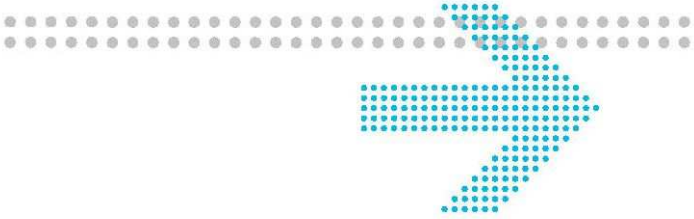
Alcatel-Lucent Submission to Commerce Commission

Discussion Paper on Next Generation Networks

February 2009



Dear Sir/Madam

As a leader in fixed, mobile and converged broadband networking, IP technologies, applications, and telecommunications applications, Alcatel-Lucent and Bell Labs have been offering consulting services to service providers, enterprises and governments worldwide since the 19th Century. Our in-house knowledge of telecommunications technologies, solutions, business issues, worlds best practices and future directions are second to none.

More so than other organisations, Alcatel-Lucent is able to lay strong claim to its technical credentials and next generation networking experience. In recent years, Alcatel-Lucent has been deeply engaged in transforming the world's telecommunication infrastructure to IP based broadband networks, including the networks of the world's leading operators. Our ongoing dialogue with governments, regulators and operators continues to shape future voice, data and video telecommunications services to consumers and corporations.

With operations in more than 130 countries, Alcatel-Lucent and Bell-Labs are local partners with global reach. The company has the most experienced global services team in the telecommunications industry and one of the largest research, technology and innovation organisations.

Alcatel-Lucent together with Bell Labs Research and Development:

- is the world's leading supplier of xDSL technologies and expertise, a position held since 1997
- is the world's leading CDMA/EV-DO vendor with global market share of more than 46 percent in 2007. To date, it has deployed commercial 3G systems (UMTS/HSPA and CDMA/EV-DO) for more than 70 operators worldwide
- has provided equipment and technology underpinning 80+ FTTx deployments in 90% of the top broadband economies including 20+ nationwide operators and 60+ municipalities and utilities
- is the world's leading supplier of GPON FTTH technologies
- is engaged with 25+ major telecommunications incumbents and competitors in IP end to end network transformations and in many more non end to end transformation projects
- has provided platforms in Australia and New Zealand upon which more than 300 Terabytes of data (equivalent to around 3 billion web pages or 60 million songs) is delivered daily

Alcatel Lucent's extensive technology portfolio, it is greater than a 100 year history as a supplier of telecommunications products within Australia and New Zealand, its extensive local engineering capability and access to international experts together enables it to offer unique insight and tools to support Technology discussion.

Alcatel-Lucent would be happy to discuss in more detail any of the questions or comments raised in this response and look forward to ongoing discussion with the commission.

Question 1

What are your views on the approach to development of the market framework and industry consultation that should be considered in New Zealand?

There remain many potential changes and reforms to New Zealand's telecommunications, IT, media and entertainment regimes which could improve services to consumers, enhance the benefits of competition and boost New Zealand's OECD international ranking. It is however difficult to confidently recommend a particular framework and approach and be sure of its long term success.

Perhaps the most significant challenge that telecommunications law and policy makers will face in the coming decade will be to ensure the pace of legislative and policy reform keeps up with technological evolution and the ongoing convergence of the formerly independent entertainment, media, telecommunications and IT sectors. Although it is impossible to accurately predict the nature and substance of future issues, we should recognise that the current pace of change is likely to present future challenges in relation to competition, censorship, copyright and fair use, privacy, cross-media ownership, content policy, liability and an even broader range of issues impinging on policy and law. Perhaps the most important change of approach that can be recommended is to implement more regular review and discussion of issues across the entire breadth of the entertainment, media, telecommunications and IT sectors with a specific view of improving the turn-around of reforms.

In this context and without question, New Zealand's entertainment, media, telecommunications and IT sectors are unique. This is not a New Zealand specific phenomena. Because of political, cultural, historical, industry structural, ownership and many other reasons, every country has unique conditions which influence the development and operation of their local industries. Thus although the uniqueness of New Zealand's industry means that the competitive and regulatory environment will be a challenge to manage and evolve, this is equally true in most other markets. Attention needs to be paid towards developments and policies being applied in other markets and their relative successes and failures. With attention towards the characteristics that set the New Zealand context apart, the lessons that are learned should then be carefully and thoughtfully applied in the New Zealand context.

