

06 – IP Telephony

Hello and welcome to the “Cisco and Cisco” seminar on IP telephony. I'm Mark Holloman, manager of Cisco IT Global Network Operations Team with responsibility for our voice and data network, as well as our Contact Center applications. I've been working at Cisco IT for over five years and I've been working with IP telephony from the very beginning, when it was an experiment in our labs to the successful service it is today. The theme of today's show is Cisco IT's internal IP telephony deployment, an overview of Cisco IT's early deployment of IP telephony to over 250 sites around the world, growing to over 50,000 IP phones deployed and in use at Cisco. I'll share with you the way we built this IP telephony architecture, what we gain from it and some of the lessons we've learned along the way. So please sit back and enjoy.

AGENDA

Today's agenda. I will cover Cisco's network environment and Cisco's telephony environment. This will give you a good feeling of what we have in our environment today, how we migrated and what we look to do in the future. I'll also talk about our retrofit process from a campus location, as well as our field sales office locations. A high-level architecture will be explained as well. I'll move right into the IPT cost savings for Cisco IT, again what we had as cost-savings for Cisco IT and how it may adapt to your customers as well. And I'll wrap up what the lessons learned in a Q&A session.

CISCO'S INTELLIGENT NETWORK INFRASTRUCTURE NETWORK PHILOSOPHY

So a little bit about our network philosophy here at Cisco. Of course we do Cisco, and Cisco as a showcase of our production environment and how our technologies really enable us to promote the productivity for our workforce. We also believe that the network is the enabling technology. We always have to be prepared for the next application and exactly how it will ride our network. Again, as I spoke about before we do use our technology in a production environment but we have to be architecturally and fiscally responsible and also enable and exert operational excellence. We would not be able to create a showcase environment if we were not able to show how we do it with an operations focus.

ENTERPRISE NETWORK CONVERGENCE

So each enterprise customer I believe has in the past their network divided into four different areas, a network for voice, a separate network for video, data, as well as storage.

ENTERPRISE NETWORK CONVERGENCE

Where we're going to take our environment is more to the IP network, all of these technologies ride the same exact backbone, the same network, we believe IP-enabled network is the way of the future, so voice, video, data and storage all ride a common platform and a common network.

CISCO'S INTELLIGENT NETWORK INFRASTRUCTURE NETWORK FAST FACTS

A little bit of fast facts, if you will, about our environment today. We are a network set up to support any IP application, we only run IP protocol within our network. So that may be a little different than what you see with external customers having different protocols on their network, such as S&A or IPX-type traffic. We within Cisco's internal environment are a pure IP protocol shop. We have just over 50,000 clients in a little over 400 locations in 50 countries. Remote users are about 30,000 at any given time; we do promote the technology for our clients to use remote technologies to connect to our network. Extranet at about 160 partner sites. Those partner sites include support as well

as manufacturing partners. I think everybody understands how cisco.com and how we use that, it's vital to our success. Ninety-two percent of our revenue is driven through cisco.com, seventy percent of our support issues are actually resolved through cisco.com.

CISCO'S INTELLIGENT NETWORK INFRASTRUCTURE OPTIMIZE FOR LATENCY: PRIOR TO US WAN

So as you can tell when we first started the company, obviously it was based out of San Jose and you see our network was built around that. So a lot of our office locations were connected back to San Jose over frame relay networks or links, our average circuit link was about 1,800 miles. So we could tell we were not set up for low-latency sensitive applications. We needed to fix our underlying WAN infrastructure to make sure our voice solution was going to be able to be supported in our environment.

CISCO'S INTELLIGENT NETWORK INFRASTRUCTURE OPTIMIZE FOR LATENCY: NEW US NETWORK

So what we did is we moved to a more hub-and-spoke model for our underlying WAN infrastructure in our U.S.-based network. What this allowed us to do is reduce the latency we saw across our network because the average circuit length moved from 1,800 miles to around 250 miles.

CISCO ALL PACKET NETWORK (CAPNET)

One of, what we call our Cisco All Packet Network, this gives you a visual of how our network is set up around the globe and shows the connectivity point for that setup.

