What is network convergence all about?
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The industry’s adoption of a converged network – that is the concept of the convergence of separate telephone, video and data networks into one IP (Internet Protocol) data network is gaining rapid momentum, with many key players in the market focusing on this new concept in infrastructure design.

Clearly, network convergence delivers a compelling return on investment (ROI), improves productivity and communications processes, and enables integration with other applications and corporate databases. In most business environments network convergence can save money, therefore, the business benefits could not be more compelling.

In this document we explain terms such as network convergence, Voice over IP (VoIP), IP telephony and hybrid solutions. Furthermore, we review the three types of solutions that exist today, which are Voice over IP, basic convergence and end to end convergence. We also outline the benefits that can accrue when a company decides to switch from an infrastructure based on separate voice, video and data networks to a single IP enabled network.
What is network convergence?

The volume of data traffic relative to total network traffic is growing exponentially. As a result, most companies need to make significant investments in a new data infrastructure over the near term to meet network demands. As they evaluate new data equipment purchases, it makes good business sense to ensure that this networking equipment can support not only data, but also carry the voice and video traffic. A single converged network brings many benefits with it which all lead to enhanced profitability and productivity and provides the building block for all business communication leading to:

- Reduced costs for support, maintenance and network management of a single infrastructure.
- A reduction in the amount of physical space occupied by equipment.
- Reduced call costs and the ability to bypass some call costs.
- Extension portability leading to reduced administration costs and a flexible working model for employees.
- Consolidated reporting and billing systems.

Why are telephony and video services moving to the data network?

Telephony vendors have realised that in order to survive in the modern business communications market they must consolidate their established product offerings into a common architectural model that is open, scalable and robust. Hence, the move towards IP based solutions. The majority of voice vendors have adopted the IP model and it has become clear that the roadmap for future development is no longer applicable to the traditional PBX. The conclusion of this transition means that voice, video and data will in the future exist on a common or converged infrastructure - the data network.

Why is the traditional PBX telephone switch no longer suitable for today’s evolving business communications requirements?

- **Complex integration**: built around proprietary or closed operating systems, PBX’s require expensive and time consuming integration projects to enable them to connect with other telecoms equipment or computer systems.
- **Operational costs**: maintenance costs for day-to-day administrative operations are high – such as the costs for moves and changes that are associated with office or departmental moves and the provisioning of telephone services.
- **Vulnerability**: the PBX is generally in one cabinet and reliability is through the replication of equipment rather than distribution over several locations. Therefore, a business that is heavily reliant on network communications is highly vulnerable due to equipment failure, as the PBX cannot be geographically distributed.
- **Limited scalability**: the slot, shelf, and cabinet architecture impose physical constraints in terms of scalability and this can prove costly for rapidly growing companies.

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The critical drivers that lead an organisation to consider a converged network are the measurable cost savings related to infrastructure, staffing and facilities, as well as improvements in productivity and customer care. There are certain circumstances that can accelerate the evaluation and adoption process:

- Building a new office or moving to a new location.
- End of lease for PBX or support contract.
- Necessary upgrades for data network.
- Lack of expansion capacity of current voice network.

In addition to reducing an organisation's total cost of ownership for its network, and reducing the ongoing costs required to maintain and upgrade the network, moving to a converged network simplifies the administration of the network. This productivity improvement allows a company's business communication staff to focus more on strategic initiatives that can generate demonstrable business benefits. While the hard cost savings are often enough to justify migrating to a converged network, often the most compelling business reasons come from the less easily quantifiable benefits of:

- **Speed**: rapid deployment of productivity applications.
- **Reliability**: network availability is increased.
- **Interoperability**: guarantees that multiple applications work together.
- **Pace of change**: easier integration of new technologies.
- **Cost reduction**: resource and time requirements are minimised, reducing implementation costs.

Network convergence is unique because of its ability to impact the entire organisation. Whether it is applications such as workforce optimisation, e-commerce and supply chain management, a converged network provides the necessary foundation to decrease implementation time and maximise an organisation's investment in new operational methods. Network convergence also allows organisations to challenge many of the traditional assumptions regarding labour, facilities, and capital investment by providing the tools to allow the organisation to mobilise its workforce.

Organisations that have moved to a converged network infrastructure are able to take advantage of this framework for more informed decision making regarding investments in network technologies, products, and services. The most effective solutions are those that unify all the environments of voice, video and data onto a single network infrastructure, enabling converged and unified business applications.

Having decided that network convergence makes both good business and strategic sense to your organisation, what approach should you take when considering vendors in the marketplace? How do their strategies fit with your business requirements, objectives and strategic direction?

