DrayTek

Work from Home Solution with VPN & App QoS

Marketing, DrayTek

Work from Home Solution

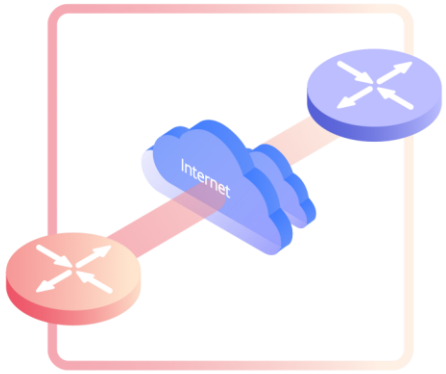
Understand Work-from-Home VPN in 5 Steps

Improving Experience for Business Critical Apps

Understand Work-from-Home VPN in 5 Steps

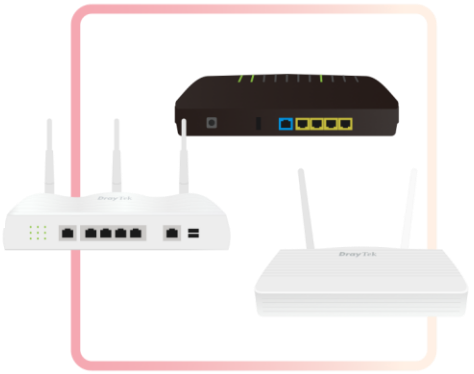
VPN Topology

Remote Dial-In VPN



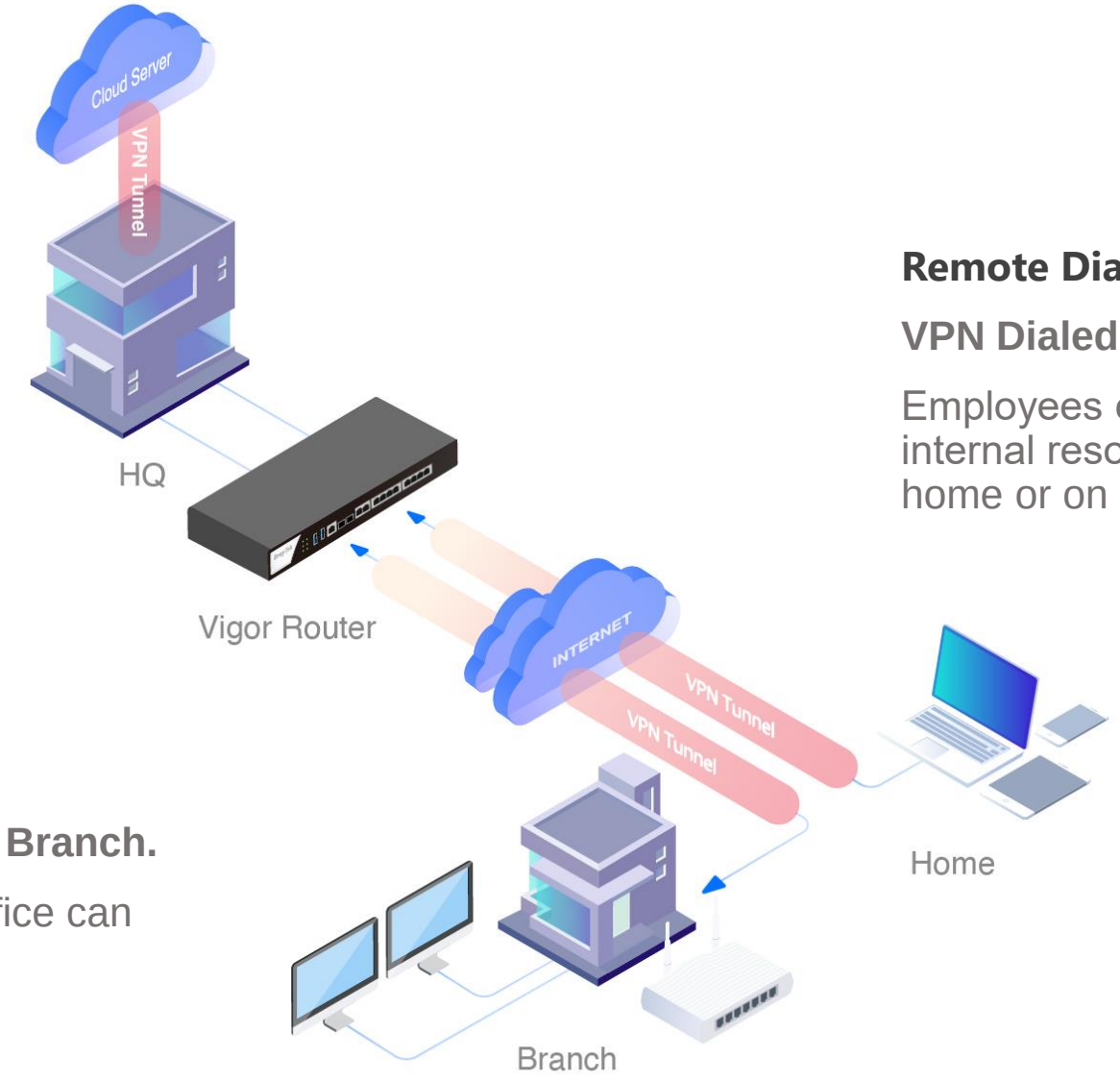
LAN to LAN VPN

VPN Router Matrix



More VPN Info

VPN Topology for Working from Home



Remote Dial-In VPN

VPN Dialed via smartphone/PC/Mac.

