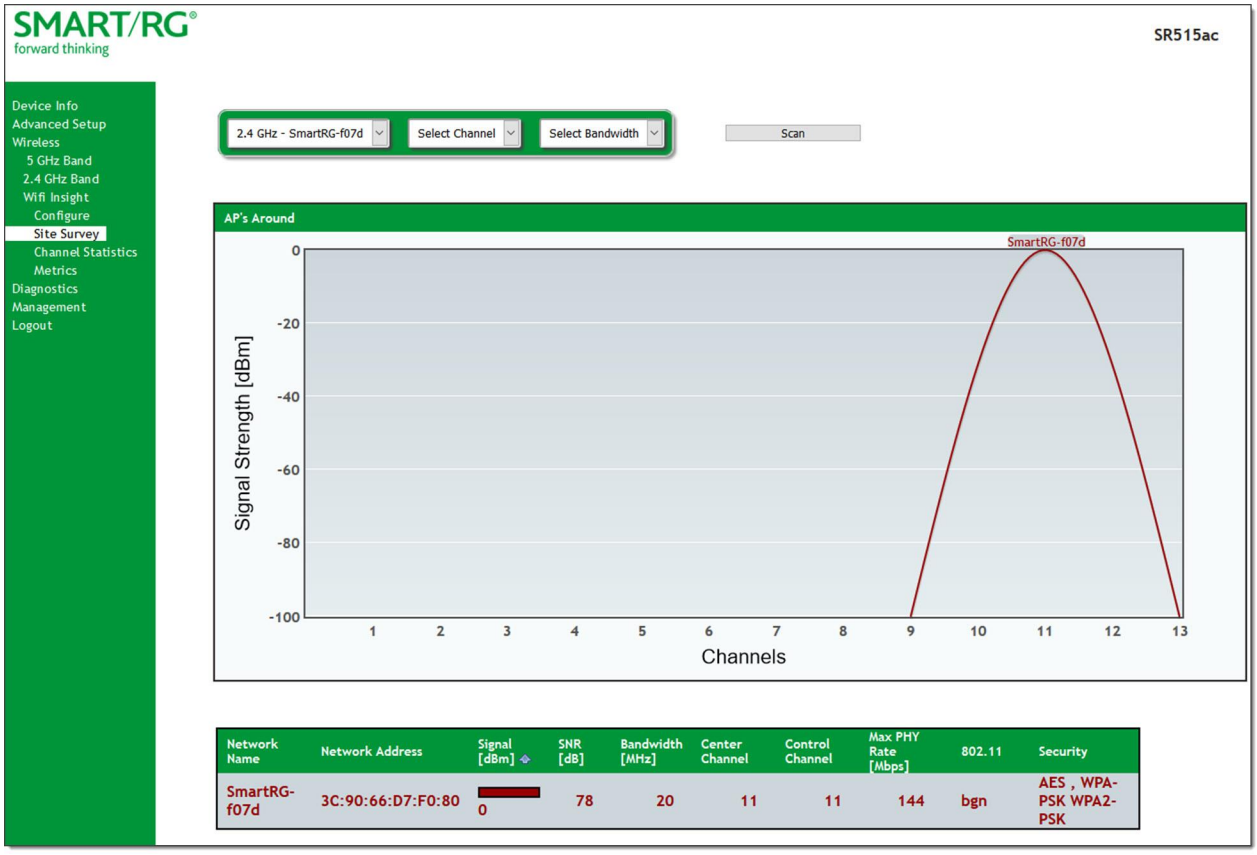
a. Click **Start collecting data every**.
b. Select the days of the week when the data should be collected.
c. In the **From** and **To** fields, enter the start and end times for collection.

4. In the **Database Size** section, configure the database size limits:
   a. In the **Database Size** field, enter the maximum size for the database file where the collected data will be stored. The default is **2** MB.
   b. (*Optional*) Select whether to stop data collection when the maximum size is reached. Options are **Overwrite Older Data** and **Stop Data collection**. The default is **Overwrite Older Data**.
5. (*Optional*) In the **Counters** section, clear any counter options that you do not need. The default is to collect all counters.
6. Click **Submit** to save the configuration.
7. To export a database, in the **Export Database** section:
   1. Click **Save Database to File**. The open/save dialog box appears.
   2. Click **OK** to save or click **Open** and **OK** to view.

Site Survey

On this page, you can view signal strength and other details for your wireless networks.

1. In the left navigation menu, click **Wireless** > **Wifi Insight** > **Site Survey**. The following page appears.



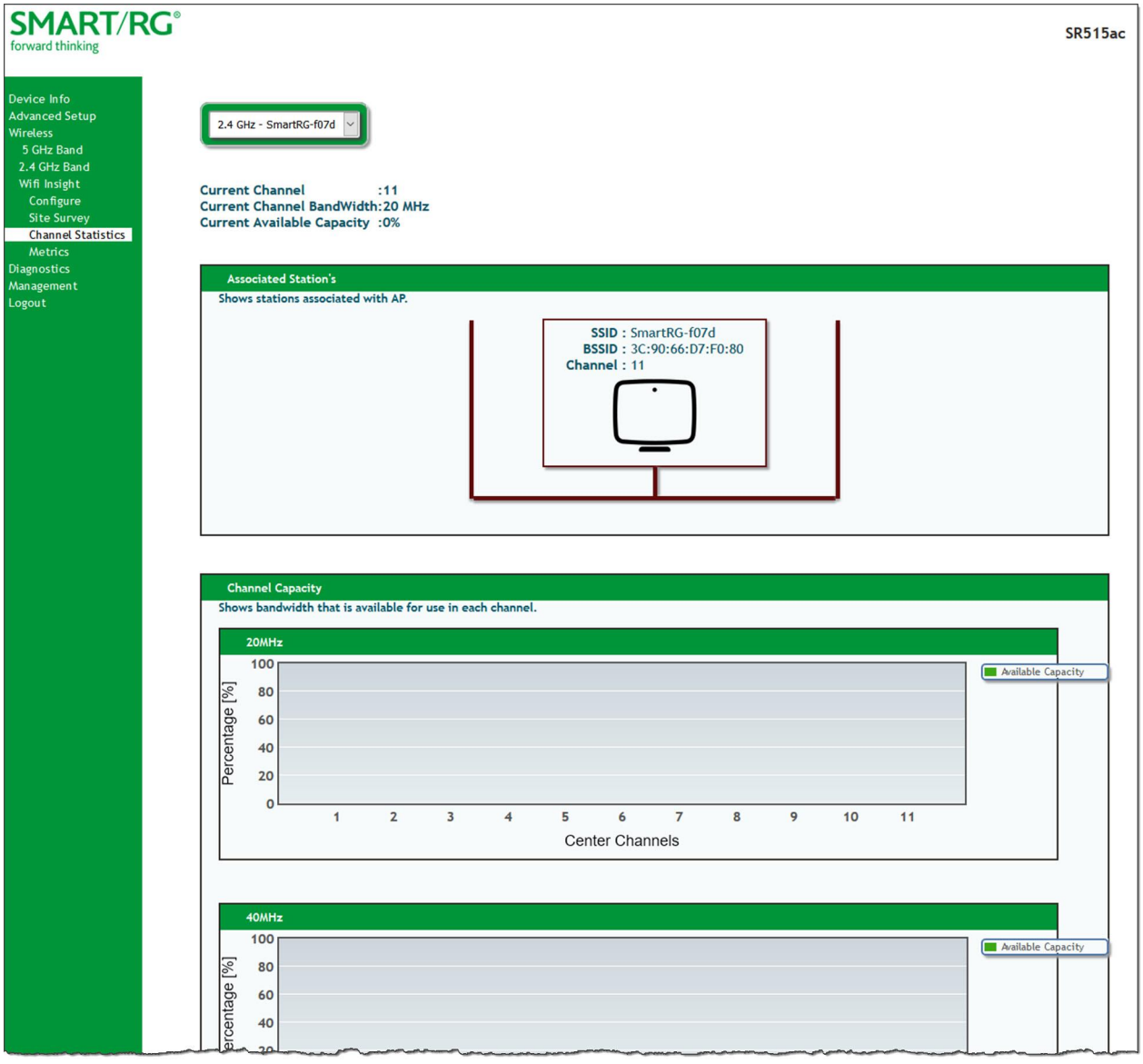
2. In the first field above the chart, select the wireless network that you want to review.

3. In the **Select Channel** field, select the channel that you want to review.
4. In the **Select Bandwidth** field, select the bandwidth.
5. Click **Scan**. The page refreshes to show the requested information.

Channel Statistics

On this page, you can view signal strength, channel capacity, interference, and other details for specific channels.

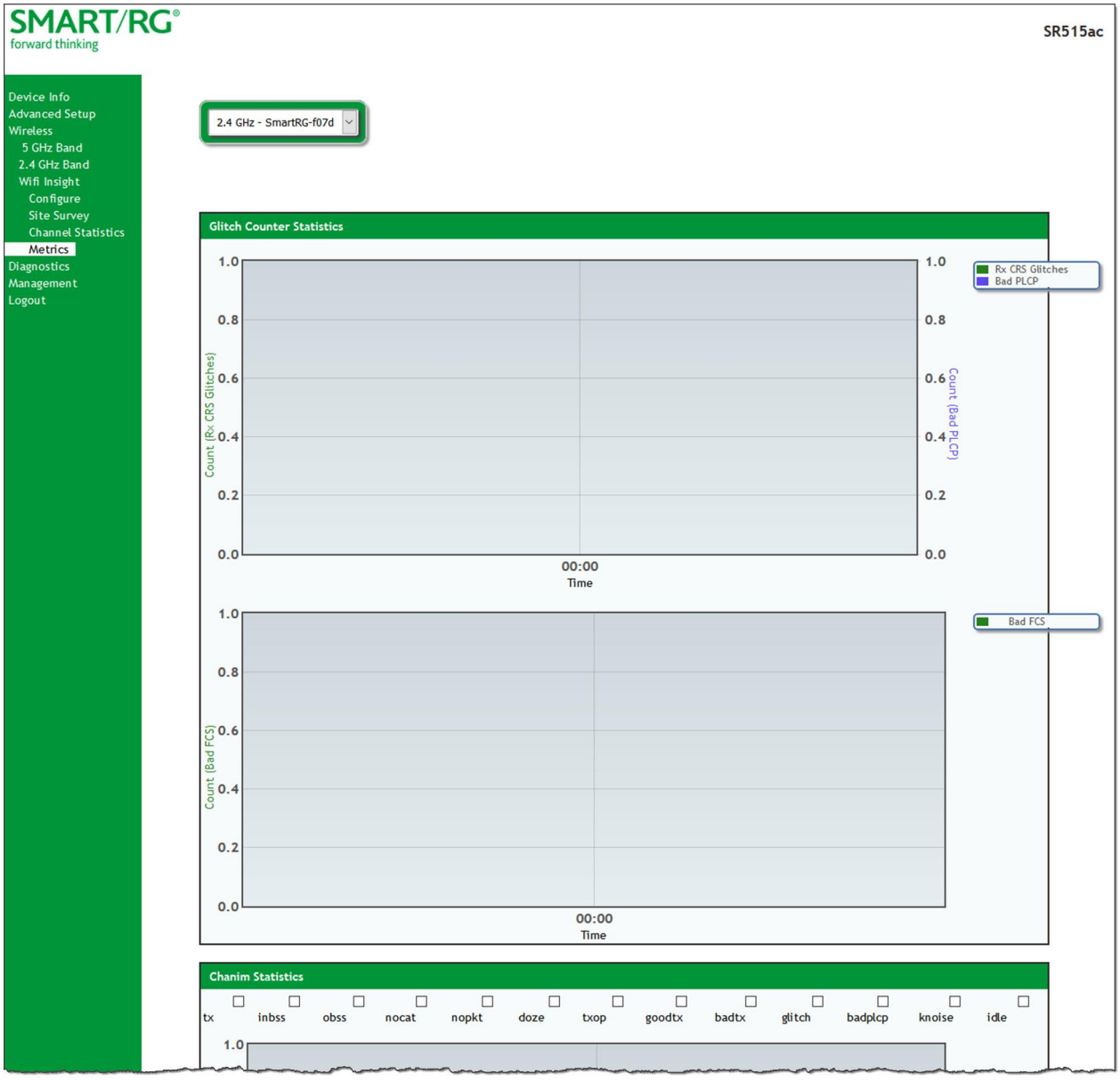
In the left navigation menu, click **Wireless** > **Wifi Insight** > **Channel Statistics**. The following page appears. In the field at the top of the page, select the band that you want to review.



