



Determining
Network Readiness
for
Unified
Communications

What's Covered

Benefits of Unified Communications

Is My Network Ready?

Sizing up Your Solution

Company Growth

The Right Networking Equipment

Network Port Requirements

Network Connectivity

Remote Users

What Switchvox Appliance is Right for You?

The Telecom world has been through many whirlwind changes in recent years. It's time for you to prepare your network for the upgrade.

Switchvox Cloud® and Switchvox On-Premise systems have made deploying a Unified Communication system for your company easier and less expensive than ever before. An analysis of your network and the number of users you wish to have will help you decide the best fit for your SMB.

This document will help you prepare your network for a Switchvox platform. We will cover details about network traffic, routing, VPN access, firewall functionality, multiple networks, home users, and much more.

Benefits of Unified Communications

Today, you are no longer asked if you need a Unified Communications platform, but which UC platform. You might have a phone system sitting in your back office. Or you're using a key system that isn't providing you the functionality you need. You want to leverage all the benefits of UC applications in one streamlined system.

Network infrastructures are changing. Your telephony, video, and data applications are converging over IP. You are using more cloud-based services and utilizing a mobile workforce. Unified Communications integrates these applications into a single, seamless interface to make your business more accessible and efficient. Constantly evolving, Switchvox provides an intelligent communications platforms that is cost effective, easy to use, and robust enough to get the job done.

Unified Communications integrates applications into a single, seamless interface to make your business more accessible and efficient.

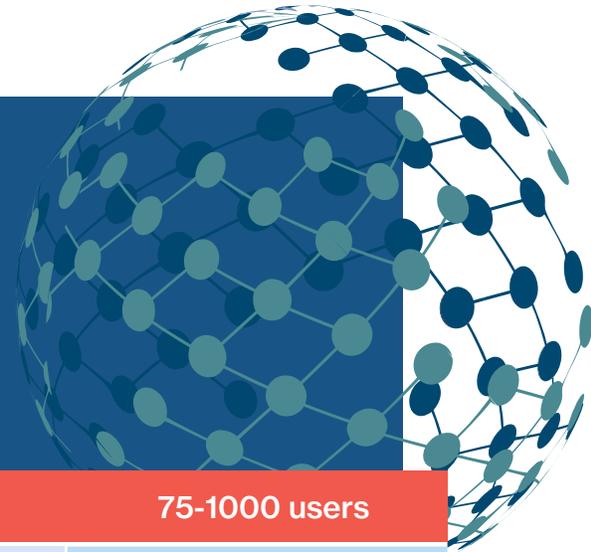
Is your network ready?

Below are a few questions about your company and the typical equipment used by each group. Your answers will help you make the tough decisions about your network and what type of equipment you'll want to install to make sure Switchvox addresses your needs and works seamlessly with your business.

How many users do you have?	Few users	Many users	Many users
What kind of networking equipment are you using?	Consumer Class	Limited Managed	Fully Managed
How many ports do you need per user?	Only 1	Usually 2	Many Available
What kind of Internet connection do you have?	DSL/Cable Modem	T1 or smaller	A Few Remote Users
Do you have remote users?	Many Remote Users	Metro-E/MPLS	Many Remote Users

How many users do you have?

The number of users you have and the location of the users is not only important to determine whether you should deploy Switchvox on a dedicated appliance, in a virtual environment, or in the cloud, but it is also important for the type of network equipment you need to address your business requirements. (You will learn more about your current networking equipment in the next section.)



How many employees does your company have?

1-30 users

With 1-30 users, your networking equipment should not impede your ability to successfully make high-quality audio calls. The amount of bandwidth that voice traffic requires is minimal – even basic networking equipment has enough processing and throughput capacity to transmit calls and data at the same time.

30-75 users

As users in your company grow, your networking needs will change. Addressing this is as simple as installing a more advanced router or a switch with a higher port density. On a 30-75 user network, you will want to ensure you have the right equipment to properly handle your voice needs.

