Cisco Public.

Streaming Video

Cisco on Cisco Streaming Video Seminar

Bob Scarbrough: Welcome to this seminar on streaming video. My name is Bob Scarbrough, the program manager within Cisco IT and your host for this overview on streaming video.

I'd like to introduce our subject matter expert, Mike Mitchell, Direct of Rich Media Communications. Welcome, Mike.

Mike Mitchell: Thanks, Bob, it's great to be here today.

Bob Scarbrough: Mike will explain how Cisco has evolved in the world of rich media communications and cover several Cisco technologies, including Video on Demand, Live Video, TV, and Telepresence. So sit back, relax, and enjoy this informative seminar. Mike?

Streaming Video Seminar Agenda

Mike Mitchell: Well, let's begin with an overview of the agenda today and what we're going to talk about. I'm going to give a little bit of an introduction of the challenge that we have at Cisco and why the heck we're deploying these things to begin with; talk about the facilities that we have to facilitate video, especially streaming video. We'll talk about how we're organized around streaming video, and then we're going to get a little bit nerdy just at the end and we'll dive into the technology. So for those out there who just want to get to the technologies, you might want to go ahead and skip ahead to the last, oh, I don't know, maybe ten minutes or so.

Bob Scarbrough: Okay.

Cisco Communication Challenge

Mike Mitchell: At Cisco, we're a large global company; we've got over 50,000 employees, and those employees are based all around the world. And do you know what? I can't afford to fly all those people into San Jose every time we do something new. I mean, at Cisco, what are we doing? We're coming out with a product like once a week, without exaggeration, and we're buying a new company, without exaggeration, about once a month right now. So there's no way that we can be competitive on a global basis if we're always traveling around to get new information out to our global employee base.

That was the main impetus for starting to use these tools, and what we found is that it's not just about the cost savings associated with the travel; it's actually about the productivity, and at the end of the day, the revenue improvements that we're seeing from using these tools. I mean, that's the main thing, is that if we can keep people up to speed on our products, there's a better chance that they're going to be able to sell them successfully into our customer base as well.

Bob Scarbrough: Okay. So how does Cisco keep everybody up to date as to what's going on?

Mike Mitchell: We do a series of regular broadcasts. There's a whole bunch of broadcasts that are monthly. We also have ad hoc broadcast capability and video on demands. To give you an idea of the scale, we're doing between 50 and 60 live broadcast a month, and we're doing around 400 video on demand's a month, so it's really great, and employees can get to it whether they're located in a Cisco office or they're full-time telecommuters.

Bob Scarbrough: Excellent.

Cisco Communication Challenge

Mike Mitchell: Like any other large company, we've got a number of different divisions in the company, and we've got all this internal churn going on as well, so again, same kind of thing: We don't want to distract people from their day jobs in order to keep up on what's going on at the divisional level, so we use the tools for divisional communications as well.

Rich Media Communication Solutions

The area that we're going to focus on today is really on the streaming side, but in this slide, we're seeing a number of different tools including video conferencing, Web conferencing and audio conferencing; and new in this space I'd also include Telepresence, which we're going to talk about in a second.

Bob Scarbrough: Oh, good.

Mike Mitchell: But what we're doing is that we're managing all of these tools as a single portfolio of tools, and I think that that's important to take a look at, because from a business perspective, even in a technology company like Cisco, executives at Cisco, they might know the difference between conferencing and streaming, and you know what? They shouldn't have to figure out the difference between conferencing and streaming. They just know that they want to use video to communicate.

So we've created one job shop, if you will, where people can come in to engage on any of these technologies in this area. Again, we'll focus mostly on the streaming side in the presentation today, but I don't want people to lose sight of the bigger picture of managing this as a single

portfolio of tools.

Bob Scarbrough: So this single portfolio, does it make it easier for people that are coming to have work completed, or is it easier for your organization?

Mike Mitchell: Well, it's both, really. So if you have the conferencing side separate from the streaming side, you can end up with redundant efforts in different organizations. For example, the line between Web conferencing and a live video broadcast is blurring more and more over time, so what you want to do is you want to have a single place on the business side that people can go to get recommendations on what tool is best for what they're trying to accomplish, and not just push a tool just because that's the only tool in your group and you want to get everybody using Web conferencing or video streaming, because that's what you're measured on.

Then on the IT side, you want to manage this as a single portfolio of tools as well, because over time, these tools are starting to converge more and more. And so again you can end up with the same redundancies on the IT side that you could have on the business side. So overall, we look at these tools as the rich media communication tools at the company, and we don't want to unnecessarily promote one in front of the other just because of an organizational issue.

Bob Scarbrough: That makes sense.

Cisco TelePresence 1000 1:1 and Executive Applications

Mike Mitchell: On the Telepresence side, Cisco has got this new product, right – you might have heard of it –

Bob Scarbrough: Cool product.

Mike Mitchell: Yeah, very cool product – called Telepresence, that we're very excited about, and it comes in a couple of different flavors. Right now we're looking at the 1000 Series –

Bob Scarbrough: And that's what we're looking at here on the screen.

Mike Mitchell: That's right. And that's just for smaller setups, about two people can use that. And we're seeing a huge uptick in the use of Telepresence overall within the company because it's great for interactions.

Now, on the streaming side, you don't necessarily have to do high-definition streaming, like what you're seeing right now is a 320-by- 240 video image, so – but that's okay, because I don't have to worry about making eye contact with you when we're communicating.

Bob Scarbrough: Right.

Mike Mitchell: But video conferencing, one of the shortfalls of video conferencing has always been the quality, right, and the ease of use. Now, with Telepresence, what they've done is they've done a great job –

Bob Scarbrough: What is the resolution that we're running on Telepresence?

Mike Mitchell: Well, it's 1080 P, so –

Bob Scarbrough: Do we offer it in both 720 P and 1080?

Mike Mitchell: Well, yeah, you can tweak it to run 720 or 1080 P, but we're running it at 1080 P internally, so the highest level of commercially available high-definition available today. And everything is set up so you can make eye contact when you're talking to somebody, so it's just like the interaction that you and I are having right now. So it's very, very close

to doing what we still think is the ultimate form of communication, which is the in-person meeting or in-person interaction.

