

Advantages of Integrated Telephony Platforms in Packet Networks

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Introduction

Service providers today know they have to shift their business paradigm from the familiar circuit-switched world, with its diminishing margins and limited network technologies, to a brave new world of packet infrastructure. This new infrastructure delivers lower costs and a cornucopia of innovative services that bring them higher margins and new markets.

But service providers are also concerned about how to accomplish this tremendous shift in technology and business. Technological overhauls are never easy, and this kind of sea change can be overwhelming for even the most savvy, well-prepared operator.

Nevertheless, service providers know that packet networks are their future, and they must grapple with the challenges of constructing these architectures and making them work for their customers.

These challenges include:

- Migrating from circuit-switched to packet networks, while maximizing the investment made in existing time division multiplexing (TDM) equipment.
- Integrating the multiple elements of a packet network into a functional whole
- Ensuring the same level of redundancy and reliability as traditional networks
- Maintaining the performance of operations support systems (OSS) while
- Migrating from one technology to the other

Through its long experience working with service providers, net.com is aware of these issues and has developed unique solutions to those challenges that give service providers an easy and protected road to this new technology. net.com's vision is to enable service providers to make that shift in their business paradigm to packet networking at a lower cost and with less network disruption than any other platform.

Challenges of Nonintegrated Networks

The "Deconstructed" Network

In the new packet paradigm, some networks are, by design, "deconstructed." Network elements that used to be integrated into one large chassis now are exploded into functional pieces that can be located almost anywhere geographically. At the same time, the old platforms' highly integrated proprietary software is replaced by standard interfaces and protocols.

Typical components of these new networks are:

- Gatekeepers
- Gateways
- Signaling servers for SS7/C7
- Application servers, such as interactive voice-response servers

However, despite all of the innovation and new thinking that has gone into them, these networks still have weaknesses.

Single Point of Failure

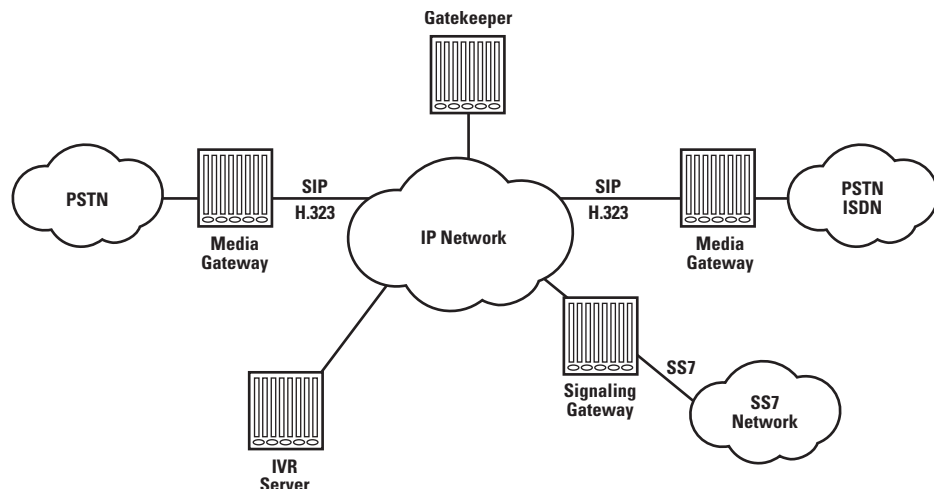
Although they are technically "deconstructed," they still rely on highly centralized call control servers, such as gatekeepers or media gateway controllers. Relying on these centralized servers to provide routing, signaling and network management, the service provider is vulnerable to network failure, because a single point of failure exists within the network.

Impacts on Network Performance

With servers acting as central processing-components within the packet network, the network architecture begins to degrade as increasing numbers of users access the network. The call-setup process for a nonintegrated platform can take as much as four seconds, because of the large number of call requests that are made among the access gateways, gatekeepers, and

Figure 1: Nonintegrated Platforms

The "deconstructed" network relies on highly centralized call control servers to provide routing, signaling, and network management.



remote gateways. These call requests also consume a large amount of bandwidth, further clogging the network.

This has several disadvantages to the service provider:

- Up to an 80 percent reduction in call-handling capacity of the gateway (10 to 12 calls a second reduced to 2 calls a second)
- Slower call setup times, up to 4 seconds
- Network congestion resulting in dropped calls

Integration Hassles

Previously, carriers building out a packet telephony network had to rely on multiple vendors' platforms to get the best in integrated voice response (IVR), switching, and billing systems. They were forced to rely on centralized call-routing processors and gatekeepers that seriously compromised network reliability and efficiency. Because the telephony components are located throughout the network and can come from multiple vendors, they are not integrated, and the network requires multiple management and configuration tools. The total cost of ownership is high because the network is more complex.

Higher Cost of Ownership

Another effect of having a network that is not integrated, is that additional equipment may be required to reduce latency and improve throughput and resilience. This is yet another capital expense for the network operator.

Stranded Investment

Service providers have made major capital investments in their TDM infrastructures. They are interested in migrating to packet networks, but have to get the most out of their earlier investments. Many packet networking systems, however, do not support dual networks and require a total migration to IP, potentially wasting millions. Also, some of the system capabilities that service providers take for granted in TDM networks, such as integration with well-known OSS systems, may not be available yet for packet systems.

