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Voice and data communications: Time to change to Next Generation Networking

Explanation - *Next Generation Networks*

A new type of customer network that reduces cost of ownership and increases user productivity

Next Generation Networks (NGNs) enable multiple services such as voice, video and data to be integrated and efficiently carried over a single infrastructure: advanced functionality changes the boundaries of communication to enhance the user experience.

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Next Generation Networks

1. Context

8*el* has published this paper to assist corporates with the process of forming the right Next Generation Networking (NGN) strategy and choice of supplier. It is aimed at senior IT and 'C' level executives, keen to understand how recent technological progress and other factors have led to NGN becoming the preferred communications solution to manage office, home and mobile communities. With lessons already learnt from early adopters, NGN offers compelling advantages including efficiency, productivity and cost reductions across the enterprise.

2. Overview of NGN and its Business Advantages

The sum of recent technological advancements in the converged networking space has inevitably bought a whole new meaning to the way businesses run their communications infrastructure. Next Generation Networks (NGN), will deliver a more efficient, cost effective, functionally rich and resilient networking experience.

Through staggered financial outlay, small and medium sized organisations can benefit from advanced network functionality, (a benefit normally reserved for larger corporates).

NGN is based around Internet Protocol (IP) technology allowing the efficient transport of voice, data and media over a single infrastructure helping to deliver a number of business advantages with total cost benefits likely to exceed expectations.

i) Cost savings
With fewer components required (e.g. lines, routers, hubs and switches), NGNs are more reliable and cheaper to run, as carriers are able to offer equipment and network economies of scale by investing in high-end equipment and capacity. Increased flexibility also means that expansion or modifying of networks through organic growth and acquisition becomes far easier, and ultimately less expensive. NGNs are able to incorporate the advantages of both 'hub & spoke' and meshed voice & data networks.

In this case, operational cost efficiencies are also available through the convergence of data, voice and video.

ii) Productivity
Emerging services such as IP based voice, web conferencing, collaboration and unified messaging can all be supported by NGN. This enables businesses to capitalise on productivity benefits yielded through office staff working 'smarter' in a more interactive communications environment. NGNs also provide any time, any place information flow and presence visibility, similar to MSN Messenger.

iii) Scalability
Generally, without disruption to service, users, sites and communication services can be added in line with varying business demand. Enterprises can deploy services in a series of phases allowing for resource and budgetary constraints. The emergence of NGN points to the end of 'Fork Lift' upgrades to both voice and data infrastructures - a desired goal for many organisations.

iv) Business continuity
Through the use of a common (IP) based infrastructure, business continuity can be easily engineered to deliver a more reliable and robust network. The flexibility offered by NGNs as an underlying infrastructure means that risk can be mitigated and policies configured to protect against service disruption. Traditionally this has often been managed as a separate plan rather than as an integral part of the network design.

Continued technological development means that the traditional phone system can run via an NGN, acting as a low cost back-up solution for disaster recovery sites.

Increased flexibility of design and the ability to merge legacy systems more easily into a manageable infrastructure means that NGNs are also able to effectively eliminate single points of failure across the enterprise network.

3. Next Generation Networks Become a Reality

Increased availability of bandwidth at a low cost accelerates the move to NGN

With potentially 'bandwidth hungry' media (e.g. data and video) applications all sharing the same infrastructure, bandwidth availability and cost are key criteria in adopting an NGN infrastructure.

Pre 1990, fibre networks were scarce and it was therefore expensive for businesses to access bandwidth. As the 1990's progressed and businesses used more services requiring bandwidth, fibre networks were rapidly constructed across the country. The inevitable competition to win customers has led to a sustained increase in bandwidth availability at relative falling costs. More recently, BT's forced campaign to un-bundle the local loop has also helped drive down the cost of last mile access delivering high bandwidth connectivity to businesses.