Metrics

On this page, you can view glitch counter, chanim, associated stations, and packet queue statistics for your wireless networks.

In the left navigation menu, click **Wireless** > **Wifi Insight** > **Metrics**. The following page appears.



Diagnostics

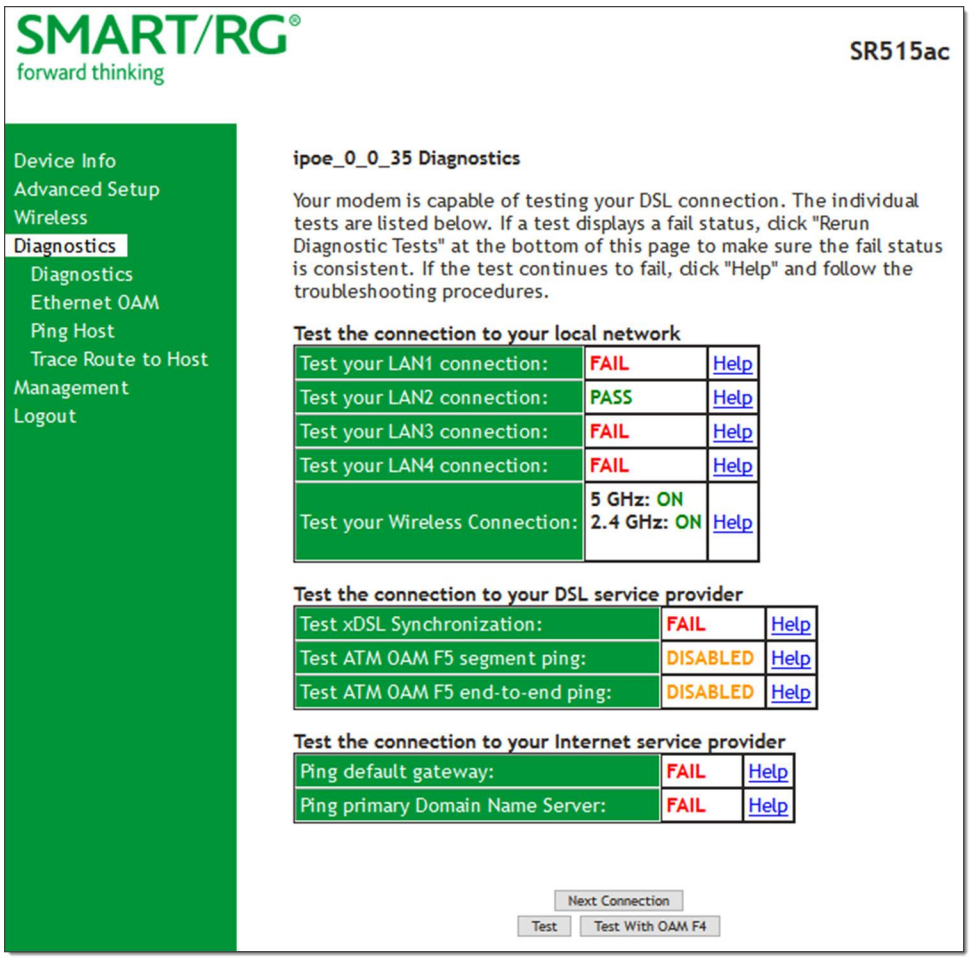
in this section, you can run line performance tests. Three legs of the data path are included in the available tests: LAN connectivity, DSL connectivity and Internet connectivity tests.

You can also ping a host or trace a connection.

Diagnostics

On this page, you can view information about your DSL connection.

In the left navigation bar, click **Diagnostics**. The following page appears.



To refresh the data, click **Test** at the bottom of the page. The normal test method is initiated, utilizing OAM F5 loopback cells.

To test the other defined connections, click the **Next Connection** and **Previous Connection** buttons.

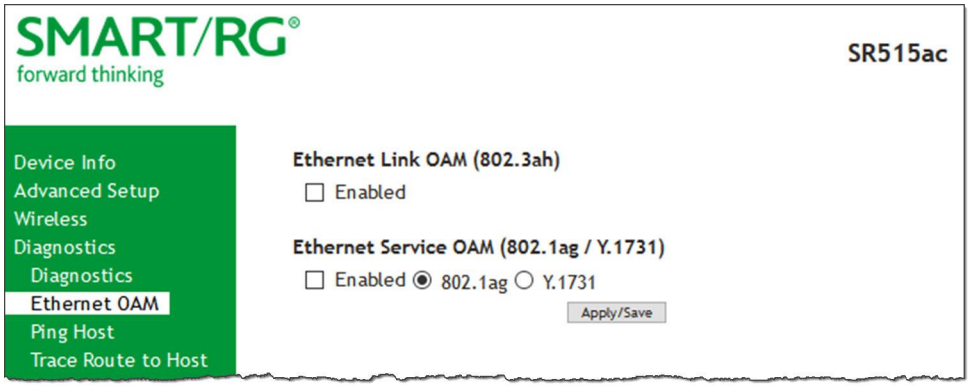
The table is updated with fresh diagnostic information about connection integrity. To learn more about what is being tested and what actions to take in the event that a particular test should fail, click the **Help** link at the far right of each line item.

To test at the VP level in lieu of at an individual VC connection, click **Test With OAM F4**.

Ethernet OAM

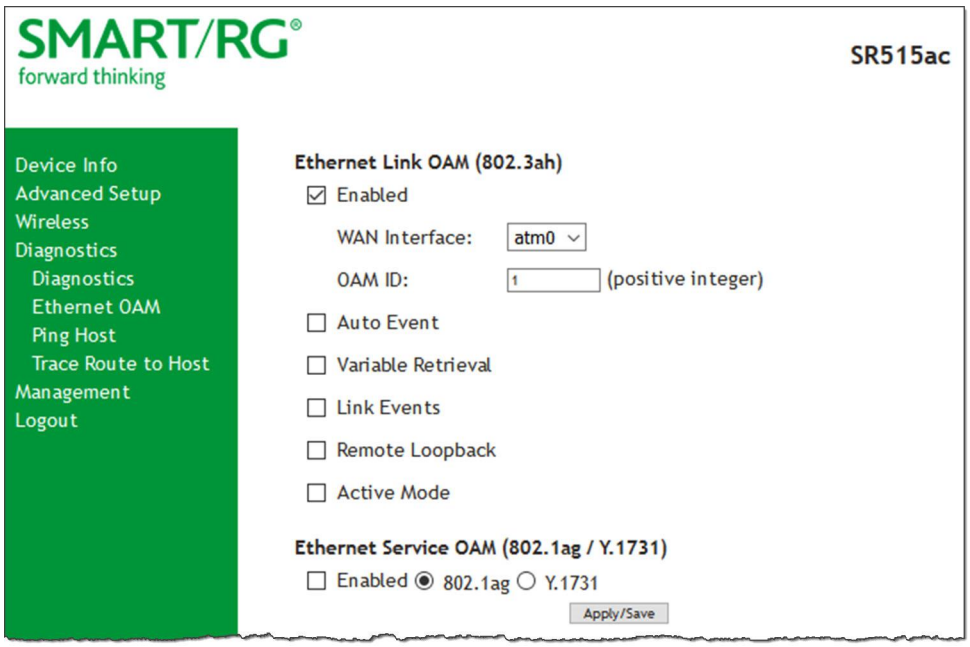
On this page, you can view diagnostics regarding your VDSL PTM or Ethernet WAN connection. Fault Management is compliant with IEEE 802.1ag for Connectivity Fault Management.

1. In the left navigation bar, click **Diagnostics** > **Ethernet OAM**. The following page appears.



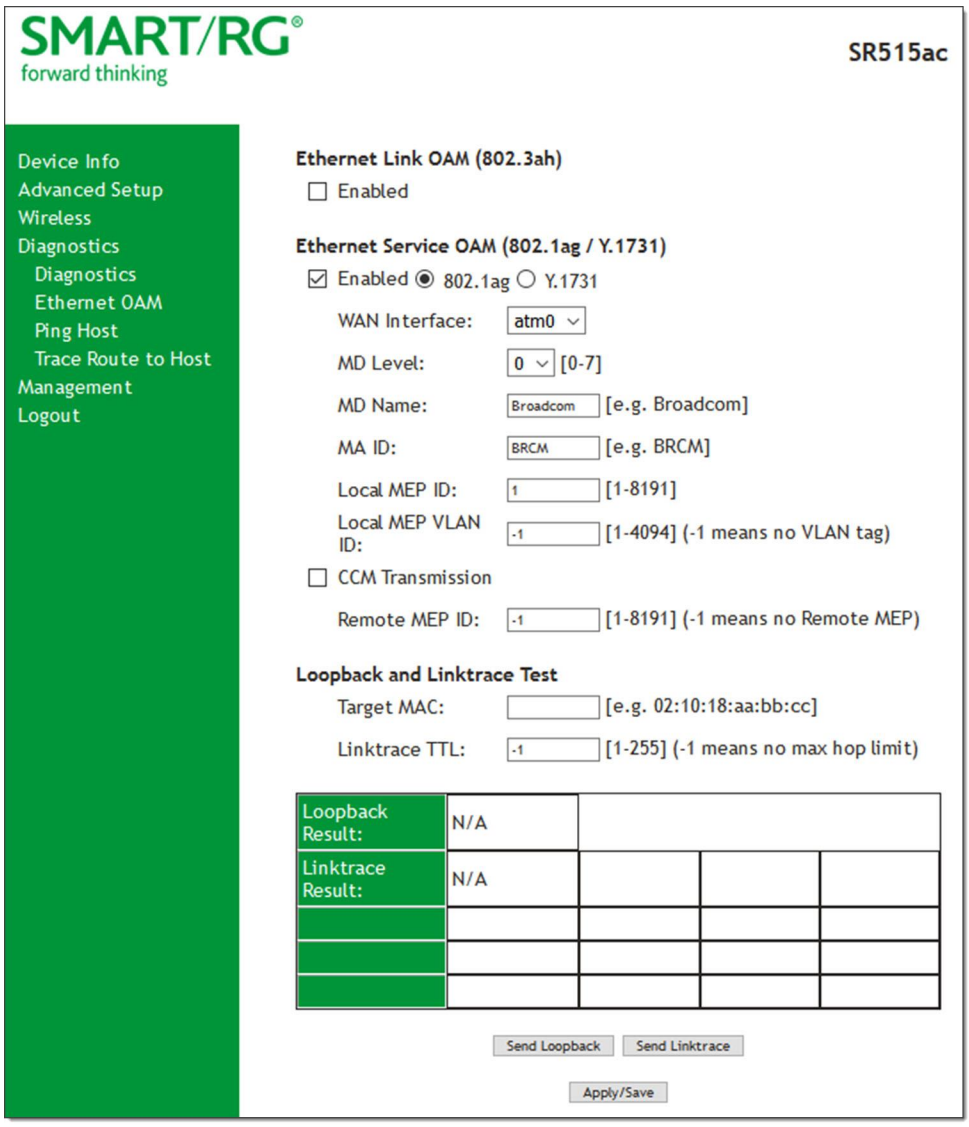
2. To enable Ethernet Link OAM (802.3ah):

a. Click the **Enabled** checkbox. Additional fields appear.