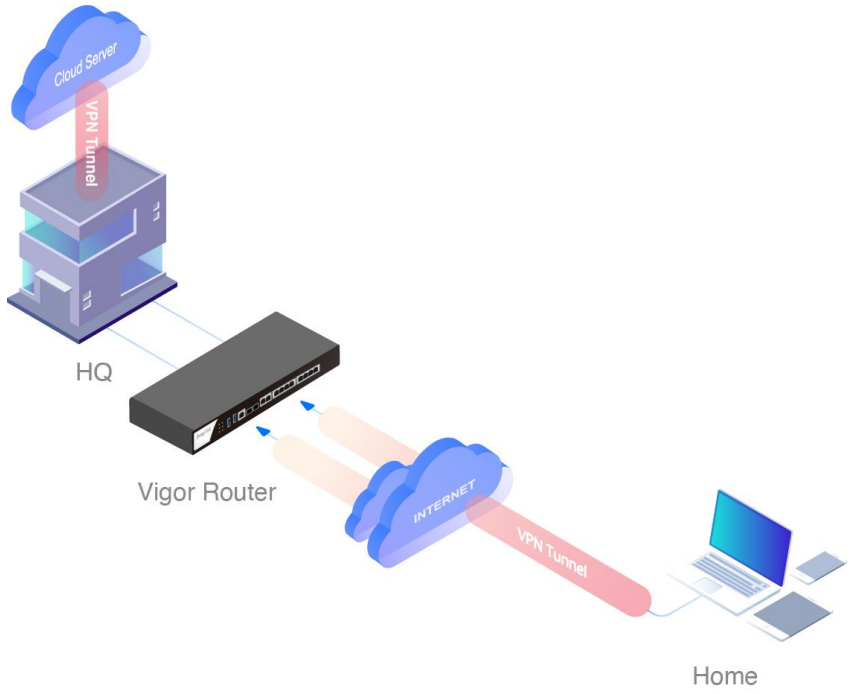
Employees can access the company's internal resources when they're working at home or on a business trip.

LAN-to-LAN VPN

VPN Dialed via a Router at Branch.

Headquarters and branch office can share internal resources.

Working from Home? Or on a Business Trip?



Smart VPN Client Download Info

https://www.draytek.com/products/smart-vpn-client/

Suggested Built-in VPN Type

Built-in VPN type is natively supported by the OS and no Smart VPN Client required.

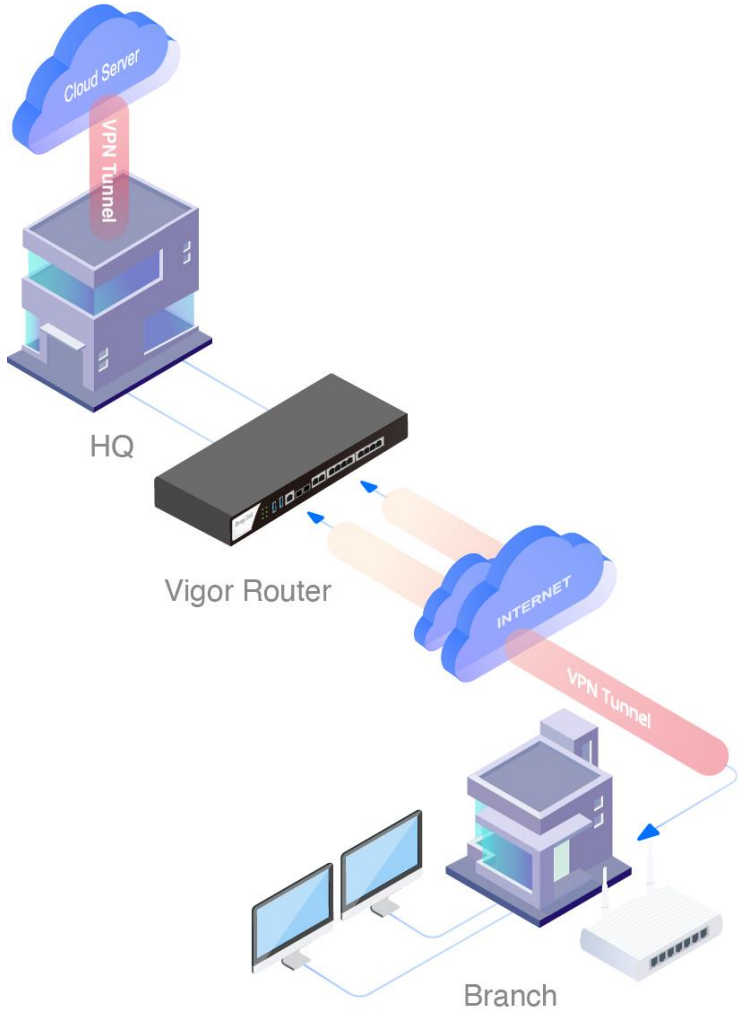
OS	Suggested VPN Type		Matched VPN in Vigor Router	Security Advisory
Windows	For V2960 & V3900	IKEv2	IKEv2 EAP	-
	For DrayOS Models	L2TP/IPsec	L2TP/IPsec	For IPsec, use **AES-SHA256** security method for *highest security* and *best performance*!
Android	For All Vigor Router Models	IPsec XAuth	IPsec XAuth	
macOS		Cisco IPsec	IPsec XAuth	
iOS		IPsec	IPsec XAuth	

Alternative VPN Type

For all clients, download Smart VPN Client for alternative VPN type.

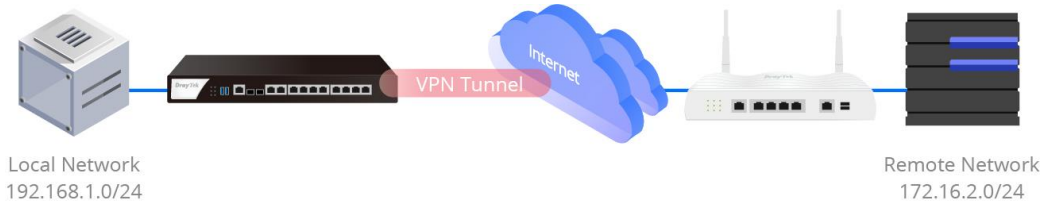
OS	VPN Type in Vigor Router		Note
Windows	For All Vigor Router Models	SSL VPN Or OpenVPN	Download Smart VPN Client for free for both SSL VPN and OpenVPN
Android			
macOS			
iOS			

Connecting Between HQ and Branches?



Branch office dials LAN-to-LAN VPN to HQ to have secure access to the company resources.

If HQ dials a LAN-to-LAN VPN to the cloud server, Branch can also access to the cloud server via HQ.



- Suggested LAN-to-LAN VPN Protocol
  - **IPSec** tunnel with **AES-SHA256** security method for highest security and best performance.

