Unified Communications Helps Localities Replace or Upgrade Aging Phone Systems

BY: Wayne Hanson | June 12, 2013

This report is based on the activities of the Digital Communities program, a network of public- and private-sector IT professionals who are working to improve local governments' delivery of public service through the use of digital technology. The program — a partnership between Government Technology *and e.Republic's Center for Digital Government — consists of task forces that meet online and in person to exchange information on important issues facing local government IT professionals.*

More than 1,000 government and industry members participate in Digital Communities task forces focused on digital infrastructure, law enforcement and big city/county leadership. The Digital Communities program also conducts the annual Digital Cities and Digital Counties surveys, which track technology trends and identify and promote best practices in local government.

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A Look at Who's Using UC and Why

In 2007, Bill Gates said that "taking the magic of software and applying it to phone calls," would transform communications and lead to the eventual death of the public branch exchange or PBX. "Once you get software in the mix, the capabilities go way beyond what anybody thinks of today when they think of phone calls," he told *Network World*. "This is a complete transformation of the business of the PBX."

The business of the PBX has been to provide voice telephone service to organizations like cities and counties at lower cost than purchasing individual lines from the phone company. Rather than buying 1,000 phone lines at $60 per month, the organization can buy a PBX telephone switch and connect those 1,000 phones to that switch using the organization's wiring. So the organization has phones for its own internal use. Then it can connect that switch to the external public switched telephone network with, say, 75 lines for making and receiving external calls. The cost drops to less than $5,000 per month plus the one-time cost of the PBX switch. So it was a very good solution at the time.

But times have changed. Voice no longer needs to run in a separate stovepipe. Cellphones and mobile devices provide one user-friendly interface for multiple forms of communication, such as voice, video, text and email. Skype, Google video chat and other services enable voice and video communication around the world — at no or very little cost and with no PBX.

Today, as cities and counties look at replacing aging PBX switches or upgrading their systems, they have some interesting options as voice yields to the magic of software and many different forms of communication converge in the same digital pipe. Unified communications (UC) offers enhanced capabilities and a new playing field for contact centers, mobile communication, computers and networks. What a smartphone or tablet does for the individual, UC does for organizations — it integrates multiple media types and provides a single user interface. And that functionality has the potential to reduce government costs, increase flexibility and boost efficiency.

"Typically with UC the desk phone is connected to a PC, or sometimes the PC serves as the phone as well as the computer," said Bill Schrier, former Seattle CTO. "In this fashion, email, voicemail and telephone directories are all integrated into the PC."

Photo: *IP-based communications let Tuscaloosa, Ala., deploy two emergency action centers a few hours after the city was devastated by a massive tornado. Photo by Christopher Mardorf/FEMA*

With UC, desk phones and smartphones can be integrated, so that during work hours, for example, an incoming call rings on an employee's desk phone and cellphone — a useful feature for workers in the field.

Another function that UC brings is "presence," the ability to look at an electronic directory and see a person's availability, reducing the amount of time wasted playing phone tag.

Some UC solutions are on-site systems purchased and owned by the jurisdiction. Others are hosted by a vendor and accessed via an Internet connection. In this special section, *Digital Communities* talked to a number of cities and counties about their experiences with UC, the lessons learned and what advice they have for other local governments.

Tuscaloosa, Ala.

On the afternoon of April 27, 2011, a huge tornado — estimated to be a half-mile wide at the ground with winds up to 200 mph — moved into Tuscaloosa, Ala. It cut directly through Tuscaloosa and Birmingham and left a trail of destruction for 380 miles across the state.

Forty-four Tuscaloosa residents died and untold others suffered injuries. It was a dark day, but the city had done advanced disaster planning and installed a unified communications system, without which things could have been much worse.

"We'd been preparing for emergencies for several years," said Doug Taylor, director of the Tuscaloosa Information Technology Department, "and the entire city had extensive training." Tuscaloosa implemented two emergency action centers in just a couple of hours, one at its City Hall and the other at the Police Department, he said. "Without it, I don't know what we'd have done."

Terminology Cheat Sheet

Unified Communications (UC): The integration of real-time communication services, such as instant messaging (chat), presence information, telephony (including IP telephony), video conferencing, data sharing, call control and speech recognition with non-real-time communication services like unified messaging (integrated voicemail, email, SMS and fax). UC is not necessarily a single product, but a set of products that provides a consistent unified user interface and user experience across multiple devices and media types.

PBX: A telephone exchange (public branch exchange) that serves a particular business or office, as opposed to one that a common carrier or telephone company operates for many businesses or for the general public. PBXes make connections among the internal telephones of an organization and also connect them to the public switched telephone network via trunk lines.

