Is Your Network Ready for UC

TPX

It's a good idea to look at your network infrastructure and capabilities now — before you decide to make the switch.

INTRODUCTION

So, you're thinking about deploying a hosted Unified Communications (UC) service. Gaining the latest and greatest communications tools, without having to purchase or maintain new hardware, may sound too good to be true... but it is true!

Because you'll be replacing that old PBX with a direct connection to a hosted service, it's a good idea to take a look at your network infrastructure and its capabilities now — before you decide to make the switch. When your Local Area Network (LAN) and Wide Area Network (WAN) are configured correctly, your UC deployment will go much more smoothly.

If assessing your network sounds like a daunting task, don't worry! That's why we've developed this guide. Follow along with us to evaluate the services and components in your network that will contribute to the successful rollout of your hosted UC service.

TO BE CLEAR, WHAT IS HOSTED UC?

It seems that everyone has their own definition and different expectations. Here's how we see it:

Hosted UC is sometimes referred to as UCaaS, which stands for Unified Communications as a Service. A hosted UC service

HOSTED
Provided as a service, not a piece of hardware or software

UNIFIED COMMUNICATIONS
Integrated, collaborative communications tools that optimize business processes for the organization

includes many individual components, all tightly integrated and working seamlessly with each other:

Voice: Voice calling delivered via desk phone, softphone, and/or mobile device

Video: Video calling delivered on the computer, on the desk phone, in a conference room setting, and/or on a mobile device

Unified Messaging: Email, voicemail, and fax messages delivered to one inbox

IM and Presence: Instantly communicate with other users, and indicate the best method of contact at a given time

Collaboration: Audio, video, and web conferencing

Integration: Integrate phone with computer, smartphone with UC platform, UC platform with CRM

Network capacity

When you're assessing your network, most likely one of the first things you'll consider is whether you have adequate capacity to support the increased bandwidth your new hosted UC service will demand. A converged service will allow the UC traffic and your existing voice or data traffic to use the same connection to the WAN — provided it's configured with Quality of Service (QoS), which we'll cover later in this document.

To help you squeeze even more bandwidth out of your connection, your UC service will likely support several different codecs to compress your audio and video calls. For instance, if your provider uses the G.729 codec for VoIP and you have a T1 configured with QoS, you can expect to have 30 simultaneous conversations over the T1 without degradation.

When adding video into the mix, ensure that your bridges and gateways are designed to optimize bandwidth use depending on the type of device being used. Video streamed from a smartphone will require much less bandwidth than an HD videoconferencing station.

For a ballpark estimate of the bandwidth you can expect your new hosted UC service to consume, refer to Appendix A for per-user bandwidth usage estimates by UC component. We've also included in Appendix B a set of bandwidth tests you can run to determine if your existing Internet connection will work well with a hosted UC service.

Network security

Even though you're working with a managed service provider, ultimately you are responsible for the security of your LAN (and possibly also your WAN, if you have several connected sites). The introduction of a hosted UC service will add intricacies to your network which require careful consideration.

The good news is that, since you are deploying a hosted UC service, you can choose to add a managed, premises-based firewall that comes pre-configured to integrate with your service. In addition to ensuring that the firewall will "play nicely" with your new UC service, your service provider will also take care of managing, monitoring and maintaining it on a regular basis — meaning you'll have one less thing to worry about.

If you decide to use your own firewall, it's important to ensure that it does as little as possible with the UC traffic. Firewall manufacturers are continually adding new features to their devices which may cause unforeseen problems with your service, such as Denial of Service prevention routines (which will blacklist IP addresses exceeding certain thresholds) or VoIP application awareness (which either alters VoIP traffic or masks its internal IP information as it traverses the firewall). Any feature or setting that causes your firewall to manipulate the

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traffic between your LAN and your service provider's network should be disabled.

If you're using your own firewall, ask your UC service provider for a list of the network security devices they currently support, and make sure yours is on there. If you are using an unsupported device and you end up having a service-affecting issue, they could ask you to remove or replace that device before they will troubleshoot the problem.

You should also ensure that your firewall does not interfere with any on-premises equipment from your service provider. For example, your provider may deploy a session border controller (SBC) in order to maintain a "pinhole" connection through your firewall. If the firewall closes the SBC's connection prematurely, your new phones will never ring - inbound calls won't be able to get past the firewall.