Hardware and software solutions come of age

One key element facilitating the uptake of NGNs is the ability of equipment vendors to develop the right hardware and software modules to cater for the immense routing and traffic demands of running a converged voice and data network, whilst securely segregating traffic on a common infrastructure.

Complicated call set-up has now been replaced by faster and easier to implement text based technology

A key element of NGN is VoIP. This technology has now moved on sufficiently to make the NGN proposition a much more attainable one.

The first set of agreed upon standards for signalling protocols in VoIP networks was H.323. This protocol, responsible for call setup and signalling, was key to the operation of the VoIP network.

Until now, H.323 has traditionally been the 'dominant' protocol as a result of its adoption by initial players making it the 'de facto' standard for IP telephony. It was perceived as being a requirement for linking new IP telephony applications. In reality however, H.323 is by nature inflexible, restricting integration and development.

This complicated H.323 protocol has led to the emergence of the much simpler Session Initiation Protocol (SIP). The concencsus of opinion amongst network consultants is that organisations should adopt SIP for all their standard VoIP deployments. SIP is more than five times faster at call set up than H.323. It is also backwards compatible and more firewall friendly. Further still, it is text based and therefore easier to deal with and cheaper to develop and integrate.

4. Overcoming the Challenges of NGN

With the development of technology, increased availability of low cost bandwidth and compelling evangelism from operators, NGN technology has now clearly passed the early adopter stage. However, NGN is still perceived as a potentially high risk solution for many network managers and directors.

Network availability and back-up

The key to any network is its availability and user experience.

Growth, mergers and acquisitions all provide businesses with the potential headache of 'networks within networks', built, run and maintained by different vendors, using a multitude of technologies. This has always presented the challenge of installing appropriate network resilience and back-up for connectivity should things go wrong.

NGNs will lead to the management and monitoring of networks being moved further into the hands of the specialist network provider with customer equipment and software being located away from the customer site. Initially this may bring about the feeling of less control for the IT manager, but the trade off is increased network availability, increased resilience, better Management Information Statistics (MIS) and freed up resource. All of which adds up to a lower risk and more cost effective networking strategy.

8el's NGN solutions are based on extensive research and logical principles

8*el* has an established track record in building business continuity into customer networks. There are two issues we believe are key to the success of a network:

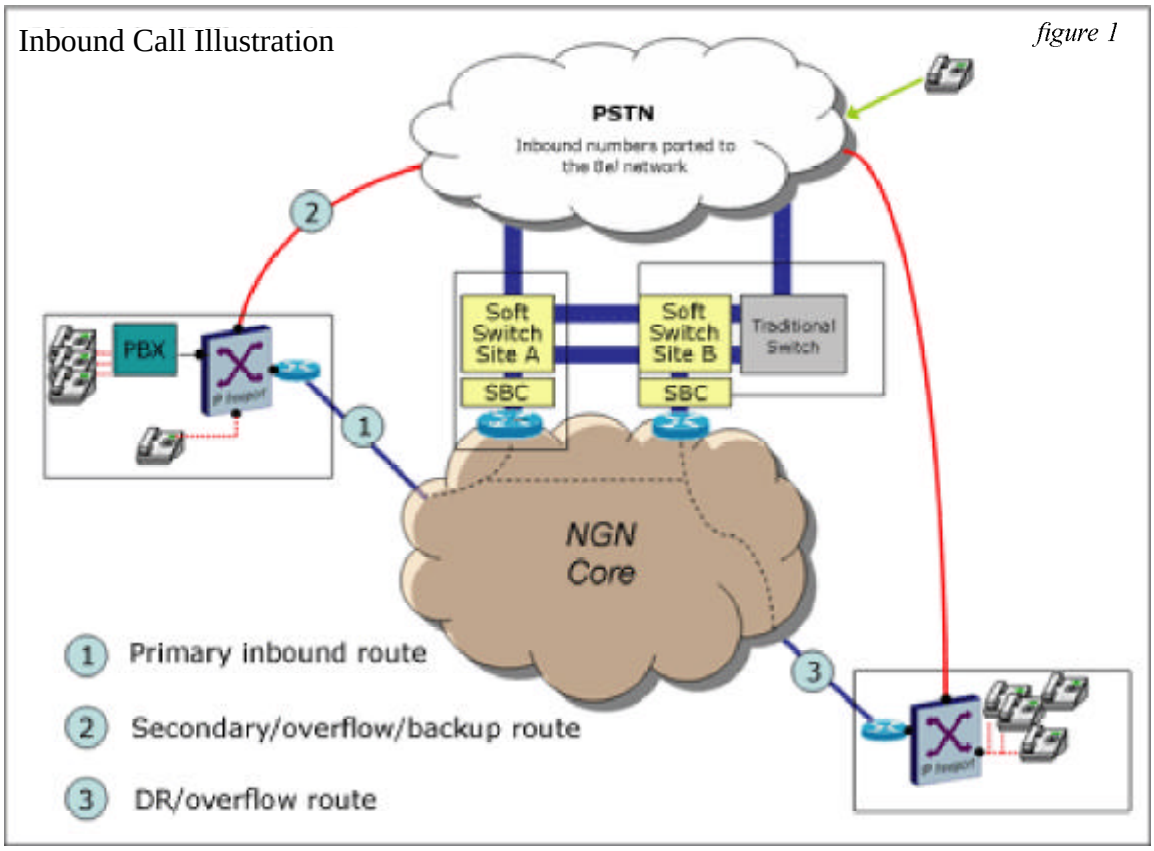
1. The escape route - if calls fail over the primary network an alternative route in the form of legacy ISDN lines divert traffic to an alternative site. e.g. *see figure 1*

