Creating RFPs for Converged Voice, Video and Data Networks

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Executive Summary:

The business environment is changing dramatically. In a few short years, the Internet has become a key driver of the U.S. economy and an accelerator for the pace of change. For the enterprise, the real difference comes in not just incorporating Internet technologies into the business, but rather in re-thinking the entire business model, and in re-inventing it around the Internet. It's this transformational power of the Internet, that has sent ripples through so many industries and companies and created what BusinessWeek called, "Internet Anxiety". We'd like to reduce the anxiety, or at least convert it into actionable elements.

A new study by the Dept. of Commerce found that the Internet Economy had created 1.3 Million jobs in the U.S. This impact is greater than industries like Energy which generated $223B in revenues and 617,000 jobs. In fact, it rivals the Automotive sector ($350B and 1.5 million jobs). And both of these industries have been around for over half a century.

The absolute numbers that are impressive, but the SPEED at which this has happened that is MOST NOTABLE.

The Internet, or more specifically technologies and applications based on the Internet Protocol (IP), have been harnessed by companies to adapt to changing market conditions and to create competitive advantages. One of the consequences of the adoption of IP technologies is the convergence of voice, video and data applications onto common networks. This convergence onto "multiservice" networks requires a fresh look at customer requirements and a new approach to the types of questions that vendors and consultants ask to determine customer needs. Many of the concepts that applied to traditional voice systems are no longer applicable, while many new concepts emerge and increase in importance.

Traditional voice networks are anchored around legacy PBX systems while data networks are anchored around LAN switches and routers. In order for voice and video to be converged with data on an IP network, a new set of requirements needs to be examined. For example, voice, video and data traffic have different Quality of Service (QoS) requirements. Ensuring that all traffic types are serviced properly is a new requirement.

In a converged network where telephony handsets can be IP-attached Ethernet devices, a number of new considerations come into play:

- Use of a single wire for both IP phone and PC
- How to apply power to the IP phone over the Ethernet.
- Assignment of IP addresses without wholesale renumbering
- Ease of adds, moves and changes
- Guarantee of voice quality even under congested network conditions
- Provision of redundancy and reliability of the network.

As this short list shows, a new approach to defining customer requirements is clearly needed. This document will draw on Cisco's experience with converged networks to provide: 1) an additional review of the drivers behind convergence, 2) a discussion of the types of Internet technologies and applications that are needed by customers, 3) an overview of Cisco's architecture to support convergence, and 4) some suggestions as to key questions to incorporate into proposals, RFPs and RFIs. The intent is to help you determine which vendors are best prepared to bring your customers forward in a new converged world.

Key Business Drivers:

Let's examine more closely the key business drivers behind adoption of converged voice, video and data networks. Why would a customer want to incorporate Internet technologies and applications into their business models? There are at least three reasons:

1. ***Cost Savings***
2. ***New Applications Enabled by Internet Technologies and Applications***
3. ***Desire to Move Away from Proprietary Solutions***

1) Cost Savings:

According to the Giga Group the predicted global Internet Commerce revenues of $1 Trillion in 2002 will be accompanied by annual cost savings of nearly $1.25 Trillion. For U.S. businesses alone, savings totaled $15.2 billion in 1998, and will reach nearly $600 billion by 2002. Using Internet technologies will reduce or eliminate many costs by improving core business processes. This means the Internet is more than just a new way to sell products and services, it's a way to efficiently run a business, resulting in significant cost savings that add to an organization's bottom line.

At Cisco Systems not only have Internet solutions made us more agile, but the financial gains and productivity gain create competitive advantage for us. The total financial impact of all these Internet Business Solutions to Cisco for fiscal year 1999 was $825M. Cisco's employee productivity value outshines all of our traditional competitors as well as those of companies in most other industries. Our own Internet business model and Internet-run business has helped us create closer relationships with customers, partners and suppliers as well as creating operational efficiencies.

2) New Applications Enabled by Internet Technologies and Applications:

Renaissance Worldwide and the Metzler group published a study in 1998 which concluded that network telephony, unified messaging, and interactive collaboration are the convergence applications most likely to be adopted by mainstream customers. While not addressed in that study, most industry observers and users also agree that Call Center technology will become critically important to the success of both current and future e-commerce initiatives. Let's briefly consider each of these areas.

Network Telephony:
In the network-telephony model, the Web user begins a transaction at the company or institution Web site, but has the option of directly connecting to a customer service representative by using what is called “click-to-dial” functionality. In this scenario, a mouse click on a hyperlink on a web page enables the Web users to directly enter into a phone conversation with a customer service representative (CSR). The result can be an audio, video, or simultaneous audio and video interaction with a live customer service representative.