Moves are estimated to cost an organisation between €75 and €135 each. IP phones offering extension mobility allow organisations to significantly reduce this ongoing cost. For example, a typical enterprise with 2,000 employees that performs 500 moves per year at an average cost of €105 per move will save over €52K per year.
Voice over IP vendors

VoIP solutions (often described as ‘Bolt on Voice’) are a quick way to gain some operational efficiency by reducing call costs between internal sites. Sometimes this approach is referred to as the IP enabled PBX or Hybrid PBX because an IP router card is used in the PBX. Although not generally recommended as a long term network convergence strategy, VoIP can be suitable in the short term, for example where a company is near the end of a building lease and is planning to move.

The weaknesses of a VoIP solution are:

• Support and maintenance still required for both the voice and data networks.
• The ‘closed’ protocols used by these systems can mean higher costs and longer deployment times to integrate new applications such as Video, Unified Messaging and Instant Messaging.
• The data network infrastructure will often need enhancing to ensure the voice quality is not affected.
• These systems are difficult to scale when the need arises to add new people or re-deploy people around an organisation.

What solutions are available in the market?

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• The life expectancy of these hybrid systems is likely to be short as they are an interim stage to a fully converged solution.
• There is no video solution.

As an alternative to an IP router card, Cisco multiservice router platforms can be deployed cost-effectively to combine voice, data and video traffic and maintaining the internetworking features of these PBX’s by transparently carrying the proprietary network signalling protocols through common channel signalling.

Distinct characteristics of a VoIP vendor

• The vendor promotes an evolutionary approach via software upgrades and IP cards in the PBX.
• The vendor relies on their voice reputation, heritage and brand recognition.
• The vendor positions “VoIP” as “IP telephony”.
• The vendor focuses on features and digital handset range.
• The vendor says that IPT is not a proven solution.
• The vendor over-simplifies a VoIP solution – “you just connect it to the LAN”.

What is Voice over IP (VoIP) and IP telephony (IPT)?

These two terms are often used interchangeably when discussing voice, IP telephony and converged networks.

Voice over IP represents the conversion of voice traffic into data for transport over an IP network. Many companies are saving internal phone call costs by routing their voice traffic over their internal data networks instead of using the public telephone network. Savings have been significant in the past, but as telephone operators have reduced prices significantly over the last few years, implementing VoIP alone now brings lesser savings. And here is the myth: Putting a VoIP card into a PBX is the same as IP telephony. It is not – it merely provides an alternative means of transport for voice. Other limitations still apply, for example the physical constraints imposed by locating the voice system in one cabinet and the enterprise still has to manage two separate technologies.

IP telephony (IPT) extends the conversion of voice traffic to data traffic right up to the phone, thus delivering full voice and data functionality over a single converged network. Companies that have embraced IPT therefore gain not only the benefits of VoIP, but also the operational benefits of a simpler infrastructure and reduced support and maintenance requirements of managing one technology. The converged network also allows them to implement services far easier than that if delivered by a traditional PBX system.

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Basic network convergence vendors

By converging data, voice and video onto a single network infrastructure, companies are able to take advantage of business applications that offer:

- Increased employee productivity such as unified messaging, mobility and e-learning.
- More unified and manageable customer interaction through converged contact centre solutions.
- Integration with other standards-based applications.

A basic converged network also reduces the need for network specialists over a VoIP solution as there is no longer a need to manage specific proprietary technologies allowing the IT organisation to utilise a more generalised skill set with a common knowledge base. This enhances the ability to handle the growth of the network or reduce the risk associated with the departure of specialist IT personnel. It will also allow an organisation to perform more critical IT functions internally, rather than having to outsource them. This gives greater control over the network and faster response time to users.

The shortcomings of these solutions include:

- A basic converged network infrastructure is unlikely to be as secure as separate voice and data networks and can potentially be disrupted by malicious attacks.
- A basic converged network architecture is often built from disparate products and therefore guaranteeing very high availability and security is not possible.
- An inability to future proof the investment so that wireless LANs, video services, content and storage applications can be added into the infrastructure at a later date.
- Flexibility, scalability, management, reporting and control of the network as often the solution is assembled using products from multiple vendors.

Distinct characteristics of a basic network convergence vendor

- Some converged network products may still be predominantly based on elements of older PBX TDM technology whereas others may be IP based.
- The vendor promotes network convergence, but may have key elements missing from their solution portfolio such as security, video, application aware networking, network management, wireless solutions and applications.
- The vendor may have limited experience in delivering converged architecture solutions.

End-to-end communications vendors

An end-to-end communication vendor builds on the benefits of a basic converged infrastructure to provide a highly reliable and secure end-to-end solution, using open standards so that all the elements of a solution and applications work together effectively. This is where the infrastructure is able to support the business in achieving corporate goals, rather than simply functioning as the data network. These vendors have an established portfolio of solutions, applications, partners, services and support options to assist in a company’s business transformation.