2. The IP*freeport* - provides 24/7 detailed visibility of the network, continuously monitoring faults and communicating any issues to the 8*el* Network Operations Centre. Effectively, 8*el*'s IP*freeport* acts as a virtual engineer for every customer site, detecting and dealing with issues before they become service affecting.

As the responsibility for service and communication assets are increasingly shifting to the operator (an area where well supported service can add real value to corporates), 8*el* is investing in hardware and software back-up at the core of its network, (to ensure further network stability and service guarantees for NGN customers). On this note, 8*el* is commissioning multiple soft switches. These switches function as IP exchanges in two separate locations (the first two being Telecity and Global Switch). This provides high resilience and removes any potential single points of failure.

8*el*'s soft switches can receive local area code numbers (once ported onto the 8*el* network from BT), ensuring efficient in-bound distribution and management of this traffic across customer networks. This guarantees calls are able to reach their destination directly, via call groups, or if unavailable will be redirected to a queue, or even stored and later distributed as voice mail messages. This functionality doubles up as a business continuity plan for service, re-routing calls as necessary to ensure smooth operations.

Increasing network availability via 8el



8el's NGN design protects users & networks from attack

Security
Security of the network is of paramount importance, and with operators set to play a larger role in terms of housing and managing network equipment, it is high on the list of considerations for early NGN adopters. To avoid exposure to attack, operators must monitor their customers' networks in real-time and manage 'pin hole' technologies. This will avoid bandwidth hijacking and call fraud, whilst protecting call quality for legitimate users.

Historically, larger organisations would expect to put in place their own security strategies but even with the available resources, new security challenges now make this option only available to the minority.

To achieve the highest level of security, 8*el* employ a combination of firewalls and Session Border Controllers. This is a new generation of equipment developed to deal specifically with the added challenges of securing IP voice and other media across network borders.

Security functions include: the protection of soft switches, applications, media servers, network and user identity.

8el's NGN solution uses technology that reduces the number of packets to protect call quality

Voice quality
It is true that call quality is measured by the perceived experience of the user during a call and is therefore somewhat subjective. End-to-end call quality would include call set-up time and call teardown time. However, once a call is established the most important issue is voice quality. This can be affected by factors including customer site equipment, network delay and lack of network control: challenges that all affect the IP network. As a result, the network must be monitored and controlled continuously and have sufficient bandwidth in order to deliver the required level of service for media and VoIP traffic.