TELEPHONY AT CISCO

So telephony at Cisco. I covered a little bit about the network infrastructure just to give you a good overview of what our network looks like and how voice rides our network. Let's talk a little bit about our telephony environment at Cisco. About five years ago we were an all-Lucent and Nortel infrastructure. We had the Lucent gear at our large-campus location and Nortel infrastructure based at our field sales offices. All this was again the telephony switches that we had in those locations. Where we are today. About 55,000 IP telephony phones deployed to all of our sites, around 234 to 250 sites that is. We currently use Unity voice mail as our voicemail solution and our contact centers are a full IPCC environment. We have no Legacy PBX solutions in place today. Our complete business does run off our IP communication software. Where are we going in the future? Our next step is moving from a Unity voicemail-only solution into a unified messaging where all email, fax, and voicemail communication is housed in one inbox. And we want to expand our centralized call-processing model. And I'll explain a little bit about that, why Cisco IT started in a decentralized call processing fashion and moved to a centralized call processing model and how we continue to evolve that moving into the future.

GLOBAL IP TELEPHONY IMPLEMENTATION

A little bit of history for us from a global IP telephony implementation standpoint. Back in '99, early 2000 we began our migration from Legacy PBXs to a converged voice and data network. For us internally obviously one of our main goals was to displace our competitor's equipment out of our network. We understood that the most important thing about running your voice infrastructure on a conversion environment is to insure you had a high-availability LAN with the appropriate QOS and inline power settings. We did all this with the thought of we need to move to a standard spaced approach and move to a more cookie-cutter design and make sure that voice and data could co-exist on the same network together.

IPT DEPLOYMENT INITIATIVES

Some of our deployment initiatives again may be a little bit different than external customers just because of Cisco IT's responsibility to be Cisco's first and best customer. We had to show worldwide leadership in how to deploy IP communications around the globe. We also had to really look at, how do we make this work as an entire solution. So not just CallManager but tying in unified messaging as well as our IPCC environment. We also had to show methodically how we would do this based on how we felt customers would do it. So not just do a

wholesale replacement Day 1 but actually do a migration strategy. And we'll talk a little bit more throughout this presentation about our goal of doing migration strategies to help our customers understand how they will go through the same migration in their environment.

BUSINESS DRIVERS

Two major business drivers for us; One was the lower cost of ownership, or operations if you will and increased productivity. What we had to focus on is how do we use this to drive our cost down, can we leverage the common network that we have in place? Can we optimize our staff to focus on voice and data operations? At the same time we can't lose sight of the productivity and mobility enhancements this product gives us. So with IP communications, with call manager we were able to allow people to have more flexibility around where they work and what they do because again at Cisco our philosophy is to focus on work is not where you go but it's what you produce.

OVERALL PLAN AND STEPS

So some of our overall plans and steps; First we had to involve the key stakeholders so they understand exactly what changes we were putting in place and how it was going to impact their business. We had to maintain a clear objective. We wanted to deliver a seamless migration so our client base would not be impacted by the migration that we were performing. We wanted to establish a clear roadmap so everyone understood exactly the point of the transition and what it was going to do for their productivity moving forward. At the same time we had to develop the management technology teams to drive change, process related to design, planning implementation and operations. So again focus our individuals on being change agents and accepting the change to increase productivity in the future.