I mean, if I could reach out to each one of you out there in the audience and have an in-person meeting, of course I would do that, but it's just simply not scalable. So instead, we look at tools like video streaming where we could hit thousands of people on this broadcast. I'm not sure we actually got thousands, but we could hit thousands of people on this video on demand, and with us just having this conversation once.

Bob Scarbrough: Okay. I understand we also have Audio Acoustics set up, so it emulates like the person is actually in the room, although they may be thousands of miles away.

Cisco TelePresence 3000 Large Team Meetings

Mike Mitchell: Yeah, and if we take a look at the next slide, then you'll see the three-screen setup, and that's where the audio comes even more into play, is that it's basically surround-sound audio where, if something is dropping behind one person, you know where it dropped; and if somebody is speaking, you know that that person is speaking so you can look over to them.

Frankly, it's just like if you were in the room with the people, and you can have that true, in-person experience without having to travel. So it's been great again for customer interactions internally, but also for internal team meetings, so we're very pleased with the internal deployment of that.

Bob Scarbrough: That's great.

Mike Mitchell: And IT's done a great job on that internal deployment. Within Cisco, you know, it's funny, John Chambers actually took my job, because I'm usually the business champion for these tools, but our CEO got so behind this because he saw the power, the impact; that all the IT guys had to do was set it up and get it going. So it's just wonderful to –

Bob Scarbrough: It's exciting, actually.

Mike Mitchell: Yeah, it's wonderful to see.

Bob Scarbrough: But you still have your job, though.

Mike Mitchell: I still have my job, but I'm going to have to talk to John about that. He should notify next time, before he gets all into that!

Cisco TV and Video on Demand (VoD)

Mike Mitchell: So within each one of the mediums, we use a variety of different tools to exploit the medium, so –

Bob Scarbrough: Which tool is most valuable out of these that you're going to be talking about?

Mike Mitchell: Well, that's a great question, because actually we don't bias any of these tools one over the other. We think that using a little USB camera on your laptop like you see here is just as valuable as the multi-million-dollar studio that we have; and it's just a matter of horses for courses. It's a matter of using the right tool for the right reason. Let me give you an example.

So if a product manager wants to create a VOD quickly on their desktop for a sales –

Bob Scarbrough: What is VOD?

Mike Mitchell: I'm sorry, Video on Demand on the desktop.

Bob Scarbrough: Thank you.

Mike Mitchell: Synchronized with PowerPoint slides, right, they can just do that on their desktop without having to take the time to book the studio.

Bob Scarbrough: So this is self-authoring, using a Cisco Unified Video Advantage camera?

Mike Mitchell: Exactly. So now within Cisco, of course, we're using the Cisco Unified Video Advantage camera, and all employees can have one if they want one; and they can use it and they can create video on demand on their desktop and publish it.

The great thing about this is it accelerates the velocity of information within the company, and in a company where basically your intellectual property, your information, is key to your profitability, if you can accelerate the velocity of information in your company, then you're going to accelerate your bottom line, right? So you're going to accelerate revenue growth.

It's all about the speed of doing business, and so we don't want people to feel like they have to go to a big, fancy studio to create a video on demand when they can do it on their desktop.

Bob Scarbrough: What are the underlying Cisco applications that are used for these solutions?

Mike Mitchell: We've got some great technologies that we're just coming out with, called the Digital Media System, that we'll talk a little bit about in the technology section. But that Digital Media System of course is publishing all this video into the network, right, which Cisco knows a little bit about the network; and we've got these things called content engines or wide-area application engines that sit out in the local area network, and they help scale that video out to a global basis. So literally I can enable every employee to do video at Cisco without worrying about killing my network.

By the way, even though we're a networking company, we still have to cost-justify everything we do. We didn't get a big bucket of money just to deploy this, so I have to look at things like making sure I'm not overwhelming the network. But you can do it if you deploy it with some forethought about how you're going to structure it.

Bob Scarbrough: Speaking on return on investment, the cost, what was your calculations that you came up with for an ROI for this?

Mike Mitchell: Well, so – I think that we're going to drill into that a little bit, but one of the things that we had to look at on the studio production side was comparing the cost of renting the equipment versus the cost of bringing the production itself in-house, right? So frankly, we just got to this point where we were spending more on renting the equipment and going to outside studios, that it became more cost-effective to bring a studio in-house.

So we're sitting in a Cisco studio in a Cisco office right now. And we built this studio specifically just because it was cheaper to do so, rather than continue renting the equipment. So I don't recommend that anybody out there go and build a big fancy studio as your first step to streaming video. We only did it once we got to the volume point to justify it, and that's the way you keep your studio in business and keep everybody happy.

Bob Scarbrough: Okay, and I notice there are several studios here as well.

Mike Mitchell: Yeah, so – we keep building them as we get to the volume point to justify it. And in fact, our newest studio is going to be in Bangalore, India, because we're just getting to that volume point as part of our expansion in India, to justify having a studio there as well.

Bob Scarbrough: Hmm. You have the ability within the studio to do live broadcasts with IP TV. From a logistical point of view, how is this broadcast across the globe?

Mike Mitchell: We're making use of a technology called MultiTask, which allows everybody to be able to receive the stream at the same time. So ii can send out a single stream, just one stream, and everybody can watch that one stream, right? So I don't have to worry about impacting the global network; I can disseminate it out.

Now, for Video on Demand what we're doing is that we're deploying it out to those Cisco content engines all around the world, so that when somebody wants to watch a video of John Chambers, like in the Sao Paulo, Brazil office, they can watch it off of a local content engine there, instead of pulling it across the wide area network.

Bob Scarbrough: How does it get to that local content engine?

Mike Mitchell: Okay, so the digital media system has a Web-based front end that allows you to publish to the Cisco content delivery manager, which is the intelligence of the system. And that pushes it out to the office.

Bob Scarbrough: So do you just randomly push everything out, or is it selected content?

Mike Mitchell: That's a great question. We do intelligent caching of the content. It's located centrally. And then we'll pre-position stuff that we know is going to be especially popular; but for the most part it's cached out so that when somebody watches it for the first time, It gets pulled in to the local office, and then –

Bob Scarbrough: Ah, okay.

