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Taking A Look at Tomorrow's Network Service Providers

The next ten years will see a rapid integration of Network Service Providers (NSPs), Internet Service Providers (ISPs) and other new market entrants in the race to supply customers with innovative services that subscribers will pay for. The challenge for all providers, whatever stage they have reached on the road to integration, will be to build a cost-effective operations and network infrastructure.

The keys to this exciting transformation are open standards, computing power, and the Internet. Together they offer a new range of possibilities and solutions. Technology will allow the Internet to blend with

technology to increase flexibility and lower costs, and re-engineer their operational processes and systems to improve service, and speed time-to-market. These moves will restructure the companies from the ground up.

New technology is shaping network convergence, including high performance, open, scalable, and highly available computing platforms; distributed databases and terabyte routers; broadband access; growth in fibre optics facilities; ATM and edge network devices; multimedia evolution; and the Internet itself. The fusing of voice, data and video traffic over common transport and switching is already occurring. For customers, this means the industry is moving from a network-centric to a customer-centric focus, allowing personalised services, and Web-enabled customer-based order, provisioning and activation.

A complex chain of players such as content providers, service providers, and infrastructure providers will deliver the services of the future. In this innovative world the customer will be king, and the old distortions of monopolies and cartels will be history.

Staying profitable and satisfying demand

When it comes to performance and reliability, the Internet cannot compare with the frame relay and leased lines of today. The challenge for Internet Service Providers is to legitimise the use of Internet for mission-critical services and to guarantee performance and Quality of Service level agreements. The new world NSP will use the "technology" of the Internet (ubiquitous and connectionless with application developers focused on IP) and integrate it with the existing and developing infrastructure of high bandwidth transmission. As a consequence,

new pricing models for performance, quality of service and personalised services will evolve and find customer acceptance.

NSPs of the future need to balance three considerations:

- keeping profits healthy when prices are falling by reducing costs and increasing revenues
- continuously delighting customers by improving service and quality
- building new revenue sources through faster service introduction

The business performance of NSPs will be dependent upon the excellence of their service management systems that integrate end-to-end processes. The most important function will be the ability to map between service application delivery, and the underlying infrastructure that supports it.

The future will see gateways developed that integrate the Internet with public switched networks. Advanced Intelligent Network architectures provide a foundation for this transition to the next-generation Internet circuit-switched networks. These Internet-enabled Intelligent Networks will enable:

- Intelligent Network call: toll-free service, calling card, software defined services
- Advanced intelligent call: alternate destination routing, mobility, next generation agent
- Messaging: call answering service, send and reply, true message
- Internet emergence: voice over IP
- Intelligent Internet services: click to dial back, voice access to Web content

Existing value-added voice services like FreePhone, calling card, and voice messaging bring in huge revenues for NSPs today, so it is critical that they run over both networks. New off-switch, distributed platforms will support systems to collect and process billing data, and other information, from the old and new networks.

What the end user demands

End users need new, better, and personalised services like data and voice integration and mobility, in addition to:

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circuit-switched, mobile, satellite, and cable networks. The new world NSP will be managing a distributed computing architecture, not a telephone network.

By 2003, the communications industry will be customer-centric, with personalised, Web-enabled services and converging technology. However, no one company will be able to succeed alone; technology partnerships offer the key to forging the next-generation infrastructure. NSPs that fail to make the transition may have no place in the future competitive landscape.

Preparing for the future

Tomorrow's architecture will be based on a high-speed fibre and packet- and cell-based switching infrastructure that is equally adept at handling voice, data, and video. The architecture will separate the transport, switching, services, and management layers using open industry standard interfaces and computer platforms. NSPs will move as much intelligence as possible out of the switches and into distributed systems that can be modified quickly, and independently, for service creation.

In preparation, virtually all NSPs are developing the means to transition portions of their circuit-switched network to a packet and cell-based switching infrastructure. Companies are today making plans to re-engineer their network tech-

- lower prices: although they are willing to spend more of their budget for telecommunications value
- big improvement in service with economic choices for grade-of-service
- faster provisioning of services, circuits, network features, carrier, and equipment
- next generation applications like Internet voice, voice and fax messaging, and video.