8*el* uses a combination of silent suppression and call multiplexing from customer sites; a process that enables multiple actions to be wrapped into a single IP packet. In turn this yields savings of 40% or more on bandwidth. This means call quality is protected whilst making the calls less susceptible to fluctuations in data bandwidth demand.

Quality of service
A Quality of Service (QoS) enabled Local and Wide Area Network (LAN/WAN) is paramount to the successful deployment of a next generation converged voice and data solution.

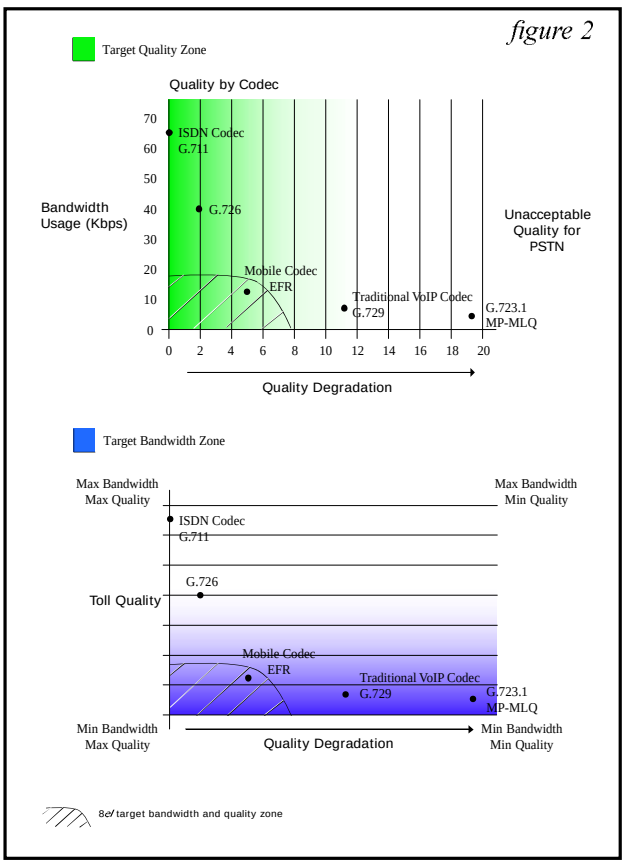
Providing QoS to time sensitive applications in both the LAN and WAN is paramount when deploying converged network solutions. Whilst voice traffic is not bandwidth intensive, it is sensitive to delays and congestion often found in IP networks; and therefore requires a network that is capable of delivering a guaranteed QoS.

NGNs provide increased quality of service to network users. Early versions of VoIP (a key element of NGN), suggested the contrary, with issues over the quality of calls. Quality issues can now be overcome by specialist operators through intelligent routing, monitoring of networks and calls via specialised NGN, Customer Premises Equipment. As a result, the most efficient protocols can now be applied to voice services in order to deliver a consistent, corporate grade, dial-tone experience.

To ensure toll quality voice throughout the network, 8*el*'s solution prioritises voice packets over the LAN and WAN using Ethernet and ATM Class of Service. This ensures voice packets are delivered using the required bandwidth, priority and low latency, especially over 'last mile' connections.

Bandwidth Usage by Codec (without IP overheads)