Live Broadcasts

Mike Mitchell: But you can do a pre-position model, but we don't necessarily want to do that, because we're producing so much video that if we pre-positioned everything out to the edge, frankly it would just take more bandwidth than doing selective caching.

Bob Scarbrough: Okay.

Mike Mitchell: And then on the live broadcast side, we're doing 40 to 60 live broadcasts a month right now, and it's been really interesting to watch the slide broadcast capability grow, because we started doing live broadcasting in '95, and then later, about '98 I think it was, we deployed the Video on Demand system. And I thought that once we deployed the Vide on Demand system that what would happen is the live broadcasting would start to trail off, right?

Bob Scarbrough: Mm-hmm.

Mike Mitchell: Because why watch a live broadcast if you can get it on demand, whenever you want it, right?

Bob Scarbrough: Right.

Mike Mitchell: And – but there was this strange dynamic that happened that's just part of human nature, I guess, where this – there was this like water-cooler effect where everybody still wants to watch the live broadcast.

Bob Scarbrough: Mm-hmm.

Mike Mitchell: And so our live broadcasting has actually been steadily growing, even though we have this world-class Video on Demand system.

Bob Scarbrough: Right.

Mike Mitchell: But also there's the interactivity that's part of the live broadcast. People can ask their questions and all that kind of stuff. But you know, you do a broadcast on people's like compensation model changing, most people aren't going to wait for the Video on Demand. They kind of want to watch the live broadcast when it comes out, you know?

Bob Scarbrough: That's for sure. What application do you use to control the multiple streams that you have to support for broadcast?

Mike Mitchell: So we're migrating to the digital media system that will allow us to control multiple encoders, and so we'll be deploying that out internally in the coming months.

Live Broadcasts

Bob Scarbrough: Okay, good. I think we've touched on live broadcast –

Mike Mitchell: Yeah, so these are some of the benefits of the live broadcast. And it gets back to the horses for courses, you know. Sometimes you want to do the live broadcast, sometimes you want to a Web conference, and so again, I recommend managing this as a single portfolio, and then making intelligent decisions on when you're going to use what medium for what.

Bob Scarbrough: Okay. What is the usual turnaround time for live to on-demand content?

Mike Mitchell: So it's about 24 hours, so we're cranking these things out, and it's great, and the 24 hours is set up in part because we are a global company, you know. So if you miss the live broadcast, within a day or two then you're going to get the video on demand no matter where you are. I mean, we're doing broadcasts this morning – like we did three broadcasts this morning from 8:00 a.m. to 9:00 a.m. Pacific time, right? Well, guess what? People in Bangalore are sleeping at that time, you know –

Bob Scarbrough: Right.

Mike Mitchell: So it's important for us to be able to turn the live broadcast to on demand quickly, and make them available to our global employee base.

Bob Scarbrough: Makes sense.

Video on Demand

Mike Mitchell: So on the Video on Demand side, we're creating three to 400 VOD's a month right now. So for those of you that are particularly adept at math that means we're creating more VOD's than we are live broadcasts. For example, this is a video on demand that we're creating right now.

By the way, as another best practice, one of the things that we're doing is that Bob and I are just pretending like this is a live broadcast, so if I say um and ah or we screw up a bunch of times, we're not –

Bob Scarbrough: Which we haven't so far.

Mike Mitchell: Yeah, which we've been perfect so far – we're not going to go through and we're not going to rerecord the whole thing, because the only way that we can scale to that three to 400's VOD's a month is by keeping the

editing down and just recording directly to disk. We're just recording directly to disk right now so we can publish it in the network. And we'll have this VOD available very, very quickly after we're done recording today.

Bob Scarbrough: What would you say the key benefits are for VOD versus live?

Mike Mitchell: Well, it's the timeliness. So it's the ability for people to get to it whenever they want to get to it. So you have the geographical challenge that I mentioned, that we're a global company, and so we have to hit people around the world; and we haven't figured out how to time-travel yet. So once we get that figured out, maybe we'll do everything live, but anyway….

So because of the time shifts, we're operating in 23 time zones, you know, then we have to make it available asynchronously, when people need to get to it.

Now, the other thing besides geographies is the – you know, people are busy during the day, so one of our dirty secrets, if you will, is that we'll require a salesperson to watch your particular video on demand, though we don't exactly book the time out of their day on their calendar to do that. So they'll generally need to get to that stuff at night, or maybe when they're traveling, that kind of thing.

So with on demand, they don't have to worry about not going to a customer visit, because they can go and watch the video on demand and get that product update afterwards.

Bob Scarbrough: Excellent. With three to 400 VOD's per month, where are you storing all this information?

Mike Mitchell: Well, so, that's a great, and what we do is that we store it all centrally, right, and then we cash it out on these Cisco content engines. So we got a big honkin' centralized storage system, and then we'll cache it out –

Bob Scarbrough: Is this Cisco – Cisco gear?

Mike Mitchell: Yeah. Sure. Yeah, so your Cisco account manager will be happy to help you with anything that we talk about today. But anyway –

Bob Scarbrough: Just say MDS!

Mike Mitchell: Yeah! So, yeah, we've got it all centrally located, and then we'll cache it out as we need to.

Bob Scarbrough: Okay. When we were talking a little bit earlier, I was curious about – we record quite a bit, and we store a lot of information, and with so many videos, you can't just store all that forever, so I was curious what your aging process is for aging out content.

Return on Investment

Mike Mitchell: Oh, okay, that's a great. So what we do is that we'll – it's all usage-based, so we'll keep stuff on the system as long as people are watching it, right? And so it doesn't matter if it's on there for 90 days or if it's on there for two years; as long as people are watching it, we'll keep it up on the system.

Bob Scarbrough: So you take the politics totally out of it.

Mike Mitchell: Yeah, that's a great point. So what we'll do is we'll let anybody publish any video they want. We don't tell anybody that they can't create a video. But if nobody's watching it, then it comes off the system, so it's

totally usage-based. We used to do time-based, but we found that not to be very effective. So usage-based is much more effective.