Centrex: Centrex is a PBX-like service providing switching at the central office instead of at the customer's premises. Typically the telephone company owns and manages all the communications

The quick setup was enabled in part by a citywide IP communications system running on Tuscaloosa's fiber network. "The voice over IP enabled us to place telephones wherever we needed them."

That was extremely important, said Taylor. "We lost our Emergency Management Department. The whole building — which was formerly a General Motors factory — is extremely large and it was just blown away.

"We lost all of that and still maintained the ability to communicate on the rest of our systems," Taylor added. The system — which began as an upgrade to provide a 311 call center — was installed by ShoreTel and became the city's basic switchboard. "The actual installation was very easy, from an IT standpoint, because the phones plug into an IP network," he said.

Taylor said the system is on-premises — and he thinks that's better than a cloud-style subscription. "We have all our equipment here at our locations," he said. "The systems that you have replicate each other on the switches, so if you have good connections like fiber between locations — like a spider web — you can actually lose a system and stay operational."

Now, some 1,100 of the city's 1,300 employees are on the new system. "We don't have all the unified communications bells and whistles," Taylor said, "but what we do have here, we really utilize."

Palm Beach County, Fla.

Palm Beach County, Fla., is the largest county east of the Mississippi, based on total land area, and it spends $7.5 million

equipment and software necessary to implement the Centrex service and then sells various services to the customer.

Contact Center: A contact center handles letter, fax, live chat, email, etc., in one location.

Public Switched Telephone Network (PSTN): The PSTN consists of telephone lines, fiber-optic cables, microwave transmission links, cellular networks, communications satellites and undersea telephone cables, all interconnected by switching centers, thus allowing any telephone to communicate with any other.

VoIP: Voice over Internet protocol refers to communications services that are transported via an IP network, rather than the PSTN.

Presence: A function that tells you if the person you want to contact is available to receive a call or text message, etc. — *Source: Wikipedia*

annually for 80 legacy PBX systems and leased phone circuits connecting 367 facilities. The county wants to save costs and simplify operations, said Michael Butler, director of network services for Palm Beach County Information Systems Services. "Our intent is to unify everything, lower our maintenance costs, make staff more efficient in supporting all the various systems — down to one system — and leverage our network. We have a fairly sizable high-speed network, with about 450 miles of our own fiber, so we want to leverage that, and then cut our [leased line] costs as well. We anticipate saving about $3.5 million per year once the system is fully deployed." The project will encompass 10,000 phones.

The county developed a 45-page list of needed features. "We selected five manufacturers for evaluation — ShoreTel, Cisco, Avaya, Siemens and Microsoft. We're going through a one-month evaluation with each of those manufacturers. We're running through the call processing engine, call center solutions, how they handle 911 — all of those various features."

The evaluations will conclude in August, and the county will select a company. Butler said Palm Beach County will use one of its existing contracting vehicles such as the Western States Contracting Alliance to avoid going out to bid.

One of the goals is to be able to do video from any endpoint within the county. "We currently have about 1,000 licenses of Microsoft Lync for instant messaging and video chat, and one of the criteria we're evaluating is should we expand our Lync presence and integrate it with whatever solution we choose for call processing."

Butler said that he underestimated the amount of work required to prepare the network for the upgrade. "We're having to go out and do stand-alone phone surveys in all of our facilities, so we know where we need to upgrade cabling, we know where we need to add additional switchboards. We have to upgrade about 900 of our switches throughout our facilities to power over Ethernet." But the work goes beyond this. "We're doing a comprehensive wire-mapping project for 911 purposes, so that we can map directly to the location of the phone. When the 911 call comes in, we can hand it off to the PSAP [public safety answering point] with the correct location information. So there's a lot of preliminary work that's gone into the project," Butler added. "I think once we select a manufacturer and start the deployment, we'll all breathe a sigh of relief."

King County, Wash.

Occupying 2,300 square miles, King County, Wash., is home to about 2 million residents and its county seat is Seattle. In 2010, when Bill Kehoe became CIO, the county was preparing to upgrade a 25-year-old PBX — with 43 fixed-cost contracts — to a voice over IP service. Kehoe suggested the county should instead move to a UC architecture. "I felt that's the way the industry was going," said Kehoe, "and it would give us much greater benefits."

UC Project Resources

To provide a detailed example of specific requirements for a UC system, Palm Beach County's UC plan might serve as a model. The full report includes an evaluation plan, project summary, executive presentation, project funding and manufacturer questionnaire.