75-1000 users

If your company has more than 75 users, you will need more intelligent networking equipment with greater processing capabilities, stronger security, and a system equipped to handle the greater amount of simultaneous voice and data traffic.

What Happens When My Company Grows?

Using Switchvox ensures that your company won't get stuck with an expensive legacy phone system that can't keep up with your growth. During any network upgrade or with any new installation, it is best to plan for the future. If you know you won't have more than 50 users in your network for the next few years, there is no good reason to upgrade in order to handle 200+ users. However, if your company is growing quickly, it is worth the extra investment in intelligent networking equipment to make sure that your service quality does not suffer.

Now that we've outlined the number of users, let's look at the right networking equipment for each category. Before installing Switchvox, deploy an optimized network for your number of users. The next few pages walk through how to optimize this network.



What is Quality of Service?

Quality of Service (QoS) provides prioritization of network traffic to help ensure that the most important data goes to the top of the queue and gets through the



network as fast as possible. QoS refers to an overall performance of your telephony or computer network, mainly the performance seen by the users of your network transmitting traffic. Network traffic is multimedia information such as high-bandwidth video, voice, and messaging.

With an unmanaged switch (typically, a consumer-class switch), all network traffic is sent as it is received. No differentiation or fragmentation is assigned to types of traffic or traffic order. This means that as one person is sending a large video file over your network or server, they will be using up a large portion of the available bandwidth for that application and could starve out other applications such as voice. If someone later picks up the phone to make a call, this call will also be transmitted on the same network pipe as the video file, but with a lower priority.

Just adding one more call to your network can cause your audio quality to suffer!

If you need any additional bandwidth, your network isn't capable of providing it on a 100 Mbps interface without any other settings in place to prioritize or fragment that bandwidth. What happens if you make another call, or you want to transfer more data at that time?

Just adding one more call to your network can cause your audio quality to suffer

If you need any additional bandwidth, your network isn't capable of providing it on a 100 Mbps interface without any other settings in place to prioritize or fragment that bandwidth. What happens if you make another call, or you want to transfer more data at that time?

How to Prioritize Voice Traffic

This is where QoS comes in. In an unmanaged network, the video traffic and voice traffic will interfere with each other, competing for bandwidth. This is why voice calls will sometimes sound great and other times sound horrible. When voice quality fluctuates, installing QoS capable switches and routers are the first steps to fixing the problem.

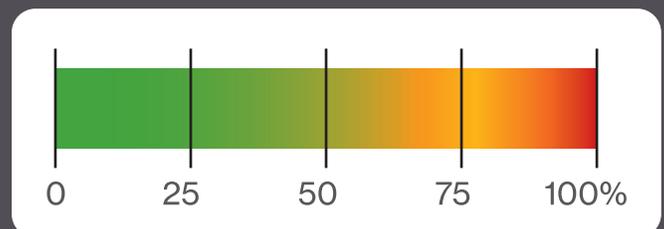
With managed switches, the Switchvox platform can tell the network switch that it is trying to send highly important voice data tagged with special QoS information. If the network supports it, the voice traffic will then take priority over the data traffic.

Does QoS work over the Internet?

Unfortunately, due to the nature of the Internet, there is no way to guarantee QoS on an Internet connection. This is because the QoS information (or tag) is stripped off the network traffic before it even hits the Internet.

Tagging Voice Packets

Switchvox can't tag your voice packets with QoS information. If you make a call through a SIP provider, or to another site over the Internet, there is a risk that the voice quality will suffer. We will cover methods of increasing audio quality over the Internet later.



The Kind of Networking Equipment You Choose Can Affect Your Voice Quality

The kind of networking equipment you choose is critical for voice. Companies with fewer employees, (e.g., under 200), may want to consider Switchvox Cloud. In addition to providing a low-cost full-scale UC solution, Switchvox Cloud offers fewer networking requirements.

In a smaller company you typically have fewer employees and less voice, video and data traffic. For example, if your company is a small retail store with a few phones and has a couple of Point of Sale (POS) terminals with no desktop computers, then you won't be transmitting a significant amount of data. Most data networks of any class provide enough bandwidth for simultaneous voice and data communications.