End users are demanding multimedia applications to connect them with anybody, anywhere, and at any time. The falling costs of desktop computing and memory, plus new applications, have fostered increased usage that consumes more network resources. These applications include Unified Messaging, LAN telephony, PC fax, Web-enabled call centres, and desktop video.

An open network environment supporting mobility and cooperation of users must provide trustworthy and efficient security. To achieve this, end-to-end security architecture needs to be implemented. It will consist of a number of components, including firewalls and packet filters, secure tunnelling, encryption, certificates and key management, user directions, and dynamic user service tracking. These components will be based on best-of-class, open technology. Nothing less will satisfy customers.

Defining characteristics of the new networks

The following drivers of change will help reshape the new world NSPs:

- bandwidth at all levels will increase dramatically, with advances in fibre-optic technology like Wavelength Division Multiplexing (WDM). The price it will bear will drop proportionately and be practically free
- voice services will be a commodity service. Everyone will offer it, and it won't sustain the revenues that the NSPs now enjoy
- a new, low cost, network infrastructure will start to replace the public switched telephone network based on the Internet Protocol. The speed of the replacement will be in direct proportion to the level of the competition
- the short fall in voice revenues will be made up for by a suite of new value-added services, and by expanding into other NSPs' markets with new IP-based infrastructure and low-cost voice services

- NSP migration will accelerate to "off-switch" Advanced Intelligent Network (AIN) and CS architectures, taking full advantage of high performance, distributed computing, and a separate transport, control, and service structure
- breadth of a customer-centric service portfolio, ease of doing business, simplicity of operations, quality, and price will be key differentiators for NSPs in the coming deregulated markets
- the traditional NSPs will undergo some serious restructuring to align their marketing and administration expenses with new competitors
- data network, telecommunications equipment, and systems vendors will compete with over-lapping portfolios
- vendors that can help the NSPs offer new service revenue opportunities, as well as facilitate the transition and keep costs down, will be the partner of choice.

The new open architecture to support these changes will enable the rapid creation and deployment of services by third-party developers to meet the needs of evolving customer demands. A standards-based platform will lend itself to rapid internal and third-party development. Operation support systems like network provisioning, engineering and maintenance, customer care and billing, service fulfilment, and quality assurance will have an open and standard interface into the network, capturing multimedia traffic information.

Key to these developments will, in part, be the deployment of efficient, cost-effective IP-based intelligent services and operations networks; separate transport, switching, applications, and the management of architecture layers with open interfaces.

Rationalising current telecommunications networks

NSPs will leverage the power of packet/cell switching and rationalise current telecom infrastructure. They will ride the innovative wave of the Internet and the technological breakthroughs of digital signal processing, fibre optics, knowledge systems, processing chips, memory, and distributed computing.

All this will support services such as Intranet, voice over IP, bandwidth on demand, unified messaging, quality of service guarantees, security and privacy, e-commerce and global access on the move.

However, NSPs with largest investments in legacy circuit-switching equipment are expected to be slower in deploying new world services than their rivals. The NSPs' challenge to introduce the new world architecture consists of the ability to:

- maintain integrity of the network
- reduce time-to-market
- reduce operations and development costs
- interoperate with other platforms
- maximise switch vendor independence
- offer an expanding array of new services
- scale as needed
- offer mass customisation.

Indeed, some NSPs transport voice in three ways: circuit-switched; via ATM, and over IP. Operating multiple technologies is expensive.

Conclusion

NSPs will be forced to maximise return on new investment while effectively leveraging existing infrastructure. NSPs that fail to start transitioning today will lose valuable time to competitors, including those that are just entering the industry with a clean slate, which can design their processes and systems on a green field. The way forward is through partnership, open standards, computing power and the Internet.

An IP-based infrastructure has cost performance characteristics several orders of magnitude better than the classic world of telecommunications. The architecture outlined above will allow NSPs to create and provision the services required to differentiate themselves, manage the costs of the transition, and grow market share.

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Tom Mercer is the director of next generation network solutions at Compaq Computer Corporation. He is responsible for developing service solutions that encompass hardware, software and services from Compaq and software applications from partners. Prior to joining Compaq, Tom Mercer held senior positions in business development, marketing and strategy with Motorola, Wang, and Booz, Allen & Hamilton. He has over 25 years of business and technical experience working with communications industry service providers.