King County had an enterprise agreement with Microsoft, and so it decided to go with Lync, the Redmond, Wash., firm's UC product. The county is two years into a four-year deployment, and has 3,000 of 13,000 staff on the Lync system, with the aim to have everyone connected. "We're phasing it in and learning lessons with each deployment," Kehoe said.

He says the county is already seeing improved efficiency and productivity from the partial deployment. "You can work anywhere you have a network connection, attend meetings ... and you are always able to efficiently communicate as long as you have a connection, whether you are flying at 10,000 feet, or in Starbucks

Key questions that may help to outline a UC project, as suggested by city and county employees, include:

Mobility

Are your staff members already using mobile devices for work?
Are staff carrying multiple mobile devices for work, personal or specialized functions?
Is there a benefit to allowing telecommuting?
What infrastructure upgrades would be required to provide expanded wireless service?
Would expanding mobility provide business, cost or other benefits?

Legacy

Do you use PBX switches that are 20 or more years old?
Are cumbersome communications systems slowing down service or stopping implementation of 311 or other enhanced services?
Do you have old call center routing and business processes that would need to be updated?

Unified Communications

Will you be replacing PBX switches or updating VoIP systems within the next three years?
Is there a business case for providing video and video conferencing?
Do office desktops and laptops have the capability to load a UC client?
What switches and building wiring would need to be upgraded?
What changes and upgrades would need to be made to the existing network to run UC?
Do you have the resources to train staff members to use UC system features?
Is your current communications system subject to disruption or outages?
Do you have IT staff to run an on-premises UC system, or would you look instead at a hosted system?
Would you need to do wire-mapping to enable 911 location information?
Can you make a case for upgrading to UC based on total cost of ownership?

or in the office. From a mobility perspective, it's going to give King County employees incredible efficiency in terms of where and when they can work, and make them much more productive on the job because of the communication efficiency."

Video conferencing via Lync Meeting is another benefit, he said. "We can set up Lync meetings where half the attendees are in the room and half are at home or somewhere else. It's very easy from your calendar and Outlook to establish a Lync meeting — it sets up all the links automatically. You click on the Lync meeting and you're in."

Kehoe holds quarterly meetings in which up to 200 people attend via video. "We don't have to rent a big conference room," he said, "people don't have to travel to the location, so there are a lot of efficiencies there. They can attend the meeting from their desks so they can continue to work if they need to, and that's happening all around the county now, where before we didn't have a good solution for meetings and video conferencing. ... Now we have more efficient communication and more ad hoc meetings."

In addition, county staff members use the system to assist residents.

For example, public health workers are using video to view and document patients taking medication.

Permitting staff members also are using the system to talk with their customers, Kehoe said. "It's not just an internal efficiency, it's also helping our residents based on the business processes they have."

The UC system earns kudos for |flexibility as well. "I have a mobile device and if Bill is talking to me about something late on Friday, I can transfer him from my computer to my mobile device as I run out the door," said Communication Director Terra Strouhal.

The phones that are being installed include a presence indicator, which shows if individuals are available. Employees can decide if it's best to communicate with one another via IM, email or video chat based on the presence function. It includes other useful features, too.

"If I really need to talk to Bill, but he's away," Strouhal explained, "I can set up an alert so I get pinged when his presence turns back to green, meaning he's available. Another feature that I love is getting my voicemail in my email. It's very nice to have a visual representation of your voicemail so you can take a quick preview, and if you're busy, see what messages you really should look at."

Kehoe said the UC system's cost penciled out to about the same price

as the original PBX voice replacement. But during implementation, some unexpected challenges arose, including a big commitment of staff time as well as considerable network and wireless upgrades necessary to support the new system.

"Because of the diversity of UC implementation, you have to spend a lot more time with customers training them, helping them understand how to use the various components," Kehoe said. "We have, I believe, four deployment teams on the project now. So the staff costs associated with UC deployment are probably double what you would find for just a straight hardware VoIP solution."

Although the county had a robust network, it still had to upgrade wiring and network capacity inside some of its buildings, according to Kehoe. "If we were doing this again, we probably would have done more work looking at the requirements and making sure that we knew which buildings weren't up to snuff in terms of their infrastructure and their networking backbone."

Wide area may need additional capacity too, he said. "If another county or city is going to do this, they are going to want to go through that evaluation and make sure they have those costs in their project fund," Kehoe said.

In addition, Kehoe said unified communications promotes mobility, and that means wireless infrastructure must be beefed up — an issue King County is still struggling with.

What's more, many older county laptops and desktop machines couldn't load the Lync client. Finally, the county needed to purchase additional products to handle some of its call-routing needs. "We have a bunch of call centers mainly in each department, and each one of them has various levels of sophistication, so you really need to analyze the workload and routing for each of those as part of your requirements gathering, and then determine whether Lync has the functionality to handle that."