However, if you have many active computer users, all of whom are sending and receiving large files, actively using email, watching videos and more, then you'll want Switchvox On-Premise networking equipment with 1000Mbps switches, in order to process and prioritize all of this simultaneous traffic.

Note: Some Consumer Class routers also act as switches, and have a web interface for configuration. Don't confuse this with a managed switch, as they most likely will not allow you to use QoS on your network!

Networking Equipment Categories

Consumer Class	Limited Managed	Fully Managed
Consumer class switches are typically found in over-the-counter retailers. These types of switches are not built for rigorous data traffic. Low-priced consumer electronics are more likely to fail in a high traffic business environment. Security issues with consumer-based switches are also a concern. In addition, these switches will not offer QoS or any form of network management.	A limited managed network includes managed switches, but no central management between sites. With a limited managed network, QoS settings will typically only cross switches and routers in which you have configured QoS. If you are using any sort of unmanaged switch or router on your network, then you will lose QoS settings.	A fully managed network ensures that QoS traffic is properly transmitted across all switches and routers in your company. This will allow you to optimize your bandwidth so voice will take precedence over data. When transferring a data file, you will eventually receive the full file over a busy network.

What is Half-duplex?

First, let's talk about the concept of "full-duplexing." Full-duplexing is when a signal travels in both directions at the same time on a single path. For example, full-duplexing allows data to be transmitted and received at the same time, on the same circuit.

Half-duplex is data transmission in one direction at a time. If your network is only transmitting at half-duplex, then your phone is not able to effectively converse with the Switchvox system.

This is normally not an issue for data, but since voice traffic is real-time, it can cause issues such as delay, jitter, and packet loss. (Half-duplex technology is not typically deployed in new networks today.)

What is Delay?

Delay occurs when there is higher-than-normal latency on your network. Latency doesn't typically cause audio quality issues, but when the latency is over about 150ms, the delay is noticeable to your users.

What is Jitter?

Jitter occurs when voice packets arrive with varying delays. This is caused by changes in latency and can typically be fixed by using QoS, or reducing the amount of traffic your network equipment is handling.

Your users will often report jitter as poor audio quality. Asterisk, the telephony engine that Switchvox is built on, supports an intelligent Jitter Buffer, which allows the system to keep your users from hearing the jitter. However, if the jitter is too high, you'll have to fix the underlying network issues to improve audio quality.

What is Packet Loss?

Packet Loss happens when one or more packets of data traveling across a network fail to reach their destination. Normally, this is not a big issue, but if your network starts to lose a lot of packets, the voice conversation will exhibit odd sounds in the middle of the conversation. This can also be fixed by tuning your network with QoS settings and ensuring voice traffic is the primary traffic on the network.

How Many Ports do You Need Per User?

The number of network ports your company has per user is an important metric, considering it dictates which phones you can purchase. You will need enough ports for all of your users. If these ports need to share a phone and PC, then you should select phones with built-in switches. If you have a gigabit network and require gigabit speeds for your PCs, you will need gigabit switches.

Since Switchvox is standards-based, you can choose any SIP-compliant VoIP phone available and use it with Switchvox. This allows greater flexibility when choosing a phone. Select phones for the user experience, pricing, and even administration. Switchvox paired with Sangoma IP phones makes phone provisioning easy and can be set up very quickly.



Only 1

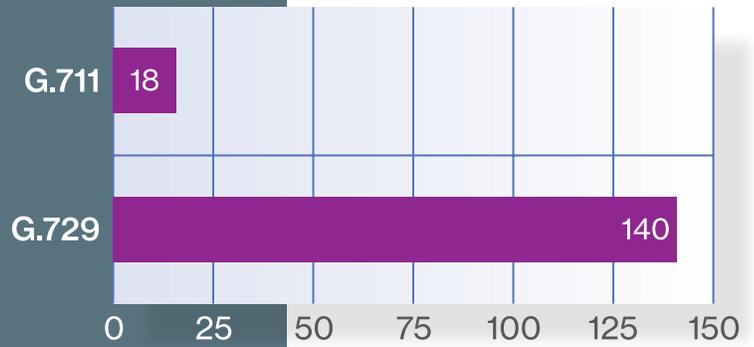
There are many models on the market that offer a switch port. Some have gigabit or 100 Mbps switches, and you'll want to be sure to get the right phone to fit your network.

