Migrating to VoIP

Over the past few years, there has been a tremendous amount of interest in the IT community concerning Voice over Internet Protocol (VoIP). Some companies have already implemented a converged VoIP network, while others are content to use separate time division multiplexing (TDM) voice and IP data networks. This white paper will discuss reasons for migrating to VoIP, the issues and challenges associated with this move, as well as specific ways to reduce costs associated with the migration.

The Move Is On
There is no question that the trend in enterprise telephony systems is to utilize a VoIP network. A significant number of businesses of all sizes currently are or will be evaluating, testing, and implementing a VoIP system over the next few years. See Figure 1.

However, is there a specific reason why companies are choosing to converge their IP data and voice networks? Is there a cost savings, or specific “killer application”, or new feature requirement that is driving the change?

The reality is that there are a number of reasons why it is happening. Whatever the motivation for VoIP, there are a number of issues for consideration prior to the implementation of an IP voice and data network, in addition to the concern of minimizing the cost of the transition to a VoIP network.

Why Is It Happening?
According to IDC, companies typically consider the following types of potential productivity enhancements or cost savings as justification for migrating to VoIP:

1. One Wire: The savings associated with a single Ethernet cable plant in terms of wiring infrastructure and ongoing support. This factor is especially important for greenfield deployments.

2. Voice/Data Applications: Unified messaging (the ability to manage different types of media using a single device at any location) is viewed as a tool to improve employee productivity. Employees benefit from being able to send and receive voicemail and/or email from a PC or phone.

3. Many Offices: A converged IP voice/data network can make it easier to manage an office as well as allow for easier expansion of voice/data infrastructure at each site. Remote offices may be a single telecommuter or a group of employees.

4. Save On Long Distance: This includes toll bypass savings for internal calls between offices. PSTN trunk costs to carrier are decreased for intercompany voice traffic.

5. Operations Savings: This includes administration of phone system moves, adds, changes (MACs) as people change locations. Centralized control of extension numbers and quicker setup for new employees are also added benefits.

Other potential reasons for migrating to a converged IP voice/data network are to address obsolescence of the current system, expansion beyond what the current system can provide, and support for specialized applications that improve customer service/support.
VoIP Challenges

Is It Right For My Business?
There are significant reasons for a business to thoroughly consider all the implications of converging their voice and data networks. The following list enumerates some of the reasons that businesses may choose not to migrate to VoIP:

1. Cost to upgrade is too great
2. Satisfied with the existing phone system or Centrex service
3. Want to continue to use the existing phone sets and don’t want to purchase IP Phones
4. Need more information about the features/benefits of a converged solution
5. Telephony leases have not yet expired
6. Fear of service disruption during migration period
7. Telephony assets not fully depreciated yet
8. VAR has never recommended a VoIP solution
9. Don’t know how to develop a business case for VoIP
10. Uncomfortable with new technology

*Source: Yankee Group

Can My Business Afford It?
Businesses, particularly small businesses, are always concerned with expenses and quantifying the Return on Investment (ROI) for any project. The cost of migrating to a converged IP voice and data network is significant and will be a major factor in the decision. For many businesses, the cost to change the entire voice and data networks will exceed what they are willing to invest. However, if there is reason to expect future improvements in business productivity or cost savings in terms of recurring company operations, then the cost of upgrading the data network, new hardware, and training IT support staff can be justified.

If cost is the only factor in the decision to migrate to a VoIP network, it may be difficult to justify. Typically, a converged IP network is more costly than a traditional network solution. However, businesses are looking more and more at the productivity enhancements that can only be provided by a converged VoIP network. VoIP vendors are adding business value and enhancing the productivity of employees rather than trying to justify the cost of a converged system simply on cost savings alone.

Once the decision has been made to move to a converged voice and data network there are significant challenges to overcome. These issues range from upgrading network hardware (routers, switches, phones) to actually supporting VoIP, to training employees how to communicate in a fundamentally new way.

Who Will Support The Converged Network?
Another major consideration for moving to a converged VoIP network is deciding how that network will be managed and supported by the organization. If one group of employees are responsible for managing the telephone system and WAN circuits, while another data-centric staff manages the data network, then the business may combine those groups or try to cross-train both of them on the new converged network.
How Do We Support Fax/Modem Applications?

Even though a business may converge its voice/data network to support VoIP, many still must utilize some form of analog technology to support fax and modem applications. Two of the most common solutions are to either purchase separate analog trunk circuits from the telephone company (telco) for each device, or to use Analog Telephone Adapters (ATAs) that convert analog signals to IP packets. However, if there are a significant number of analog devices then the outcome of providing additional trunk lines or several ATAs can become very costly. An enterprise IAD can help resolve this problem by providing analog circuits that share the same telco trunk circuits that the VoIP system utilizes.

Initial Costs vs. Recurring Costs

Like any other business project, the transition to a converged VoIP network will have one-time capital expenses associated with the actual purchase of hardware and installation of the network, as well as recurring operational charges for access to the Wide Area Network (WAN). These types of access charges would include telco trunks for voice and Internet access for data communications and VoIP calls.