For other jurisdictions creating an RFP for unified communications, Kehoe has some suggestions. "You want to talk about your desktop and laptops, the age of those — making sure you have specifications for that, so the client can work with the type of device or phone you are going to install. [You also need to talk about] your network connectivity, wireless capacity, your infrastructure and buildings, call center requirements, and 911 requirements. That requirements phase, that RFP, and technical/business requirements are a key phase of the project."

Northwest Tri-County Intermediate Unit

The Northwest Tri-County Intermediate Unit provides specialized services to 17 school districts in three Pennsylvania counties. Director of Technology Solutions and Services Vincent C. Humes said the unit has a nomadic workforce, with 400 people typically in the field and less than 100 in the office. Consequently bring your own device is a big topic of discussion because staff have a mix of personal and unit-provided mobile devices. "We've taken the position: Here are the protocols that your device has to support, and if it does that then we're OK with you making that connection," Humes said.

"We have the traditional IP phones on our desks, and we used to have a lot of BlackBerrys, but recently we've gone to more of the iOS and Android-type devices. The vast majority are iPhone-based."

The unit's IP telephony is tied to its Active Directory, said Humes, allowing for features including voicemail that shows up in email and a single number that rings both the office phone and cellphone, but doesn't ring cellphones after 5 p.m.

The unit provides video bridging for the school districts and also provides "firewall traversal," said Humes, as that can be an issue when video conferencing. The firewall — designed to stop unauthorized access to an internal system — will sometimes do its job too well and cut off video, he said. Some districts run college-level courses via video, and the unit runs video staff meetings.

"We use Avaya for all our video stuff — bridges, firewall traversals," Humes said, "and we just started using the Avaya endpoints."

If a jurisdiction is moving to UC, Humes said IP-based systems are the way to go. "But there are caveats. A lot of people have traditional PBXes, and when they have power outages, they don't have the distributed power issues they might have when they start to roll out an IP-based system, where they might have multiple wiring closets with POE [power over Ethernet] switches. Another thing is that total cost of ownership."

In one example, Humes said a vendor beat another on a short-term comparison, but in a five-year analysis, the other vendor came out with a $100,000 advantage. "Look at those long-term total cost of ownership numbers, because they can certainly make a difference. Some of the players have great stuff, but you are going to pay dearly for it over time."

Charlotte, N.C.

Charlotte, N.C., handles about 3 million calls annually across its call centers, including 311 for the city and Mecklenburg County. In 2011, about the time the city's voice system was nearing the end of its life, Charlotte learned it would host the 2012

Democratic National Convention with an estimated 50,000 communications-hungry delegates, members of the press and public.

"We had an existing system that was primarily our contact center," said Bellverie Ross, senior program manager of Charlotte. "We had about five contact centers, but this was our 311, Where's My Bus [app] and so forth. The actual call center applications and the platform itself were going to expire. It wasn't just about support, those applications were gone, and we couldn't do maintenance or anything on the platform as of December 2012." Ross said that components had been upgraded piecemeal and parts of the system were "fighting one another."

Charlotte decided to go with a Cisco/NWN hosted UC platform, and Ross said the city was one of the first to do so. "We made the decision on the platform in September, we started the planning in February and we went live in June. That is pretty much unheard of in the public sector," she said.

"The hosting made it go faster, because it was all within NWN's data center. So we didn't have to put anything in our data center, we just needed to connect to them." Ross said that city staff needed to replace phones in the call center and prepare the network, which she called "normal project work."

Ross had some 100 projects running leading up to the convention, but the UC system was not one of the trouble spots. And since that time, a hosted interactive voice response system, an enhanced Web presence and mobile apps are reducing the call center traffic volume.

Ross has some advice for her colleagues: "Don't build a system you will use today. Build a system that will support you five years out. Otherwise, by the time you get it in, it is outdated. We are going to move more channels to Facebook, Twitter and the Web, and with tools that Cisco brings to bear, I can do that now. I have the ability to do it, because it's inherent in the product."

In addition, make sure you understand your business processes. "When you start putting in a phone system, particularly in a call center, you think of the business processes of the workflow of how a call comes in. But on the back end, you support business processes. How will this affect your internal IT staff? Your help desk staff? The end users? And think about that, because that's where the 'gotchas' are in the processes and learning to work with one another, particularly in a hosted environment."

Ross said the relationship with NWN has been going well, but it has been a learning curve for both sides. Finally, she suggested building one major upgrade into the cost. "That way you know you've got the longevity to take you out probably seven years."

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