Usually 2:

If you can offer your users a separate network port for their phone, it will make administration easier. Connecting a computer into a phone can sometimes be counter-intuitive. 2-ports per user will offer your phone a bit more reliability.

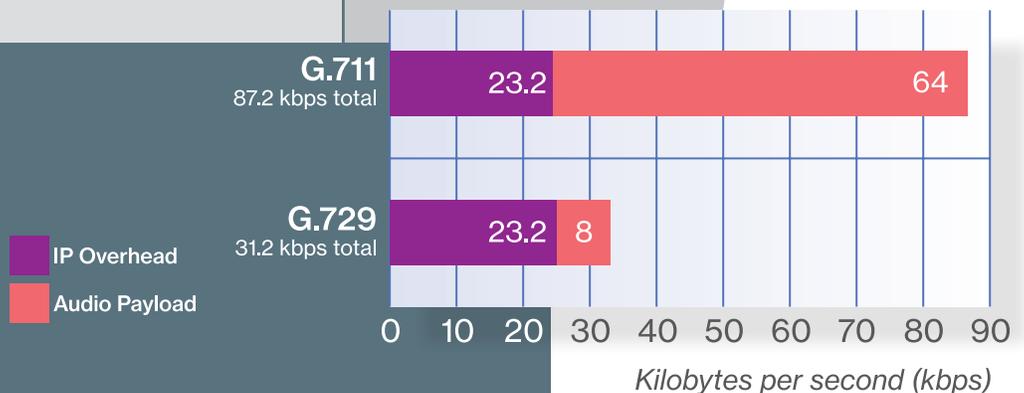
What Kind of Internet Connection Do You Have?

Your Internet Service Provider will play a significant role in your phone service. Your internet connection will need to have proper bandwidth available at each company location. You will want a high upload speed or broadband service of approximately 1000Kbps up/down per call multiplied by the number of concurrent calls at your company's peak.



Approximate number of simultaneous calls (using AX2 trunks)

Consumer Class	Limited Management	Fully Managed
<p>DSL and Cable Modems. Though DSL is considered “high speed,” the data rate can be slow when applied to a business phone system. DSL rates can be as low as 1.5Mbps and as high as 20+Mbps. And, while cable modem rates can range from 10-100+ Mbps, this service usually offers lower upload than download connections.</p> <p>Note: Test your system before making a commitment to use either of these for all your calls.</p>	<p>T1 or similar connection. Typically, hundreds of users are able to share a T1 line comfortably. In addition, with a T1 or similar connection, you will have a synchronous upload and download rate. Depending on the codec you use, a T1 may be sufficient for both your data and voice traffic.</p> <p>Note: If your data traffic requires more bandwidth or is queued up before your voice traffic, then you may run into audio quality issues.</p>	<p>Metro-E/MPLS. When your company selects a Metro-E/MPLS type of Internet connection, you typically will not experience voice quality issues. Metro Ethernet circuits can exceed 2 Mbps and may even support 10Mbps or Gigabit services.</p> <p>Note: You will want to ensure that your Metro-E/MPLS network is capable of some level of QoS, so that significant data transfers do not monopolize any inter-site voice traffic.</p>



Do You Have Any Remote Users?

Having remote users can sometimes cause unforeseen issues. For example, if you have a slower Internet connection, remote users might have audio quality issues on calls through the Internet. Increasing your available bandwidth, or decreasing the bandwidth required for each call, can fix this.

It is typically much easier to reduce the bandwidth of a call than to increase your available bandwidth. You can do this by changing the codec used by your remote users and your SIP provider with a low-bandwidth codec like G.729.



What is G.729?