b. Modify the fields as needed, using the information in the **Ethernet Link OAM (802.3ah)** section of the table below.

3. To enable Ethernet Service OAM (802.1ag/Y.1731):
   a. Click the **Enabled** checkbox. Additional fields appear showing values for 802.1ag. To configure Y.1731, click the **Y.1731** radio button. The page refreshes.



b. Modify the fields, using the information provided in the **Ethernet Service OAM (802.1ag/Y.1731)** section of the table below.

4. Click **Apply/Save** to commit your changes.
5. To run a loopback test, enter a MAC address in the **Target MAC** field and click **Send Loopback** at the bottom of the page. The results appear in the **Loopback Result** row of the table.
6. To run a linktrace test, enter a MAC address in the **Target MAC** field and click **Send Linktrace** at the bottom of the page. The results appear in the **Linktrace Result** row of the table.

Field Name	Description
Ethernet Link OAM (802.3ah) section	
Ethernet Link OAM	Click the **Enabled** checkbox to set options for this protocol. Additional fields

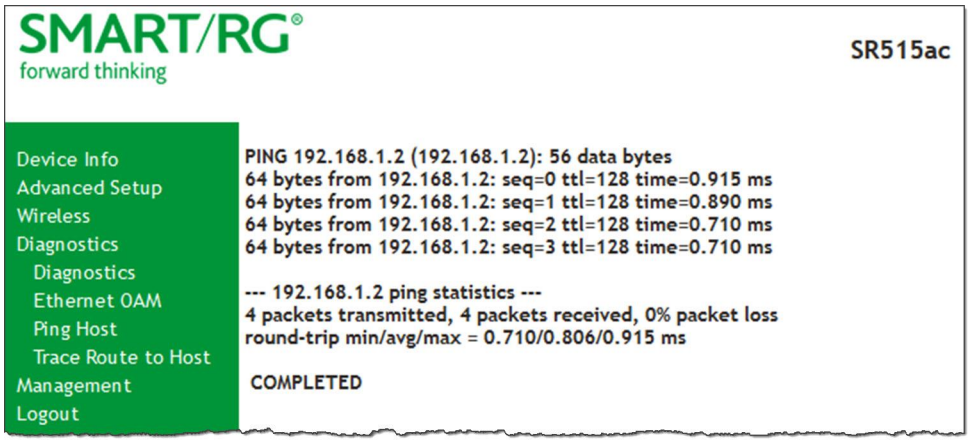
Field Name	Description
(802.3ah)	appear.
WAN Interface	Select the WAN interface that you want tested.
OAM ID	Enter the ID of this OAM configuration. Only positive numbers are allowed.
Auto Event	Select whether to create event log entries automatically.
Variable Retrieval	Select to enable on-demand link diagnostics, including bit-error-rate approximation.
Link Events	Select to enable reporting of critical conditions that may cause link failure.
Remote Loopback	Select to enable on-demand link diagnostics, including bit-error-rate approximation.
Active Mode	Click to enable this feature.
Ethernet Service OAM (802.1ag/Y.1731) section	
Ethernet Service OAM (802.1ag/Y.1731)	Click the **Enabled** checkbox and then click **802.1ag** or **Y.1731** to set options for this protocol. Additional fields appear.
WAN Interface	Select the WAN interface that you want tested.
MD Level	(*Appears for the 802.1ag option only*) Select the domain level for this maintenance domain. Options are **0** - **7**. The larger the domain, the higher the value you should select.
MD Name	(*Appears for the 802.1ag option only*) Enter the name of the maintenance domain, e.g., Broadcom.
MA ID	(*Appears for the 802.1ag option only*) Enter the MA ID, e.g., BRCM.
MEG Level	(*Appears for the Y.1731 option only*) Enter the MEG level for this service.
MEG ID	(*Appears for the Y.1731 option only*) Enter the MEG ID for this service.
Local MEP ID	Enter the ID of the local MEP. Options are **1** - **8191**.
Local MEP VLAN ID	Enter the ID of the VLAN for the local MEP. Options are **1** - **4094**. The default is **-1** (no VLAN tag).
CCM Transmission	Select to enable CCM transmission.
Remote MEP ID	Enter the ID of the remote MEP. Options are **1** - **8191**. The default is **-1** (no remote MEP).
Loopback and Linktrace Test section	
Target MAC	Enter the MAC address for the test, e.g., 02:10:18:aa:bb:cc.
Linktrace TTL	Enter the maximum number of hops allowed. Options are **1**- **233**. The default is **-1** (no hop limit).
Loopback Result	The results of the loopback test.
Linktrace Result	The results of the linktrace test.

Ping

On this page, you can ping a server by host name or IP address.

1. In the left navigation menu, click **Diagnostics Tools** > **Ping Host**. The following page appears.

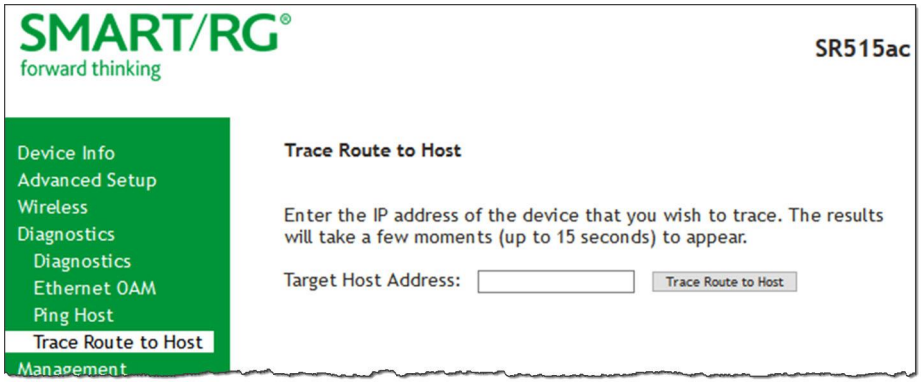
2. Enter the host name or IP address.
3. Click **Ping Host**. The details of the ping appear on the page.



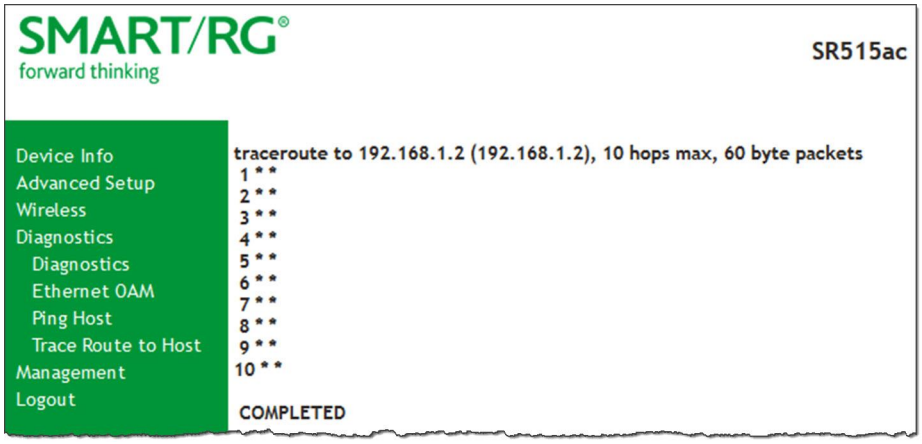
Trace Route to Host

On this page, you can use the Trace Route utility to trace a connection.

1. In the left navigation menu, click **Diagnostics Tools** > **Trace Route to Host**. The following page appears.



2. Enter the host name or IP address that you want to trace.
3. Click **Trace Route to Host**. The details of the trace appear on the page.



Management

In this section, you can manage configuration files, access control, management server configurations, SNMP Agent settings, and work with event logs.

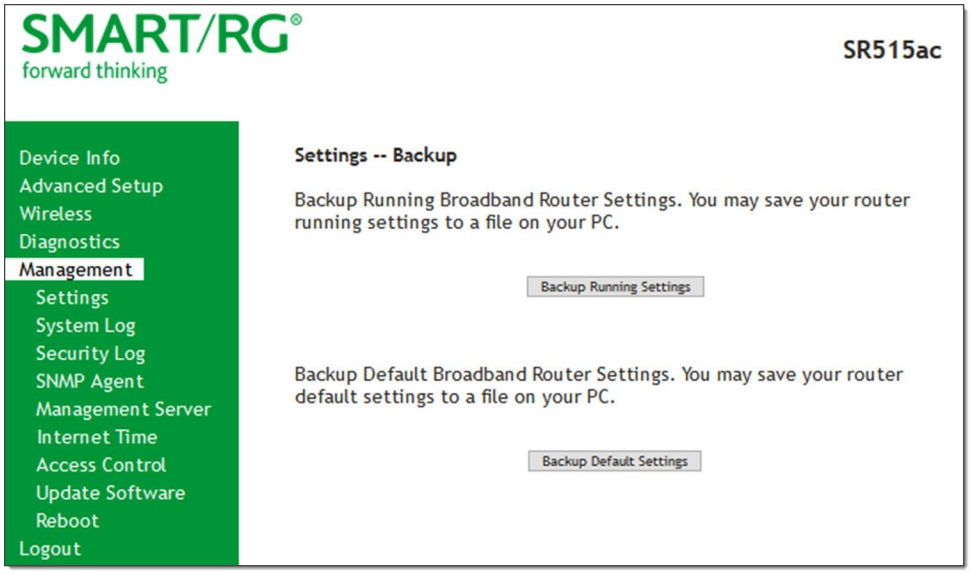
Settings

In this section, you can back up the current settings, restore saved settings, or reset the gateway to default settings.