CAMPUS RETROFIT PROCESS

So now I'll talk a little bit about our campus retrofit process and then we'll move into our field sales office retrofit process as well. So when we first started to deploy the IP phones we set up similar to how we think external customers will do the migration. So we set it up just for the IT staff in the beginning. And two reasons for this, one was we wanted to figure out the exact support process, how we would need to change our support model for the new telephony environment. Second was we wanted to make sure we worked out all the issues with the product and turned the product into an enterprise-ready solution. Remember we were deploying five to six years ago, so the product has advanced quite a bit since the early stages of our deployment. Once we felt like we were ready to roll out to other employees besides Cisco IT we started to really focus on new employees. So as we were doing hiring, instead of giving them Legacy PBX phones that we had to go into the wiring closets and punch down we would give them IP phones. They would take them to their desk from orientation, plug into the network jack and immediately be available for use. Our next step was to give people new IPT phones when they were moving from one building to another building. As we expand teams or team size is reduced our facilities group will move them to the appropriate-sized locations. As the moves were happening we would instead of punching down new locations to punch down for the Legacy phones, we would just give them new IP phones, busy-out their connections in the Legacy PBX and make sure that they were functioning when they got to their new location. Then as we did that the next step was building retrofit and as you can see we used the stage migration in bullet three. We did one building per week; we wanted to make sure that the expansion modules were taken out on a weekly basis if possible to help us recover that maintenance cost. And then the Legacy PBX to our Cisco call manager tie-lines had to be provisioned appropriately as we were passing traffic between the Legacy PBX and the new call manager solution. I've got some diagrams coming up that will better show this and you'll be able to get a better picture of exactly what that migration looked like. One key bullet, the LAN infrastructure that I have here in bullet two is we as a group had to insure that our LAN infrastructure was ready for voice-over IP. So based on the density of our calls that meant the Catalyst 6500 switch with inline power for us. We had to insure the aux VLANs were there and the appropriate QOS settings were in place. Funny story for us with the QOS settings is we make sure that we mark our traffic on the edge so when we get to a point of potential congestion on the WAN that it's marked appropriately and given the right priority. One thing that we found out based on our client base; we've got a lot of engineers in our environment. We were finding that if we didn't mark the traffic correctly or rewrite traffic that we would be passing some traffic that's not high-priority with the higher class of service. For example, we had some engineers giving their gaming applications class of service six or seven that was taking precedence over our voice traffic on our network. So what we



did to get around that, all traffic that we do not trust that are coming from the PC environment we rewrite that to a default class or class of service of zero.

PRE-AVVID ARCHITECTURE

Here's the visuals I was talking about earlier. The next couple of slides are just going to walk you through exactly what I covered verbally on the previous slide. So here was our environment before we went to an IP telephony environment. We had our normal PBX with the main processing node there connected to our OCTEL voicemail system with the OCTEL net providing the voicemail networking across all of our environment. The expansion modules you see out to the side with different connectivity into the PST and those expansion modules sat in each building throughout our campus. This is just a visual, we had many more EPNs than are identified here but this is just a visual for six buildings at that.

CISCO CALLMANAGER COEXISTS

This is where we first brought in the Cisco call manager cluster into our environment. Really what we want to show here is how it does integrate with your Legacy PBX solution and your Legacy voicemail solution so it can offer you a migration strategy as opposed to having to do a forklift replacement. In the beginning all of our traffic to the PSTN went through the Legacy PBX. That's when Cisco IT was just on the call manager cluster. As we started to move additional members over to the IP telephony cluster we started to move DIDs and PSTN connectivity directly into Cisco call manager. And we did that through several different means, through WAN router products, our 3640s, 3745s. Or we also use the 6608 blades in our environment that fit in our Catalyst 6500s.

PBX REMOVED

So this is when the Legacy PBXs were completely removed from our network and that happened in fiscal year 2003 for us. We had a marketing term, believe it or not, that said Legacy free by 2003. And that's what really drove us to meeting that goal and getting the Legacy PBX out of our network. So this shows also how we migrated from an OCTEL voicemail environment to a Unity environment. Our staff would not, could not accept not having the voicemail networking capability between folks that had migrated to Unity and folks that were still on the Legacy voicemail OCTEL network. So what we did is we used a Cisco product called Unity Bridge to bridge the different environments. And so that allowed us to maintain the voicemail networking component as we did a slow migration from OCTEL to Unity environment. Again we do the migration phases and strategy because we believe that's what our Cisco external customer clients will want to do as well. So again we can build these case studies. We can build VODs such as I'm doing today to enable us to share the story of migration the way our external customers will do it.

UNIFIED MESSAGING 100% CISCO SOLUTION

And this is our future goal, complete unified messaging based on 100 percent Cisco solution. One reason that we went with the voicemail only solution before we went to a complete unified messaging is again to show migration strategy. So if customers are not prepared with their AD or their certain mail store environment, they can go to a Unity voicemail-only solution first as a step to unified messaging and then later move to a unified messaging solution.