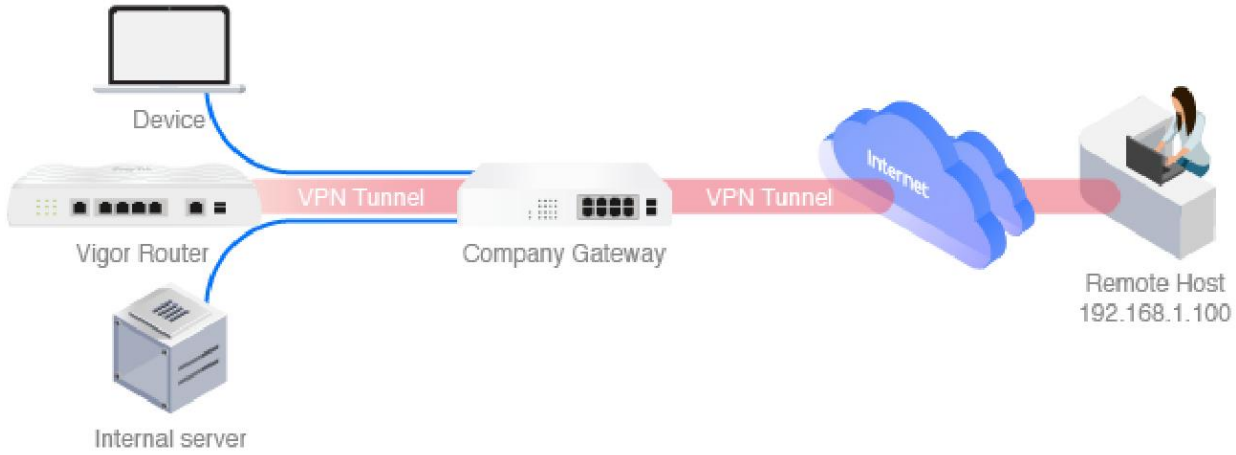
DSL VPN Router

	Single WAN		Dual WAN	
	Vigor2762 Series	**Vigor2765 Series**	**Vigor2862 Series**	**Vigor2865 Series**
				
WAN	1 x RJ-11 DSL WAN (VDSL2 30a) or 1 x GbE WAN	1 x RJ-11 DSL WAN (VDSL2 35b) or 1 x GbE WAN	1 x RJ-11 DSL WAN (VDSL2 30a) + 1 x GbE WAN	1 x RJ-11 DSL WAN (VDSL2 35b) + 1 x GbE WAN
IPsec VPN Performance	70 Mbps	200Mbps	85 Mbps	300 Mbps
SSL VPN Performance	40 Mbps	60 - 80 Mbps	45 Mbps	70 - 130 Mbps
Max. concurrent VPN Tunnels	2	2	32	32
Max. Concurrent OpenVPN + SSL VPN	-	-	16	16

Broadband VPN Router

	Single WAN	Dual WAN			Multi WAN		
	Vigor2133 Series	**Vigor2926 Series**	**Vigor2952 Series**	**Vigor2960**	**Vigor3220**	**Vigor3900**	**Vigor3910**
							
WAN	1 x Fixed GbE WAN (or 1 x SFP for FVac model)	2 x GbE WAN	2 x GbE WAN (including 1 SFP WAN as option)	2 x GbE WAN	4 x GbE WAN	4 x GbE WAN	8 Switchable WAN/LAN 2 x 10G SFP+ + 2 x 2.5GBASE-T + 4 x GbE
IPsec VPN Performance	70 Mbps	80 Mbps	200 Mbps	600 Mbps	200 Mbps	900 Mbps	3.3 Gbps
SSL VPN Performance	40 Mbps	45 Mbps	60 - 90 Mbps	100 - 300Mbps	60 - 90 Mbps	80 - 400Mbps	1.6 Gbps
Max. concurrent VPN Tunnels	2	50	200	200	200	500	500
Max. Concurrent OpenVPN + SSL VPN	-	25	50	50	50	100	200

Don’t Want to Change the Existing Office Network?



Keep your current office network, and simply put a Vigor Router in your LAN to work as VPN server.

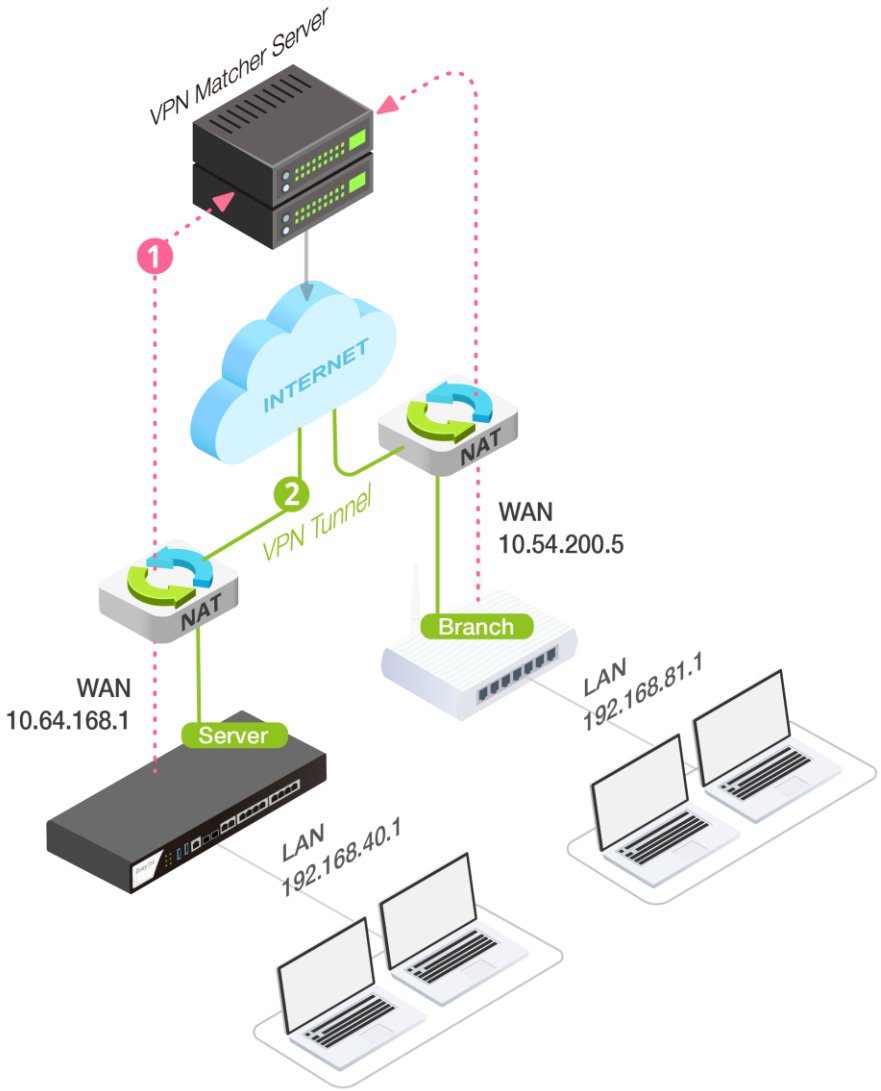
1. Connect Vigor Router’s WAN port to DMZ port on your company gateway router (or setup port forwarding for VPN to pass to Vigor Router, e,g., port 443 for SSL VPN).