Backup

You can back up the current settings for your gateway to a file stored on your computer.

1. In the left navigation bar, click **Management** > **Settings**. The following page appears.



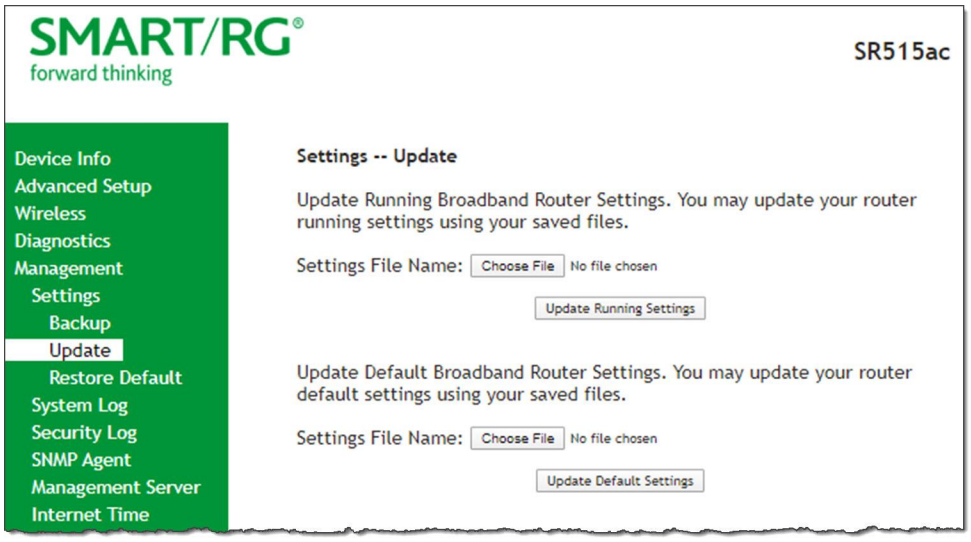
2. To save a backup file of the currently running settings to a local drive, click **Backup Running Settings**. The open/save dialog box appears. Select a location and click **OK**. The backupsettings.conf file is created in your default download location.
3. To save a backup file of the default settings to a local drive, click **Backup Default Settings**. The open/save dialog box appears. Select a location and click **OK**. The backupdefaultsettings.conf file is created in your default download location.

Note: If you plan to create backups frequently, you may want to rename the backup files by appending dates to the file name. Otherwise, every new backup file overwrites the previous backup file.

Update

On this page, you can restore previously backed-up gateway settings. Both Current and Default settings can be managed here.

1. In the left navigation bar, click **Management** > **Settings** > **Update**. The following page appears.

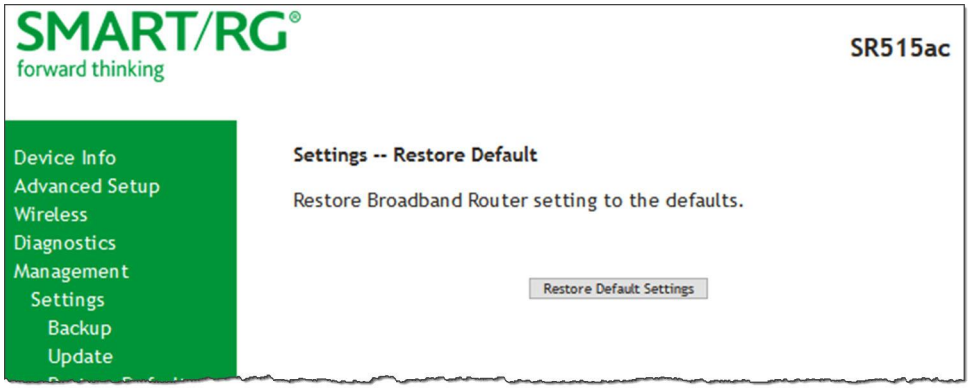


2. Click the **Choose File** button for the type of setting you wish to restore.
3. Locate the desired .conf file on your local system and click **Open**.
4. Click the appropriate **Update** button.
   The gateway reboots when the update has completed.

Restore Default

On this page, you can reset the gateway to its default settings which can be the factory defaults or defaults that you customized and stored.

1. In the left navigation bar, click **Management** > **Settings** > **Restore Default**. The following page appears.



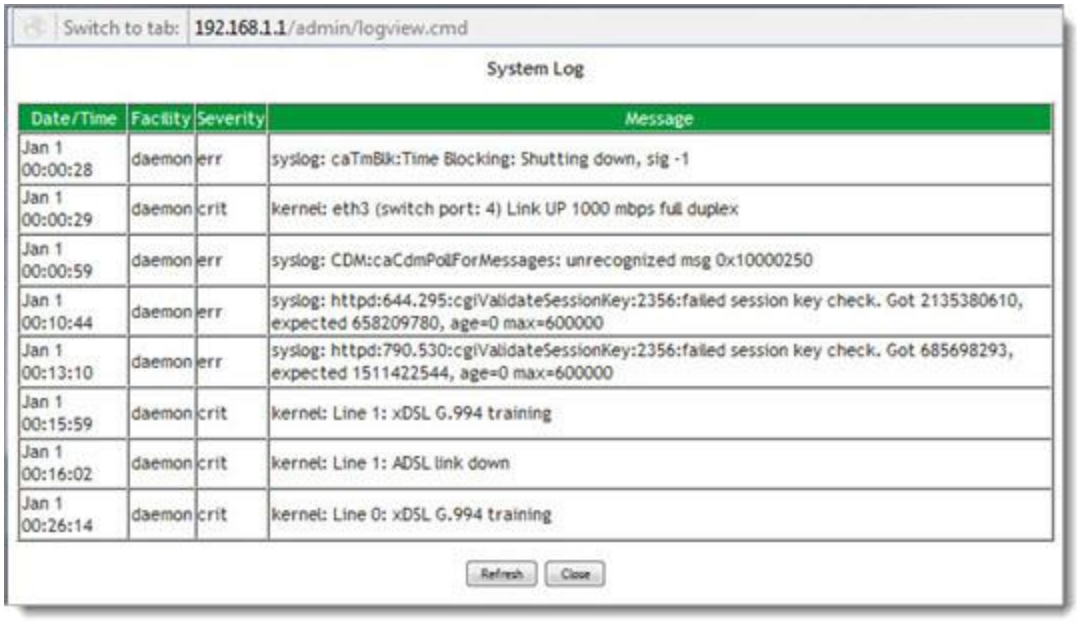
2. Click **Restore Default Settings**. The gateway is rebooted.

System Log

On this page, you can view and configure the system log generated for your gateway.

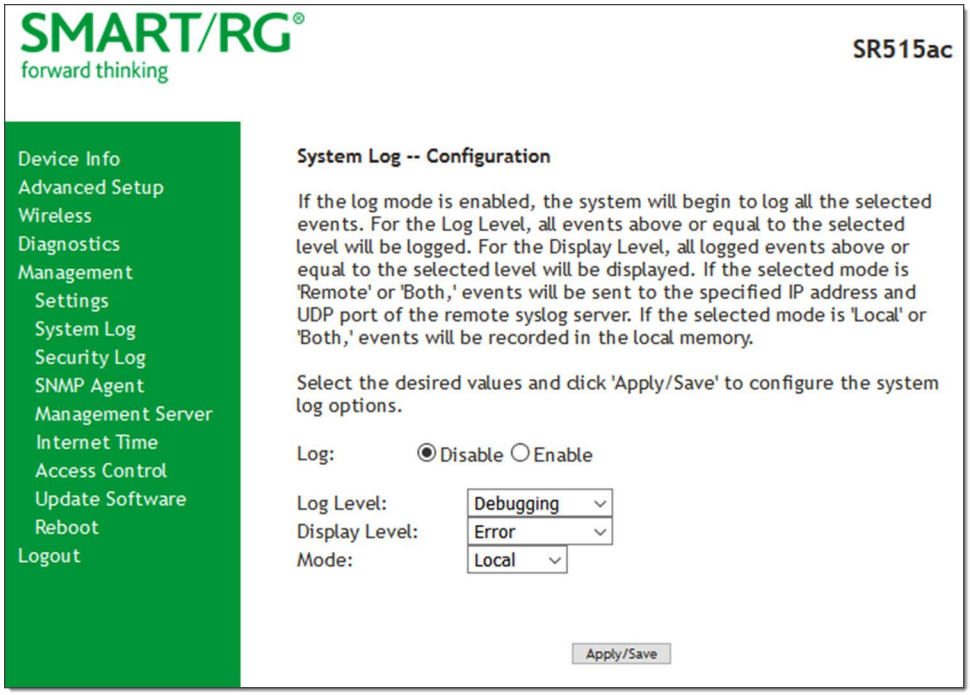
1. In the left navigation bar, click **Management** > **System Log**. The following page appears.

2. To view the contents of the system log, click **View System Log**. The System Log details page appears.



3. To update the displayed entries, click **Refresh**.

4. To modify the system log settings:
   a. Click **Configure System Log**. The System Log - Configuration page appears.



   b. To enable logging, click **Enable** next to the **Log** label.
   c. Modify the settings as needed.

      The following table describes the options for configuration of the system log.

Action	Description
Logging Level	Select **Error** unless actively troubleshooting a situation with a subscriber for which increased log detail is required. Options are **Emergency**, **Alert**, **Critical**, **Error**, **Notice**, **Warning**, **Informational**, and **Debugging**. The options are listed in top-down order. The default is **Debugging**.
Display Level	Select **Error** unless actively troubleshooting a situation with a subscriber for which increased detail is required. This field has the same options as the **Logging Level** field. The default is **Error**.
Mode	Controls where log events will be sent. The default is **Local**. To send logs to the specified IP address and UDP port of a remote syslog server, select **Remote** or **Both**.

Action	Description
	To record events in the local memory of your SmartRG gateway, select **Local** or **Both**.

d. Click **Apply/Save** to save your changes.

Security Log

The security log contains a history of events related to sensitive access to the gateway. Logged events include:

- Password change success/failure
- Authorized login success/failure
- Security lockout added/removed
- Authorized/Unauthorized resource access
- Software update

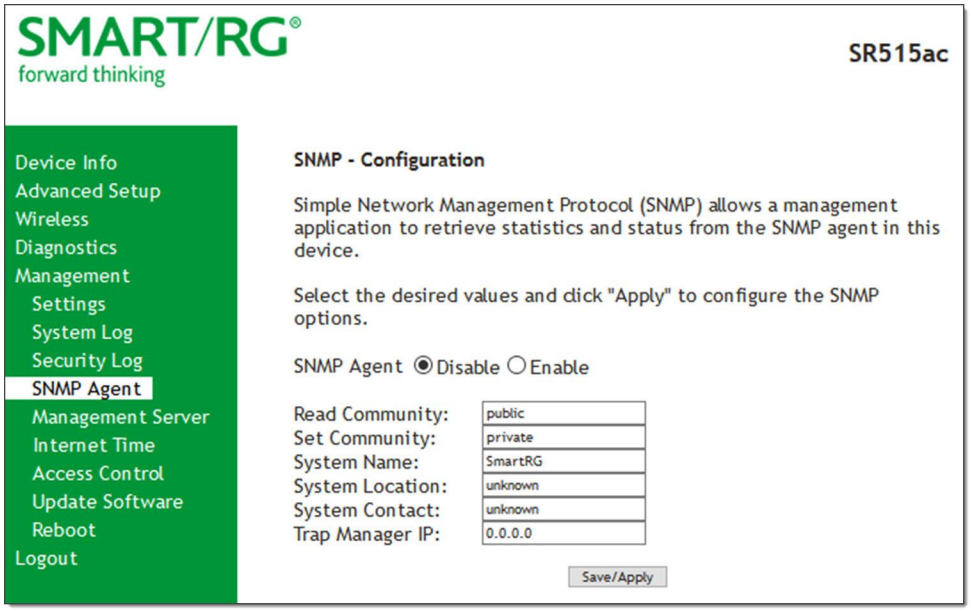
1. In the left navigation bar, click **Management** > **Security Log**. The following page appears.

