

CREXENDO VIP NETWORK SETUP/BEST PRACTICES:

This document outlines the necessary steps to configure your customer's network to allow the Crexendo VIP phones, MobileWeb, Mobile and CrexendoHD products to function correctly and smoothly.

A customer's network should be configured to best industry practices to provide VOIP traffic proper signaling and quality of service. A network administrator should take into account the proper items and best practices to have a successful installation and high quality baseline:

- **ISP Connectivity**
 - Broadband – install or verify you have a modem that is able to be put into a bridge or pass-through mode.
 - Best model modems usually provide one coax input and one or two Ethernet outputs that can be connected to your firewall.
 - Fiber – Ethernet handoff to the firewall
 - DHCP/Static – this is a customer preference, our service will function with either setup. The firewall WAN interface should have a Public IP Address.
- **ISP Throughput**
 - The download and upload speeds should be considered when adding VOIP or any additional services to your network.
 - Network administrator should allocate enough bandwidth (download/upload) for data services and for VOIP traffic.
 - VoIP Traffic takes up approximately 100-120kbps per active call.
- **Firewall**
 - A business class firewall is required to provide proper SIP signaling, QoS and traffic shaping.
 - Examples: Sonicwall TZ/NSA models; Watchguard, Sophos, Fortinet, Meraki, etc... (please see our list of “Recommended/Tested Firewalls”)
- **Network Switches**
 - A business class switch is required to provide best practice LAN configurations for VoIP and Data.
 - POE is recommended to eliminate the need for power adaptors for phone devices.
 - Managed Switch will allow a network administrator to configure VLANs, QoS and security on the network.
- **Network Segmentation**
 - Proper segmentation of network services is best industry practice
 - Provide separate logical VLANs for your VoIP and Data traffic.
 - This will allow the network admin to use/share one Ethernet cable between a phone and computer. This would logically segment the traffic by tagging the VoIP traffic to a specified VLAN and the Data traffic to it's own/or Native vlan.
 - Provide separate physical Ethernet jacks for VoIP devices (on Voice VLAN) and for Data devices (on Data VLAN).

FIREWALL BEST PRACTICE CONFIGURATION

Below are the key elements to allowing full functionality and high quality VoIP through your firewall. For the specifics of how to implement each item you may need to refer to the manufacturer documentation.

Note: Crexendo VIP traffic IP Addresses, URLs and Ports are listed below. Please use this table when creating your rules:

VIP Ports:

Port	Protocol	Application	Description
5080	TCP and UDP	SIP	SIP Signaling
5082	TCP and UDP	SIPS	Secure SIP Signaling
20000-27999 24000-25999	TCP and UDP	RTP	SIP Phone RTP
80 443 8000 8001 8080 8443 5080 5082 9002 20000-21999 (RTP) 24000-25999 (RTP) 19302 (STUN service)	TCP and UDP	WebSockets/Provisioning stun.l.google.com	CrexVIPMobile, WebPhones, Physical Phones

VIP Geo IP Addresses and URLs:

FQDN	IP Address	Description
usw.crexendovip.com	136.179.46.97	west
usc.crexendovip.com	162.217.15.97	central
use.crexendovip.com	155.130.141.97	East
portal.crexendovip.com/portal	136.179.46.100 136.179.46.96/28 162.217.15.96/28 155.130.141.96/28	CrexVIPMobile, WebPhones, Physical Phones

VIP Additional Services IP Address and URLs:

Service	IP Address	URL Filtering	Ports
VIP Enterprise Fax – ATA's	54.219.249.208 52.32.130.83	ataini.ipfax.net ataserver.ipfax.net	TCP 80 TCP 442 TCP 443
CrexendoHD – video conferencing DNS Entries Current Active Conferencing Clusters & (AWS Tenet Floater)	ap-south.snaphd.io ca-east.snaphd.io eu-west.snaphd.io us-east.snaphd.io us-west.snaphd.io us-west.snaphd.io 3.130.158.184 18.130.7.254 35.183.150.146 35.175.185.150 52.34.73.65 54.188.133.147 54.153.249.187	usw.snaphd.com use.snaphd.com	8080 8081 443
Google Text to Speech Info	Please review Googles Site: https://www.gstatic.com/ipranges/goog.json		
Yealink Redirect Trusted IP's/Ports	https://support.yealink.com/en/portal/knowledge/show?id=035c46eea77827eb20d53a4d		

SIP ALG

SIP ALG is a proxy function of firewalls that allows the firewall to translate and speak as a “proxy” to VoIP providers SBC and Endpoint servers. This communication on most firewalls tends to have difficulty making this translation (i.e. translating English to Greek, then Greek to English on its way back), the signaling may get malformed.