IP addressing

The new IP phones you're about to install are nothing like the phones of the past. They're actually more like small computers, designed with one function in mind: turning analog speech into IP packets. That means a VoIP phone deployment of 30 phones is similar to deploying 30 additional computers on your network: each device needs an IP address in order to join the network.

Most organizations with hosted communications systems use DHCP to dynamically assign IP addresses to their phones. In this configuration the phone requests a DHCP lease upon startup, then follows the lease timeout set by the DHCP server.

If you can't support IP address assignment with DHCP, or if you find that doing so causes video-enabled endpoints to fail, you could instead statically assign IP address information. However, if you use static IPs, you may find it is quite a challenge to keep track of which device get which address. If you assign one

address to two devices, you will start running into issues.

Whether you use DHCP or static IPs, you will want to make sure you have enough IP addresses in your current pool. To estimate the number of IPs you'd need, multiply the number of users by two (one phone and one computer for each user), then add a reasonable buffer to allow for growth in users and/or devices.

Quality of service (QoS)

Quality of Service (QoS) is a feature supported on most managed network switches and routers to ensure that priority is given to specific types of network traffic. You can prioritize traffic based on a number of different criteria, including its type (voice, video, or data), application, or user (employee, guest).

For a successful hosted UC deployment, each type of traffic must be identified and classified so the most sensitive types of packets will be given priority through any bottleneck segments. For example, you can mark all voice (VoIP) traffic with an IP Precedence bit of 5 by default, all video traffic with an IP Precedence bit of 4, and any lower-sensitivity data traffic (such as email or data sharing) with an IP Precedence bit of 3. You can then configure your LAN switches to look at the Precedence bit, and give the highest priority to traffic marked with a 5.

Once your network traffic reaches the router, if your service provider is also providing a QoS-enabled connection from your location to their network, they should reclassify all traffic based on its destination network. For example, all traffic going to the outbound proxy will be marked with an IP Precedence bit of 5, and all other traffic will be marked with a 3.

A word of caution: If too much of your traffic is tagged as high priority, your QoS settings won't be very effective, since the traffic will essentially be competing with itself. Also, if you have any users with a Bring Your Own Broadband (BYOB)*

configuration, the benefits of QoS unfortunately won't be available to them — your service provider cannot control QoS over the public Internet.

* You may find BYOB if you have users who work from home, locations with a small number of users, and/or new offices that need to be quickly incorporated into your system.

Local area network (LAN)

Whether your LAN consists of one network switch sitting in a back closet, or multiple switch rooms spread across several buildings, the configuration for a hosted UC service will be essentially the same.

To make sure your new hosted UC service will work well, you'll need to ensure that there are only switches on the network and no hubs. Hubs are designed to broadcast traffic, which will cause network congestion and ultimately degrade the quality of your UC service.

If your switches are not Power over Ethernet (PoE) enabled, you may need additional AC adapters or PoE injectors to get your phones on the network. (See the next page for more info on PoE.)

The network switches should be deployed in a tree or hub-and-spoke topology. This will ensure that all network traffic originating from one switch has the same number of Ethernet hops to reach the network gateway as any other switch. You
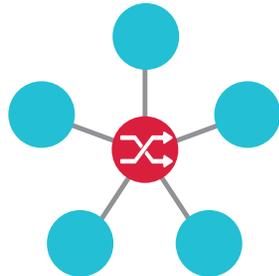
Hub-and-spoke network topology   *Tree network topology*
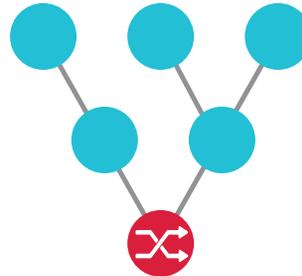
should take care to keep any Ethernet device from being more than three hops away from a network gateway.

Power over Ethernet (POE)

What does your phone's power have to do with your network? The answer: Power over Ethernet (PoE).

Like any other electronic device, your new IP phones need power in order to function. They may be powered by one of two methods: by an AC power supply or through a PoE-enabled network. PoE is often the preferred choice since it eliminates the hassle and clutter of using those AC adapter "bricks."