Unified Messaging:
Unified messaging is generally regarded as a key member of the core set of applications that will justify initial multiservice telephony implementations. Unified messaging means having the ability to access and immediately respond to voice, fax, and e-mail messages from customers and coworkers, 24 hours a day, from any phone or PC within the extended enterprise.

The professional productivity advantages of a unified messaging system are significant. Through its support of a universal inbox that can contain voice, fax or e-mail messages, universal messaging removes the need for message copying between different media types, and reduces the probability of information errors caused by manual copying.

Unified messaging also offers substantial message-access and transfer-flexibility advantages. Access can be through traditional handsets, PCs, or fax machines depending on the users needs. For example, the user can listen to e-mail messages on a wireless phone while driving to the airport, or re-direct a fax from an e-mail account to a hotel fax machine, or listen to voice messages on a PC while dialed in to the company's network, or forward a voice message to anyone in the world with an e-mail account.

Interactive Collaboration:
Collaborative applications are those applications and utilities that combine voice and video interaction with information sharing. Prominent product examples include Microsoft NetMeeting, White Pine Software’s CUSeeMe Pro, and Macromedia’s Shockwave Multiuser Server.

One of the most promising areas that multiservice collaborative capabilities can improve upon is knowledge management. Knowledge management goes beyond managing the information typically generated by executing transactions and the data available in structured databases to encompass the skills, expertise, and ongoing insights about management processes that are critical in shaping judgments and actions. One of the key foundations for implementing effective knowledge management in many companies will be the ease of communication and information access simultaneously facilitated by multiservice collaborative applications whose operation is best supported by a converged network.

Call Centers:

Call centers are sites where groups of skilled representatives or agents receive and answer incoming telephone calls, managing customer contact. Traditionally, call centers have used toll-free voice communications between a customer and a company's customer service, marketing, or technical support organization. The range of functionality supported by a call center can range from five telephones with a PBX system to the use of more advanced telephony technologies such as interactive voice response (IVR), automatic call distribution (ACD), voice-mail system, fax server, and computer telephony integration.

Any of these methods can easily result in frustration for both customer and customer service representative, because neither can see the other, nor can either see a model of what the customer is trying to order or the conditions that are causing product problems to occur. In addition, customer frustration can occur when operating in self-help mode and not interacting with a customer service representative. As much as 66 percent of existing e-shopping carts are abandoned before the related business transaction is completed.

More businesses are now finding that online call centers that make an increasing use of Intenet-based telephony services, can often be a far more effective approach to the delivery of higher-quality customer service. The reason is that this class of implementation is increasingly able to support a greater extent of traditional telephony services but also supports means by which face-to-face interaction, or text or graphical interchange can occur, if required.

3) Desire to Move Away from Proprietary Solutions:

Customers are now in control -- they are demanding choice and flexibility. And given the pace of change, they want the best solutions quickly. Open standards are critical to the fundamental transformation occurring right now on the Internet because they expand how customers get solutions and how technology is provided. According to an article in Business Communications Review (Nov. 1999) titled "Why Convergence Will Succeed", the conclusion was that even though there are several challenges to implementing Internet technologies in enterprises, customers will adopt VoIP solutions because they are "open" and standards-based, rather than "closed" and proprietary.