2. Download Smart VPN Client on your device. Select VPN type, and either add your office network to “more route” or enable **Change Default Route**.

3. Done! Start working from home!

It works for LAN-to-LAN VPN as well! See more at Single-Arm VPN: https://www.draytek.com/support/knowledge-base/5745

More Information-- DrayTek VPN Matcher



VPN Server Behind NAT Made Easy

Some ISPs assign private IP addresses for a multi-site company, and most 4G providers offer private IP, too.

VPN Server with private IP behind NAT makes branches unable to establish a LAN-to-LAN VPN tunnel.

To overcome the limitations, register all your VPN Vigor Routers to DrayTek VPN Matcher, then VPN Matcher will help exchanging the connection information between VPN Server and branches.

With the connection information, VPN tunnel can be established successfully.

DrayTek Work from Home Solutions

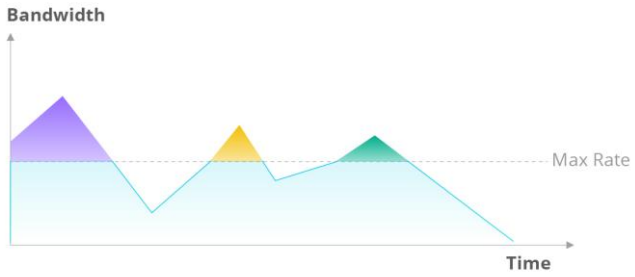
Understand Work-from-Home VPN in 5 Steps

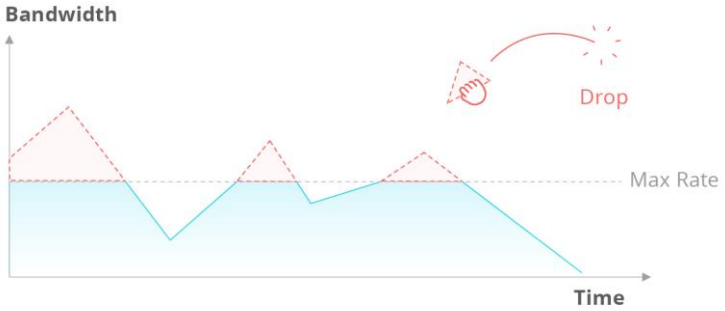
Improving Experience for Business Critical Apps

- Bandwidth Management Makes Apps Work Smoothly
- QoS Topology for Working from Home
- Flexible Bandwidth Allocation for Business Critical Apps
- Flexible Bandwidth Allocation with QoS in 3 Steps
- App QoS Is Improved!
- Improved App QoS Router Matrix

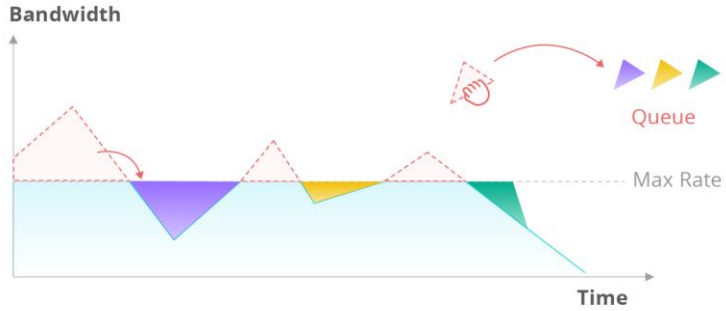
Bandwidth Management Makes Apps Work Smoothly

2 types of bandwidth management





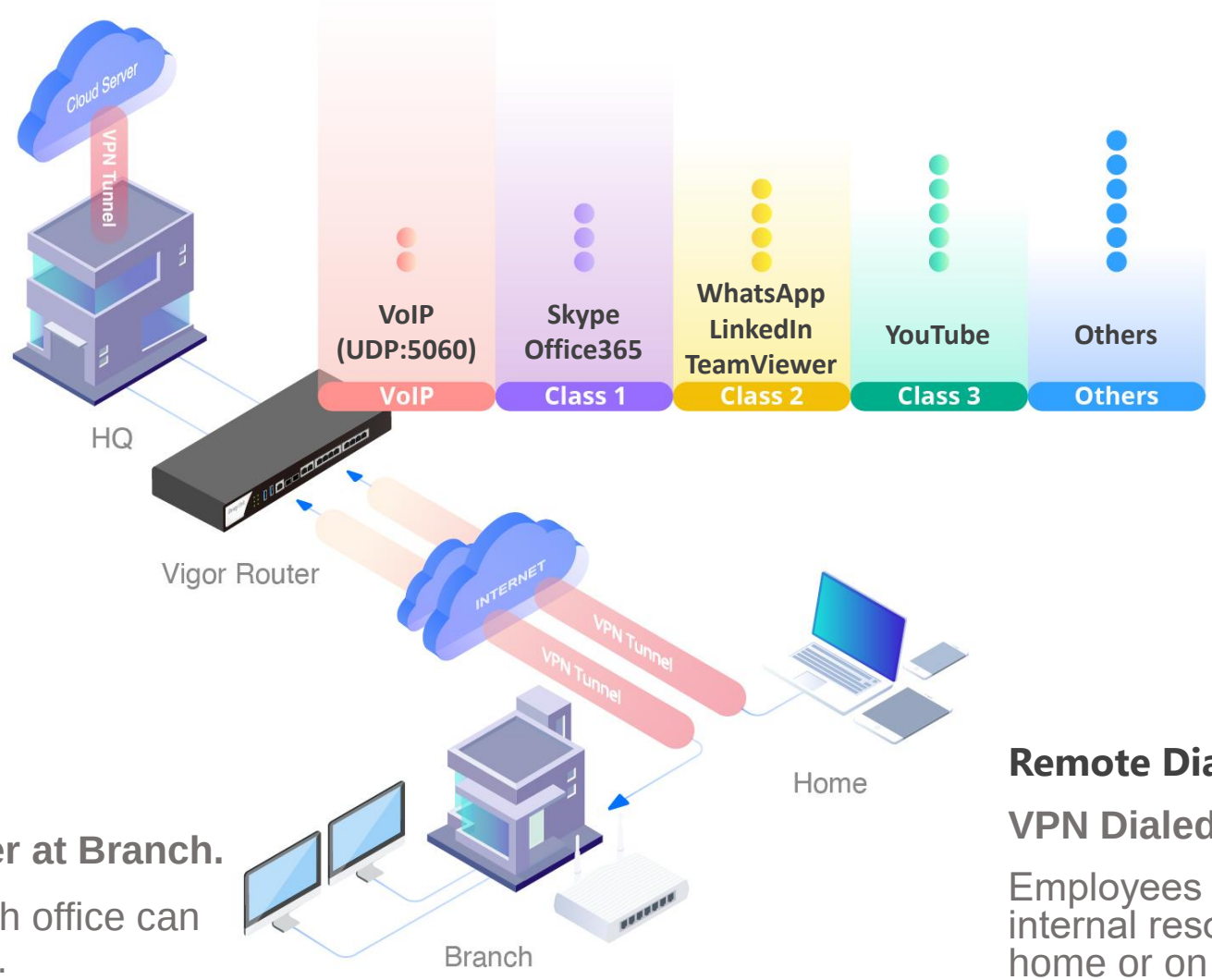
Policing (Bandwidth Limit)



