

The Future Technologies and Management of Voice Over IP

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Abstract

The big buzzword in Telecommunications for the past three years has been VoIP, or voice over Internet Protocol. This technology allows users to connect VoIP telephones to a home or business network, bypassing the original telephone connection. There are several new software companies that have introduced desktop applications that allow users to easily use their computers to conduct telephone calls. For long distance purposes, it can be cheaper to use VoIP technologies instead of the standard telephone lines. There are several pitfalls to VoIP, such as a slow connection speed, which can cause poor audio quality or dropped calls, similar to a cell phone. This presents several obstacles for management in deciding if VoIP would be cost-effective. It also presents obstacles for the technology specialists to understand the pitfalls and develop more effective technologies. Improved connection speeds and emerging advanced technologies, could lead to an increase in VoIP usage.

The Future Technologies and Management of Voice Over Internet Protocol

Telecommunications managers should be continually searching and monitoring the market for emerging technologies. One such technology that managers should be aware of is voice over Internet Protocol, otherwise known as VoIP. VoIP allows for the combining of voice and data applications onto a single platform, which is known as “convergence.” A converged network offers businesses numerous advantages over the older, two-network voice and data system, including lower costs, simpler network management, and the ability to deploy new applications that heighten both productivity and customer service. With the lowering costs of high speed internet options, VoIP has become a valid option for Telecommunications managers, but one that takes careful analysis and planning for VoIP to be beneficial.

Brief History of Voice Over Internet Protocol

Voice over Internet Protocol was created in Israel in 1995 by a group of hobbyists since PC-to-PC was one of the only means of communications. They developed a desktop application that would organize the voice into packets, ready to be sent over the Internet. In 1998, entrepreneurial companies developed VoIP services that allowed customers to make a call to phones through their software free of charge. Advertisements, usually banner ads, were displayed at the beginning and end of the call. These services were only available in North America. SIP and H.323 were developed in 1998 as well. SIP relates to end-user IP Telephony applications and H.323 is a new standard for routing between the circuit-switched and packet-switched worlds used for termination of an IP originated call.

General Overview of Voice Over Internet Protocol

There are several VoIP applications on the market today that perform different types of functions. Some desktop applications allow for free Internet telephony. This generally applies to calls made from one computer to another, usually utilizing the same service provider. This requires that both parties are logged in and running the application, similar to an instant messaging program. This can be an inconvenience and serves little to no practical function in a business environment. Practical Internet telephony exploits the use of gateways. A gateway is a node which interconnects data networks and plain old telephone service (POTS) networks. In other words, a gateway performs the conversion from a packet data stream which is digital to an analogue voice signal and vice versa. With such a gateway, users can call each other via IP from analogue telephones. (Kubher et al.)

VoIP and Telecommunications Management Decision Making

Telecommunications managers have to analyze whether VoIP is more economical than their current telephone system. There are several factors that they will have to analyze in making a decision to switch to VoIP. Where they may be saving on the fixed costs of service if they choose to use VoIP, there are several hidden costs that telecommunications managers need to be aware of. Some service providers charge an amount per incoming call. There are also costs for monitoring network stability and capacity to ensure calls are not lost and uptime is stable. A telecommunications manager also has to decide whether they are going to maintain their own system or have a managed VoIP system. Usually large corporations can afford to maintain their own VoIP system, since they have the technical and managerial resources to do so. Larger

corporations usually have greater security concerns; therefore will usually manage their own system. Small to mid size organizations usually find it more cost efficient to have a service provider manage their VoIP system.

Another factor for management in deciding whether they should use voice over Internet Protocol is security. IP networks are very vulnerable to outside factors, making the need for careful planning in developing a secure VoIP system. There are several steps that telecommunications managers can take to minimize these security risks. It might be advisable for telecommunication managers to run VoIP over a separately managed network. Most of these lines are not encrypted; therefore, all of the lines can be monitored by hackers. Locations where hackers could potentially tap into the network should be secured. If a VoIP session is going to be initiated over the Internet, a VPN tunnel is required. IPSec and Secure Socket Layer VPN vendors are adding VoIP support to their products.

It is important for telecommunications managers to run their VoIP server separate from the rest of the network. The utilization of a firewall that is VoIP “aware” is essential if there are voice-mail options. It is important to keep voice-mail completely secure since company secrets may be discussed. Redundancies across the entire system are necessary for a stable VoIP environment. These redundancies include backup power and backup circuits. Some other options available to telecommunications managers in securing their VoIP system include, network security and health monitoring technologies, access controls at connection points to data network segments, and scalability of design relative to current and projected requirements.