And to your point, it takes the politics out of it, because if somebody jumps up and down because nobody was watching their video, we just hand them the usage report and say, "Nobody was watching your video"; you know, "Either market it better or maybe it wasn't that important after all."

Bob Scarbrough: Yeah. It's difficult to actually debate that.

Mike Mitchell: Yeah.

Bob Scarbrough: We have a slide here on the ROI that we talked a little bit about, but there's some fascinating numbers there.

Mike Mitchell: Yeah. So the first number there is $47 million, and when we first started looking at the ROI of these tools, we looked at travel avoidance, so how many plane tickets didn't I buy; how many hotel rooms didn't I book. And you know, you get to a pretty decent number with a company Cisco's size. We got to
$47 million.

But we still felt like we were leaving a bit on the table with that $47 million number, so what we started to do next was look at the productivity benefits: Okay, Bob, you didn't have to travel, but the main thing is that – you know, you didn't have to travel, but you also didn't have to take the time to travel. And when we did that, we got to the larger number there, the $149 million number.

Bob Scarbrough: Okay.

Mike Mitchell: And by the way, when we got to that number, we only looked at the driving time to the airport and that kind of stuff. We still assumed that you work on the plane, so we didn't factor in like an eight-hour day because it's an eight-hour plane flight, so – you know, that's –

Bob Scarbrough: A conservative number, then.

Mike Mitchell: That's a very defensible number. But you know what, we still felt like we were leaving a bit on the table. And the bit that we felt we were leaving on the table was, what was the revenue generation benefits of using these tools? So cost avoidance is all fine and good, but you know what? We're all in business for a reason, and so what's the revenue generation benefits of making your sales force more productive or getting your product out to market that much faster.

Then we got to a number that's so big that actually I'm not allowed to put down the exact number, so I have to say hundreds of millions, because frankly, it looks unbelievable. But the lesson learned is that the revenue benefits is a three- to four-time multiple, conservatively, of the cost avoidance.

Bob Scarbrough: That definitely helps you justify your organization.

Mike Mitchell: Well, that's right, and anybody who's looking at deploying these tools, I would encourage you to look at the same model, because it aligns you with again the reason your own company's in business, which is to generate revenue, and makes you relevant to those lines of businesses that are generating revenue.

Bob Scarbrough: You know, we haven't really touched much on the environmental savings here – how this might affect us environmentally. And with companies looking more towards green, can you touch base on that?

Mike Mitchell: Yeah. Actually, we're doing in-depth analysis right now of what the environmental benefits are, but we think they're substantial. To give you an example, and I don't have exact numbers to share with you, but to give you an example, a business traveler that travels conservatively – like let's say somebody from California goes to London four or five times a year – you're producing tons – tons – of carbon emissions when you do that; the plane, rental cars, all that kind of stuff.

To look at the comparison conservative – you know, fairly and conservatively, we're looking at the carbon emissions from the tools that we're using, like right now, like we're – all these lights we have on, we're producing carbon emissions; we're using electricity. But the measurement's in pounds. So from traveling for your interactions, you're producing tons of carbon. For using these tools, whether they're tools like video streaming or Telepresence, per interaction you're using pounds. So it's pounds versus tons.

Bob Scarbrough: Wow.

Mike Mitchell: So the numbers look like they're going to be quite compelling, once we complete our analysis.

Bob Scarbrough: That's good.

Slide 13

Mike Mitchell: So now we're going to get into the facilities side of it?

Bob Scarbrough: All right.

Studio Locations Worldwide

Mike Mitchell: All right. Here we go. Ready? So yep, we do have studios on a global basis, and so we're spanning the globe –

Bob Scarbrough: What was the criteria for deploying these?

Mike Mitchell: Well, so that's a great question, and actually it was volume-based. So we'll rent the equipment until we need to build something, and in each one of these locations, we got to the point where it was simply cheaper to put the capability in place than it was to continue—

Bob Scarbrough: Okay, so you were renting at these locations prior.

Mike Mitchell: Yeah. And then we're looking at expanding next in Bangalore, as I mentioned earlier, because that's the next – it's basically, they're calling it Cisco's second headquarters. So it won't be quite as big as the center of the universe here in San Jose, but it'll be the second center of the universe, if you will.

And we've got some interesting things going on over there, like Wim L. Frank, one of our senior vice presidents, is relocating physically to Bangalore and taking on the title of chief globalization officer –

Bob Scarbrough: I understand he's going to have the first home Telepresence as well.

Mike Mitchell: Yeah, that's the plan.

Bob Scarbrough: I spoke to the program manager yesterday and I offered to be a guinea pig for the first – "You're not first."

Mike Mitchell: Yeah, because it will be 4:00 in the morning when he's in these senior staff meetings, senior executive meetings, right; so he doesn't want to have to drive through the morning in Bangalore to get to the office to do that, so – and also we're looking at enabling not just him of course, but

all of the employees there by putting in this studio, so that we can truly act as a global company.

Bob Scarbrough: That's exciting.

Mike Mitchell: Yeah. They're doing some other interesting things in the space, if I could for just a second, which is like human resources is interviewing candidates in Bangalore over Telepresence.

Bob Scarbrough: Oh, really?

Mike Mitchell: Yeah. So, you know, Bangalore is a hot job market, so they're using the tool to be able to close on candidates rapidly, but not just close on the candidates rapidly, but make sure that there's a fit there, because that's – frankly, if I could say it, I see some companies as rushing into Bangalore and they're just hiring anybody, right, and they're not having the human connection with the team, either back in the United States or wherever – Europe, wherever the other sections of the team are located. There's not a match there, right?

Bob Scarbrough: Right.

Mike Mitchell: So with Telepresence, you can close that gap and you can make that match and make sure that you're not just hiring somebody because they happen to be in India physically, but there's also a team dynamic there.

Bob Scarbrough: That's a great value-add.

Mike Mitchell: So we got big studios.

Bob Scarbrough: That's beautiful.

Large Studio

Mike Mitchell: Yeah. So we built a big studio here in San Jose, and actually Bedfont Lakes also, outside of London, also has a big studio. But we also have smaller studios that we'll talk about in the next slide.

Bob Scarbrough: Okay. I noticed that with the variety of studio sizes, I'm curious, how many people does it take to support these things?

