



Customer Application Note

Next-Generation Communication at Advocate Health Care

Advocate Health Care, the largest, fully integrated, not-for-profit healthcare delivery system in Chicago, teamed up with Alcatel to deliver an innovative communication solution for healthcare professionals, and is pioneering the definition of emerging mobile clinical applications leveraging technologies such as Unified Communication, SIP (Session Initiation Protocol), presence, and mobility.

NEXT-GENERATION COMMUNICATION AT ADVOCATE HEALTH CARE

In 2001, Advocate Health Care decided to transform a voice network of PBXs from multiple vendors into an Alcatel next-generation IP Communication system. The result today is increased care givers' satisfaction and efficiency, better patient satisfaction, and reduced costs.

Advocate Health Care is the second largest employer in Illinois, the largest, fully integrated, not-for-profit healthcare delivery system in the Chicago area, and one of the top 10 such systems in the USA.

In 2003, Advocate had 349,526 Health Advisor consumer contacts; 30,263 physician referrals; 1,562,910 hospital outpatient visits; 146,809 hospital admissions; 19,764 births; and 2,721 home care admissions.

More than 1 million people were served through community benefit programs. Advocate provided \$55.9 million in charity care in 2003, for a total of more than \$1 billion in uncompensated care since 1995.

Today, a complete VoIP (Voice over IP) Metropolitan area healthcare communication system is operational over more than 45 locations, as a result of Advocate and Alcatel teaming up to lay the foundations for next-generation healthcare communication systems.

■ Background

Dedicated to providing the best quality healthcare to patients, their families and the community as a whole, Advocate Health Care owns eight hospitals with a total of 3,500 beds, and offers acute care, outpatient services, home healthcare, counseling, day care, physician services, skilled nursing care, and healthcare education.

With 24,500 employees, including 4,600 physicians, Advocate's dedication requires best-of-breed communication tools.

This case study examines how Alcatel's IP-based voice platform helped not only to reduce costs and provide better communication to medical professionals, patients and administration people, but also to set the stage to deliver next-generation healthcare communication services throughout the Advocate network.

■ The challenge

Over time, Advocate Health Care has grown as a result of mergers between hospitals, the addition of new medical facilities, and the creation of a physician network. The mixed nature of Advocate's communication network created a difficult situation at many levels.

For instance, Advocate had more than 65 locations equipped with PBXs from four different vendors, and had limited networking capabilities, and disparate voicemail systems. In all, there were as many as 29 different management platforms in place, while like most other healthcare organizations, Advocate was operating a very lean, but very effective, support staff.

There was a huge opportunity to improve patient reservation systems while slashing costs, through more automation and integration of the hospital databases, but it was very difficult to integrate all of Advocate's systems including its various call centers and automated customer service functions.

In addition, the lack of XML (eXtensible Markup Language) capabilities prevented Advocate from leveraging Web Services to integrate communication with business processes more effectively.

■ The Alcatel solution

Advocate's network evolution was a challenge; it could not disrupt business operations on a large scale, and it needed to be installed piecemeal over time. Alcatel's **OmniPCX Enterprise** was a perfect solution, due to its flexibility and ability to inter-

operate with multiple existing systems. Using a combination of IP, digital, wireless, and analog technologies, Alcatel partnered with Advocate to devise a plan to

migrate the many different systems in place to a single, network-wide communications system.

Today, a complete VoIP Metropolitan Area Network (MAN) is operational over more than 45 locations, providing a rich feature set across all sites. Voicemail solutions have been streamlined, with a combination of networked voice mail systems over Advocate's MAN for more than 15 systems, while AMIS (Audio Messaging Interface Specification) was used to link disparate voicemail systems during the transition phase.

At the infrastructure level, the deployment of this company-wide architecture, based on the Alcatel OmniPCX Enterprise IP platform, allowed total cost of ownership (TCO) to be reduced, with significantly lower recurring telecom costs and optimized management. For example, new capabilities such as call detail records, as well as directory using LDAP (Lightweight Directory Access Protocol), were integrated into Advocate's IT applications.