PoE is typically made available to the phone through a PoE appliance, such as a PoE-enabled network switch. Make sure that your PoE appliance has the capacity to support the number of phones you are deploying — don't forget to account for differences in power consumption between different models. Some switch manufacturers enable PoE on each switch port, but restrict the total power available to all ports.

An Uninterrupted Power Supply (UPS) is highly recommended to protect the investment you've made in your network devices. A UPS can be used in conjunction with your PoE appliance so that, in the event of a power outage, your phones remain powered up. The UPS should be adequately sized to supply power to all of the switches, routers, firewalls, and phones on your network throughout an outage.

If you have any users on a BYOB connection (such as in a home office), remember to order some additional AC adapters for their phones, since they most likely won't have PoE. Refer to Appendix C for PoE specifications on devices that are commonly deployed with hosted UC services.
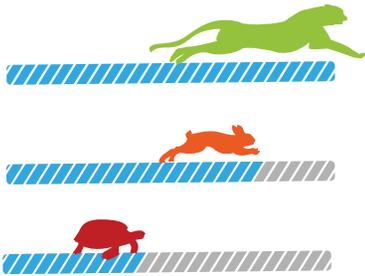
Cabling

Before you use that random cable you found in the back of the closet to plug in a new phone, remember: not all cables are created equal. IP phones do not use the type of cabling that you'd find in a typical phone system. Instead, they use the same cabling as your data network. Even data cabling can vary widely, so be sure to take a close look at those little letters printed on the side of each cable:

For most hosted UC applications, Cat5e cable will be the best choice to deliver the bandwidth each work station needs. You can "future-proof" yourself by using Cat6 or Cat6a, but this higher class of cabling will likely come with a higher price tag to match.

Also remember that at each location you want to deploy a phone, you must have a readily accessible network jack to accept an RJ-45 male adapter. Most new phones come with a 6-foot cable, so the jack should ideally be positioned about 4 feet from where the phone will sit.

If you review your existing setup and find you'll need to do extensive rewiring, your hosted service provider will probably not be able to do this work for you. They should, however, be able to recommend at least one wiring contractor for you to call.

CONCLUSION

Although implementing a hosted UC solution may require some minor updates and modifications to your LAN or WAN, it is far easier and more cost-effective than building up an on-premises UC infrastructure from scratch. Most likely, your new hosted UC service can be installed side-by-side with your existing telecom services, which will allow plenty of time for testing before you completely cut over to the new system.

Outsourcing your UC services to a managed service provider will leave you free to look after your own network and ensure its continued capability to handle your new UC applications.

FOR A SUCCESSFUL HOSTED UC DEPLOYMENT, EACH TYPE OF TRAFFIC MUST BE IDENTIFIED AND CLASSIFIED SO THE MOST SENSITIVE TYPES OF PACKETS WILL BE GIVEN PRIORITY THROUGH ANY BOTTLENECK SEGMENTS.

Shown on Cable	Stands For	Usage
Cat6a	Augmented Category 6	Supports 10-Gigabit Ethernet speeds (up to 10 Gbps)
Cat6	Category 6	Supports Gigabit Ethernet speeds (up to 1 Gbps/1,000 Mbps); will also support 10-Gigabit Ethernet speeds over short lengths
Cat5e	Category 5 Enhanced	Minimum requirement if the network is running at Gigabit Ethernet speeds
Cat5	Category 5	Minimum requirement if the network is running at Fast Ethernet speeds (up to 100 Mbps) and/or needs to support PoE
Cat3	Category 3	Often found in legacy networks. Will not support PoE or speeds greater than 10 Mbps

A
APPENDIX

TYPICAL BANDWIDTH CONSUMPTION
FOR HOSTED UC SERVICES

Component	Typical Bandwidth/User	Notes
Voice Call	40 to 80 Kbps	Depends on codec and data link protocol
Web Conferencing: Idle	1 kbps	
Web Conferencing: Slide Sharing	10 kbps	Assumes slides change every 30 seconds
Web Conferencing: Desktop Sharing	45 kbps	
Web Conferencing: Video	65 kbps	Small webcam, 15 fps
Video: Low Quality	170 to 300 kbps	352 x 288 at 15 fps
Video: Medium Quality	900 to 1,500 kbps	640 x 360 at up to 30 fps
Video: HD Quality	1,500 to 2,000 kbps	1280 x 720 at up to 30 fps
Instant Messaging & Presence	3 kbps	When messaging (non-idle)
Email	5 to 10 kbps	Hosted Exchange

B
APPENDIX

BANDWIDTH TESTS

The following tests for latency, jitter, and capacity will help you determine if your existing Internet connection will work well with a hosted UC service.

