

Conquering the cost-capacity crunch with IP-based networks

White Paper

Nokia Siemens
Networks



Executive summary

Demand for sophisticated services is booming, but conventional circuit-switched technologies are unable to provide the necessary network capacity, and certainly not at any reasonable expense. This cost-capacity crunch is putting the squeeze on service providers. There is, however, an antidote – packet-based technology. It is cost-effective, scalable, and flexible. But most importantly, its unrivalled efficiency enables service providers to ramp up capacity and service capabilities while containing Capital and Operating Expenditure (CAPEX and OPEX).

Traffic shows no signs of abating, with video already clogging the pipes. Only packet-switched networks can help service providers break through capacity barriers, minimize Total Cost of Ownership (TCO), and deliver the gratifying experience savvy users expect.

Depending on the network assets currently in place, service and traffic mix, and business model, service providers may:

- Build a packet-based overlay network that coexists with legacy infrastructure
- Retire current assets and roll out a packet network based on the Internet Protocol (IP) from the point of access to the core
- Reuse legacy assets by migrating to a mix of IP/Ethernet-based packet technology for access and aggregation towards the network core

IP/Ethernet technology provides a flexible platform and streamlines delivery to achieve unsurpassed efficiency.

Stepping up to packet-based technologies

“Service providers will need to rethink their approach to metro networks to simplify and speed up service delivery as well as cutting costs. We believe traditional approaches work to some extent but ultimately do not and will not scale. Bandwidth usage has changed, becoming much more dynamic, which requires a shift in thinking about how to solve the congestion problem, as well as how to implement and fix the problem.”

Source: IDC

IP/Ethernet networks are clearly the way to go. Burgeoning traffic, increasingly diverse services, and users' discerning standards for premium-quality, personalized services are driving operators to adapt and adopt. Fierce competition, a vigorous and often volatile market, and flat-rate – some would say cutthroat – pricing policies are also motivating factors.

Most major fixed network operators have made the switch, with smaller fixed, mobile, and corporate operators following suit.

Performance is another catalyst: Time Division Multiplex (TDM) networks deliver high Quality of Service (QoS), but not the granular scalability essential for networks to handle packets. It is sure to become an even bigger issue as demand continues to soar, especially when capacity increases can only come at the price of steeper CAPEX and OPEX. This is not so with scalable and flexible IP/Ethernet-based solutions, where a single, streamlined platform delivers a host of unprecedented packet-based services – quickly, easily, and cost-effectively.

There is, however, a complication: IP and Ethernet packet standards are rooted in IT rather than telecommunications. Service providers can ill afford problems such as packet loss, latency, and jitter to plague their services. It takes skilled engineers to solve these problems and ensure carrier-grade performance and reliability.

Such carrier-grade IP and Ethernet solutions deliver the QoS necessary to handle mounting multimedia and data traffic. They drive down CAPEX and OPEX. Better still, they afford service providers the opportunity to capitalize on unprecedented network efficiency and integrate service and network layers. Providers will be able to fine-tune services to zero in on ever smaller segments of the market, thereby treating customers to a truly personalized communications experience. Other noteworthy benefits include far greater energy efficiency and environmental savings.

The short-term approach to tackling today's network challenges may vary from provider to provider. But over the long haul, there is only one way forward for telecommunications – and that road is paved with IP and Ethernet networks.

Living up to customer expectations



Figure 1: What service providers really want (according to Business Needs Study 2009)

Customer satisfaction reduces churn, builds loyalty, and increases CLTV (customer lifetime value) and earnings. What's more, the cost of winning new customers is several fold that of retaining subscribers.

CLTV directly affects profits because it is so expensive to acquire and set up a new subscriber. It can take several months revenue to recoup these initial costs and begin turning a profit. Even a modest extension of average customer retention time can have a major impact on CLTV and the bottom line.

Telecommunications is a hotly contested market. Competitive pressure can drive down average revenue per user to the point where combating churn becomes mission-critical. So service providers must defend their positions by decoupling cost from capacity to cope with escalating traffic. And they must stake out new territory by offering compelling new services that treat customers to a truly gratifying 'personalized' experience.

A Nokia Siemens Networks study of 30+ mature markets found that poor customer care and slow data service have the greatest adverse effect on customer retention. Subscribers value easily activated new services and fast data rates. IP/Ethernet-based networks provide higher performance and a unified platform with more standardized activation procedures for all services.