Once the decision has been made to migrate to VoIP, the next question is how to save money while making the transition. An Enterprise IAD can help a business save money. Cost savings can be achieved by reducing the recurring charges from the telco for PSTN trunk circuits, as well by the IAD providing valuable diagnostics and troubleshooting capabilities that a support staff can utilize to manage and support the network.

Focus on the Wide Area Network

The primary ways to save money migrating a telephone system to VoIP that will be discussed in this paper are by using an enterprise IAD to do the following:

1. Share Public Switched Telephone Network (PSTN) trunks between the legacy TDM telephone system and the new IP PBX
2. Support analog applications (fax, modem, etc.) instead of using PSTN trunk lines or ATAs
3. Troubleshoot PSTN trunks and PBX circuits to determine exactly where problems are occurring in the migration

Share PSTN Trunks

In any telephony network, the PSTN trunks are a significant recurring cost for the business.

Figure 2. PSTN Trunks for the Existing Telephony System

As the voice network migrates from a single PBX (or Key System) to a hybrid mix of PBXs, the cost of the PSTN trunks can double due to the separate trunk circuits required by each PBX.

Figure 3. PSTN Trunks for Two Telephony Systems Can Double Monthly Expenses
Using an enterprise IAD, the PSTN trunks can be shared between the two telephone systems and the recurring charges to the PSTN carrier (telco) are minimized.

In this type of application, the enterprise IAD emulates the carrier Central Office switch (Lucent 5E, Nortel DMS100, National ISDN) and provides the T1/PRI/Analog trunk circuits transparently to the telephone systems. When an enterprise IAD is used in this type of network configuration, the one-time capital expense for the IAD can be recovered in a payback period as quick as six months.

In addition to sharing the PSTN trunks between telephony systems, another benefit of using an enterprise IAD is that Direct Inward Dialing (DID) trunk numbers can also be shared between the two systems. See Figure 5.

**The Migration Is Easier**
The enterprise IAD can dynamically switch incoming calls to the appropriate PBX based on the DID number. This capability allows a business to migrate new users (extensions) to the new IP PBX in a controlled cutover plan. The migration from a TDM telephony system to a VoIP system is often complex and simply does not happen overnight. Using an enterprise IAD, the business has the flexibility to migrate users to the IP PBX as quickly or as slowly as they choose.

The enterprise IAD’s sophisticated Dial Plan/Busyboard gives the business control over how individual phone numbers are routed between the two systems. Essentially, the business now has the same type of Central Office functionality the telco does to switch and control trunk circuits before calls are delivered to the IP PBX or the existing legacy PBX. Configuration changes, such as call routing between PBXs, are quickly and easily implemented using the enterprise IAD Dial Plan menu.
Support Analog Applications

In addition to traditional voice applications, most businesses require analog circuits for applications like fax machines, modems, and credit card readers. One of the challenges facing IP PBX solutions is to support analog applications with the same connection speed that TDM-based systems provide. One option is to purchase separate analog circuits from the PSTN carrier and pay for individual business lines each month. However, this can be an expensive solution depending on the number of circuits required and the cost of each circuit. Also, this type of solution does not provide the business much flexibility in growing and/or modifying analog applications.

Using an enterprise IAD, the trunk circuits can be shared between the IP PBX and traditional analog applications. The enterprise IAD again emulates the PSTN central office switch and provides standard analog loop-start circuits to the fax machine and/or modem so that the devices can achieve high connection rates and maintain reliability.
3 Troubleshoot PSTN Trunks and PBX Circuits

An enterprise IAD can also save time and money by providing valuable troubleshooting and diagnostic functionality for the IT staff managing the converged network. If the trunk circuits from the PSTN carrier are PRI, the enterprise IAD can provide Q.931 ISDN message decoding as well as call trace functionality. The IAD can also provide valuable information regarding the utilization of the trunk circuits in terms of how many times per hour the trunk was full, average utilization, etc.

In addition to these diagnostic functions, the IAD can also function as a Bit Error Rate Tester (BERT) and provide loopback capability. When working with a PSTN carrier or when trying to isolate a troubled network segment, loopbacks and BERT testing are two of the most important tools for this process. Since the enterprise IAD can provide the type of functions that are often provided by an external test set, companies can save money by not having to purchase a test set.

Summary

While there are many motivations for VoIP and convergence, using an enterprise IAD can save significant amounts of money for businesses that are migrating to a converged VoIP network. The specific ways that costs can be minimized are by sharing PSTN carrier trunks between the existing (TDM) telephony system and the new VoIP system, using the IAD to deliver analog circuits for fax and modem applications instead of separate PSTN carrier circuits, and by using the diagnostic and troubleshooting capabilities in the IAD to aid with device management and troubleshooting.

ADTRAN® offers a complete line of enterprise IADs for small, midsize, and large businesses that can be used to save money in a VoIP network. The ATLAS™ products feature a sophisticated Dial Plan and Switchboard that allow users to easily manage call routing from the telco to their telephony system(s). ATLAS products are also commonly used to convert a telco PRI to T1, Analog, or BRI circuits for sharing between multiple end user applications and minimizing monthly telco expenses.
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