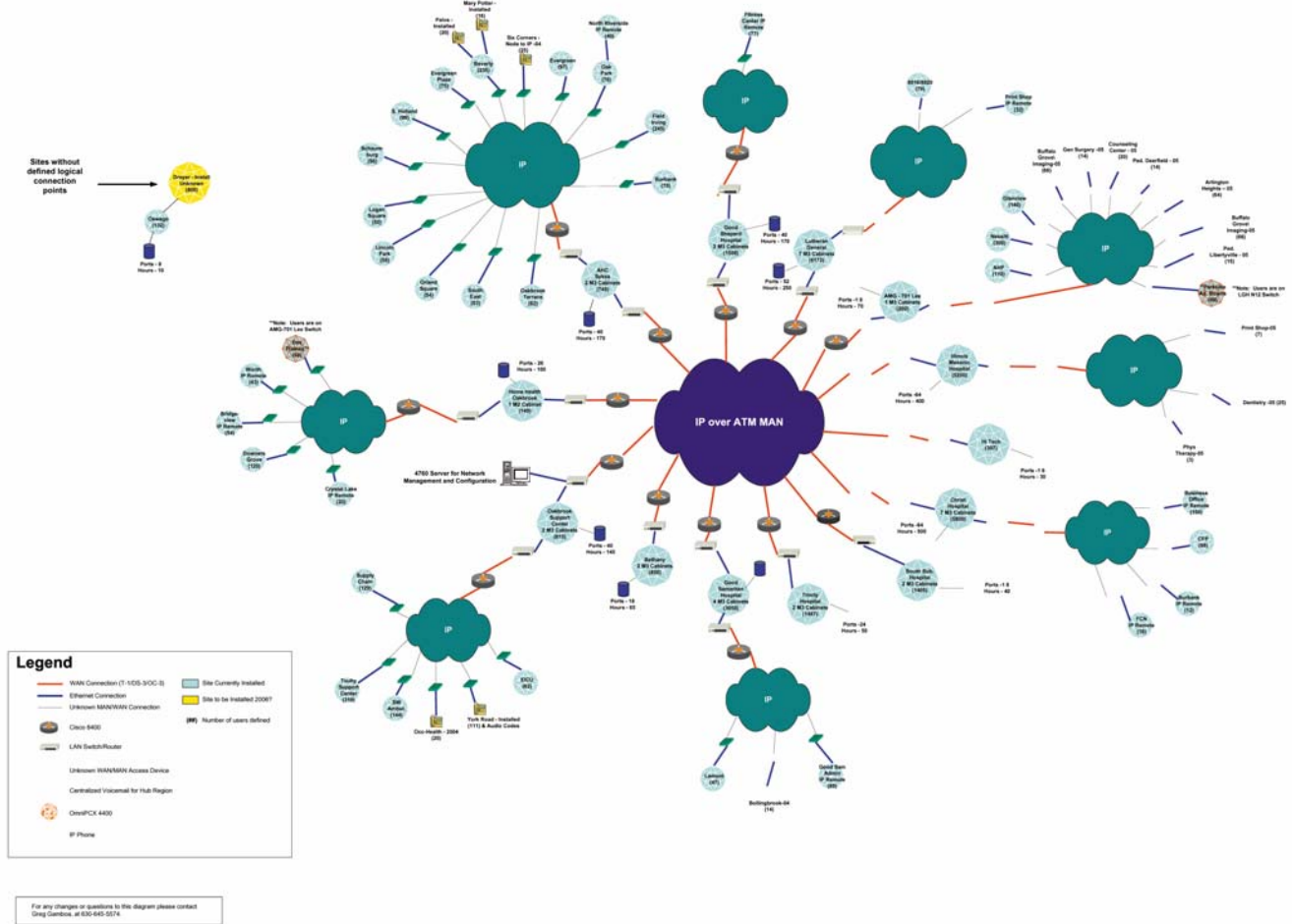
With HIPAA (Health Insurance Portability Accountability Act) privacy and security regulation just coming into force, and new challenges like single sign-on to physician Web portals on the way, Advocate now has a single point of network management to meet these developing requirements.