Mike Mitchell: Yeah, the large studio, I think it's a minimum of seven technicians. One of the guys listening in the other room could actually tell me for sure, but anyway, I think it's about seven technicians for the large studio. And then for the smaller studios it's three, four, maybe down to one technician. Like for you and I right now, I think we only rate one technician; I think that's the way it works. And we look at that when we look at how expensive it is to run the studio, so if we can, we actually prefer doing things out of the small studios than the large studios.

Bob Scarbrough: And you also have a makeup artist on staff as well.

Mike Mitchell: We do, yeah. And people laugh at that a little bit, but the truth is that these lights create quite a bit of glare, and so for me in particular, if I didn't have a little bit of powder on right now, then you'd all be blinded right now. All you'd see is this like big shiny spot where my head was. So anyway, we kind of need that.

Small Studio

Mike Mitchell: Here's a small studio shot, and the people will recognize maybe the picture in the lower right-hand corner there, because that's actually where we're sitting right now. And it's great for what we're doing, so we just turn on the lights, we get our friend Monty Montgomery who's helping us produce this in the other room, and we can produce a VOD

very quickly and then I'd be able to publish it on the network.

Bob Scarbrough: Good. I see the one on the left there is similar to like a newsroom. It's got a green background.

Mike Mitchell: Yeah. So we use a green screen, we do quite a bit. One of our senior executives is actually right next-door right now, using the green screen. And what we can do is simple special effects in the background with the green screen. You're right, it's just like what the weatherman uses, right, and so you can use a green background or a blue background – it's called a chroma key effect – and you can replace any color with anything you want in the background.

And you know, let's face it, a lot of the stuff that we're doing in the corporate world is kind of boring, and so what we try to do is we try to make it lively by superimposing things on the background.

Bob Scarbrough: Makes sense.

Self-Provisioned VoD Authoring

Mike Mitchell: So – and, you know, it's not just out of the studio that we're doing things. About half of our video on demand's right now are actually just created by people on their own, sometimes using a vendor but more often using these self-authoring video on demand capabilities that we have, so you can create a VOD on your desktop, as we talked about, or you can go to one of these little mini-stations that we have set up in some of our larger offices, but not like headquarters-scale offices.

So for example, our New York City office in Manhattan, they have a little self-authoring station like you see here, with the lights set up, and they can create VOD's for their customers, video on demands for their customers –

Bob Scarbrough: So just the quality's a little bit better on that versus obviously a laptop.

Mike Mitchell: Yeah, exactly. You've still got the TelePrompTer, you're making eye contact. We've got a good lighting setup here. And that's the number-one thing people screw up when they're creating their own VOD's, by the way, is –

Bob Scarbrough: Lighting?

Mike Mitchell: Yeah, they always have the light behind them, and then they're just like this shadowy thing, you know.

Bob Scarbrough: Right.

Mike Mitchell: So we try to avoid that with these self-authoring stations.

Bob Scarbrough: How many self-authored VOD's do Cisco employees produce per month?

Mike Mitchell: A couple hundred, 150, 200 VOD's a month. So people are using it. And again, if – you don't need all this big fancy studio stuff. We're not going to do the company meeting using a little self-authored station here, a little USB camera.

Remote Broadcasts-IP Backhaul

Mike Mitchell: You know, senior VP's aren't going to be using this kind of setup, or even very important people like myself here, who's privileged to actually have this studio environment to be able to leverage. So when we can, people can use this environment, but they shouldn't be restricted by it.

Bob Scarbrough: Okay. I saw this slide, and the question that came up is, can you explain how people actually do remote broadcasts? Walk us through this?

Mike Mitchell: Yeah. So you know we have a lot of very skilled people here in our studio environment, skilled audio/video technicians, and we have a lot of equipment too – whole racks of encoders doing video encoding. But what we don't want to do is have to be able to scale that for every meeting room at Cisco, or even in every office at Cisco, or even in our large conference center. We don't want to have to basically rebuild a studio in every location.

So what we do is we have this concept that we call IP backhauls which, we're taking feeds in from those classrooms or those meeting rooms, back here to the studio over our IP network. And there in the room, they just have a very simple setup that is doing high-bit-rate encoding, like about six megabits per second. So we're taking in a very high-quality feed back across our network, back to our central location in San Jose.

Then our skilled technicians here and our encoders can take that high-quality feed and trans-rate it down to the lower bit rates – 900K, 100K – and then stream it out all around the globe. So basically what it means is that we can originate a broadcast from anywhere without having to roll in a bunch of equipment to do it.

Bob Scarbrough: That's excellent.

Encoders and Servers

Mike Mitchell: Yeah. So here's that rack of encoders – actually, we've got about 70 encoders there on that rack, so – but again, to get started, what do you need? You need one encoder. But at the scale we're doing it, we need this relatively elaborate setup, and it's all managed using – it's called a Raritan system, and that's what you see there on the left-hand side, is the screens that people use to manage all those different encoders when the feeds come in.

Bob Scarbrough: So you've scaled up to this over a period of years.

Mike Mitchell: Yeah, exactly. So as I mentioned, we started doing live broadcasting in '95, and then Video on Demand in '98. So – and we're at this, you know, three to 400 VOD's a month, 50 to 60 live broadcasts. So we need this. But I don't want to scare people and think that you need this to get started.

Bob Scarbrough: Right.

Slide 20

Mike Mitchell: So we're going to talk about the organizational stuff?

Bob Scarbrough: Okay.

Overall Organization

Mike Mitchell: Okay. So here's, at a very high level, how we're organized. There are two different groups here; one's the rich media communications group, so that's the team that I'm privileged to manage. Then on the IT side – so I'm not in IT, right? And on the IT side, there's a separate group who's managing the IT functions.

Now, this isn't, again, the way that you need to be structured in every company. In some companies I talk to, it's all in IT. In some companies it's even more in the business. In some companies it's in IT, but it's client-funded IT, it's not centralized IT.

Bob Scarbrough: Right.

Mike Mitchell: So you can – when I talk to this slide, it's not that you have to be organized by this, but I think that you have to have, or at least I'd recommend that you have each one of these areas.