Test 1: Run a trace route to look for latency

From a Command Prompt in Windows, type *tracert xxx.xxx.xxx.xxx* (where xxx.xxx.xxx.xxx is the IP address of your hosted provider's server) and press *Enter* to see the path your packets will take to the hosted provider. Ideally, you should see no more than 20 "hops" and a total round-trip time of less than 65 milliseconds.

Test 2: Run a ping test to look for jitter

From a Command Prompt in Windows, type *ping –t xxx.xxx.xxx.xxx* (where xxx.xxx.xxx.xxx is the IP address of your hosted provider's server) and press *Enter*. This will perform a continuous ping test. After a minute or so, press *CTRL+C* to stop the test and view ping statistics. A good connection will have less than 1% packet loss and minimum, maximum, and average trip times all under 55 milliseconds.

Test 3: Run a bandwidth test to check for capacity

Visit *TPx.com/Resources* to run a bandwidth speed test on one of our servers. When the test is complete, it will display your average upload and download speeds. You can use this information, combined with the bandwidth estimates in Appendix A, to determine if you have sufficient capacity available in each direction.

Rinse and Repeat

Each of these tests is a snapshot of a moment in time. For more accurate results, run all three tests multiple times, during different hours of different days. If there is a particular time you know your network is usually very busy, be sure to run the tests then. While excellent results from these tests do not necessarily guarantee that your connection will be suited for a hosted UC service, poor results do indicate that the connection will not work well.

C
APPENDIX

TYPICAL POWER CONSUMPTION FOR POE-ENABLED DEVICES

Polycom Devices

Device	When Idle	When Active	Maximum	Class Advertisement*
Polycom VVX 1500	6.5 W	9.4 W	10.5 W	0 - No classification
Polycom VVX 600	4.3 W	5.0 W	5.4 W	4 - High power
Polycom VVX 500	3.4 W	4.2 W	5.0 W	4 - High power
Polycom VVX 410	2.4 W	4.3 W	4.5 W	2 - Low power
Polycom VVX 310	1.9 W	3.1 W	3.5 W	2 - Low power
Polycom VVX 300	1.8 W	3.0 W	3.5 W	2 - Low power
Polycom SoundStation IP 7000	4.6 W	6.1 W	9.9 W	0 - No classification
Polycom SoundStation IP 6000	4.1 W	5.0 W	7.0 W	0 - No classification

Per IEEE 802.3at

C

APPENDIX (CONT)

TYPICAL POWER CONSUMPTION FOR POE-ENABLED DEVICES

Generic Calculations

Device	When Idle	When Active	Maximum	Class Advertisement*
IP Phone	2 to 3 W	4 to 8 W	4.5 to 9.5 W	2 - Low power
Video Enabled IP Phone	3 to 6 W	4 to 8 W	7 to 14 W	0 - No classification
IP Camera	1 to 3 W	2 to 6 W	5 to 11 W	0 - No classification
Paging Speaker	1 W	5 to 10 W	13 to 20 W	3 - Mid power
Security Intercom	1 to 5 W	10 to 12 W	10 to 12 W	0 - No classification

ABOUT TPX

TPx is the premier managed services carrier that delivers comprehensive communications solutions to 75,000 business locations nationwide. Businesses nationwide trust TPx to manage their mission-critical network services. TPx's award-winning, enterprise-grade unified communications, managed IT, and network connectivity services empower companies to unleash productivity by streamlining processes, proactively monitoring systems, and staying current with rapidly-changing technology. TPx backs its services with a zealous commitment to Customer Care, including a network uptime guarantee and 24/7/365 live-answer technical support.

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