

Evolution PBX and Your Data Network



Document Version 1.0

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Evolution PBX Network Scope Definitions

Intuitive Voice Technology provides support for Evolution PBX, iView software, and hardware purchased from Intuitive Voice.

Intuitive Voice does not provide free configuration or support of WANs or LANs unless otherwise contracted. Diagnosing or repairing problems related to your WAN or LAN is limited to eliminating Intuitive Voice software as the culprit and providing best-effort consultation and diagnostics. Standard Evolution PBX Support Agreements do not modify WAN or LAN this support policy unless otherwise contracted.

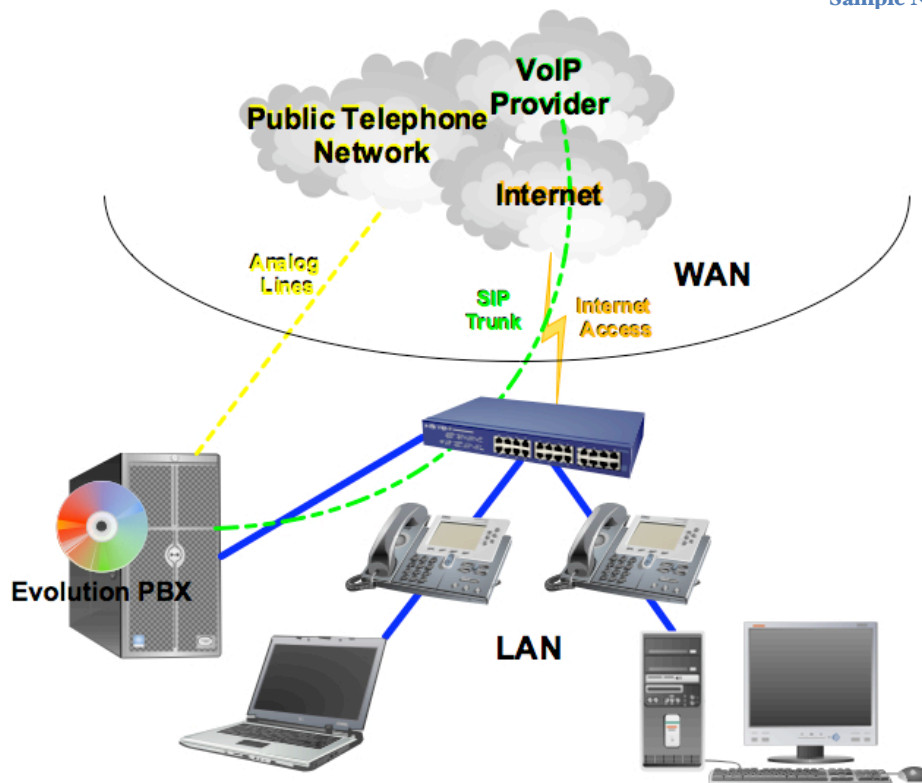
Intuitive Voice support for network hardware including routers, firewalls, and switches is limited to best-effort configuration guidance and information. Professional Services or other paid services may be required for network support or configuration.

Note: Email pbxsales@intuitivevoice.com or call 602-249-5750 to request a quote for Professional Services or Technology Guidance Services.

Local Area Network

Your Local Area Network (LAN) is the physical data network that is inside your office building. The LAN typically consists of one or more Ethernet switches and copper twisted-pair cabling. Evolution and supported telephones require Ethernet switches (not hubs) and require Category 5e or better twisted-pair cabling. You must have a switch with enough ports to plug in the Evolution PBX server and all of the telephones that you plan to have in your office. You will likely need at least two or more ports for other purposes as well. For example, an Evolution system with ten Polycom telephones will require at least eleven Ethernet ports plus whatever other devices that may need to be connected to your network.

Sample Network Diagram



Note: Some network hardware may be a multifunction device. For example, your Internet router may actually be a modem, router, and switch contained in one box. Most residential and small business devices include at least a router and switch but often also include a DSL modem, firewall, or a wireless access point. Please be aware of the multifunction device concept when reading this document.

Advanced Ethernet switches may offer additional benefits such as Power over Ethernet (PoE) and Quality of Service (QoS).

Power over Ethernet provides a convenient method of supplying power to telephones that support PoE. VoIP telephones normally require an AC power adapter but PoE allows for simplified telephone installation and in some cases reduces the cost of each telephone if the AC power adapter is not purchased.

Quality of Service is a method of controlling bandwidth on a network by keeping track of different types of traffic and ensuring that designated traffic is cared for or guaranteed compared to standard or low priority traffic. QoS can help voice traffic get through your network without being trampled by standard data traffic (such as surfing the Web or sending an email). There are different types of QoS that can be configured for both your LAN and your Wide Area Network (WAN or maybe Internet access).



Note: Email pbxsales@intuitivevoice.com or call 602-249-5750 to request a quote for your new network hardware or for Professional Services to assist with your current hardware.

Intuitive Voice does not provide configuration or support of LANs unless otherwise contracted. Diagnosing or repairing problems related to your LAN is limited to eliminating Intuitive Voice software as the culprit and providing best-effort consultation and diagnostics. Standard Evolution PBX Support Agreements do not modify LAN support unless otherwise contracted.

Wide Area Network

Your Wide Area Network (WAN) is your Internet access and also includes private or virtual connections to other offices if your business network is so configured. There are many different Internet access technologies and each may offer different VoIP capabilities. Typical Internet access types include DSL, cable modem, and dedicated T-1. DSL and cable modem are frequently oversubscribed so that you share some amount of bandwidth with other Internet Service Provider (ISP) customers. This sharing creates the potential for VoIP quality issues. T-1 Internet access is usually dedicated bandwidth to one customer. This improves your odds that your VoIP traffic will not be affected by other customers traffic but does not improve your own data traffic interaction with your own VoIP traffic. Some ISPs offer Quality of Service features to improve your VoIP quality.