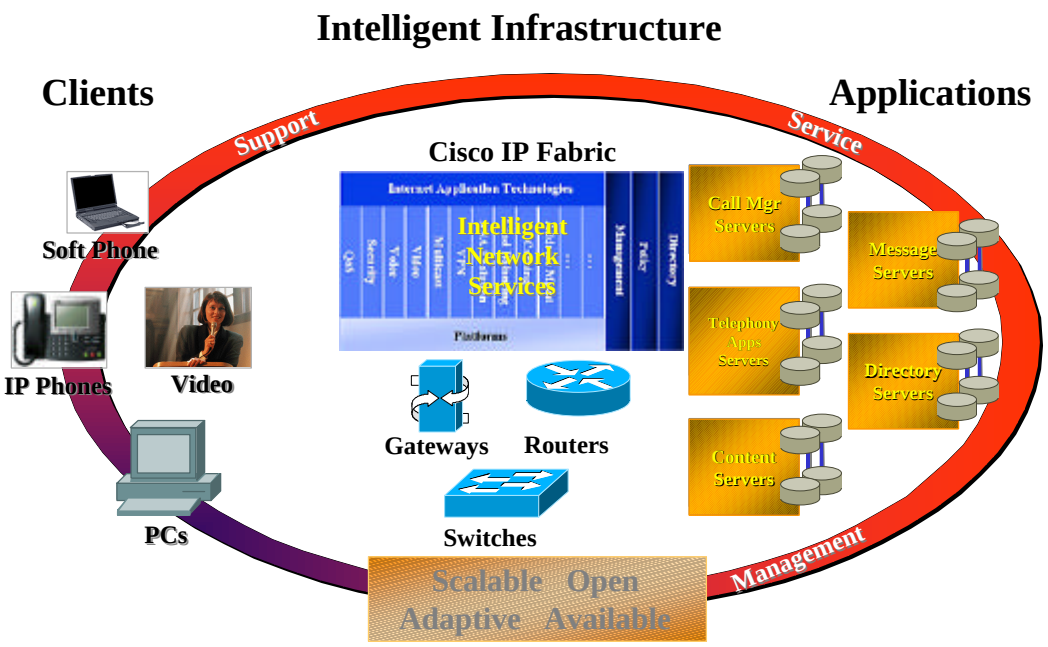
It's similar to the transformation we experienced in computing, where the closed, protected, and centralized mainframe gave way to an open computing model. No longer did all the pieces of the solution trickle in from one vendor. Rather, we experienced an explosion of innovation, competition, and solutions offering customers more choice, flexibility, and providers. This same phenomenon is occurring in telecommunications. The vertically-integrated, closed model of the traditional PBX is simply incapable of quickly delivering the range of flexible solutions demanded in this fast-paced, whitewater business environment.

By necessity, the rigid structures of the past are giving way to an open communications world built on standards, where many providers can contribute to the customer solution. And deliver them faster. This ecosystem as it's sometimes called, is quickly creating an increasing number of best-of-breed providers, delivering applications, servers, Internet appliances, systems integration, and more.

In the Internet ecosystem model for doing business, a company creates value by forming an ever-expanding community through direct links, with partners, suppliers, distributors, employees, and customers.

Convergence Requires a Comprehensive Architecture:
Accomplishing these goals requires a new approach. To build intelligent converged networks for the future, you'll need more than the basic network fabric. In September 1999 Cisco announced its Architecture for Voice Video and Integrated Data, or AVVID, a comprehensive framework for building converged networks. AVVID is illustrated in Figure 1 below.

Figure 1. Cisco AVVID Architecture:



Cisco AVVID signals the availability of New World voice, video and data solutions for the enterprise and is the culmination of Cisco's five phase multiservice strategy which provided a roadmap and vision for converged networks beginning back in 1997.

Cisco AVVID is comprised of three distinct building blocks:

1. An ***intelligent IP infrastructure*** based on multilayer intelligent switches, routers and gateways with vital network services like quality of service (QoS), security and management
2. New World ***applications*** such as unified messaging, new collaborative capabilities, IP contact centers, etc., and call processing platforms and solutions such as CallManager. .
3. ***Intelligent IP-enabled clients*** including IP telephones and software-based phones, video clients, etc.

By deploying the right combination of these products for a converged networking solution, customers will be able to keep pace and stay competitive in an ever-changing business environment. In contrast to Old World strategies, Cisco AVVID incorporates technologies, services and products that are available today while maintaining flexibility to accommodate future solutions and products. Cisco AVVID enhances the Internet Ecosystem by building on the established foundation of the Internet where open standards, co-operative development and interoperability with multi-vendor, multi-product solutions are required.

Based on an Internet model, Cisco AVVID relies on a distributed architecture to ensure system availability and scalability. With the trend continuing toward distributed computing, customers are quickly realizing the benefit of having no single point of failure and are able to build as little or as much availability as they need into an integrated solution.

Intelligent Infrastructure:
The foundation of Cisco AVVID is the infrastructure component which is built on intelligent network services implemented on multiprotocol routers with Cisco IOS® software, multilayer LAN switches and call processing hardware and software. These devices need to have the QoS, intelligent network services and high performance to support converged applications.

As the industry leader in routing, Cisco has a number of proven, voice and video capable platforms available today. These include a range of solutions with the ability to terminate both Analog and Digital voice interfaces for integration with a legacy PBX or to the Public Switched telephone network (PSTN).

With IP telephony expanding beyond simple toll bypass applications to the desktop, the Cisco Catalyst family of multilayer LAN switches provides the necessary QoS capabilities and scalable bandwidth throughout the LAN to support converged applications. With its proven scalability, intelligent network services and flexible

architecture, the Catalyst family will continue to evolve and preserve customers' investments.

Other key infrastructure pieces include Cisco Call Manager, and digital and analog telephony gateways.