G.729 is a Low-bandwidth Codec. This means that a G.729 call will take up a fraction of the bandwidth required to make a call with an uncompressed codec.

No Remote Users	A Few Remote Users	Many Remote Users
Since you won't have any remote users, the only Internet-based calls you will need to worry about are if you are using a SIP provider of any kind. If you are, you may want to look into using G.729.	With a few remote users and good Internet service, you won't have any trouble with calls over your internet connection. If your audio quality sounds good with the default codec, you won't need to use G.729 yet.	As the number of remote users increases, you will want to bring a VPN service online, and activate more G.729 on your network. This will be strictly a function of how big your Internet connection is, and how many calls you want to successfully make.

What's the Next Step to Getting My Network Ready?

By now you have determined that your network is ready for Unified Communications. You've addressed the networking hardware and voice quality settings, and invested in phones and other technologies that will make the most of your available bandwidth. You need a UC solution that will work with any phone and all types of networking services which will also save you money and provide all of the features for your business communications today and in the future.

If you've successfully addressed all of the networking considerations on the previous pages, your network is ready for Switchvox! The next step is implementation.



Why Switchvox is the Right Solution

Saves You Money

Out of the box, Switchvox Cloud and Switchvox On-Premise is more affordable than proprietary systems that have fewer features! And, because we don't lock you in to specific service providers or equipment vendors for your phones, you can choose a solution that fits your needs and your budget. Switchvox puts you in control of the most important asset in your business – your voice.

Grows With You

If you're like most businesses, you want a system that will easily accommodate future growth, without unexpected expenses. Scalability and advanced features are just what Switchvox provides. This family of appliances enables you to easily add new users and office locations as your business grows, without disrupting your current communication system. Plus, with the benefit of subscriptions, when new features are released, your system is always kept current. Updates are made server-side and all clients are updated at the same time.

Many Products in One

Switchvox is more than just a business phone system, it is a complete Unified Communications solution that combines the power of many products into one. Complete with a conference bridge, chat/instant messaging and fax server, you can easily consolidate some of your office activities and save more money in the process.

Easy to Manage

An intuitive point-and-click interface allows you to manage every aspect of Switchvox from anywhere you have internet access. Empower your employees to manage their own find me, follow me and voicemail boxes. You can easily know the "who, what, when, and where" of your business calls using Switchvox's extensive features, including the integration of caller ID, distinctive ringtones, and call history.

Phones Designed Exclusively for Switchvox

IP phones from Sangoma are designed exclusively for Switchvox. Offering the tightest integration possible, these phones incorporate plug-and-play installation saving you time. Extend your Switchvox system to your desktop phone with built-in apps or build your own apps with an open API. You can customize your complete communications experience whether you're in the office or on the road.



	D60 Entry-level	D62 Entry-level, Gigabit	D65 Mid-level	D80 Executive-level
	Entry- and mid-level phones with 2 line keys. These are the best value phones designed for any employee in the company. The D62 offers gigabit connectivity.		Executive-level feature phone with up to 20 pages of rapid dial/busy lamp fields for your most important contacts.	Executive-level gigabit phone with high-definition capacitive touch-screen and advanced user interface.
Line Registrations	2	2	6	6
Feature Keys	4	4	4	Touchscreen
Rapid Dial/ Busy Lamp Field Keys	Up to 1 key 1 contact	Up to 1 key 1 contact	Up to 5 keys 100 contacts	Up to 20 on-screen, scrolling to 100 contacts
Ethernet LAN and PC Port	10/100Base-T	10/100/1000Base-T	10/100/1000Base-T	10/100/1000Base-T