2. Do any of the following:
   - To view the log, click **View**. The log appears in a separate window. To update the log, click **Refresh**.
   - To purge the log entries and start fresh, click **Reset**. A confirmation message appears. Click **Close**.
   - To export the logs to a local drive, click the **here** link in the last line of the instructions on the page. The log appears in the browser window. You can save the page or select all of the log text, paste into a Notepad window and save the file.

SNMP Agent

On this page, you can configure the SNMP (Simple Network Management Protocol) settings to retrieve statistics from the SNMP agent for the gateway. You can enable or disable the SNMP agent and set parameters such as the read community, system name and trap manager IP.

1. In the left navigation bar, click **Management** > **SNMP Agent**. The following page appears.



2. Modify the fields as needed.
3. Click **Save/Apply** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
Read Community	The options are public and private. The default is **public**.
Set Community	The options are public and private. The default is **private**.
System Name	The name of the system.
System Location	(*Optional*) The location of the system.
System Contact	The contact for the system.
Trap Manager IP	The IP address where the trap manager is installed.

Management Server

A management server is an Auto Configuration Server (ACS) such as Cisco Prime Home which offers significant advantages in terms of automation and productivity when managing subscriber devices in the field.

In this section, you can configure ACS settings for the TR-069 client and configure STUN server settings.

TR-069 Client

On this page, you can configure the gateway with details about the management ACS to which this gateway will be linked.

SmartRG gateways support TR-069-based standards for remote management. The TR-069 client page is preset with default connection parameters and generally only needs to be enabled, pointed to the ACS URL, and any required ACS credentials entered.

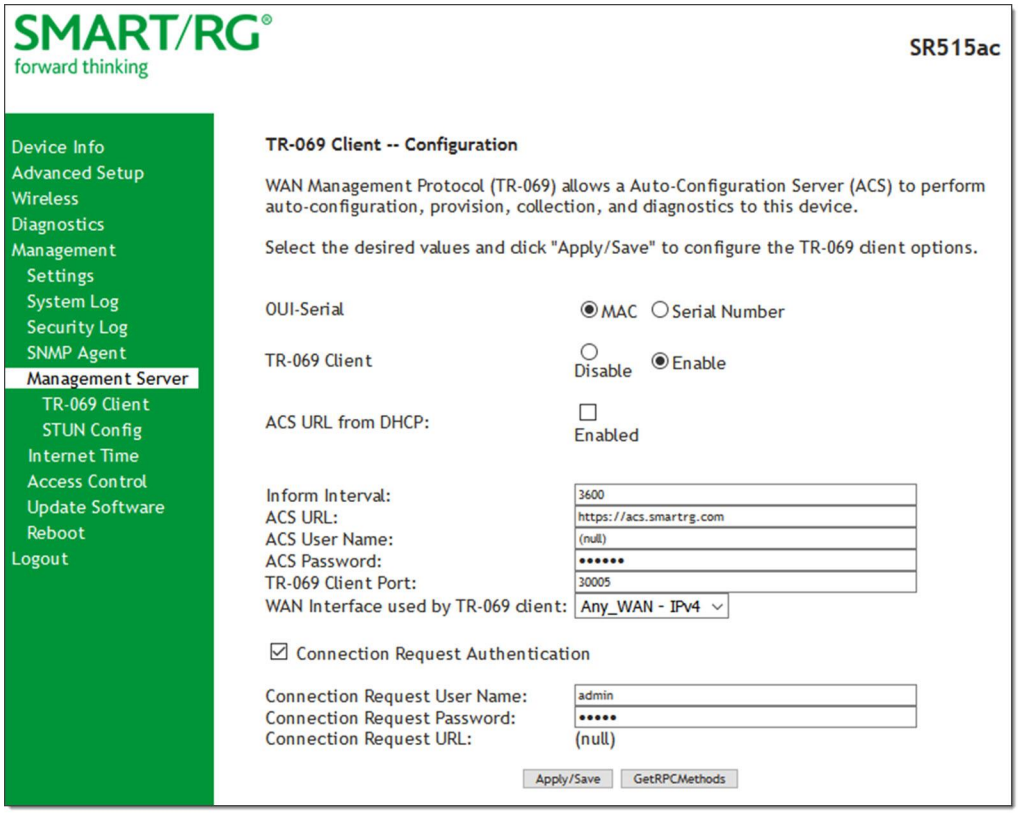
SmartRG products can accommodate several ACS products, including:

- Device Manager by SmartRG
- Cisco Prime Home
- ClearVision
- Calix Consumer ACS

A minimum firmware level of v2.5.0.x is required.

If you need to modify the request defaults, consult the ACS manufacturer's documentation.

1. In the left navigation bar, click **Management** > **Management Server**. The following page appears.



2. Update or complete the necessary fields per the instructions received from your ACS platform vendor.
3. Click **Apply/Save** to commit your changes.

Note: This manual does not cover the setup of your ACS. Consult the materials provided by your ACS vendor to determine the appropriate parameters and server settings for configuring remote WAN side management via an ACS using the TR-069 Protocol.

Field Name	Description
OUI-Serial	Select whether to use the base MAC address or the serial number of your gateway when connecting to the ACS. This value may display in an ACS user interface when looking at the device details of a particular gateway. The default (and the most typical scenario) is **MAC**.
TR-069 Client	Enable or disable the TR-069 client on the CPE. You can disable the TR-069 WAN Management Client if no ACS is employed. The default is **Enable**. **Note:** If you may want to add an ACS to your infrastructure in the future, it is

Field Name	Description
	recommended that you leave this option enabled. When this feature is disabled, every gateway deployed with this setting must be manually re-configured to enable this client.
ACS URL from DHCP	Click the **Enabled** checkbox to enable your gateway to obtain the ACS URL via DHCP.
Inform Interval	The frequency (in seconds) with which the CPE (gateway) checks in with the ACS to sync and exchange data. A typical production environment entails CPEs in the field informing to the ACS once/day or every 86,400 seconds.
ACS URL	Enter the URL for the CPE to connect to the ACS using the CPE WAN Management Protocol. This parameter MUST be in the form of a valid HTTP or HTTPS URL. An HTTPS URL indicates that the ACS supports SSL. The "host" portion of this URL is used by the CPE for validating the certificate from the ACS when using certificate-based authentication. You can include a port specification suffix if your ACS platform requires it, e.g., http://customer.acs.wanmanagmentservices.com:30005 where 30005 is the port number. The default is **30005**. A minimum firmware level of v2.5.0.x is required.
ACS User Name	Enter the user name by which this gateway logs in to the ACS. The default username is typically admin.
ACS Password	Enter the password to authenticate the above user name. The default password is typically admin.
TR-069 Client Port	Enter the TR-069 port number.
WAN Interface used by TR-069 client	Select an interface to declare how this gateway will connect to the ACS. Options include **Any_WAN - IPv4**, **Any_WAN - IPv6**, **LAN**, **Loopback**, and the interfaces configured for your gateway.
Connection Request Authentication	This option is enabled by default. To *disable* authenticated connection requests, click the checkbox to clear it.
Connection Request Username	Enter the user name by which this gateway authenticates the ACS.
Connection Request Password	Enter the password by which this gateway will authenticate to the ACS.

Field Name	Description
Connection Request URL	There is typically no need to set the Connection Request URL as it is normally established automatically based on the effective WAN IP. In some cases, the port can be configured as needed. An example value for this field might be "http://xxx.xxx.xxx.xxx:30005/" where the xxx values are specific WAN IP octet numbers. **Note:** The default port value is 30005. This URL may need to be configured for interoperability with your ACS vendor. If so, consult with SmartRG.

4. To force the gateway to attempt to sync with the ACS, click the **GetRPCMethods** button. This will assist you in verifying the TR-069 parameters entered above.
5. Click **Apply/Save** to save your changes.

STUN Config

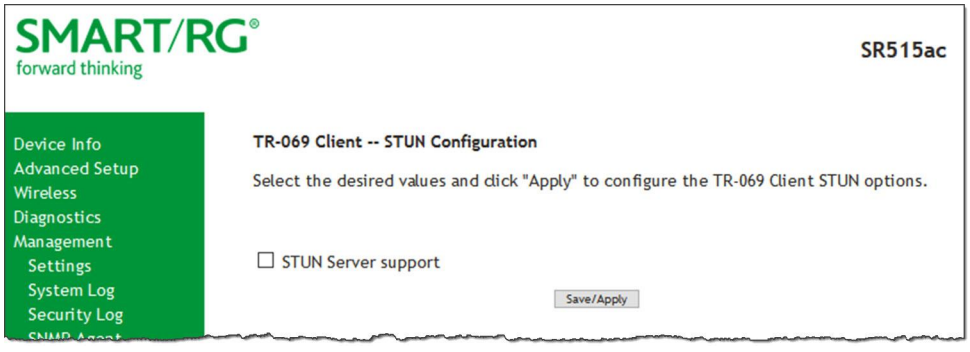
STUN stands for “Simple Traversal of UDP through NATs”. STUN enables a device to find out its public IP address and the type of NAT service it is sitting behind.

STUN is most commonly used with older modems under ACS management connected via a NAT gateway. NAT accommodates a LAN-side device that has been allocated a Private IP address such as a CPE device on a private network behind an ONT. In this instance, the regular CWMP Connection Request mechanism to talk to the modem gateway cannot be used to initiate a session with that ACS.