End-to-end network convergence solutions will reduce the cost and complexity associated with managing multiple and remote sites, meet stringent service quality requirements and provide optimal availability and security. This means:

- Deliver the “whole” end-to-end solution (voice, video, data, wireless, security, network management, content delivery and productivity enhancing applications).
- Demonstrate true, strategic business value in an end-to-end solution.
- Have a proven track record of designing, deploying, and supporting end-to-end solutions.
- Architecture built to support applications which can include voice, video, data, contact centres and unified communications.

A proven architecture such as Cisco’s Architecture for Voice, Video and Integrated Data (AVVID) provides a framework for today’s business solutions. As the industry’s only enterprise-wide, standards-based network architecture, Cisco AVVID provides the road map for combining a company’s business and technology strategies into one cohesive model. With Cisco AVVID the benefits derived from such an approach include:

- Productivity: by leveraging the Cisco AVVID architecture companies can deploy comprehensive tools and applications to improve productivity easier, cheaper and quicker than if the equivalent capabilities were implemented on a segregated, non-convergent network.
- Innovation & Agility: companies have the ability to adapt quickly in a competitive and changing business environment.
- Efficiency: traffic prioritisation and intelligent networking services maximise network efficiency for optimised application performance.
- Interoperability: standards-based interfaces allow open-integration with 3rd party developers, providing customers with choice and flexibility.

Combining the network infrastructure and services with applications such as IP telephony, unified communications and video, the architecture defined by Cisco AVVID accelerates the integration of the technology strategy with the business vision.
It is the enabler of Internet business solutions for customers via the network infrastructure, as well as of key partnerships with developers and integrators.

Security

With IP telephony gaining ever more momentum and entering operational areas of businesses, security can easily be overlooked as the interest and promise of new applications takes hold. Security must always be an inherent part of every network design based on the principles of protection from the outside (perimeter security) and controlling the inside (internal security). It becomes increasingly important for vendors to integrate security features and functionality into all areas of the architecture to guarantee a secure environment for all enterprise communication activities. This integration is very difficult to achieve in a basic converged network and generally only vendors who have an integrated end-to-end solution can offer the levels of security expected.

Management and Flexibility

An end-to-end solution should also focus on network management, since an effective way of managing, operating, and maintaining a communication network is essential. The right network management tools provide innovative ways to manage critical network characteristics such as availability, responsiveness, resilience, and security centrally and in a consistent way.

A converged communications solution also delivers a key benefit in terms of flexibility. Whether a company needs to add new users at a new location quickly, with the ability to work from home utilising technologies such as Virtual Private Networks, or to move a department without the need for support staff and additional equipment, an end-to-end communication solution based on IP provides this capability.

Applications

Perhaps the most exciting facet of an end-to-end converged network is the provision of new applications that provide functionality that is rarely seen in the traditional world of separate telephony and separate data environments. These applications complement the existing converged architecture in the areas of productivity, customer response and customer management. Such emerging applications include IP desktop/telephony integration, unified messaging, and customer contact centres.

The applications for this technology however have few of the traditional limitations and new and innovative applications will continue to emerge adding complimentary value into the converged network.

Distinct characteristics of an end-to-end communications vendor

- Solutions-focused partner.
- Promotes value, productivity, applications, infrastructure and return on investment.
- They can demonstrate a complete portfolio of products that support end-to-end solutions.
- The solution architecture supports the enterprise business objectives.

Summary

Voice, video and data are applications that can now be cost effectively supported on one common network infrastructure, a converged network. The drivers for this are the major business benefits of return on investment, flexibility, scalability and progressive productivity. Certain circumstances, such as office relocation, can accelerate the return on investment.

There are three main approaches being offered in the market today:

- VoIP solutions are generally low cost and can reduce call charges between internal sites. Other ongoing operational costs are likely to remain as before and it will not be possible to gain other benefits of scalability and progressive productivity, therefore VoIP is usually considered as a short term solution only.
- Basic network convergence brings the benefits of a single infrastructure, such as productivity, reduced maintenance and ownership costs, future-proofed investment and greater flexibility. However the network vendor may have key architectural elements missing from the solution resulting in incomplete application integration and lower returns on investment than an end-to-end solution.
- An end-to-end converged network infrastructure is more able to support the business in achieving corporate goals. Based on an architecture where voice, video and data are some of the applications supported by the converged network, this solution can deliver the highest ROI, productivity, flexibility, security and availability. This approach provides the enterprise with a holistic solution providing strategic business value to the end-user. This translates to the enterprise as a flexible communications platform that is secure, highly available, scalable and offering ubiquitous access and mobility to all users.
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