Shaping (QoS)

	Bandwidth Limit	QoS
Bandwidth	Overall bandwidth limit	Predictable limit for up to 4 customizable classes
Latency	May varies from time to time	Controllable jitter for each class
When bandwidth exceeded	Drop	Queue (drop if queue is full)
Direction	Outbound / Inbound	Outbound / Inbound
Pros	Lower router resource required	Set priority for important traffic
Cons	Important traffic may be dropped	More router resources required

QoS Topology for Working from Home



LAN-to-LAN VPN

VPN Dialed via a Router at Branch.

Headquarters and branch office can share internal resources.

Remote Dial-In VPN

VPN Dialed via smartphone/PC/Mac.

Employees can access the company's internal resources when they're working at home or on a business trip.

Flexible Bandwidth Allocation for Business Critical Apps

- Flexible bandwidth allocation
  - Bandwidth can be reserved for business critical apps, and used by other apps when available

- VoIP protocol always has the highest priority
  - A pair of 88 kbps bandwidth is constantly reserved specially for VoIP calls.
  - VoIP is detected by listening to VoIP ports
    - Default SIP UDP Port is 5060 (configurable)

    - RTP ports are auto detected

Flexible Bandwidth Allocation with QoS in 3 Steps

1. Define your WAN bandwidth and operational direction

General Setup | Set to Factory Default |

Index	Enable	Direction	Inbound/ Outbound Bandwidth				Class 1	Class 2	Class 3	Others	Status
WAN1	☐	BOTH	--Kbps/		--Kbps		25 %	25 %	25 %	25 %	Status
WAN2	☑	BOTH	800	Mbps /	800	Mbps	35 %	30 %	20 %	15 %	Status
WAN3	☑	BOTH	500	Mbps /	500	Mbps	25 %	25 %	25 %	25 %	Status
WAN4	☐	BOTH	100	Mbps /	100	Mbps	25 %	25 %	25 %	25 %	Status

Flexible Bandwidth Allocation with QoS in 3 Steps

1. Define your WAN bandwidth and operational direction
2. Specify the business critical apps and their importance

Class	VoIP	Class 1	Class 2	Class 3	Others
Priority	High				Low Priority
Apps	VoIP	VPN DNS Skype	HTTP Office 365	YouTube Facebook	Others BitTorrent

App QoS

Bandwidth Management >> APP QoS

APP QoS

Enable / Disable

Traceable | Untraceable

Select All | Clear All | Apply to all: QoS Class 1 (High) | Apply

Enable	Instant Message	Version	Action
☐	Facebook/Instagram		QoS Class 1 (High)
☐	LINE	5.23.0.2134	QoS Class 1 (High)
☑	LinkedIn		QoS Class 2 (Medium)
☐	Signal	1.26.2	QoS Class 1 (High)
☐	Slack	4.0.0	QoS Class 1 (High)
☐	Snapchat	10.79.5.0	QoS Class 1 (High)
☐	Telegram	1.7.10	QoS Class 1 (High)
☑	WhatsApp	0.3.2848	QoS Class 2 (Medium)

Enable	VoIP	Version	Action
☑	Skype	8.51.0.86	QoS Class 1 (High)
☐	WeChat	2.7.1	QoS Class 1 (High)

QoS Rules

Bandwidth Management >> Quality of Service

Rule 1

☑ Enable

IP Version: IPv4 / IPv6

Local IP Address: 192.168.62.1(mask:255.255.255.0) Edit

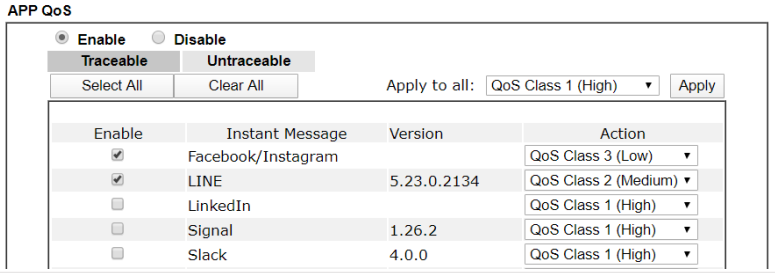
Remote IP Address: 192.168.60.1(mask:255.255.255.0) Edit