Note: Did you know that Intuitive Voice Technology can help with your next Internet connection? Email pbxsales@intuitivevoice.com or call 602-249-5750 to request a quote for a dedicated T-1 with QoS support.

It is important to consider your Internet access hardware, and in particular your router and firewall. Some routers are known to have difficulties with VoIP and other routers require specific configuration to work with VoIP. Lower priced network hardware may not be built with as high standards as enterprise routers (such as those frequently offered for dedicated T-1 lines) whereas enterprise routers may require advanced configuration knowledge.

Router and Firewall Recommendations

Following is a non-exhaustive list of routers and firewalls that Intuitive Voice has positive or negative experiences.

Routers and firewalls that have caused problems are as follows:

- Linksys BEFSR series such as the BEFSR41 - known to cause problems with SIP VoIP.
- Linksys RVO series such as the RVO42 - may interfere with Network Time Protocol (NTP) causing inaccurate time or date on Polycom telephones.
- Netgear FVX538 - known to cause problems with SIP VoIP.

Routers and firewalls that require firmware updates and/or require special configuration:

- Linksys WRT54G - may have problems with port forwarding, update to the latest firmware.
- Linksys RVS4000 - questionable support of SIP VoIP.
- Microsoft ISA Firewall - may work well but requires professional configuration.
- SonicWall Firewalls - may have problems supporting SIP VoIP, may require professional configuration, update to the latest firmware.
- Watchguard Firewalls - may require professional configuration.
- Cisco PIX Firewalls - may require professional configuration (remove all fixup protocol statements for SIP).
- Cisco routers - may require professional configuration.

Routers, firewalls, and Ethernet switches that Intuitive Voice supports* with Evolution PBX:

Draytek Vigor 2910

- Draytek Vigor 3300v
- Draytek Vigor 2910, 2910g, 2910v, 2910vg



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Port Forwarding

Your router or firewall may require port forwarding to work with VoIP providers or remote VoIP telephones. Following are the ports that may be important to your service:

Note: Port forwarding and firewall rules are complex subjects. Please contact your network specialist for more information about securing your network. Email pbxsales@intuitivevoice.com or call 602-249-5750 to request a quote for Professional Services or Technology Guidance Services.

- **22** - TCP port 22 is used for SSH, a remote terminal configuration protocol. Intuitive Voice Technology uses this port for remote diagnostics and custom configuration requests. Forwarding this port from the Internet to Evolution is optional but may be required for many support and configuration requests.
- **69** - UDP port 69 is used for TFTP (Trivial File Transfer Protocol) configuration file loads. Remote VoIP telephones and devices that are automatically provisioned require this port to be open. Forwarding this port is required if automatic configuration is desired for remote devices such as Polycom telephones.
- **80** - TCP port 80 is used for standard web traffic (http). Forwarding port 80 allows access to the Evolution web interface. Intuitive Voice Technology uses this

port for remote diagnostics and custom configuration requests. Forwarding this port from the Internet to Evolution is optional but may be required for many support and configuration requests.

- **123** - TCP port 123 is used for NTP (Network Time Protocol) to provide automatic date and time for supported telephones (Polycom, Linksys, Cisco).
- **5060-5061** - TCP and UDP ports 5060 and 5061 (sometimes 5062-5063 are referenced as well) are used for SIP (Session Initiation Protocol) to provide call signaling and registration information. 5060 typically must be forwarded from the Internet to Evolution for remote devices to register and make calls over the Internet. These ports are also typically mandatory for VoIP service provider accounts. Some cases have been reported of specific router or firewall models that will ONLY work when forwarding only UDP and not RTP for SIP traffic. Please experiment or contact your hardware provider for additional information.
- **10000-20000** - UDP ports 10000 to 20000 are used for RTP traffic (Real-time Transport Protocol). RTP is the protocol that transmits the audio for a telephone call. 10000-20000 typically must be forwarded from the Internet to Evolution for remote devices to hear and be heard. The whole range may not be required depending on what type of telephone you are using and how many calls you will make over your Internet connection. These ports are also typically mandatory for VoIP service provider accounts. Check with your VoIP service provider to verify the ports that they require to be forwarded (some service providers may require 8000 to 10000 rather than 10000 to 20000).

Refer to your router or firewall manufacturer for information about how to forward ports on your device or email pbxsales@intuitivevoice.com or call 602-249-5750 to request a quote for a new router or Professional Services quote.

For Additional Help

You can download documentation for Evolution PBX by visiting <http://www.intuitivevoice.com/wiki.htm>. If you have questions or need technical assistance with Evolution PBX call (602) 249-5750 or send an email to support@intuitivevoice.com.

If you have questions about third party hardware or software please visit the following websites:

Cisco VoIP Telephones: <http://www.cisco.com>.

CouterPath Software Telephones - <http://www.counterpath.com>.

Digium PCI Cards: <http://www.digium.com>.

Draytek Routers: <http://www.draytek.us>.

Linksys Analog Terminal Adapters and VoIP telephones: <http://www.linksys.com>.

Polycom VoIP Telephones: <http://www.polycom.com>.

Sangoma PCI Cards: <http://www.sangoma.com>.

Errata

Please report errors or confusing descriptions by sending an email to support@intuitivevoice.com.