- We recommend on most firewalls to disable SIP ALG.
- Only on certain Cisco ASA model’s do we recommend enabling or keeping SIP ALG on:
 - IOS versions between 8.2 to 9.3
 - If the IOS version is 9.4 and above disable SIP ALG (“no sip-inspect” within the policy-map global_policy)

UDP Timers

UDP timers come in play on networks with VoIP devices where there is a registration cycle that keeps the session and pinholes open for communication between the VoIP device and Crexendo VIP servers. Depending on your firewall’s default setting we recommend raising the UDP Timers to ensure the session and port is not torn down.

- UDP Timer or UDP Inactivity Timers
 - Set to anything above 60 seconds, we typically use 80 seconds as a standard.
- Cisco ASA and ISR models we use the following CLI commands to update:
 - `timeout xlate 3:00:00`
 - `timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 icmp 0:00:02`
 - `timeout sunrpc 0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00 mgcp-pat 0:05:00`
 - `timeout sip 1:10:00 sip_media 0:10:00 sip-invite 0:03:00 sip-disconnect 0:02:00`
 - `timeout sip-provisional-media 0:02:00 uauth 0:05:00 absolute`

Access Control Lists

ACLs are security lists that allow or deny specified traffic flow within and through a firewall or router. Depending on your network design and setup some instances require very specific traffic to be allowed through a firewall while simpler designs may already have all traffic allowed. ACLs also help with adding QoS services, UDP timers, bandwidth management rules to be applied to in our case specified VoIP traffic.

- Outbound ACL’s
 - Allow VoIP defined traffic (see table above) by ports and IP Addresses.
 - Allow NTP traffic for the devices on this subnet.
 - Allow DNS lookup for the devices on this subnet.
- Inbound ACL’s
 - Allow inbound traffic from the IP Addresses defined in above table to the VoIP device subnet.

QoS

Quality of Service, allows the firewall to prioritize the VoIP traffic over normal data traffic. The QoS can be identified based on DIFF SRV tag (EF 46), ports or destination IP Addresses (see table above.)

- Define the VoIP Specified traffic to be “Priority” traffic when traversing the firewall.
- On a lot of firewall’s this can be done within the ACL rules and ordering of the ACL rules putting the more important traffic (VoIP) at the top of the list.

Note: Typically we can only control the outbound traffic’s priority.

Traffic Shaping/Bandwidth Reservation

Shaping or reserving of bandwidth allows a network administrator to allot a static or dynamic (depending on firewall model) amount of bandwidth for VoIP traffic. Shaping goes hand in hand with QoS/Prioritizing VoIP traffic.

These features together help protect the quality of the voice traffic even on high transactional, high volume firewalls and incase of bandwidth saturation.

- Configure either traffic shaping or bandwidth reservation to allot for a minimum of half the number of VoIP devices on the network. Also allowing bandwidth up to what is needed (infinite) or if the all the VoIP devices were active at the same time.
- I.E. If 10 phones are on a network, I would set my minimum bandwidth limit to be at least 500kbps (5x100kbps) and a max of 1-1.5mbps.
- Some models use percentage % for the shaping, this can be calculated in the same way based on the upload bandwidth

Other Considerations

All business class firewall’s have many different security modules added to their software. We want to make sure that we “whitelist” or “exclude” all VoIP traffic from any of these types of services. The goal is to provide the VoIP traffic with the most efficient path in and out of your companies firewall. Below are some services that you will want to disable or whitelist the VoIP traffic detailed in the table above:

- Antivirus
- DPI – Deep Packet Inspection
- Intrusion Prevention
- Content Filtering

Once these items have been configured you will be ready to install and implement the Crexendo VIP Phones on your network with confidence.

If you have any further issues please contact us by opening a ticket at support@crexendo.com

Crexendo Operations Support Team