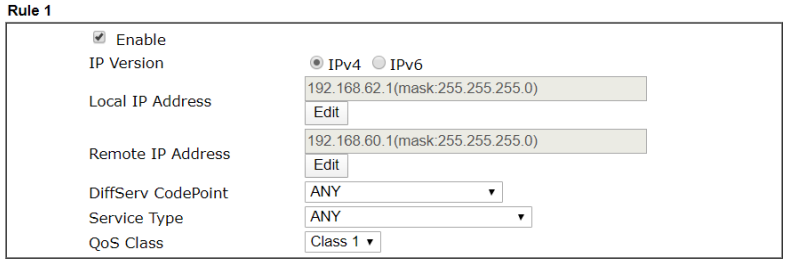
DiffServ CodePoint: ANY

Service Type: ANY

QoS Class: Class 1

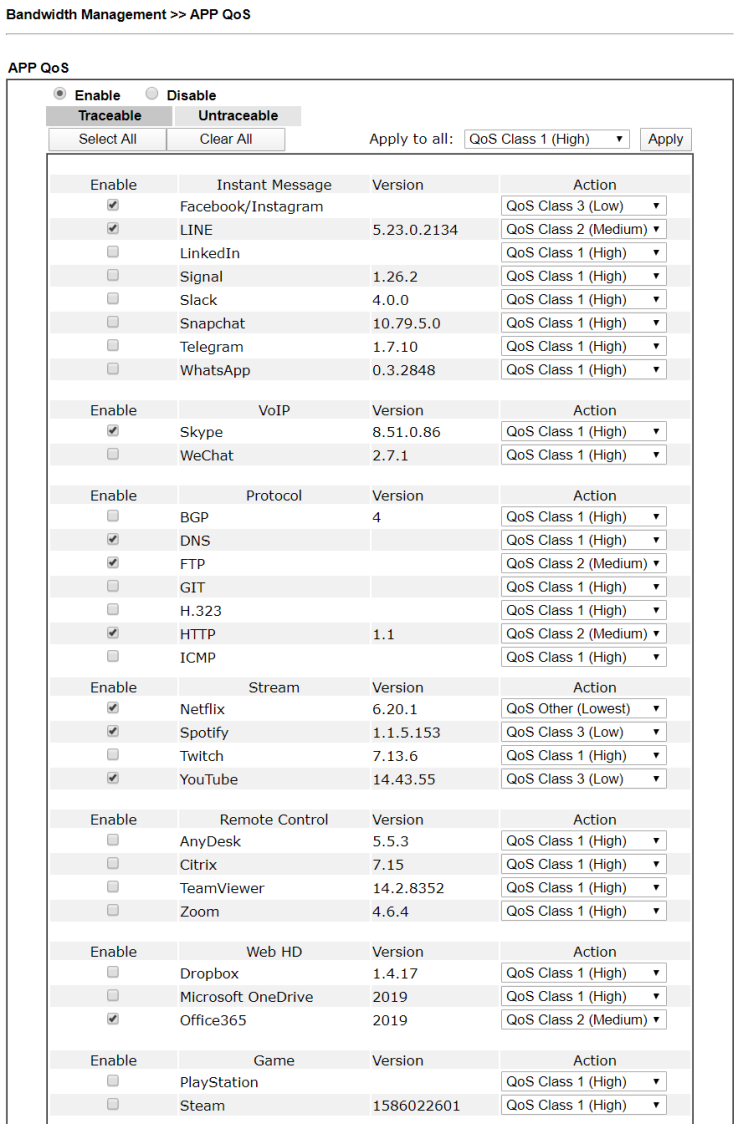
2 Types of QoS Bandwidth Reservation





	App QoS	QoS Rules
Support	150+ popular apps (keep growing)	Class rules set up by **1)** service type **2)** IP addresses **3)** DSCP
Examples **Set up class rules by…**	Business critical apps, such as Skype, Office 365, YouTube, etc.	**1)** specific protocols (e.g., DNS) **2)** • VPN traffic (e.g., working from home or on a business trip) • important subnet (e.g., FAE department) • specific IP address (e.g., important server) **3)** specific kind of traffic flow (e.g., IPTV)
Pros	Easily setup rules in few clicks	Flexible “Source + Destination” rules for a variety of scenarios
Cons	Rules is applied to all LAN clients	Basic computer networking know-how required

Bandwidth Reserving Example with App QoS



Bandwidth Management >> APP QoS

APP QoS

Enable Disable

Traceable Untraceable

Select All | Clear All | Apply to all: QoS Class 1 (High) | Apply

Enable	Instant Message	Version	Action
☑	Facebook/Instagram		QoS Class 3 (Low)
☑	LINE	5.23.0.2134	QoS Class 2 (Medium)
☐	LinkedIn		QoS Class 1 (High)
☐	Signal	1.26.2	QoS Class 1 (High)
☐	Slack	4.0.0	QoS Class 1 (High)
☐	Snapchat	10.79.5.0	QoS Class 1 (High)
☐	Telegram	1.7.10	QoS Class 1 (High)
☐	WhatsApp	0.3.2848	QoS Class 1 (High)

Enable	VoIP	Version	Action
☑	Skype	8.51.0.86	QoS Class 1 (High)
☐	WeChat	2.7.1	QoS Class 1 (High)

Enable	Protocol	Version	Action
☐	BGP	4	QoS Class 1 (High)
☑	DNS		QoS Class 1 (High)
☑	FTP		QoS Class 2 (Medium)
☐	GIT		QoS Class 1 (High)
☐	H.323		QoS Class 1 (High)
☑	HTTP	1.1	QoS Class 2 (Medium)
☐	ICMP		QoS Class 1 (High)

Enable	Stream	Version	Action
☑	Netflix	6.20.1	QoS Other (Lowest)
☑	Spotify	1.1.5.153	QoS Class 3 (Low)
☐	Twitch	7.13.6	QoS Class 1 (High)
☑	YouTube	14.43.55	QoS Class 3 (Low)

Enable	Remote Control	Version	Action
☐	AnyDesk	5.5.3	QoS Class 1 (High)
☐	Citrix	7.15	QoS Class 1 (High)
☐	TeamViewer	14.2.8352	QoS Class 1 (High)
☐	Zoom	4.6.4	QoS Class 1 (High)

Enable	Web HD	Version	Action
☐	Dropbox	1.4.17	QoS Class 1 (High)
☐	Microsoft OneDrive	2019	QoS Class 1 (High)
☑	Office365	2019	QoS Class 2 (Medium)

Enable	Game	Version	Action
☐	PlayStation		QoS Class 1 (High)
☐	Steam	1586022601	QoS Class 1 (High)

	Class	**VoIP**	**Class 1**	**Class 2**	**Class 3**	**Others**	
Priority	High					Low	Priority
	Apps	VoIP	DNS **Skype**	HTTP **Office 365**	**YouTube** **Facebook**	Others BitTorrent	

- Put “Skype” into Class 1 ensure conference calls can work well.
- Put “YouTube” and “Facebook” into Class 3, since employee shouldn’t waste much time on both of them.