➤ For more information on Alcatel OmniPCX Enterprise, visit our website at http://www.alcatel.com/enterprise/en/products/ip_telephony/omnipcxenterprise/index.html

Figure 1: Advocate Health Care telecommunications network design



Advocate Health Care Enterprise Telecommunications Network Design



Beyond benefits at the infrastructure level, the deployment of the Alcatel solution also allowed Advocate to improve services tremendously to the three key populations in its environment: patients, nurses, and doctors.

■ Patient care enhancements

Alcatel’s technologies have greatly improved patient interaction. Contact center solutions were leveraged to enhance first-call resolution by routing calls to the right medical teleconsultant, and automated access to patient information, consolidated from all data sources, was provided.

This new contact center enables callers to be prioritized according to their medical state; it is also used for medical triage services delivered by nurses or doctors, and for 24/7 automated service.

An interesting detail is the deployment of a voice portal. It is available 24/7, and allows appointment scheduling with hospital physicians. The use of VXML (Voice eXtensible Markup Language), also known as voice-enabled Web, enables automated voice access to the hospital database for appointment tele-scheduling. The use of standards simplifies integration with Advocate’s databases. Better yet, as the same system automatically reminds patients before the appointment, it significantly decreased the number of no-shows for consultations.

The infrastructure in place is also adapted to many other applications, such as self-service access to interactive medical information; prescription refill; flu vaccine reminders; research surveys for disease management; risk assessment; and research surveys.

In the near future, video will also improve patient life. Typically, it will be used for contact between mother and baby when the baby is in isolation, or for patients who lack immunity or who are contagious.

With the fast deployment of broadband access, video will also greatly improve geriatric care, enabling richer communication between patients and relatives. It will also extend diagnostic reach, with rural medicine gaining access to the best Advocate Health Care specialists.

■ Improved communication with and for nurses

Alcatel’s solutions also focused on providing nurses, the most numerous healthcare professionals who are at the heart of the great majority of interactions, with specific communication services.

The openness of OmniPCX Enterprise simplified integration with legacy medical applications. An illustration is the integration of OmniPCX Enterprise with paging systems and nurse call systems that transmit emergency information to mobile device displays.

With the evolution towards the so-called “Silent Hospital”, Advocate Health Care wants to suppress public addresses as well as overhead pages, and to simplify the difficult call process of locating and communicating with highly mobile healthcare professionals.

The deployment of mobile phones will help to achieve these goals; the call process will be simplified, and the call will directly reach the right person with real-time information on the call subject. The information can be originated by a button pushed by a patient, or by patient sensors sending a variety of medical information.

Mobile voice terminal deployment is one driver that has led Advocate to pilot a WLAN (Wireless Local Area Network) infrastructure, along with locating people and equipment, e.g. finding a wheelchair based on RFID (Radio Frequency Identifier), or locating a physician using either WLAN or GPS.

■ Keeping up with physicians

Physician mobility goes beyond voice roaming within hospital premises. Physicians need mobile access within and outside the hospital campus. Dual-mode cellular/WiFi (Wireless Fidelity) PDAs will give physicians the ability to access hospital databases or patient records and more, and could also replace their mobile phones.

A typical application is telemedicine. Urgent information from a patient sensor could be sent in real time to the physician’s PDA. The physician could use the PDA to talk to his patient, and offer immediate medical as well psychological assistance.

Location technologies using GPS or WiFi will also enable new communication scenarios; for instance, it will be possible to route calls intelligently, based on the physician’s presence and availability. Typically, in an emergency situation, the communication system would look first for a physician whose agenda shows he is available (if he is in cardiac resuscitation, he wouldn’t be called), and who is located close to the patient, before routing the call. Rich presence will also improve the way the physician collaborates when he is in the operating room, his office or a consultation room, by keeping the network informed of his availability and willingness to communicate.

■ New, advanced communication options

Physicians are the most critical assets of the hospital; they need advanced collaboration tools to share their knowledge. However, in many cases, the physician call process is difficult, slow, and intrusive, since there is little information on the physician’s location or availability.

One of the interesting capabilities of OmniPCX Enterprise is its ability to reach a physician through a true multimedia multi-interaction, based on advanced session management.