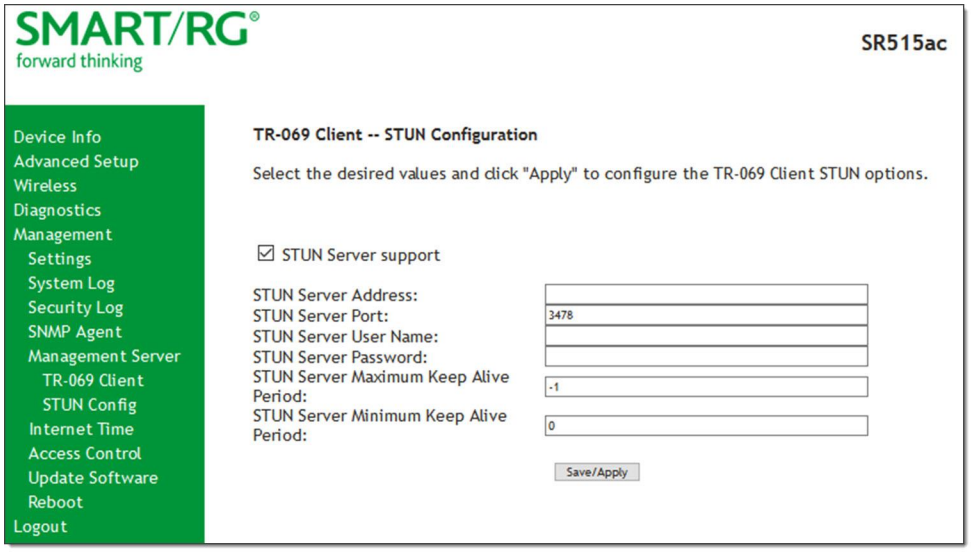
A STUN server receives STUN requests and sends STUN responses. STUN servers are generally attached to the public Internet.

On this page, when a STUN server is present within the infrastructure of the Service Provider, you can configure this gateway with the connectivity specifics for that server.

1. In the left navigation bar, click **Management** > **Management Server** > **STUN Config**. The following page appears.



2. To configure STUN server settings, click **STUN Server support**. Additional fields appear.



3. Complete each field in accordance with the implementation specifics of your server.
4. Click **Save/Apply** to commit your changes.

The fields on this page are explained in the following table.

Field Name	Description
STUN Server Address	The physical STUN server's assigned network address. An invalid address will produce an immediate on-page error message from the gateway. You can enter a maximum of 256 characters An ACS server may also have STUN functionality running on the same physical box. Consult your ACS vendor for implementation options and also TR-069 protocol documentation, if necessary.
STUN Server Port	Set the port number associated with your STUN server infrastructure. Options are **0** - **64435**. The default is **3478**.
STUN Server User Name	The username by which the gateway accesses the STUN infrastructure. Maximum length is 256 characters. Special characters are valid. The value will be hidden.
STUN Server Password	The password by which the modem authenticates the above username to the STUN infrastructure. Maximum length is 256 characters. Special characters are valid. The value will be hidden.
STUN Server Maximum Keep Alive Period *	Enter the maximum time(in seconds) that the keepalive function should be active. Options are **-1** - **Unlimited**. The default is **-1** (no maximum limit).

Field Name	Description
STUN Server Minimum Keep Alive Period *	Enter the minimum time(in seconds) that the keepalive function should be active. Options are **0** - **Unlimited**. The default is **0** seconds.

* This mechanism is used in coordination with the refreshing of NAT bindings. Specifically, in conjunction with use of Restricted Cone NAT or Port Restricted Cone NAT (as may be configured in some gateways). A device's internal address / port mappings, which the STUN protocol is allowed to make use of, can have keep alive values attributed. These minimum and maximum keep alive times define respectively, the minimum time to retain the mapping information STUN has discovered, and the maximum time to retain that information, before refreshing it through forced re-discovery.

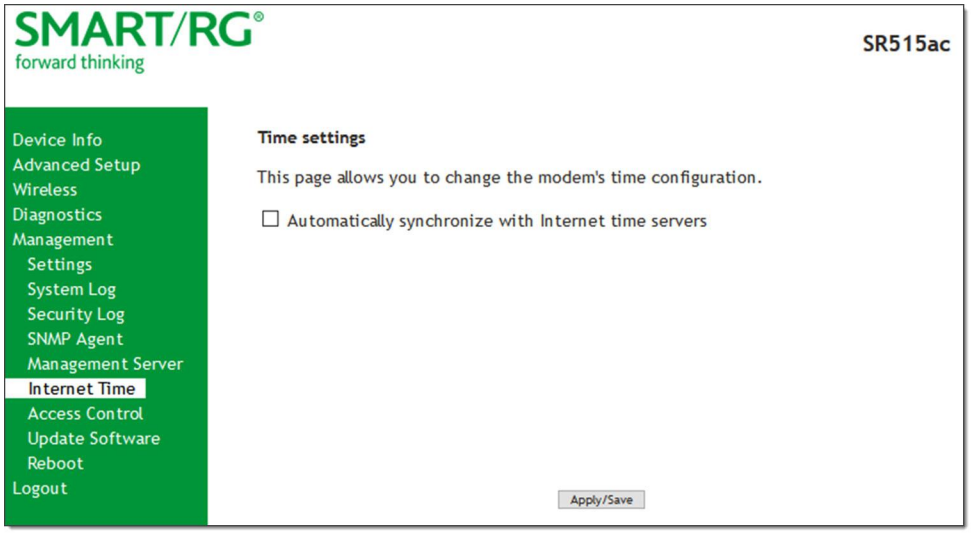
With the above-mentioned NAT schemes, it is possible the network address translation initially established may not be used after a specified elapsed time. Such internal mapping is dropped. The gateway will then assign a different address mapping. This mechanism within the STUN protocol allows for coordinated refresh on the bindings for mappings it uses. For further information, review STUN-related RFCs.

Selecting appropriate values for these two fields are influenced by a variety of environmental factors including devices types deployed, services employed and NAT configuration options enabled within the topology.

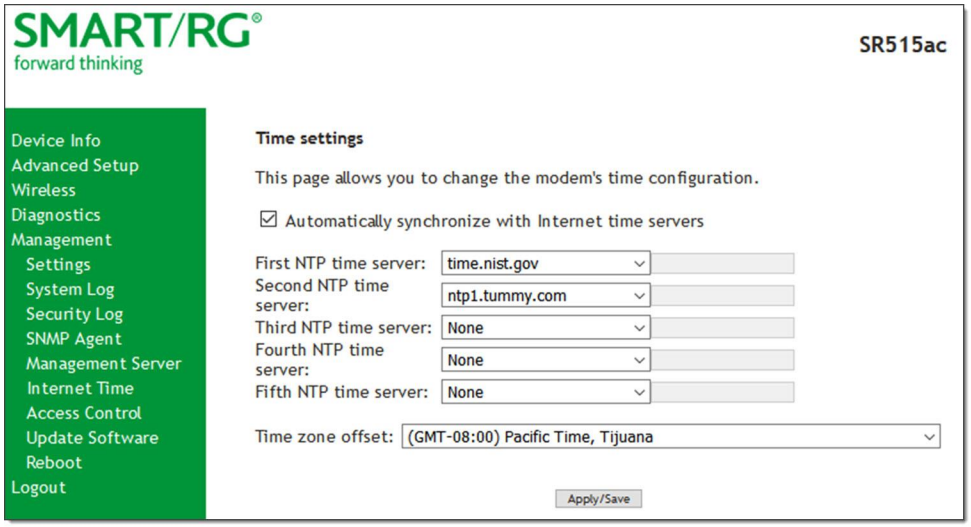
Internet Time

On this page, you can synchronize the clock in your gateway with reliable external clocking servers available on the Internet.

1. In the left navigation bar, click **Management** > **Internet Time**. The following page appears.



2. To configure the time settings, click **Automatically synchronize with Internet time servers**. Additional fields appear.



3. Select servers from the list or enter your own NTP servers.
4. Select the desired time zone for the gateway.
5. Click **Apply/Save** to commit your settings.

Access Control

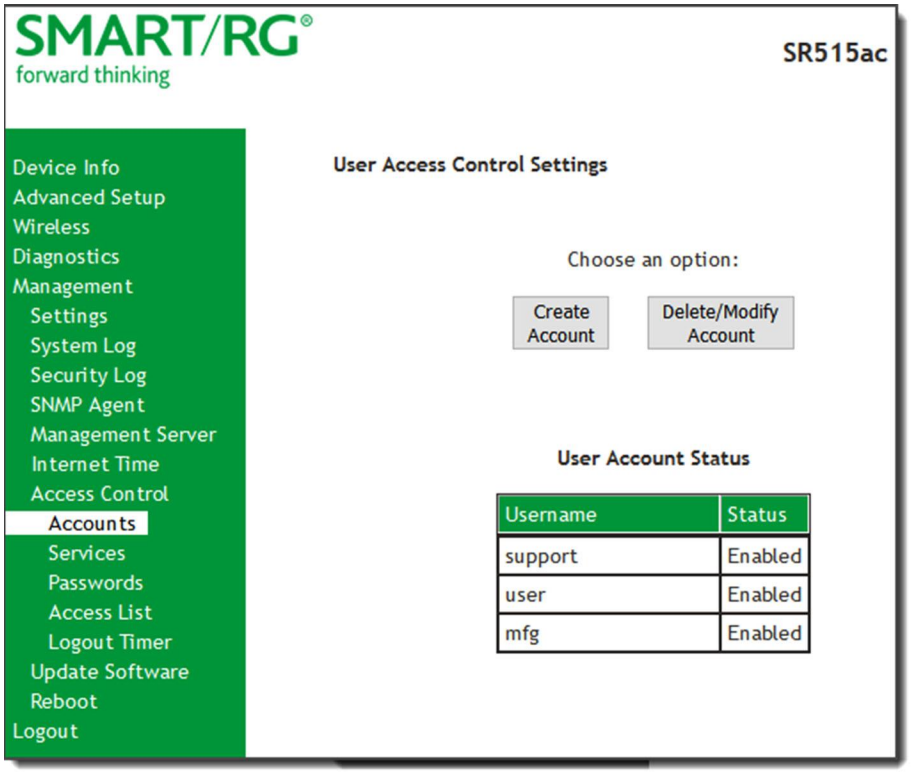
In this section, you can manage access to your gateway and network. You can configure passwords, accounts, services, the logout timer, and access lists.