figure 2



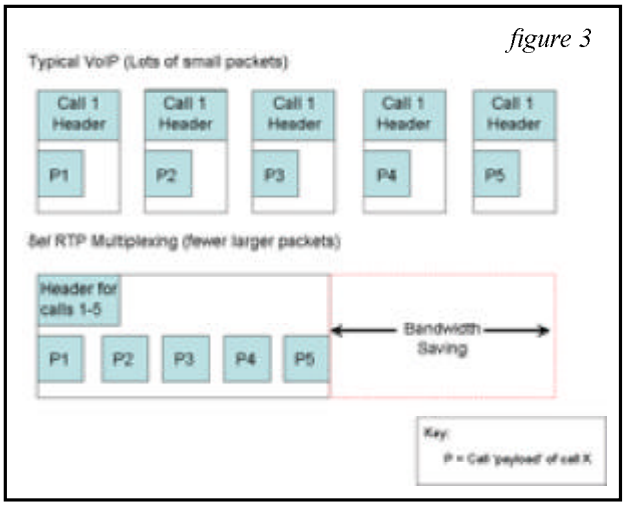
8*el*'s specialised Customer Premises Equipment (8*el* IP*freeport*), provides visibility of network activity for proactive management. By constantly assessing a range of criteria for each call, including: location of caller, destination of call, route, and time of day, 8*el*'s IP*freeport* then 'decides' on the most appropriate codecs to use in order to achieve the highest possible call quality and bandwidth efficiency e.g. *see figure 2*. 8*el* is leading the market in this area as other operators will merely provide solutions that 'fix' the codec for calls.

8*el*'s IP*freeport* is a key enabler behind NGN solutions offering providing customers with;

1) Bandwidth savings
   -Dynamic codec selection
   -Real Time Multi-plexing *e.g. see figure 3*
   -High quality silence suppression
2) Best available IP call quality
3) Increased network visibility
4) Intelligent routing
5) Sail and steam option

8el RTP Multiplexing via the IPfreeport

figure 3



5. Summary

With a critical role played by telephony across all professional businesses, maintaining service remains integral to the role of the communications department. Having recognised this, 8*el* has developed a 'sail and steam' approach; allowing both new and existing technologies to work alongside each other in a staged, rather than a revolutionary style migration. For instance, a single user can be migrated to NGN telephony services acting as a test bed for the new platform, prior to the entire office or business roll-out.

Although the implementation of Next Generation Networking ultimately involves the replacement of the legacy network, 8*el* is able to do this in a staged approach also helping to minimise the upfront financial impact. In terms of cost this will depend on the number of sites, speed, level of functionality and feature set required.

There are business benefits to adopting and implementing a Next Generation Network. Cost savings can be realised immediately and are likely to increase post initial investment.

Savings can be realised through:

1) Reduced call line rentals
2) Free inter-company calls (Site to Site or home worker to office)
3) More efficient usage of network capacity
4) More cost effective centralised Internet gateway
5) Lower cost disaster recovery

Capital investment decisions in the Next Generation environment

Clearly, companies are faced with key investment decisions as existing infrastructure requires upgrading or becomes obsolete. The investment decision usually requires a view on the potential Return of Capital (RoC) available. With the development of more SIP based applications for business processes and communications, a company must make the right decision on a Next Generation Network that will deliver long term scalability and compatibility to maximise RoC.

Companies who are considering investing in WANs, PBXs or Unified Messaging today should consider whether they should be making these capital purchases directly, or outsource to an NGN provider who can show enhanced RoC for the organisation.

8*el* is well placed to roll-out its 'NGN network solutions' to corporates. With a thorough understanding of how to deploy and support Next Generation Networks, 8*el* will provide low risk, staged roll-outs that deliver the available financial and productivity benefits of this new way of working.

6. Contacts and Further Information

To discuss your business requirements, communications needs and strategy for migrating to Next Generation Networks including how it might impact your WAN, Internet and telephony services in the short term, please contact an 8*el* Voice & Data consultant on 0845 33000 93

Visit our website at www.8el.com/NGN

Related Research

Making the Case for VoIP, AT&T, 2005
Network-Based IP Communications: The Time is Now, AT&T, 2005
SIP and the new network communications model, Nortel Networks, 2003
VoIP in Contact Centers is Inevitable but Not Imminent, The Yankee Group, 2005
VoIP in the Enterprise: Ready for the Mainstream, Brown D & Odgers P, 2005
Voice quality is critical to the business of the network, Houck D & Yang W, 2004

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