Switchvox Appliances



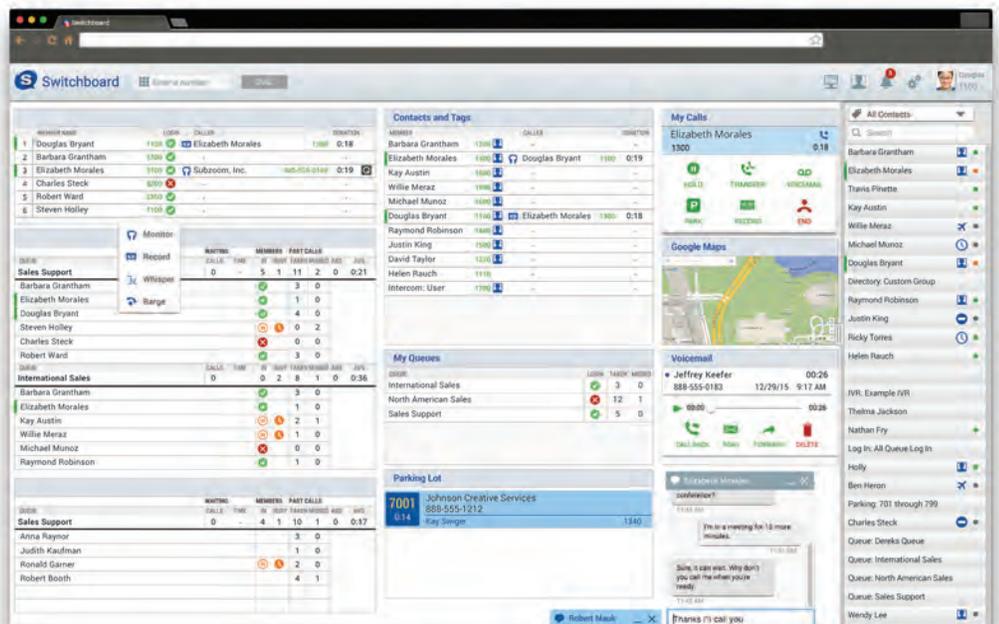
Four models to fit your needs. Starting from the top: Switchvox E510, Switchvox E520, Switchvox E530, Switchvox E540

	Switchvox E510	Switchvox E520	Switchvox E530	Switchvox E540
Phones	150	300	600	1000
Concurrent Calls	50	100	200	200
Storage	SSD	SSD	SSD	Mirrored SSD
Internal Dell Remote Access Controller (iDRAC)	No	No	iDRAC8 Enterprise	iDRAC8 Enterprise
Power Supply	External Wall 65W	External Inline 65W	Internal 250W	Internal Redundant 350W
Installation	Wallmount Bracket	Rackmount with Shelf (sold separately)	1U Rackmount	1U Rackmount
Dimensions (D x W x H)	4.5 x 4.5 x 2.0 (in) 114 x 114 x 51 (mm)	7.2 x 7.0 x 1.2 (in) 183 x 178 x 30 (mm)	19.5 x 19.0 x 1.7 (in) 495 x 483 x 43 (mm)	24 x 19.0 x 1.7 (in) 610 x 483 x 43 (mm)
Package Weight	3.5 lbs (1.6 kg)	6 lbs (2.7 kg)	24 lbs (10.9 kg)	38 lbs (17.2 kg)
Operating Temp	0°C to +50°C	+5°C to +35°C	+10°C to +35°C	+10°C to +35°C

There are many powerful options to choose from in the Switchboard interface.

Do you want to record calls? Do you want to integrate with Salesforce or create web mashups with Google Maps? All of that is possible, with just a few clicks of your mouse.

We can simplify phone system challenges for businesses just like yours. Thousands of small businesses have already recognized the benefits of this powerful, yet affordable solution.





Want to find out more about Switchvox?

Access product information, videos, white papers, and interactive demos at

www.Sangoma.com/Switchvox

Everything Connects, Connect with Sangoma®.

Sangoma is the leading provider of enterprise grade, value-based communications solutions.

With Sangoma, businesses of all sizes can find affordable hosted and on-premise Unified Communications (UC) systems with advanced functionality.

Sangoma offers a complete portfolio of next-generation UC solutions, delivering industry-leading quality at price points that maximize customers' return on investment.

For more information on Switchvox: www.Sangoma.com/Switchvox • +1 256-428-6271 • sales@sangoma.com

Sangoma Headquarters: +1 256-428-6000 • www.Sangoma.com

Recognized as the best value in UC.