Platform Comparison: Nonintegrated vs Integrated

Function	Nonintegrated Platforms	Integrated Platforms
Call Setup Time	Slow, as long as 4 seconds because of need to signal other components in network.	Fast, only 100 milliseconds if BSP• protocol used. No need to signal other components in network.
Call Completion	Medium, because no backup if a gateway or gatekeeper is down.	Good, because nodes are redundant. If one is down, another can complete the call.
Bandwidth Efficiency	Constant signaling to other network components eats up bandwidth.	Excellent. Integration of multiple functions in one box eliminates need for constant signaling.
Network Latency	Bad. Greatly affected by network efficiency.	Excellent. Little congestion. Frame packing technology further reduces latency. ••
Call Controller	Separate network component.	Fully integrated.
IVR	Separate server required, which increases bandwidth usage and cost. if server is down, no IVR function.	Fully integrated. No impact on network efficiency or cost. Multiple nodes with IVR provide backup.
SS7 Support	SS7 signaling server required, increasing cost and complexity.	Fully integrated, so no extra cost.
Cost	High because of multiple network components.	Low because single platform incorporates many functions.
Single Point of Failure	Yes	No

Characteristics of the Integrated Platform

An integrated IP/TDM switching platform supports multiple modes of operation in one chassis. These platforms typically include the following capabilities:

- Gatekeeper
- Gateway
- Signaling (acts as a virtual SSP in a SS7/C7 environment)
- Multiple transport protocols, including SIP and H.323 packet aggregation
- Interactive voice response (IVR)
- Customized scripting to administer call process flows and for third-party application development

Benefits of the Integrated Telephony Platform

Integrated telephony platforms offer a service provider a fully integrated business solution for the competitive IP telephony market. Carriers and service providers now prefer products that are fully managed and integrated, end-to-end solutions. This gives them more flexibility when expanding their networks, while simultaneously reducing the huge costs and management headaches resulting from non-integrated systems. Using this approach has enabled net.com to overcome many of the challenges associated with deploying a packet network.

No Integration Hassles

Unlike a multivendor network, integrated platforms can process calls in a distributed architecture. This consolidates multiple telephony functions into a single managed solution, a solution that supports switching, compression, IVR, signaling, a PSTN-to-packet gateway and gatekeeper functions in one box.

No Single Point of Failure

Some of net.com's platforms will also have an IVR system as an integrated

component. This means voice prompts can be played from each platform, not just from a central server over the IP network. Therefore, the network transports revenue-generating calls, not voice prompts.

No Negative Impact on Network Performance

Within an integrated platform the call-setup time is fast because there are no separate IVR servers, gatekeepers and signaling servers. When net.com's BSP signaling method is used, the setup time is about 100 milliseconds (ms). These functional components are integrated into the platform. Also bandwidth is not wasted throughout the IP network, and this bandwidth can be used for revenue calls. All of this means faster response times, greater bandwidth efficiency, and no single point of network failure.

No Increased Cost of Ownership

An integrated platform reduces the total cost of network ownership. Its fully integrated functionality means you need not invest in multiple devices to deliver voice and value-added services. Fewer devices and management systems mean lower technical support requirements and reduced operational costs, including housing costs.

No Stranded Investment

An integrated platform that supports both IP and TDM switching gives operators a migration path to packet that doesn't require dumping expensive TDM infrastructure.

Profit Through the Rapid Creation and Delivery of Value-added Services

As this paper has discussed, packet networks, if correctly architected, can provide services at lower cost, both initially and on an ongoing basis because of lower operational costs.

However, one of the most important advantages of packet network systems in the long run may be their synergy with IP networking in general, a synergy that gives service providers almost unlimited options in designing and delivering new services to their customers. There is the potential for hundreds and thousands of new services, from voicemail and fax mail, to call-center services, interactive voice response (IVR), calling card, wholesale services.

Support for SIP (session initiation protocol) is the key to making these envisioned services reality. SIP has been acknowledged for some time as

the protocol of the future for packet voice, but now it has achieved enough maturity for real SIP-based services to be deployed. The flexibility of SIP and its synergy with HTTP and HTML, make it possible for Web developers who have little experience with telephone protocols to create complex telephony applications, opening the doors to a wave of new application creativity.

Also, platforms, such as the net.com SHOUTIP™ platform provide open APIs as well as the SHOUTscript™ scripting language that helps developers quickly and independently create new services. Service providers and developers are already using the SHOUTIP's APIs to create new services.

The net.com SHOUTIP Platform

net.com's SHOUTIP platform is an integrated packet telephony platform specifically designed for carriers transitioning from a circuit-based network to a packet-based network or for next-generation carriers building brand-new packet infrastructures.

net.com's approach has been to develop an integrated IP/TDM switching platform that supports multiple modes of operation in one chassis.

The SHOUTIP platform allows service providers to bring value-added services rapidly to market, thus driving increased revenues and retaining customers; all within a framework designed to control operational costs. The platform gives service providers a modular, fully integrated business system for the voice IP services telephony market.

The SHOUTIP platform is a fully integrated solution, which means service providers will not have to invest in multiple devices to support service offerings. Fewer devices and management systems mean lower technical support requirements and reduced operational costs, including housing costs. The SHOUTIP platform reduces the total cost of network ownership.

Conclusion

While there has been a great deal of development of so-called "deconstructed" or nonintegrated network infrastructures for IP voice, that fact remains that these infrastructures have numerous issues and challenges in providing efficient, reliable voice services.

Integrated platforms in IP voice provide reliability, efficient processing of calls, no single point of failure and lower costs for network operators and should be their platform of choice.



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