Bandwidth Reserving Example with QoS Rules

QoS rule is supported for a more precise scenario.

Such as reserving bandwidth for a dedicated VPN tunnel or an important server in your office.

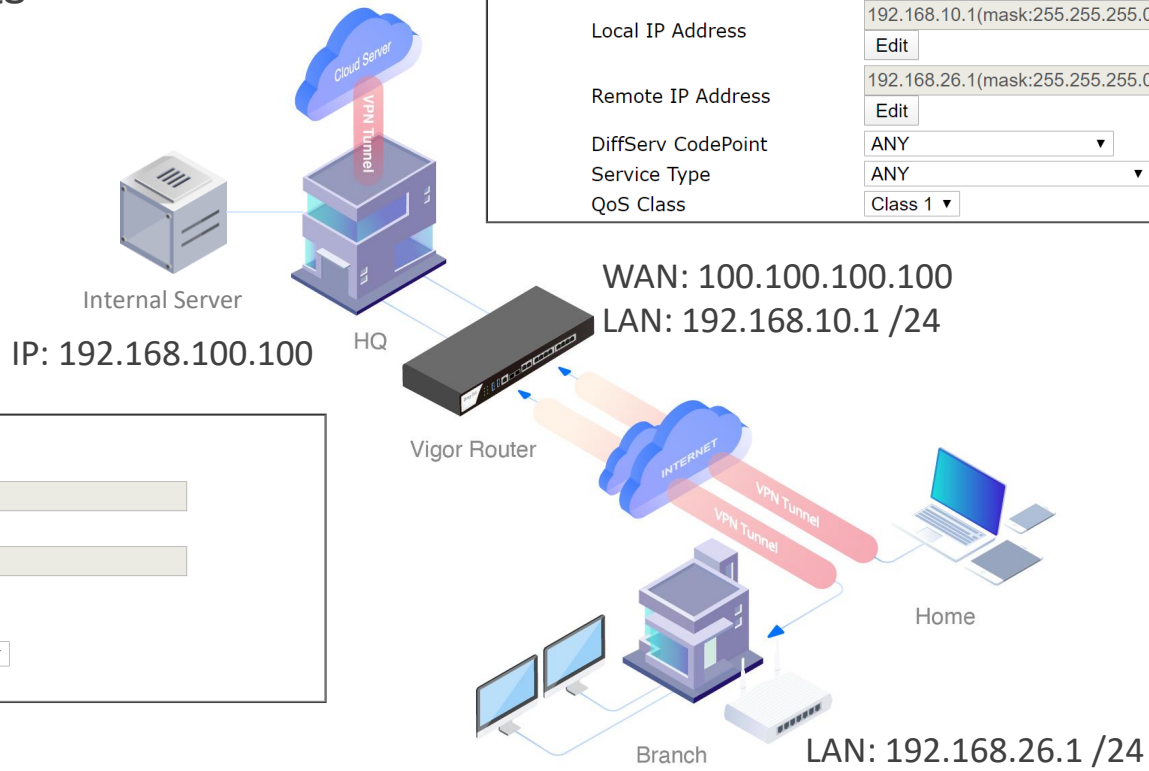
Or if you need a rule for specific LAN clients instead of all LAN clients.

Rule 1

Enable	
IP Version	IPv4 IPv6
Local IP Address	192.168.10.1(mask:255.255.255.0) Edit
Remote IP Address	192.168.26.1(mask:255.255.255.0) Edit
DiffServ CodePoint	ANY
Service Type	ANY
QoS Class	Class 1

Rule 2

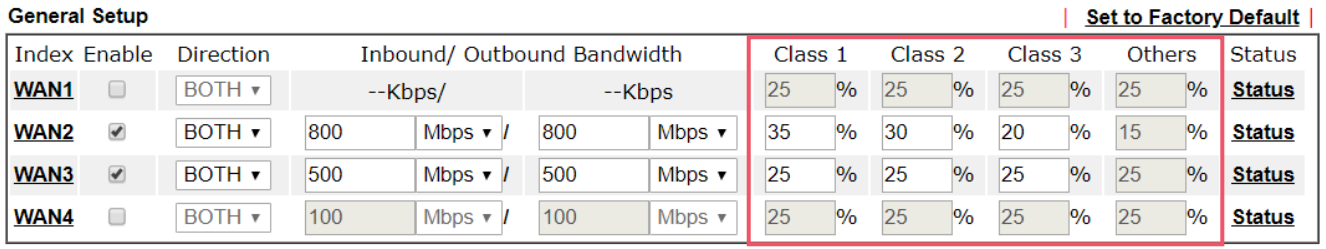
Enable	
IP Version	IPv4 IPv6
Local IP Address	192.168.100.100 Edit
Remote IP Address	Any Edit
DiffServ CodePoint	ANY
Service Type	---Predefined---
QoS Class	Class 1



Flexible Bandwidth Allocation with QoS in 3 Steps

1. Define your WAN bandwidth and operational direction
2. Specify the business critical apps and their importance
   - With App QoS and QoS rules
3. Reserve corresponding bandwidth ratio for business critical apps
   - It is recommended to reserve bandwidth for high-priority classes (bandwidth can be used by other less-priority classes when available)

	Class	VoIP	Class 1	Class 2	Class 3	Others	
Priority	High					Low	Priority
Bandwidth Ratio	High	176 Kbps				Low	Bandwidth Ratio
	Apps	VoIP	VPN DNS **Skype**	HTTP **Office 365**	**YouTube** **Facebook**	Others BitTorrent	