In some cases when people are getting started, all these areas is covered by one person, right? They're doing like one thing or a quarter or whatever, they're just getting started, and that's fine too; but I think you just have to think about each of these different functions when you're getting into this space.

Bob Scarbrough: Now, do you have to communicate with IT in any way if you're going to be doing a live broadcast –

Mike Mitchell: Absolutely. Yeah, we're completely dependent on IT. If they're not successful, we're not successful. So we make sure that we have a very strong relationship there and that we're closely communicating.

For example, internally we do a 900-kilobit-per-second stream, and so what IT has done is they provisioned us 2.7 megabits so we can do three simultaneous 900-kilobit streams. So that's our limitation, and we abide by that, so we help IT as well because we act like the cops. We say, well, you can't do that, you know, instead of everybody pinging IT: "Oh, can I do a broadcast?" You know, we act as the funnel or the front end of that. So it's been a good relationship.

Now, some people will ask like where's the line between you and IT, so it's at the encoders. So the encoders are actually managed out of our studio services group, so they sit on the business side. But as soon as that video leaves that encoder and gets on the network –

Bob Scarbrough: Gets on the network?

Mike Mitchell: Yeah. So then that's where the handoff is –

Bob Scarbrough: That's the demarcation point.

Mike Mitchell: Yeah. That's the handoff to IT. And we managed it like that because we wanted anything that you plug a camera into to sit on the business side, because otherwise what we were going to end up having to do is have an IT guy sitting right next to a business guy, because you have both an encoder and a camera there, right?

Bob Scarbrough: Mm-hmm.

Mike Mitchell: So we wanted to have the same group handling both the encoders and the camera equipment.

Bob Scarbrough: Okay.

Client Services

Mike Mitchell: So drilling into it a little bit on the client services side, so this is our client – the responsibilities of our client services organization. So basically these are like our internal salespeople, and what they do is that they go out to each of the critical lines of business – businesses internally, for example, our engineering group or our sales group or our marketing group. And they're assigned to each of those groups, and they spend more time with those groups than they might even with our own team, you know.

And what they're doing is that they're looking at those groups' key business processes and they're prescribing these tools – the whole

portfolio of tools, not just streaming – they're prescribing these tools to that business group to see if they can accelerate those business processes. And each one of these people are measured on the ROI, the return on investment for accelerating those business processes.

For example, at the engineering group, if the engineering client services manager can show that they accelerated a product launch, there's an ROI associated with that, right? And so they capture that and they justify their own existence.

Now, starting this was a little bit tough because –

Bob Scarbrough: Yeah, I can imagine.

Mike Mitchell: -- you know, I – yeah, because I had to take head count out of some other areas that we have end points, you know, and put them into these areas. But it's successful, you know, because – one of the things that you don't want to do is just put up a Website or declare a new group in place or something, and then just expect everybody to come to you, you know.

Bob Scarbrough: Right.

Mike Mitchell: And so – and what we again want to do is make sure the tools are aligned with key business processes so we can do things like bring a product to market that much sooner by using the tools.

Production Services

Mike Mitchell: Then on the production side, we've got a team of producers on a global basis. And by the way, all of these responsibilities are managed globally as one team; I should bring that up as well. So the folks located in London or Singapore or the new location in Bangalore, we're all part of the same team. And we do that to be able to share best practices, so I'd certainly recommend that as a best practice as well.

But on the production side, for the production team, these are people with titles like "producer," right? So if you're an executive or just an individual contributor at Cisco and you want to do a video broadcast, you'll go to a Web-based form, you'll fill it out. And then you'll get assigned a producer that will help you be able to exploit this medium to its full potential. So for this today, we got assigned a producer, Bob Gardner, that's helping us to make sure that we can make the best use of this medium, right?

So – and then there's – the manager of this team, he calls it video triage, right? So he takes in all these requests, he gets several requests a day, and then he assigns it to what producer he thinks would be best suited to handle the particular request as it comes in.

Bob Scarbrough: I'm curious, how far ahead do you have to book and reserve a studio?

Mike Mitchell: So – you know, it's like anything. We like notice as far ahead of time as possible, right –

Bob Scarbrough: Days, weeks, months?

Mike Mitchell: You know, we like weeks. Months is kind of useless because things change too quickly around here, so – so weeks. But frankly, the system's on all the time. We have a baseline capability of technicians who know how to operate all the equipment. So if my pager goes off and somebody needs to do something, we can be on the air literally in minutes.

And to be honest, once you set up this capability, anybody can do that.

It's not something special. It's just the nature of the IP network; you have this always-on network that you can be able to leverage. So, you know, you can start broadcasting at any time once you provision it properly with IT. So we find that the gate now is really with the content providers. It takes them more time to get their content together than it does for us to be able to do a video broadcast.

Studio Services

Mike Mitchell: Then the studio services – so these are the technicians that aren't really IT technicians, right? So these are audio/video specialists, and they make sure that all the systems are running. They do manage the encoders, so there's a little bit of server management capability on that side of the house as well.

Bob Scarbrough: Okay.

Mike Mitchell: But they make sure that everything's operating and take care of the encoding, the compression – all the different things that do require some technical skill but isn't a traditional, anyway, IT function.

Bob Scarbrough: Who chooses the size? I notice that VOD's are various sizes.

Mike Mitchell: Yeah, so – you know, we started at the 176-by-144 size, and we did that because of the lower bit rates that we were streaming at. Frankly at the time – this was a few years ago – the codex weren't very good, so if you just made the video window bigger at 100 kilobits, it would just look bad, you know. So – I mean, you make it at a lower resolution, a smaller window, then, you know, it just looks a little bit better for whatever bit rate.

Now the codex are getting better and so we're doing things at larger resolution. What you're looking at now is a 320-by-240, which is approximately twice the size of some of the other VOD's that we create.

Bob Scarbrough: Yeah. Good.

Rich Media Services

Mike Mitchell: And then on the IT side – and again, we couldn't be successful without our IT partners – they are making sure that everything works behind the scenes, right? So they're handling the management of the network infrastructure; they're also handling the application deployment or application development we have to do. We do do a little bit of custom development in-house. But more and more, as these tools become more and more mainstream, we're buying off the shelf, and that's our preference, is to buy versus build, to avoid any sort of long-term maintenance headaches.