ORIGINAL FIELD OFFICE ARCHITECTURE

All right, that spoke a little bit about our campus retrofit process. Let's talk a little bit about our field office or remote-site conversion from Legacy PBX systems to our call manager solution. In the early stages when we first started to deploy there was no such thing as survivable remote-site telephony, which is SRST. There was a dilemma that IT managers were faced with, do we take a high-risk model and use the centralized call-processing environment where the headquarters house our call manager servers and we did all of our voice across the WAN, so phones connected back to the centralized cluster across the WAN. The problem with that is if the WAN failed at that time, you lost complete voice services at the branch office. Or you could choose a not-so-cost-effective model where you put a call manager server in



every location so if you did lose the WAN you were able to still maintain voice services. Cisco internally decided on putting a call manager at every location. Again we needed to displace our competitor, get our competitor out of our network but we felt like voice services were too valuable for the high-risk model.

CURRENT FIELD OFFICE ARCHITECTURE

Cisco IT working with the business unit helped enable the feature call survivable remote-site telephony SRST. What this allows you to do is move to a centralized call-processing model where your cluster is back at your headquarter location and your phones are at your WAN location. If you do lose the WAN connectivity or the WAN link your local router at the remote site acts as your call processing engine and you're still able to make and receive calls through that engine. When the WAN's restored your phones fail back over to the centralized headquartered cluster. SRST has come a long way since the early days and Cisco IT had a hand definitely in developing the SRST model and enhancing the features as we move forward. In the early stages it provided simple call processing, so the ability to make inbound and outbound calls, to receive calls as well. Limited functionality around conferencing, conference stations and features that you get with a normal call manager cluster. Over the past two years we've done a good job in further developing that protocol to allow it to look more like a call manager cluster and provide you the features when you have a WAN failure.

CENTRALIZE IPT (CCP/SRST)

This is just a high-level overview of Cisco's internal cluster setup in our environment. So I'll start on the left-hand side if you will showing you the San Jose cluster serves most of our western region of the U.S. as well as Mexico. Our RTP cluster serves all of Latin America, South America as well as the central and eastern part of the U.S. And then our Boxborough cluster serves all of the northeast into the central northern area of the U.S. as well as Canada. Over in EMEA, our Europe, Middle East and Africa location, we've got a pretty unique setup. For Europe we have our cluster divided across the WAN so we're doing clustering across the WAN there. So a third of our cluster is in London, a third in Amsterdam and a third actually sits in our Brussels location. So what that gives you is a lot of continuity business resiliency if you will. So if we were to lose one of those locations our staff could go to hotspot locations and use cell phone or go home where they may have an IP hard phone and actually still make and receive calls. And then in our APAC region we've got our cluster divided up as referenced here, four clusters across our Asia-PAC region. What we really want to focus here is expanding our centralized call-processing model internal in Cisco IT. So we would like to see the number of clusters that we have here reduced in the future and what we're doing is working with the BU to enhance the product to be able to make that happen for us.

ARCHITECTURE

This is a very high-level architecture; on the right-hand side you see our remote locations, remote offices, and their connectivity back to our centralized call manager hub in our headquarters locations. You can see the TFTP publisher is the brains of the cluster, that's where all the data is stored and where we modify the database, new phone numbers, new route patterns, things like that. Our active subscribers control the actual call processing. And then we have backup subscribers in a one-to-one fashion for fail-over in case we have a server issue. All of these devices are split so the clusters split across different data centers. And what that enables us to do, if we were to lose a complete data center, is allow us to still maintain the functionality of our voice services.