Advocate and Alcatel are jointly defining new healthcare communication scenarios leveraging SIP (Session Initiation Protocol) based technologies, such as presence and multimedia session management, to offer advanced communication options. One scenario is as follows.

An emergency event prompts the attending physician to call the most appropriate specialist. The physician immediately receives on his IP Touch phone information about the specialist’s availability (agenda status, communication media available).

From his phone, he sees that the specialist’s agenda is marked “consultation until 20:00.”



He sends an instant message (IM); the specialist sees it on his phone and, given the emergency, accepts a voice call.



Given the complexity of the case, they decide to extend the interaction and share a medical image. Since the communication involves the Electronic Intensive Care Unit (EICU), a video camera is monitoring the patient and his electro-cardiograms, and thus video is added to the interaction.

This scenario of rich interaction illustrates next-generation healthcare collaboration that starts with IM, continues with voice and data sharing, and ends with video. This scenario is available from a telephone set or from a Web-based interface, and remains as simple as a phone call. OmniPCX Enterprise makes directory, agenda, presence and IM information fully accessible from IP Touch phones, and offers collaboration, data sharing and video functions via its “My Teamwork” applications, which are fully integrated within the hospital portal (Figure 2).

Leveraging its strong openness characteristics, OmniPCX Enterprise was successfully integrated into a very rich and modular healthcare ecosystem, involving the creation of:

- A Nursing Module, which creates a bridge between hospital/clinical information systems, nurse call systems, patient monitoring systems, and in-building and WAN wireless devices;
- An Information Systems Module that links applications, e-mail, network management, Web and wireless devices;
- A Facilities Module, which interconnects fire alarms, HVAC (Heating, Ventilating, and Air Conditioning), security systems, and Alcatel managed devices.

Figure 2: "My Teamwork" applications facilitate collaboration



"Having a standards-based solution that would deliver a seamless network became key in our review of vendors, and proved to be a wise decision."

The XML capabilities of OmniPCX Enterprise, IP Touch phones, and Unified Communication solutions simplified greatly the integration of communication with Advocate's business processes.

Finally, the openness of Alcatel's contact center and voice portal solutions facilitated the deployment of inbound patient support across any media, as well as tele-scheduling. Support for VXML standards was essential to facilitate easy and powerful integration between the communication system and the hospital's databases.

■ Acknowledgement

We would like to thank Mr. Gary Horn for his co-authorship.

■ Conclusion

The architectural flexibility of Alcatel's solutions facilitated the multiple transitions required. The evolution from PSTN to IP was completed smoothly. *"With a large organization like Advocate, we recognized that we didn't need to go all-IP, all at once,"* said John Robinson, Director of Telecommunications at Advocate Health Care.

"Top-quality patient care requires integrating individual elements such as Clinicians, Physicians, Nursing, Legal, and Administration expertise into a coherent whole workflow; it also requires integrating silos of information in multiple systems. Alcatel's standards-based approach helped us achieve this goal," said Gary Horn, Director, Enterprise Architecture and Network Security at Advocate Health Care.

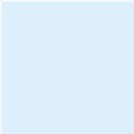
Mr. Horn is Director, Enterprise Architecture and Network Security, Advocate Health Care. He is responsible for the design, configuration, installation, and support for Advocate's large and complex voice and data network system implementations, in addition to network security and business continuity operations. Mr. Horn has been associated with the Advocate organization (including its predecessor company, Lutheran General Hospital and Health System) since 1981 in a variety of telecommunications and network engineering roles.



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■ Glossary

IP PBX	IP Private Branch Exchange
XML	eXtensible Markup Language
VoIP	Voice over IP
MAN	Metropolitan Area Network
LDAP	Lightweight Directory Access Protocol
IP	Internet Protocol
AMIS	Audio Messaging Interface Specification
HIPAA	Health Insurance Portability Accountability Act
VXML	Voice eXtensible Markup Language
SIP	Session Initiation Protocol
EICU	Electronic Intensive Care Unit
IM	Instant Messaging
HVAC	Heating, Ventilating, and Air Conditioning



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