Bob Scarbrough: So as we continue to grow and move in different locations, does your organization engage with IT to help them architect a solution or a network to accommodate these technologies?

Mike Mitchell: Yeah, absolutely. So we bring our business requirements to IT, and in that client services manager function they do a lot of business requirement gathering, you know. And then we act as a funnel again into IT where we'll kind of sort through the noise and look at what we think would have the largest impact on the business side, and then hand it over to IT and then they will, you know, give us the reality check on the –

Bob Scarbrough: Yeah, I was going to say, what do they say about the cost? If, you know, they're going to have to make an incremental adjustment that's going to cost, you know, hundreds of thousands or millions of dollars, who incurs that cost?

Mike Mitchell: Well, sometimes it's client-funded, so sometimes we go back to the client, or I go to my boss, right, to try to get the money. And sometimes it's a sunk IT cost. So, you know, to be honest, each time it's a little bit different as we look at what we're trying to do and where the perceived benefits are. So for example, some things that are good9on the business side also happen to be good on the IT side, so there are some things that make things easier to manage, like maybe buying a new software package that has some new features that we want, but also reduce the overhead on the IT side.

Bob Scarbrough: Okay.

Slide 26

Mike Mitchell: So are we going to get a little nerdy now?

Bob Scarbrough: Yeah. Time to get nerdy.

Mike Mitchell: Right. Boy, I can't wait. Boy, all this business stuff was starting to stress me out.

Bob Scarbrough: Yeah, well, throw the business stuff away and – you can always tell the nerds, you know, they really enjoy the technology portion.

Mike Mitchell: Yeah. I brought my glasses too, so we're all set.

Bob Scarbrough: Okay. Here we go.

Cisco Digital Media System

Mike Mitchell: Yeah, so this is our new Digital Media System, which is something that we're quite proud of. It's in part – I don't want to take too much credit for this – but in part, based on some of our own internal best practices. A very smart team went and developed this product, so – they developed their own code from scratch that met the same needs that we had internally for video streaming, so we're very excited about this because we're going to be migrating to this product internally over time.

And it's really a nice little turnkey system. As I mentioned, historically we've done some internal development, and what we'd much prefer to do is to buy things off the shelf; and so this gives us the capability to buy a turnkey streaming system off the shelf that is really world class.

You've got these encoders here under Media Creation. You've got a mobile encoder, it's WiFi enabled, so you can take that into a conference room somewhere and not even have to plug it into the network and you can start doing video streaming. Those buttons on the front, the three buttons on the front are presets, so a technician on our team can set it up, you know, with the preferred streaming profile; and then the camera person can just push the button, you know, A, B or C, to enable that streaming profile, so you don't have to be technical at all. You just plug the camera and the microphone into it and then start streaming, you know.

Bob Scarbrough: So are both these devices remote, or just the 1000?

Mike Mitchell: Yeah, just the 1000, yeah. So the bottom system there is the 2000, and –

Bob Scarbrough: Is that a TV in there?

Mike Mitchell: Yeah – well, it is, actually; it's a preview monitor, although I don't know if it's organic LED or just LED. But anyway, there's a cool little monitor on the front that gives you a preview of what you're funneling through the

box, which is kind of cool.

And, you know, on the A/V side, the engineers in my group are drooling over this box because it's got SDI inputs, so really high-quality feeds, you know, studio-quality feeds into the box. You can do two simultaneous streams off the box. It's got dual NICs on the back, you know. So it's more the high-end model, but great for a studio environment.

Bob Scarbrough: Okay, good. As we move forward, I know we're going to get nerdy, but we should probably also clarify the acronyms. NIC – network initiation –

Mike Mitchell: Oh. Yeah. Yeah. Sorry.

Bob Scarbrough: Okay.

Mike Mitchell: Yeah. And SDI – I don't know what SDI stands for, actually, but somebody right now on my team is watching this who's saying it out loud –

Bob Scarbrough: Something digital interface –

Mike Mitchell: You're probably right, something digital interface.

Bob Scarbrough: System digital –

Mike Mitchell: Anyway, it's really clean video, is the net of it. So – you know, so that's on the encoder side, right? And then you get into the management side, which to me is the most important thing, because you know what? You're going to have a variety of encoders in your network, and what you really need is a centralized point to manage all that content that's being created in this wide variety of different environments, you know. So people can go and create content using whatever they want at Cisco, right? But then when they go to publish it, they have to go through this centralized media system, and this is where we track usage, that we enforce our policies like the usage-based archival.

Bob Scarbrough: Mm-hmm.

Mike Mitchell: You need to have the centralized media management system to be able to do this, and you need it to be able to scale on a global basis, because this media manager is really the front end to the network. You can't give business users – and again, I'm on the business side—but you can't give business users direct access to the IT network. So you need to abstract it with this Web-based interface that enforces the business policies, the usage policies, and still allows them to upload content directly into the network.

Bob Scarbrough: Okay. Just thinking back a little bit, I didn't have an opportunity to ask this question, and that is that I noticed that we can't download a lot of these videos –

Mike Mitchell: Yeah.

Bob Scarbrough: -- they're in like a streaming server where we can actually access them. And the reason why is because if I were to hop on an airplane, sometimes I'd like to – I don't have 45 minutes to watch this video from a streaming point of view, so I'd like to download it, but I can't do that. Can you explain why?

Mike Mitchell: Yeah. So basically it's because of the – a combination of the download time – like these are fairly large files. But also there's a little bit of a security concern, you know, where we don't want the files all over the place, you know. So if you're streaming on your network, it's inherently more secure than if you have these downloaded files running around all

over the place.

Now, that said, we are doing some video podcasting, for example, so we are enabling it in some instances. But generally for content that we're comfortable doing that with.

Bob Scarbrough: Okay.

Mike Mitchell: Then you've got the delivery side here. And so the key thing about IP video and one of the really cool things about IP video is, when you say IP video, a lot of people just think of your laptop, your PC, your desktop –

Bob Scarbrough: Right.