Applications:
Cisco provides key applications, such as Unified Messaging, IP Contact Centers, Directory Servers, and Content Servers. However, an important element of Cisco AVVID is its open and interoperable nature. This means that customers can choose the best-in-class solutions in a number of different areas where previously, they were locked into proprietary applications from a single vendor. As a result, innovation is encouraged and overall networking costs will come down based on market demands and competition.

One of the primary benefits of a converged network solution is the ability to deploy advanced applications for a competitive advantage while minimizing IT expenses. Through Cisco's open architecture, developers can write next-generation applications on leading development platforms like Windows 2000, TAPI and JTAPI, which will ultimately provide customers with a wide range of innovative options.

Intelligent IP Clients
The third component of the architecture is intelligent client devices, including physical phone sets sitting on a desk, IP enabled wireless phones, pagers, personal digital assistants, and other IP-enabled intelligent agents. Cisco Systems offers various IP telephones that are available today. These devices will evolve to include functionality that is not possible in today's PBX-based systems. Examples include intelligent personal assistants that allows an IP phone to interface with a scheduling application and intelligently route the call to your location or the ability to sort/review messages based upon user-determined preferences rather than just chronological order. Client applications such as directory lookup, single-button collaboration and click to dial are only the beginning of innovations in this area.

Another View of AVVID:
In looking at the architecture from another perspective, (Figure 2) you can see how client devices attach to infrastructure components, invoke call-processing functions, and interface via standard APIs like TAPI and JTAPI to Cisco and third-party applications.

These platforms interface with a unifying software fabric composed of both foundational services and network services. Foundational services provided by Cisco IOS include functions like multi-protocol routing. On top of that are network services such as SNA, voice, video, security, and QoS. All of these rely on Cisco IOS to provide connectivity to the platforms.

Figure 2. Another Perspective of AVVID:

Cisco AVVID makes changing or adding capability to your network easier and gives you the agility to quickly make changes when your business needs it. When you do require added functionality, it's often just a software upgrade to your existing hardware and can be downloaded directly from our website.

The network services also put "intelligence" in the network. This means your network can acquire knowledge and is able to act based on that knowledge. For example, it is able to recognize data from different applications and is also aware of network conditions. With this knowledge, the network can alter its behavior according to criteria you define. For example, you might choose to prioritize certain applications, or certain users, under different conditions.

On top of these services are a new generation of innovative applications that provide customers with specialized web-based functionality rapidly building and deploying new Internet applications.

Creating an RFP for a Converged Solution:

Cisco Systems has a great deal of experience helping our customers prepare for building converged networks and applications. In order to position your customers, we would suggest that you ask vendors the following questions in your RFPs and RFIs:

Vendor's Vision and Experience:

- Does the vendor have a clear vision regarding the future of Internet technologies and a leadership position within the industry?
- Does the vendor have a clear vision concerning the convergence of voice, video, and data in business communications systems?
- Is the vendor committed to open industry standards? Is the vendor an active participant in proposing new standards to help advance the industry? Ask the vendor to cite examples.
- Is the vendor an active participant on standards bodies? Ask for a listing of the standards bodies to which they belong.
- How much experience does the vendor have with building and supporting intelligent network infrastructures?

System Architecture and Infrastructure:

- Does the vendor offer a comprehensive convergence architecture that is based on open industry standards? Is it a distributed architecture that is flexible and highly scalable? Ask for a detailed list of supported standards and examples of where these are implemented in the vendor's current products.
- Does the vendor offer a broad range of LAN/WAN products and solutions for building intelligent networks? Are these products based on open systems standards? How would the vendor create a geographically dispersed network?
- What kind of Quality of Service (QoS) mechanisms does the vendor use to guarantee that there will be no degradation of service for voice, video, or data on the network? How does the vendor's proposal support end-to-end QoS? In a converged network supporting voice, broadcast video, H.323 video, and data, how are QoS issues resolved?
- How do LAN switches recognize voice traffic to guarantee QoS?
- How does the vendor recognize voice traffic at the WAN edge and guarantee QoS across WAN links?
- How does the vendor provide for Call Admission Control to guarantee that LAN/WAN links are not oversubscribed?
- Ask the vendor to explain how the intelligent network architecture provides power to IP phones over the Ethernet. Can the network automatically detect the presence of the IP phones? If so, how is this done, and what are the benefits of this feature?
- Can the vendor provide easy addressing of the IP phones without having to change the addressing scheme of the existing IP data network?
- Can IP phones share existing Ethernet ports with data devices, or do the IP phones require additional Ethernet ports be added by the customer to support voice?