Accounts

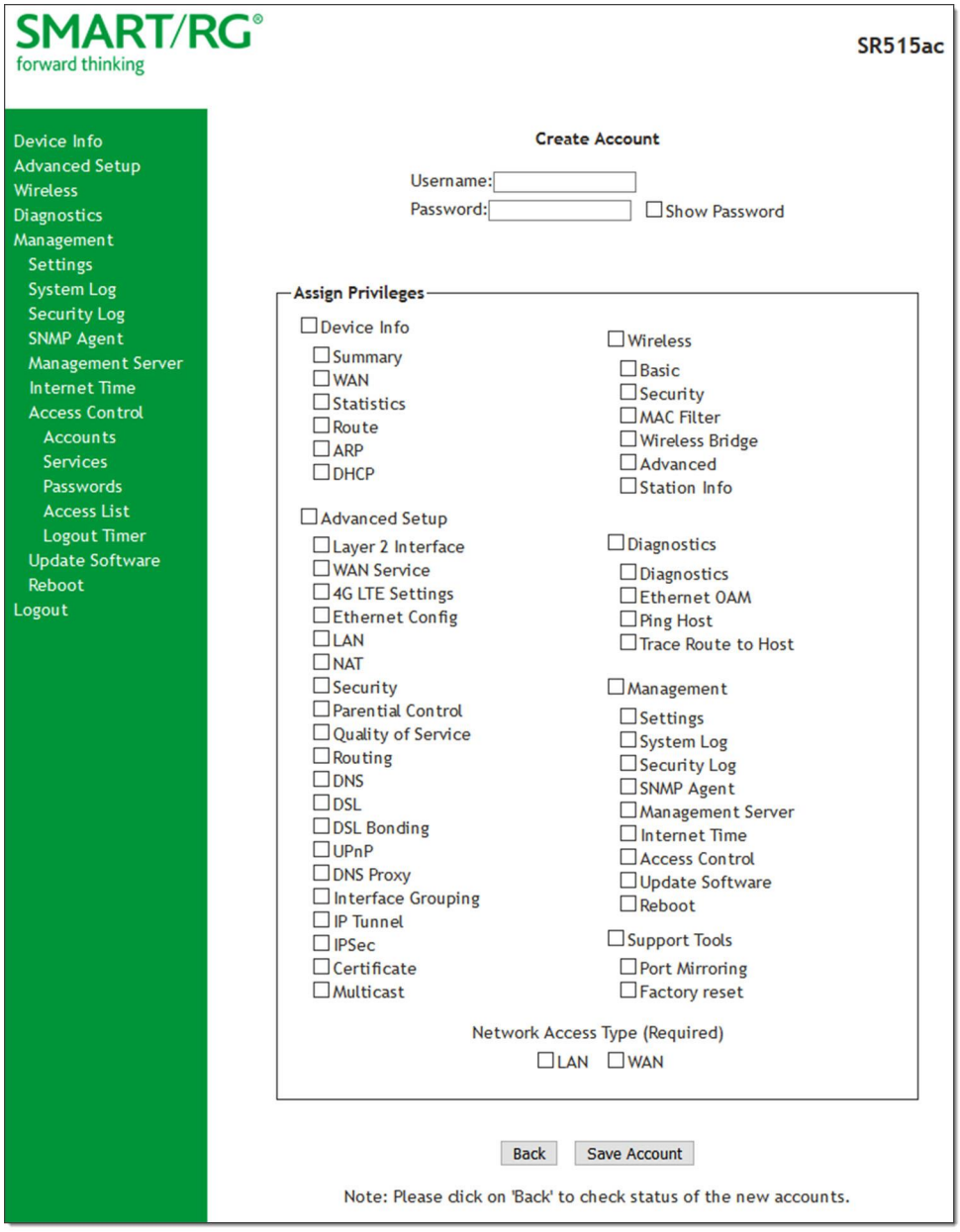
On this page, you can create and manage user accounts for your gateway. Your gateway can support multiple login accounts for its on-board user interface. Each account can be customized to grant access privileges to specific pages in the interface. This is particularly useful when an ISP wishes to limit access for subscribers, yet grant full access for technical support and on-site installation personnel.

Add an Account

1. In the left navigation bar, click **Management** > **Access Control** > **Accounts**. The following page appears.



2. To set up a new user, click **Create Account**. The following page appears.



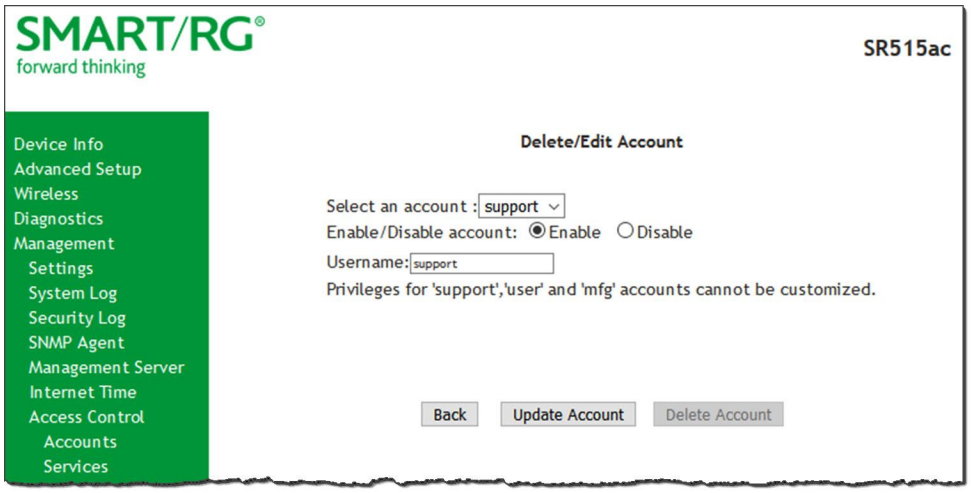
3. Enter a **Username** and **Password** for the new account.
4. Select the features that you want this user to access. If you select a subcategory, the subordinate boxes are also selected.
5. Click **Save Account** to commit your changes. The new account is created. To test the account credentials, log out of the interface and then log back in using the new account.

Delete or Modify an Account

Notes:

- While you can NOT modify or delete the default user accounts (Admin, Support, MFG, or User), you can disable the **Support**, **MFG**, or **User** accounts.
- You must be logged into the gateway as the Admin or Support user to modify or delete any accounts.

1. In the left navigation bar, click **Management** > **Access Control** > **Accounts** and then click, **Delete/Modify Account**. The Delete/Edit Account page appears.



2. In the **Select an account** field, select the account you wish to modify or delete.
3. Do one of the following:
    a. To modify an account, check or clear the desired boxes and then click **Update Account** to commit your changes.
    b. To disable or enable an account, click the **Enable/Disable account** buttons and then click **Update Account**.
    c. To delete an account, scroll to the bottom of the page and click **Delete Account** to remove the account and then click **OK**.

Your changes are implemented immediately.

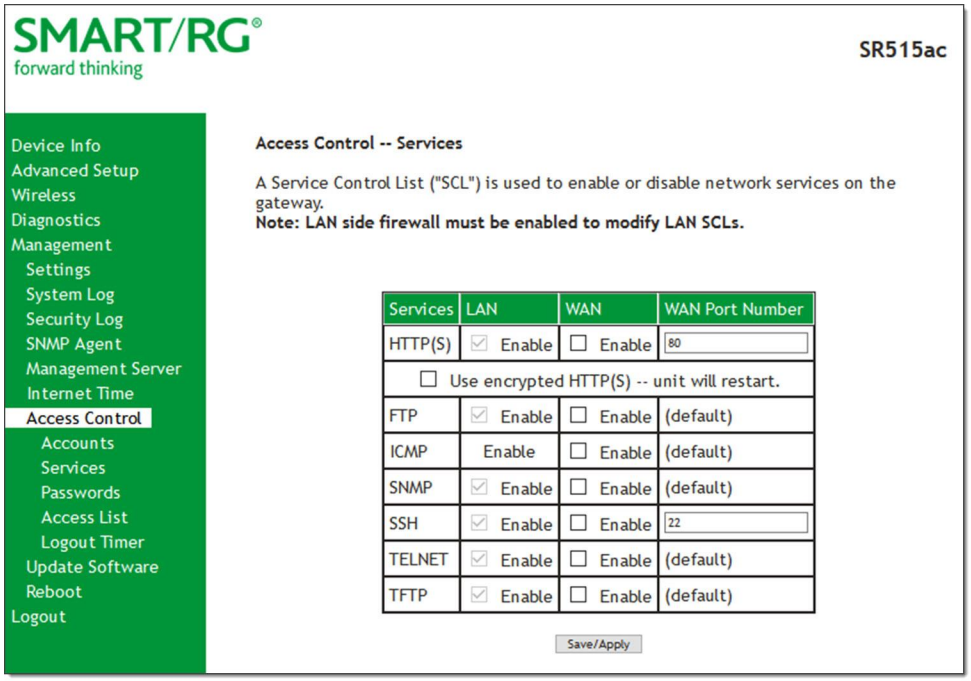
Default Passwords

USER	PASSWORD
admin	admin
support	support
user	user
mfg	IDH7iw@ibRsPOIBa

Services

On this page, you can define a Service Control List to control which services (FTP, HTTP, Telnet, etc.) are restricted on the LAN.

1. In the left navigation bar, click **Management** > **Access Control**. The following page appears.



2. Modify settings as desired, using the information in the table below.
3. Click **Save/Apply** to commit your settings.

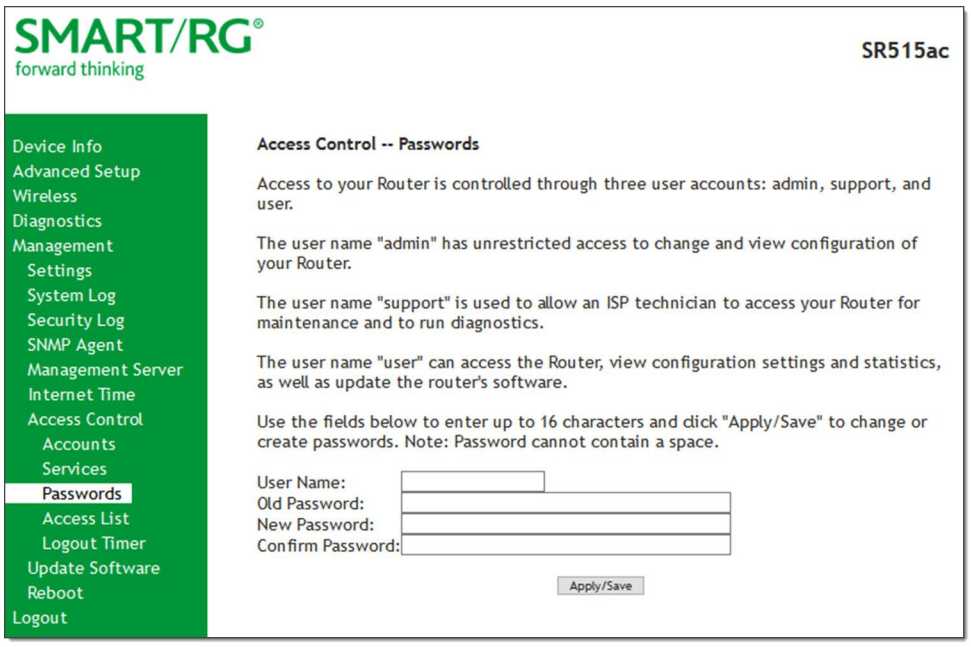
Field Name	Description
Services	This column identifies the SCL services that can be enabled or disabled. Options are: **FTP**, **HTTP**, **ICMP**, **SNMP**, **SSH**, **TELNET**, and **TFTP**.
Use encrypted HTTP(S)	Click this checkbox to implement secured HTTP. **Warning**: When you click this option, the gateway reboots.
LAN	Select the service enabled on LAN side firewall. Depending on configuration settings made elsewhere in the GUI, this column may be read-only. **Note:** ICMP is always enabled by default and has no checkbox in the **LAN** column.
WAN	(*Appears if a WAN service is configured for your gateway*) Select the service enabled on the WAN side firewall.
WAN Port Number	The port the access control applies to on the WAN side for the given service. See port information below.
Service port options	

Field Name	Description
FTP	FTP Service access (For WAN, this is the default port).
HTTP	HTTP Service access (For WAN, this is in association with specified port (default is port 80).
ICMP	ICMP Service access (For WAN, this is the default port).
SNMP	SNMP Service access (For WAN, this is the default port).
SSH	SSH Service access (For WAN, this is in association with specified port (default is port 22).
TELNET	TELNET Service access (For WAN, this is the default port).
TFTP	TFTP Service Access (as with default port).