Mike Mitchell: But you know what? You can deliver that video anywhere, and that's what this digital media player here is. And so you can go and feed that video into something like a plasma display in a break room, or into your cafeteria, or in a lot of companies, you know, you've got a manufacturing floor or you've got an employee base where not everybody is spoiled like we are here, where we all have our little laptops, you know, running around and everything. So you've got an employee base that might not have their own PC, so you can go in and deploy systems to shared environments, be it a projector or a plasma display, an LCD.

And then in retail, you can use that same plasma display, okay, so you can use that for running commercials, right? And then in the morning you can go and use it for employee training, so exact same –

Bob Scarbrough: Oh. Oh, yeah.

Mike Mitchell: There's a car dealership I was talking to in the Midwest, right, where they were doing that. Where, before the dealership opens, they've got all their mechanics on the showroom floor looking at these very high-end plasma displays, but they're watching a training on how to – you know, the latest repair on an engine or something, right?

Bob Scarbrough: Mm-hmm.

Mike Mitchell: But then when the showroom floor opens, you've got the latest hot car zipping by on that same display, you know, for all the customers coming through.

Bob Scarbrough: Yep.

Cisco Digital Media System-Product Portfolio Overview

Mike Mitchell: So anyway, the advantage of your IP network is that you can leverage it to deliver content to multiple different types of devices.

Bob Scarbrough: Excellent.

Mike Mitchell: So, you know, and then when you're deploying it out, what you're doing is that you're encoding it, you're managing it, and then you're distributing it out; and then again, you can hit either a TV or some sort of projection device, or you can hit the desktop PC. And the Cisco system includes the actual user interface there on the desktop PC as well. So it's fully customizable so you don't have to show all the Cisco logos if you don't want to; you can show your own company logo. But anyway, it gets you going with the user interface as well.

Bob Scarbrough: Yeah.

Mike Mitchell: So it's a great little turnkey system.

Bob Scarbrough: Excellent. There's a busy slide.

Cisco Digital Media System-Integration into the Network

Mike Mitchell: Yeah. So this is the slide that they tell you not to produce because it has too much stuff on it. But anyway, so what we're doing is that when we create the content, we distribute it out to the edge using our wide-area application engines, also called content engines. So what this means is that you're not taking up WAN bandwidth, okay, in your local office. So regardless of what your company's WAN looks like, you can deliver high-quality video to a remote office.

Bob Scarbrough: And you do this in off-peak hours?

Mike Mitchell: Oh, absolutely. So it'll trickle during peak, you know, not taking too much of your bandwidth, but just trickling intelligently during the day. But then this system's intelligent enough that you can set business hours, so that overnight it goes boop, and it'll feed the whole thing through.

Bob Scarbrough: So where's the intelligence? Is the intelligence in the network with class of service, or is the intelligence in the media portion?

Mike Mitchell: Yeah. So the intelligence is a combination of a central distribution manager and the network.

Bob Scarbrough: Okay.

Mike Mitchell: And by the way, you can seesaw it. So if, God forbid, you don't have a network, a Cisco network, you can put all the intelligence into the CDM. Or if you've got all-Cisco network, then you can put more and more of the intelligence into the network itself, so it's your choice as the user.

Now, the best public example that we have of this is the Hard Rock Café's, right? So, you know, you think about these Hard Rock Café's, each one of these restaurants don't have a lot of bandwidth. I'm not sure what they have, but they don't have a lot of bandwidth. And those videos that you're seeing in a lot of the Hard Rock Café's are actually coming off one of these local content engines, right?

And so, you know, you're able to serve up high-quality video content, but manage it centrally from the Hard Rock Café headquarters, you know, so that they can make sure that they have a consistent base of videos out in the Hard Rock Café's around the world.

Bob Scarbrough: Excellent.

VPN Unicast Support

Mike Mitchell: Yeah. So, you know, the other thing you can do is use this system to scale for your teleworkers as well. So what we do is that we put the content engines right behind our VPN concentrators so that when people are working from home or, you know, frankly, again, in our global environment, you've got a lot of people in the middle of the night who still want to watch the live broadcast or whatever, so they VPN into their local concentrator, and then right there on the other side of that concentrator is a Cisco content engine, serving up all that video content. So again, we're locating the content as close to the edge as possible to be able to scale it out to employees all around the world.

Bob Scarbrough: And optimize bandwidth, as you had said.

VoD On-Demand Access

Mike Mitchell: Absolutely. Absolutely. And the way that we're doing it, by the way, is that we're using a hybrid caching and pre-positioning model. So we're pre-positioning out the content of 13 locations, and then from there it's cached.

Bob Scarbrough: Are these the 13 locations that we saw on that previous slide?

Mike Mitchell: Some of them are, yeah. But it's the 13 key locations where we have the most bandwidth, basically. So we pre-position it out there. And then from there, let's say that you're in a small Cisco office; then it's cached on demand out to you. So the first time you watch it, it comes over the wide-area network. But every time after that, it's there in a local area network.

Now, what we're doing is that we're actually in the process of migrating, so that we'll be in a 100% caching model where everything will be centrally located, and no matter where you are, it will be cached out. And we're doing that because we're using so much video that it's simply more efficient to go ahead and go to 100% caching model rather than pre-positioning everything out to the edge. So the point being for customers is that you can do any combination of pre-positioning or caching that you want, and it's just a matter of what meets your business needs, and what's the best practice on your particular network, either caching or pre-positioning.

Bob Scarbrough: Okay.

Slide 32

Mike Mitchell: So I guess that wraps it up, Bob?

Bob Scarbrough: Yes, it does. I'd like to thank everybody for viewing this seminar, and I'd like to especially thank you, Mike.

Mike Mitchell: Thanks, Bob, a pleasure.

Bob Scarbrough: Appreciate it. And for additional information, please reference what you see on the slide there: Go to www.cisco.com\go\ciscoitatwork. And it will provide you access to literally hundreds of case studies as well as operational best practices and you'll be able to watch this video from that location as well. And there's a case study, an excellent case study on streaming video, and you'll see the slide deck as well. So thank you very much.

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at **www.cisco.com/go/offices.**

Printed in USA C78-331727-01 10/06

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at **www.cisco.com/go/offices.**

Printed in USA C78-331727-01 10/06