- If the IP phones can share the Ethernet connection, how does the vendor maintain QoS for voice and data on the same connection?
- Does the vendor support a wide variety of analog and digital gateway products for connectivity to the Public Switched Telephone Network (PSTN)? Are these gateways based on industry standard interfaces? Are all of the following supported: T1, E1, PRI, BRI, FXS, FXO, DID, E&M?
- Are these gateways fully interoperable with the PSTN and legacy TDM systems?
- Can the vendor's system support H.323-compliant gateways provided by other manufacturers?
- Is the vendor proposing special purpose gateways, or can the customer upgrade their existing routers and LAN switches to support gateway functionality?

Call Processing System Hardware and Software:

- Is the hardware platform based on a server-class system that is highly reliable, available and robust? Ask the vendor to explain redundancy options that are available, and what other mechanisms they use to provide for fault tolerance in a distributed server environment.
- Does the hardware and software platform easily scale from small to very large systems sizes? Ask the vendor to describe what is required to scale from 100 users to over 10,000 users?
- Is the system software based on support for industry standards, such as H.323, G.711, G.729, MGCP, 802.1p and 802.1q?
- Does the system provide industry standard application programming interfaces (API's), such as TAPI and JTAPI?
- Does the Call Processing Server support the basic feature set of a typical PBX?
- Can the system be administered through a standard Internet browser? Can system administration be done either locally or remotely? Is the system secure from unauthorized access? How is security provided?
- Does the system provide for local and remote diagnostics?

Client Devices:

- Does the vendor offer a broad variety of IP phones, including an IP Softphone? Can displays on the IP phones show information in a standard web browser format?
- Does the vendor offer a PC-based attendant console?
- Can the vendor support standard analog devices, such as 2500 sets and fax ports?
- Can the vendor's system support H.323-compliant client devices provided by other manufacturers?
- Are the IP phones supported on standard Ethernet connections?
- Do the IP phones have a built-in 10/100 Ethernet switch that allows the user to plug a PC into the IP phone and support both devices on one Ethernet connection?
- Does the client support H.323 Netmeeting?

Applications:

Voice Messaging

- Does the vendor offer an integrated voice messaging solution?
- Is the voice messaging solution based on an IP-enabled architecture?
- Are messages stored in an industry standard format, such as WAV files?
- Is the proposed voice messaging system easily scaleable from hundreds to thousands of users? Ask the vendor how scalability is achieved.

Unified Messaging

- Is the proposed system a true "unified messaging" solution where voice, fax, e-mail are stored on a common message store?
- Is the proposed system scalable from small/medium business to large enterprises?
- Does the unified messaging system integrate with products from other vendors?
- Does the proposed unified messaging system supports industry standards (MS Exchange, IMAP, POP3, AMIS, VPIM, etc.)
- Does the proposed unified messaging system emulate the user interfaces of most popular voice mail systems?

IP Contact Center

- Can the vendor provide a complete call center solution set that is scalable from a single site to a networked application?
- Does the networked call center support pre-routing and post-routing?
- Are remote agents supported?
- Is skills-based routing available?
- Does the call center solution provide a complete set of pre-defined reports? Can the customer create custom reports? Is the raw data from the call center application exportable in a standard format so that the customer can perform data analysis on another application?
- Does the call center system provide real-time as well as historical statistics?
- Is an IP-based IVR available?
- Is an IP-based automated attendant application available?

Video

- Can the vendor provide H.320 to H.323 video gateways?
- Does the vendor offer H.323 video terminal endpoint products?
- Does the vendor offer H.323 video multi-point conferencing solutions?

Call Accounting

- Does the proposed system provide Call Detail Records (CDR)?
- Does the vendor provide a call accounting package?

Support (Design, Implementation, Maintenance):

- Does the vendor offer a comprehensive set of implementation solutions, including project management, site survey, design review, configuration development, and installation services.
- What capabilities are provided within the product to lower the cost and improve the ease of installation?
- Does the vendor offer complete end-user and administrator training?
- Does the vendor supply a full set of detailed product documentation? Is up-to-date documentation also available from a vendor web site?
- Can the vendor act as a systems integrator for large-scale voice, video, and data networks and applications? How much experience does the vendor have? Ask the vendor for a list of customer references of comparable size and scope.
- Can the vendor provide on-site and remote service, and are these services available 24 x 7 x 365? Can the vendor provide worldwide support for their offerings?
- Does the vendor have the capability of providing for disaster recovery on a large scale?

Migration Strategy:

- Can the vendor support a phased migration from legacy TDM equipment, such as PBXs, voice mail systems, and digital phones to an IP-based telephony environment?
- Does the vendor have a clear understanding of interoperability issues and the experience to solve them in a migration strategy?
- Ask the vendor to provide a clear and comprehensive migration plan.