Bad news has always traveled fast in the telco business: A 1986 White House Office of Consumer Affairs survey found that four out five dissatisfied customers tell more than ten others about the disappointing experience. That figure is likely to be far higher today with social networks affording people access to a far wider audience.

Boosting customer satisfaction is the key to avoiding such pitfalls and turning subscribers into the best ambassadors for the service provider's brand. Research has confirmed that many people turn to family and friends first for advice on choosing a new service provider. And an enjoyable experience motivates customers to try new offerings and use services more often, all of which helps combat churn.

Fundamentals first, then the frills

First service providers need to get the fundamentals right by providing a decent connection and sufficient bandwidth at the right price. Get these wrong and customers will surely stray. Network availability and performance carry great weight, but roaming capability, the look and feel of content, applications' ease of use, devices, and security also shape customers' perceptions.

Then providers must go beyond the basics to deliver the innovative services that sophisticated subscribers want, for example, social networking, mobile TV, and Voice over IP (VoIP). These people are willing to pay premium rates for premium services, but they bargain for an excellent user experience in return.

Packet-based technologies provide faster, more affordable, and more flexible ways of delivering both the fundamentals and the frills.

Rich rewards beckon

Data traffic is rising as mobile devices proliferate and grow smarter. Mobile broadband is the most convenient access technology for people today. Yesterday many machines communicated mostly via dedicated links; today many more send messages across fixed and mobile networks. Applications such as remote metering, security, environmental monitoring, healthcare, tracking, tracing, and the like are thriving, and machine-to-machine communication traffic is snowballing.

This explosive growth poses a challenge and affords an opportunity that service providers cannot afford to ignore. TDM networks lack the scalability necessary to relieve the congestion. The costs of scaling to meet capacity demand are prohibitive, which helps explain IP's meteoric rise.

Expenditure vs. quality – a paradox?

Competitive pressure compels service providers to look for ways to minimize TCO without cannibalizing the very asset that allows them to offer best-in-class services. But boosting capacity while cutting costs need not be mutually exclusive. There is a way to accomplish this balancing act – by moving to a packet-based network.

Forging ahead to a packet-based future

IP/Ethernet networks deliver multiple services across shared infrastructure to fully exploit network resources. They are far more flexible than networks with dedicated connections that can only be used for one type of service. The underlying platform remains stable as services evolve and advance. This inherent flexibility enables service providers to roll out new services that much faster.

Yet another factor driving the evolutionary trajectory of packet-based networks is that many future services are sure to be IP-based. Consumers have eagerly embraced fixed-line video services, and the success story is likely to continue with IPTV. Long-Term Evolution (LTE), by definition based on IP technology, may well ignite mobile business by sparking VoIP enriched with presence, content sharing, and messaging services.

Again, the origins of packet transmission pose a daunting obstacle. IP was engineered to convey data, where best-effort service generally suffices, so real-time capability is not an inherent in the technology. Providers must painstakingly engineer their networks to achieve the reliability necessitated by real-time services such as VoIP, IPTV and video on demand – even if they have had success offering best-effort, packet-based services.

Users accustomed to TDM-driven services expect the same or an even better experience from their IP successors. The tolerance threshold for dropped or delayed packets that cause poor voice quality or jittery video is very low. For example, anything more than 150 ms latency, ± 20 ms jitter-inducing delay variance, and 5% packet loss will not do for VoIP.

Implementing IP and Ethernet in carrier networks requires advanced skills. IT-level engineering and network management expertise will not suffice to ensure hierarchical traffic management maintains QoS across multiple services and security measures provide end-to-end protection for voice and video-based services.

Service providers' safe bet is to work with a reliable partner who not only delivers IP/Ethernet-based equipment, but also has the skills it takes to design, implement, and engineer such networks. Powerful tools are no less important because they make it so much easier to run a multi-service, multi-technology, multi-vendor packet-based network. Maintenance personnel must be able to readily pinpoint a fault, pick the right replacement part, and repair flawed fiber. The right operation services support tools provide this information without requiring in-depth knowledge on the part of the operator.

One destination, several approaches

To recap service providers' options, they can build an IP/Ethernet network that coexists with legacy infrastructure, ditch current assets in favor of immediate, end-to-end migration to IP, or reuse assets by migrating their networks to IP/Ethernet. Aside from the given business model, this decision hinges on three factors.