Passwords

On this page, you can create or change passwords associated with access to the gateway. Three accounts are available to manage: Admin, Support and User.

1. In the left navigation bar, click **Management** > **Access Control** > **Passwords**. The following page appears.



2. Enter the information for the logged-in account.
3. Click **Apply/Save** to commit your settings.

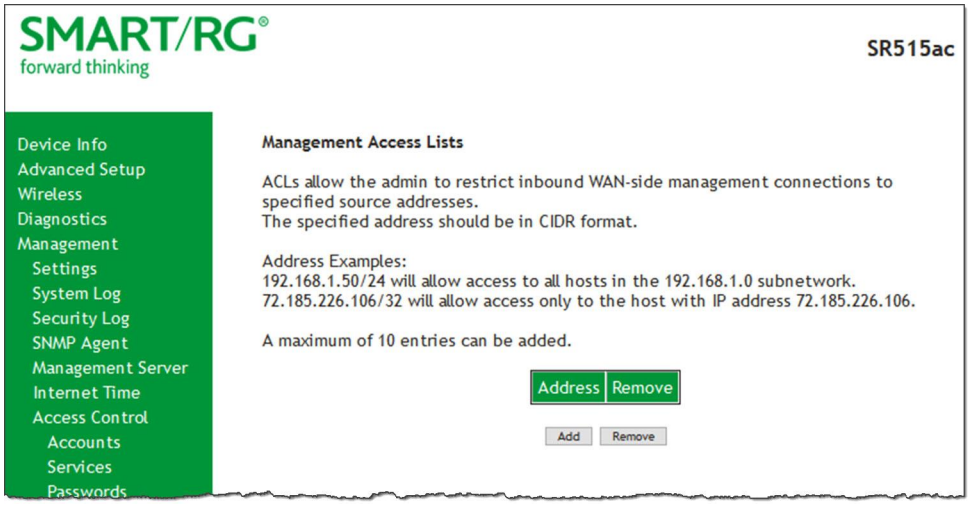
The fields on this page are explained in the following table.

Field Name	Description
User Name	Specifies name of account to be configured. Options are **admin**, **support**, **user**.
Old Password	Enter the current password for the entered User Name.
New Password	Enter the new password for the entered User Name. A maximum of 16 characters is allowed.
Confirm Password	Re-enter the new password.

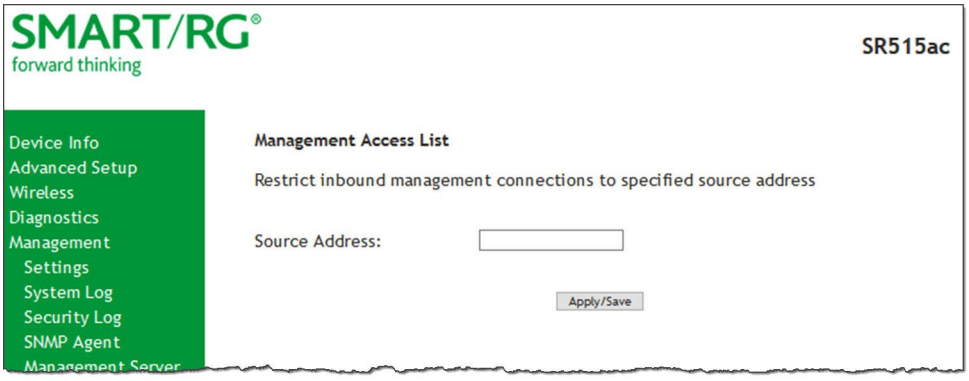
Access List

On this page, you can create and manage access control lists to control inbound access to specific IP addresses.

1. In the left navigation bar, click **Management** > **Access Control** > **Access List**. The following page appears showing any addresses already configured for managed access.



2. To add an address:
   a. Click **Add**. The following page appears.

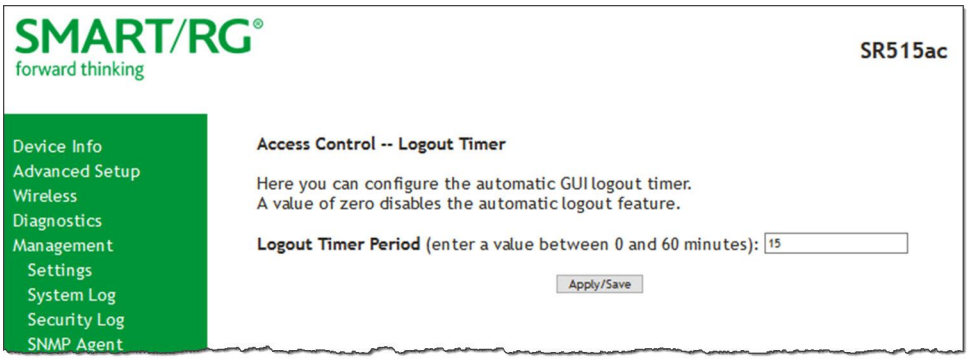


   b. Enter the address for which you want to restrict access.
   c. Click **Apply/Save**. You are returned to the Management Access Lists page.
   d. To add up to 9 more addresses, repeat steps 2a - 2c.
3. To remove an address, click the **Remove** checkbox next to it and then click **Remove**. The list is updated.

Logout Timer

On this page, you can define the maximum time that a session can remain open before the gateway logs out.

1. In the left navigation bar, click **Management** > **Access Control** > **Logout Timer**. The following page appears.

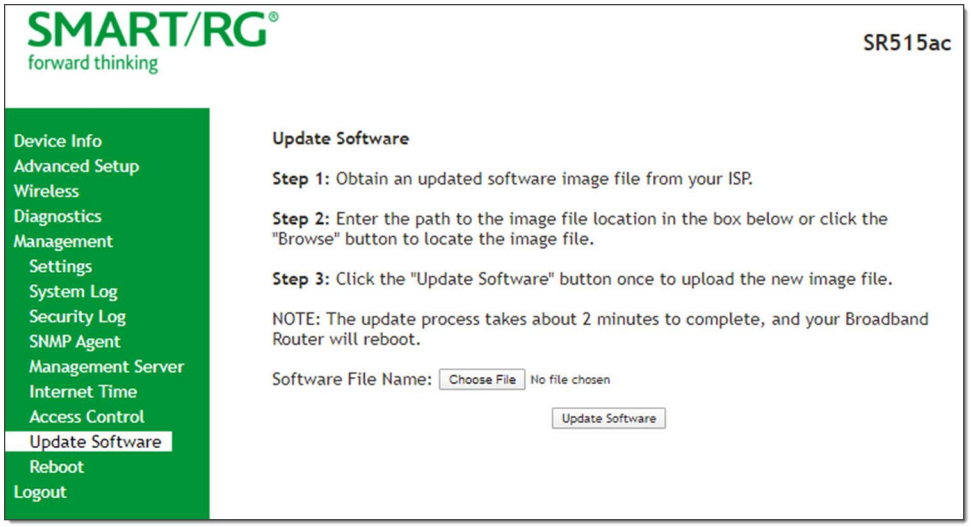


2. In the **Logout Timer Period** field, type the number of minutes after which a session will be ended. Options are **0** - **60** minutes. The default is **15** minutes. To disable this feature, enter a zero (**0**) in the field.

Update Software

On this page, you can update the firmware of your SmartRG gateway. Software updates for SmartRG products are available for download by direct customers of SmartRG via the SmartRG Customer Portal.

1. In the left navigation bar, click **Management** > **Update Software**. The following page appears.

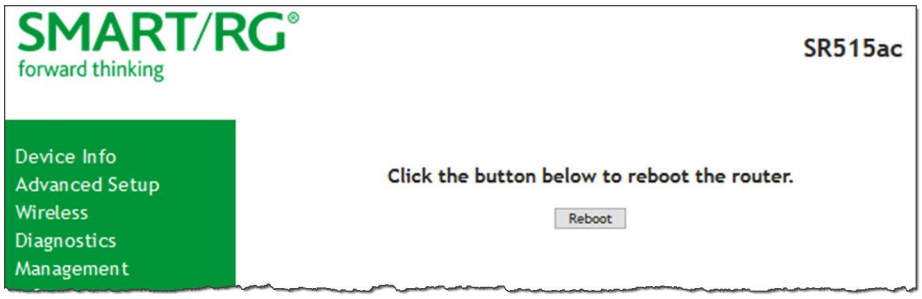


2. Follow the on-page instructions. When the update has completed, the gateway reboots.

Reboot

Occasionally, troubleshooting measures may require that the gateway be rebooted. On this page, you can reboot your gateway.

1. In the left navigation bar, select **Management** > **Reboot**. The following page appears.



2. Click **Reboot**. Your gateway is rebooted and you must log in again if you want to make further changes.

Logout

1. To log out of your gateway, click **Logout** in the left navigation menu. The Logout page appears.

2. Click the **Logout** button. A success message appears.

FCC Statements

FCC Interference Statement

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numrique de la classe B est conforme Ã la norme NMB-003 du Canada.

FCC Radiation Exposure Statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and it also complies with Part 15 of the FCC RF Rules.

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed an operated with a minimum distance of 20cm between the radiator and your body.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution! Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC - PART 68

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. On the bottom case of this equipment is a label that contains, among other information, a product identifier in the format US: VW7DL01BSR555A.

This equipment uses the following USOC jacks: RJ-11/RJ45/USB/Power Jacks.

A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA. A compliant telephone cord and modular plug is provided with this product. It is designed to be connected to a compatible modular jack that is also compliant. See installation instructions for details.

Ringer Equivalency Number Statement

Notice: The Ringer Equivalency Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information, please contact SmartRG, Inc. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

If your home has specially wired alarm equipment connected to the telephone line, ensure the installation of this device does not disable your alarm equipment. If you have questions about what will disable alarm equipment, consult your telephone company or a qualified installer.

IC CS-03 statement

This product meets the applicable Industry Canada technical specifications. / Le présent matériel est conforme aux specifications techniques applicables d'Industrie Canada

The Ringer Equivalence Number (REN) is an indication of the maximum number of devices allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the RENs of all the devices not exceed five. / L'indice d'équivalence de la sonnerie (IES) sert à indiquer le nombre maximal de terminaux qui peuvent être raccordés à une interface téléphonique. La terminaison d'une interface peut consister en une combinaison quelconque de dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas cinq.

Canada Statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS 102 et la conformité à l'exposition de RSS-102 rf, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformité de rf.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

5GHz

5150-5250 MHz band is restricted to indoor operations only.

Revision History

REV	DATE	CHANGES
1.3	July 2020	Updated for SmartRG Firmware Release 2.6.2.5.
1.2	March 2020	Updated for SmartRG Firmware Release 2.6.2.4.
1.1	October 2019	Updated for SmartRG Firmware Release 2.6.2.3.
1.0	September 2019	Initial version of publication. For SmartRG Firmware Release 2.6.2.2.