There are several factors that a telecommunications manager must take into account when developing a well thought out security plan for VoIP. There are three main threats to VoIP security: authentication failures, integrity failures, and privacy failures. Telecommunications

managers should consider all three at each layer of VoIP implementation. The application layer is the most difficult in securing. Most VoIP networks run on phones, which have limited hardening and poor security. Telecommunications managers should plan for their failure and the need to upgrade many of them very quickly. VoIP security is a complicated issue that is consistently going to change, similar to maintaining security on traditional networks; therefore, consistent monitoring and upgrading security measures will be necessary. (Snyder)

There are two main benefits for corporations to utilize a convergence strategy, one being the cost savings associated with using one large network versus two smaller networks and the ability to easily deploy applications incorporating voice and data functionality. Although the ultimate objective of Internet telephony is, of course, reliable, high-quality voice services, at the moment that level of reliability and sound quality is not available on the Internet. This is primarily because of bandwidth limitations that lead to packet loss. The increasingly heavy use of the Internet's limited bandwidth often results in congestion, which in turn can cause delays and erroneous packet transmission. These are all issues Telecommunications managers must analyze and decide if adopting a VoIP would be an economical decision. (Chertok)

VoIP and Quality of Service Expectations

Quality of Service (QoS) is a critical component to choosing between the current telephone system and the voice over Internet Protocol alternative. While the industry would like you to believe that the QoS of VoIP is comparable to the standard circuit-switched system. The QoS of the existing circuit-switch system is exceptional, but the economic benefits of VoIP are what make this option more attractive to managers. Telecommunications managers have to be aware of the quality elements that are expected by the users for their telephone services. Users

expect the following: telephone to work every time they want to make a call, the service to always be available, all of their calls to be completed as dialed, a high level of connect latency (rings in seconds), a high voice quality (at least as good as the circuit-switched system), a high level of speech latency (imperceptible), all of the available services that are available on the circuit-switched system, these services to be functioning properly, and the billing to be completely accurate. QoS has evolved for networks to focus on packet delivery statistics. Telecommunications managers must be aware of all of these factors before making a decision to move towards a VoIP alternative.

The Future of Voice Over Internet Protocol

There are several factors that will govern the rate at which companies will adopt voice over Internet Protocol systems. One of the most important factors in the future of VoIP is the availability of broadband service. Because VoIP requires this broadband access, the degree to which policy makers and regulator encourage or discourage the building of broadband networks will probably determine how quickly VoIP takes off. If regulators encourage the further adoption of broadband, VoIP should see a significant increase in the growth rate since the cost of making calls is significantly less. Without provisions to encourage the growth rate of VoIP systems, voice over Internet Protocol will gradually erode fixed-telephony revenues.

Universal-service and interconnection charges are another issue. In a relic of older policies designed to encourage data traffic, for example, many types of VoIP calls in the United States are exempt from the usual universal-service and access-charge levies. As a result, VoIP providers don't contribute in the traditional way to explicit and implicit universal-service subsidy

flows. Regulators need to consider how to regulate these Internet-based calls or whether to regulate them at all. (Beardsley et al.)

Another factor that could influence the growth of voice over Internet Protocol is the Federal Communications Commission's regulations. Presently, they have been pressured into stepping in to make regulatory decisions concerning the governance of VoIP. This was sparked by several states exploring their ability to regulate intrastate VoIP calls. The state and federal government will be battling the industry over how or even if VoIP should be regulated. A major part of the debate comes down to monetary issues. States and incumbent telephone providers want a piece of the VoIP pie. Their focus centers on three primary areas, state telecommunications tax revenues, monetary contributions to the federal state universal service fund supporting rural services, and intercarrier compensation for calls traveling the public switched telephone network. The regulations that were set forth for the monopoly circuit-switch phone systems are ill-suited to be translated to the VoIP systems. But it is important to understand the regulatory backdrop to participate in the current regulatory debate of VoIP. (Blosser and Kunin)

Conclusion

While VoIP could be an emerging standard in communications, it is important for telecommunications managers to consistently analyze their internal environment to decide if implementing a VoIP system would be economical. As broadband becomes more readily available and increased bandwidth speeds are utilized, companies will be more willing to adopt VoIP systems without worrying about a loss in the Quality of Service. While it will be a gradual process of transferring circuit-switch phone systems to voice over Internet Protocol systems, it is

a technology that telecommunications managers must be aware of and constantly analyze the benefits for their business.

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