IPT COST SAVING AREAS

So a lot of times I'm asked to do return-on-investment studies for Cisco's internal deployment of IP telephony. I'm not sure that's a fair comparison that we have with our external customers just because of the cost that we get our equipment at. So what I like to do is really focus on the cost savings that we've seen internally in Cisco IT and let you compare it to what external customers may see. So for us we had definitely a reduction in our costs associated with moves, adds, and changes. We also had a reduced infrastructure expense for new sites. So Greenfield locations, instead of running a network cable for voice and a network cable for data, we were actually able to run one network cable to serve both because they ride the same physical median today. We're also able to eliminate the Legacy PBX maintenance

cost that we had with our external vendors at the time. And now with a centralized call manager model, not having to deploy a call manager to every location you can see where that saves you on support costs as well as hardware costs for those locations. We were able to reduce our international and domestic interoffice calling charges. Now we were doing toll-bypass within Cisco early 1996-1997 timeframe and we were doing this with a router connected to our PBX. And what we would do is take traffic from the PBX that was destined between San Jose and RTP and send it across our WAN. With the advent of voice to your desktop, now everyone can take advantage of that because you don't have to have a special router connected into your PBX at every single location. Now your telephone device is an IP-enabled device and you can send your traffic across the WAN for every single site, not just your large-campus locations. We were also able to see a reduction in the number of external communication lines. So that could be the number of PRIs that we had at a location. For example, in our Atlanta, Georgia office we had about five PRIs that handled the voice traffic in and out of that office. What we found out that, based on where the majority of that office traffic was going to another Cisco location, be it San Jose, RTP or any other field sales office we were able to reduce the number of external communication lines from five to about three. So again saving costs on the number of external communication lines we had at that office and we saw that across the globe. The other thing that deployment or the migration will help you do is really identify areas in your environment where you need to clean up, maybe circuits that aren't currently used or circuits that you really didn't even know existed. The migration from the Legacy PBX environment to the IPT environment will enable you to see where some of this waste exists and make sure you clean up your environment. We were also able to see cost savings when we, really productivity gains if you will because we shifted our IT staff focus from administrative punch-down things that we were doing in the wiring closet with our staff to more value-added application development or new ways to make the IP telephony environment more productive for our staff. The other thing we did internally within Cisco IT was to consolidate our voice and data Help Desk. Now that voice is actually an application your Help Desk that handles data applications can also handle your voice application. So that was a real big productivity boost for our IT staff.

KEY PROJECT LESSONS LEARNED

Some key project lessons learned. And we'll go a little bit more detail into this in just a view slides but an overview of this is you know voice is only as good as the network it runs on so insure you have a high-availability network design and the right end-to-end QOS as well as security mapped out. Watch for surprises, as much as we like to be cookie-cutter and standard across the globe there are different country requirements. So if you can shoot for the 80/20 rule, 80 percent standards based just on what you're rolling out, and 20 percent of what of one-offs. I think you'll do a good job in limiting support nightmares on the back end. Voices service, Cisco call manager is an application that does run on servers, those servers have to be properly managed. So make sure that that you've got a good cross-functional team between your voice and data groups and also identify the management tools that are going to be required to support your environment, every environment's different. You may need to make sure you've got the right monitoring tools set up and reporting tools so you can alert out on issues before it has to be called in by your client base.

MORE LESSONS LEARNED

One thing we talked about was strategic placement of equipment -- our servers. One of the things that we're not embarrassed to talk about is in the early days when we first started deploying Cisco IP telephony, we wanted to put our entire cluster in one single rack in one single data center. The problem with that is if that data center for some reason lost power we lost voice services for the complete campus location. We learned that the hard way and we started deploying our environment with redundancy in place, obviously. So we split our cluster between data centers and all of our environment. And as we talked about we even took that a step further in our EMEA region where we're actually splitting across the WAN. Do the same thing with gateways. As a network company we saw this early and we didn't run into this as much as maybe some external customers have but appropriately placing your gateways in appropriate NOCS -- separated NOCS to provide that redundancy for you. Spend a little bit of time talking about relationships with regards to how the teams have to come together. Obviously there are different technologies that are in play here and with the convergence everybody's a little nervous about what my role will be with the new technology. It's broken down into three groups, telephony, LAN, as well as server. A lot of people leave out the server



or hosting environment but that's a key component because remember IP telephony call manager is an application that runs on servers. So you've got to have a group that knows how to manage the server knows how to do upgrades and knows how to communicate application downtimes that may be required for server upgrades. Telephony's pretty straightforward. You've got to have the right skill set that knows how to run a telephony environment and then you've got to have the right networking group to understand how packets are routed across the network. And they also have to learn how sensitive voice is to network interruptions. The Legacy telephony individuals know that very well and will be able to work with the network team to make them understand as well, how important voice is to our client base.