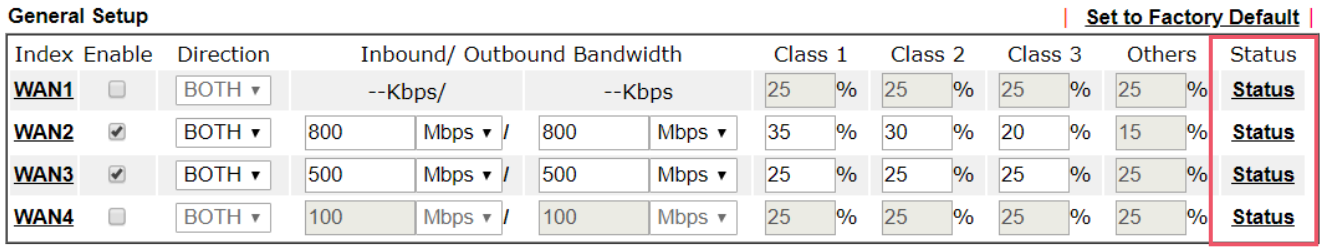
General Setup | Set to Factory Default |

Index	Enable	Direction	Inbound/ Outbound Bandwidth		Class 1	Class 2	Class 3	Others	Status
WAN1	☐	BOTH	--Kbps/	--Kbps	25 %	25 %	25 %	25 %	Status
WAN2	☑	BOTH	800 Mbps /	800 Mbps	35 %	30 %	20 %	15 %	Status
WAN3	☑	BOTH	500 Mbps /	500 Mbps	25 %	25 %	25 %	25 %	Status
WAN4	☐	BOTH	100 Mbps /	100 Mbps	25 %	25 %	25 %	25 %	Status

Flexible Bandwidth Allocation with QoS in 3 Steps

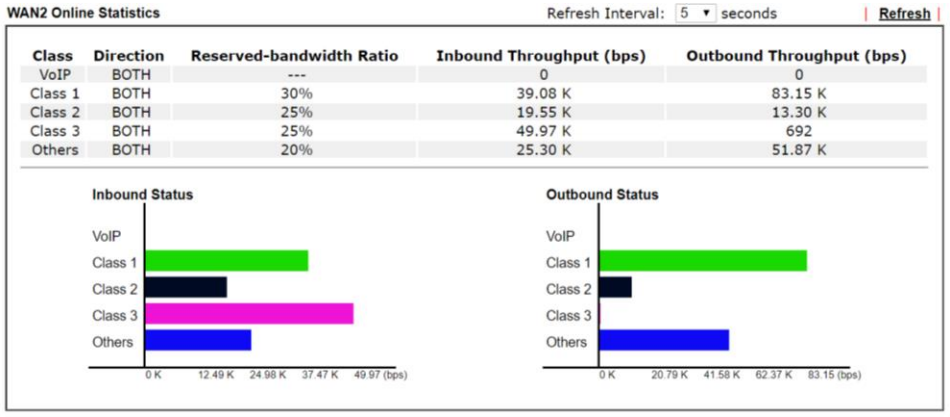
1. Define your WAN bandwidth and operational direction
2. Specify the business critical apps and their importance
   - With App QoS and QoS rules
3. Reserve corresponding bandwidth ratio for business critical apps

- All set! Then it is available to verify the status.



General Setup | Set to Factory Default |

Index	Enable	Direction	Inbound/ Outbound Bandwidth	Class 1	Class 2	Class 3	Others	Status
WAN1	☐	BOTH	--Kbps/ --Kbps	25 %	25 %	25 %	25 %	Status
WAN2	☑	BOTH	800 Mbps / 800 Mbps	35 %	30 %	20 %	15 %	Status
WAN3	☑	BOTH	500 Mbps / 500 Mbps	25 %	25 %	25 %	25 %	Status
WAN4	☐	BOTH	100 Mbps / 100 Mbps	25 %	25 %	25 %	25 %	Status



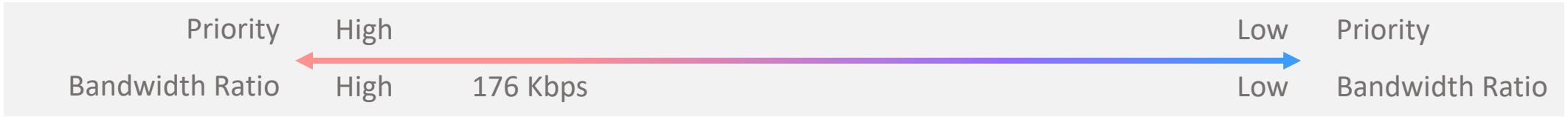
WAN2 Online Statistics Refresh Interval: 5 seconds | Refresh |

Class	Direction	Reserved-bandwidth Ratio	Inbound Throughput (bps)	Outbound Throughput (bps)
VoIP	BOTH	---	0	0
Class 1	BOTH	30%	39.08 K	83.15 K
Class 2	BOTH	25%	19.55 K	13.30 K
Class 3	BOTH	25%	49.97 K	692
Others	BOTH	20%	25.30 K	51.87 K

App QoS Is Improved!

- 110+ apps supported → 150+ apps supported
- Popular apps can be inspected and classified into different classes

	Class	VoIP	Class 1	Class 2	Class 3	Others
Basic App QoS	**Apps**	VoIP	DNS	HTTP	**Skype** **YouTube** **BitTorrent**	Others



Improved App QoS	**Apps**	VoIP	DNS **Skype**	HTTP **Office 365**	**YouTube** **Facebook**	Others BitTorrent

Routers with Improved App QoS

	Dual DSL WAN		Dual Broadband WAN	
	Vigor2862 Series	**Vigor2865 Series**	**Vigor2926 Series**	**Vigor2927 Series**
				
WAN	1 x RJ-11 DSL WAN (VDSL2 30a) + 1 x GbE WAN	1 x RJ-11 DSL WAN (VDSL2 35b) + 1 x GbE WAN	2 x GbE WAN	2 x GbE WAN
NAT Throughput	500 Mbps	800 Mbps	500 Mbps	800 Mbps
Max. NAT Throughput With QoS Enabled	300 Mbps	To be tested	300 Mbps	To be tested
Max. NAT Sessions	50k	60k	50k	60k
Firmware Supported	Since f/w 3.9.4	Since f/w 4.2.0	Since f/w 3.9.4	Since f/w 4.2.0