The first is the installed base. A hybrid network may be the best choice for a major incumbent with many assets in place. He can migrate from the current network towards IP while continuing to capitalize on legacy resources. In contrast, a challenger that carries considerable traffic via leased lines may opt to seize the initiative and build an IP/Ethernet network of his own.

The second issue is the range of technologies and services the service provider plans to offer. A packet network may be the way to go if the prospects of new services such as IPTV or VoIP look bright. The same rationale applies to mobile networks, where the motivation to adopt HSPA or LTE may be decisive.

The third consideration is the availability of expertise and experience with packet-based standards. Does the service provider have a partner who can deliver the goods?

The holistic, solution-focused approach to IP implementation and integration

A leading vendor for fixed and mobile network infrastructure and services, Nokia Siemens Networks builds IP/Ethernet solutions on a platform of best-of-breed products, both 'home-grown' and sourced from leading vendors such as Cisco and Juniper and other partners.

Every business is different. Hence the enterprise takes a consultative approach to finding the right solution, assessing each service provider's current situation, network assets, customer set, and business goals. Peerless telecommunications experience flows into every proposal.

Resilient IP – or ResIP for short – is what this is all about. ResIP-certified solutions leverage industry-leading IP and Ethernet products to provide unparalleled performance and enable service providers to deploy true carrier-grade IP networks, mitigate risk, and speed their services to market. Customers benefit from a skill set that has proven its merits in countless network installations small and large. Resident experts design, develop,

implement, and verify end-to-end packet-based solutions enabling access, aggregation, and core networks to be deployed with utmost efficiency. Multiple-vendor networks are an option. But whatever the proposal may entail, the installed network will be engineered for the greatest resiliency and excellent QoS to make the move to IP smooth. After all, the world's largest and most powerful fixed and mobile networks are built on expertise sourced from the ResIP.

Management

With multiple technologies and vendors' elements featuring in radio, core and transport networks, management can be costly and complicated. Nokia Siemens Networks' NetAct streamlines multi-technology management to handle the entire network and drive down OPEX. NetAct also reaches across domains to configure end-to-end connections. This is far faster, more accurate, and more scalable than any manual configuration of multiple network elements.

Traffic engineering helps make the most of network resources. NetAct furnishes the fault and performance data operators need to gauge and allocate resources to suit the needs of a growing business. NetAct Transport helps configure restoring mechanisms in all network layers and provides powerful alarm and performance monitoring functions to boost availability and enforce service level agreements. And that keeps the network up and services running to prevent lost revenue and improve customer satisfaction.

Services

Nokia Siemens Networks plans, optimizes, and even operates entire IP/Ethernet networks, to include partners' equipment. Service providers can take advantage of several technologies – routing, switching, and transport – in a packet transport domain that has been optimized from day one to achieve significant savings.

The ResIP Center is a wellspring of expertise. This is where Nokia Siemens Networks develops engineering rules and design guidelines that underpin its solution-oriented approach tailored to each service provider's needs. It provides the proving ground for each provider's specific adaptation or integration case, and the means to deliver the proof of concept for such adaptations and solution blueprints. This hands-on experience is invaluable when implementing and troubleshooting service providers' networks.

Conclusion

The advantages of IP/Ethernet networks are indisputable: They help boost user satisfaction, cut CAPEX and OPEX, and enable a host of new services with promising revenue prospects.

Service providers are bound to adapt and adopt. And when they do, they will have to make some tough choices – whether to build an overlay network, ditch current assets and opt for a full-fledged packet network, or migrate to a mix of IP/Ethernet-based packet technology. Network design issues, implementation details, migration and legacy integration concerns – all this and much more demands the attention of a knowledgeable expert.

The ResIP proof-of-concept lab and many implementations for leading service providers have given Nokia Siemens Networks a deep well of experience and expertise to draw on. The company combines and integrates the best products of Cisco, Juniper, and other leading suppliers of IP and Ethernet equipment with its IP-enabled products to create true end-to-end IP solutions. And it has NetAct, a single management platform to handle all these products and technologies. Armed with these skills and tools, service providers can finally conquer the cost-capacity crunch.

Nokia Siemens Networks
P.O. Box 1
FI-02022 NOKIA SIEMENS NETWORKS
Finland
Visiting address:
Karaportti 3, ESPOO, Finland

Switchboard +358 71 400 4000 (Finland)
Switchboard +49 89 5159 01 (Germany)

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