LESSONS LEARNED FOR FUTURE DEPLOYMENT

Study customer usage. I think that one thing that's real important is to understand how your clients or customers use telephony and make sure as you're doing your migration that they understand what enhancements will be made with the new deployment, with the new technology. Understand how they use it and make sure you focus on ways to keep them productive and don't underestimate how a migration can impact their productivity. Also study current voicemail solution. So how do your clients use their voicemail? Maybe with the new technology it's going to be a totally different way of using voicemail, or any solution IP telephony as well. Make sure they understand the features, the functionality, and communicate as much as possible the new way. Be a change agent for your clients; help them understand the productivity gains that you'll have. And then study current PBX trunking. So again as you're migrating you're going to have calls coming into your PBX from your new call manager environment. Make sure that you set up the appropriate amount of trunking between those two environments to insure you don't run into busy signals because there are no channels available for the calls going across those systems. Again as you migrate buildings, as we would migrate a building, as we migrated an engineering building, maybe the call volume between the two systems wasn't that high. But as you migrated a sales building or a building that had a lot of telephony needs, then the usage would go up so you would get closer to maxing out your trunking. We need to make sure that we do understand our clients and know what trunking is required between the two systems.

LESSONS LEARNED FOR FUTURE DEPLOYMENT

I don't think we focus enough on dial plans early in the game. As we migrate we need to understand what the dial plan for our entire global infrastructure looks like. And when you plan your dial plan, don't just plan it for what you have currently today, but focus on future requirements. So for instance within Cisco we use an eight-plus-seven dialing plan for our internal dialing, eight is the access number. Then we have a three-digit site code and then a four-digit extension so we really want to focus on the growth that your company will have, that should drive your dial plan. Some companies like to stick with the full ten-digit dialing. That is up to the individual company but we do need to make sure that we stress the importance of focusing on the dial plan and making sure that our focus there is long-term, not short term. A key bullet that I think I've stressed throughout this presentation is understanding the network infrastructure. Your voice solution is only going to be as good as the infrastructure that it runs on. So now in a converged environment you've got to manage your network infrastructure with that in mind. Voice is one of the most visible applications. If you don't have your LAN and WAN infrastructure set up to support your voice component, voice deployments will not be successful. Standardize across Cisco call managers as much as possible. What this helps you do is you know the environment as a trouble ticket is open, so you don't have to spend a lot of your time understanding the environment or the one-offs, know your environment. Standardize it as much as possible and then that makes troubleshooting a lot easier for your Day 2 support staff. And then one of the most important as well is change management process. So remember with the change in this environment it's no longer two different networks running voice and data, it's one single network. So a change process that may have been good for your data network, with voice component being added onto your data network, it changes your change management process. Let me give you an example. When I first started at Cisco and voice rode a separate network if I wanted to do a change or an upgrade to a switch let's say at 5:30 or six o'clock at night, I would go through my normal change management process, get the appropriate approvals and make sure everybody was okay with it. If someone was still working at six o'clock and I rebooted that switch for it to take the new CatOS load, it was okay because the person may miss an email, they may miss a website and they may have to refresh but everything would come back fine. Take that one step further with a converged environment and look if you had voice riding that

network. Since that phone is connected to that access switch and that's your last level of redundancy, when you reload that switch for it to take the new code, if you did it at 5:30 or six o'clock and somebody was on a call, conference call, working late, what have you, then that call drops because the power to the phone is no longer sent. So the phone goes dead and is no longer able to process that call. So not meant to scare anybody. What that means is you just need to make sure your change management process fits your new converged environment.

KEY TAKEAWAYS

So some key take-aways. IP telephony -- you know, the ready infrastructure comes first. So you've got to have your LAN, WAN, high-availability, low-latency, QOS, inline power, all those things have to be in place before you put voice on your network. A good thing to do is have some type of voice audit done on your network to insure your network is ready for voice-over IP. Again the key component is the underlying infrastructure -- making sure that your network is now prepared to carry the voice; centralized to maximize the benefit. In other words, the least amount of call manager clusters you have in your environment, servers in your environment, the less patching and Day 2 support you have to do with that server base. Centralize the simplified voice-over IP configuration. Again we talked about standards, cookie-cutter approach. The less call manager clusters you have in your environment, the less strain you're going to do from your standards. If you have ten clusters in your environment, it's going to be a lot easier to keep those all in uniform. If you have 300, then you've got more room for error with your configurations. Again focus on your dial plan and your future requirements around dial plan. And voice-over support and management is key. So don't only think about the migration, the deployment of IP telephony but really focus on Day 2 support and how you're going to manage the environment. What does the team structure need to look like? What does the support structure need to look like? What does your change management need to look like?

Q AND A

So now I think I've got a little bit of a Q&A session. I've put together some questions that customers had asked us about this topic in previous sessions. We have a little time left and I'd like to answer a few of them.

Q. Let's start with question number one. What is the key factor in making IP telephony successful?

A. That's covered through the presentation. One thing that I think people really need to focus on is the underlying infrastructure. IP telephony will only be as good as the network it relies on. If you continuously have network outages and voice is riding that network, then you're going to have IP telephony or voice outages. Voice again in my opinion is one of the most visible application on your network. So make sure your network is prepared to handle voice before you roll out the IP telephony solution. A lot of times I tell customers that I speak with, the voice application is probably one of the best network monitoring tool you'll ever put on your network because you know immediately when voice is out if you're an Operations Manager.

Q. Question number two, how has the support staff adjusted to this new technology?

A. I'll be perfectly honest when we first started to talk about the deployment of IP telephony in our environment, even within Cisco it made a lot of people nervous about one, their job and exactly what their role would be in this new environment, this new converged technology. The Legacy PBX individuals really felt like oh no, my job's going away, I'm not comfortable with a converged environment. Today I can honestly say that those same individuals that had that concern understand that IP telephony is an application. You still need that skill set, you still need the network folks to understand how packets are routed through the network and perform their piece. You still need the hosting skill set to understand how upgrades are done and how patches are applied to the server environment. So again I think it gives people an opportunity to expand their career. So now they don't only have the Legacy PBX or voice application experience, now they've got a little bit of network experience, they've got a little bit of hosting and server experience as well. So it really opens up career opportunities for these individuals.

Q. Question three, can you provide examples of where IP telephony has made your client base more productive?



A. I sure can. One of, to me the biggest factors of IP telephony is just the mobility you get with it. So the ability to make calls from home, the ability to make calls in hotel rooms or any other Wi-Fi hotspot or wired hotspot. That really gives you a lot of productivity enhancement for your clients and it's also a lot of cost savings involved there as well. I'll give you an example where IP telephony really made one of our contact centers a lot more productive in an unfortunate situation. We had an ice storm in our RTP location and the site was closed for about three days. With that generally in the Legacy PBX world, we would have had to change our business process and have to ask folks in San Jose to come in earlier to cover the tech support that RTP usually supplies during their daytime. With IP telephony, folks that were still at home and had power but they could not come into the site, we were really able to have those individuals, those contact center agents, handle calls remotely from their home. So they would log into the contact center applications through their phones at home and still appear to be an agent working right on the RTP campus location. So that really showed us how our business processes could change and make ourselves more productive with the IP telephony solutions. I have many more examples just like that but that's a great one that shows the remote capabilities of our product. I think that's about all the time that I have for questions today.

FURTHER IP COMMUNICATIONS RESOURCES

And for more information about Cisco IT deployments, you can go to the Cisco IT at Work site to find Cisco IT case studies about multiple things, what we deploy, what benefits we've gained, what lessons we've learned and some operational practices and presentations to help you learn more. You can also find more information on IP telephony and IP Contact Center design guides, operational practices, and several other documents, white papers and presentations on cisco.com. Below that you'll see a toll-free number you can call for more information or to place an order. You can order Cisco resources on the web from the URL at the bottom of this page.

END

I'd really like to thank those of you for watching and spending time with us today and for being interested in this Cisco Global Technology seminar series and what it is all about. We hope you've enjoyed the show, and it has helped answer some of your questions about IP telephony.



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