Without question, lessons from other markets indicate that a collaborative and consultative approach between government and amongst stakeholders promises to achieve national outcomes sooner than could otherwise be achieved by following a combatitive and exclusionary approach. The Commerce Commission is already demonstrating that it is taking the right approach because it has engaged New Zealanders and New Zealand industry in these discussions. Local organizations will have the first hand experience associated with the challenges in the local market. Because of ongoing and disruptive evolution of technologies, applications and industry relationships, public consultation leading to real reform needs to become a regular activity moving forward.

Question 2

Do these core principles provide a useful underpinning for considering NGN issues, or whether they should be modified or supplemented?

In order for New Zealand to maximise the benefits it can derive from NGN technologies, applications and infrastructure and achieve these benefits as soon as practical, it is important to first identify clear and unambiguous, measurable national objectives and targets. Having first identified desirable targets, all of New Zealand's stakeholders (including both public and private interests) will be well placed to identify the impediments and opportunities and manage the ongoing NGN transformation.

Without clear targets and objectives, progress cannot easily be measured and stakeholders cannot easily be held to account for their achievement. Without regular review and consultation, well intended earlier objectives and targets risk missing the significant implications of ongoing technological and industry evolution.

Question 3

Are there additional elements that have to be taken into account when defining NGN? If so, what are the additional elements, why should they be taken into account and what impact do they have?

For consumers and businesses, the great promise of an NGN transformation is the possibility of introducing new services which will save cost and time and enhance the utility of existing services. For infrastructure providers, the great promise of NGNs relates to their multi-service and enhanced management capabilities which can reduce the cost of maintaining both aging legacy platforms and multiple single-service networks, therefore freeing funds for further investment. For application providers and access seekers, NGNs promise significantly enhanced carriage capabilities, opening the possibility for real innovation in service delivery, the chance to differentiate and create new revenue streams to expand their business.

The development and running of operations support systems constitutes a substantial component of the overall business case for NGN transformation. Together, the investment and ongoing expenditure in operations and business support systems can significantly exceed the burden of their legacy predecessors. It is therefore easy to overlook the impact of NGN and competition policy and regulation. If inadvertently impaired, the cost of transformation can easily blow out and the viability of businesses is undermined. Ultimately, consumers will bear the burden in the form of reduced choice of services, providers and even reduced availability of best practices applications.

It is therefore our consolidated view that the infrastructure component of an NGN transformation should be considered just one component of a much larger overall business transformation process. From that, an improved operating model can be derived, which in turn again may reduce the requirements on the NGN, all leading up to this desired cost improvement. Policy, regulation and objectives should be targeted across the whole, not just a part of the overall NGN transformation.

Next Generation Networks promise to deliver significant environmental benefits to the community. Alcatel-Lucent urges policy makers to pay additional attention to the whole-of-life environmental impacts of the alternate forms of next generation access technologies. The discussion around additional carbon footprint, especially from consumer equipment tends to dominate the overall discussion of the end-to-end NGN implementation. However this should be balanced by recognising the significant carbon savings from online applications and tele-working. Insufficient attention has been paid to these issues thus far.

Given the importance of national telecommunications infrastructure and its role, particularly at times of national emergency, Alcatel-Lucent believes it is as important to understand the vulnerabilities as it is to understand the capabilities of next generation technologies in an open access, multi-service, multi-provider context. We have always placed considerable attention to engineering flexibility, resilience and reliability into our network designs and advising governments of the issues and trade offs. We recognise that each decision can have a huge impact upon the future.

It is imperative for New Zealand for decision makers to have access to current and relevant advice and that policy makers balance the twin requirements of a competitive market with engineering driven reliability, resilience and evolution. Both have their place. Few would be satisfied with an outcome that delivers one without the other.

Finally, content availability is a significant issue. Due to the demographic and geographic situation of the country, most content consumed in New Zealand is sourced from abroad. So no matter how good the New Zealand NGN infrastructure is, improvements to user experience could be constrained by accessibility and availability of offshore content. On-shore caching of content coupled with application based innovations favouring or preferring onshore traffic (for peer to peer applications for example) are areas warranting significant research and enquiry.

Question 4

What do you think IMS fulfils? Is it necessary, or are there other ways of fulfilling its function? What are the implications of this layer for the future of NGNs?

IMS offers a platform for session management, subscriber management and open applications access. As long as the offered services remain fairly simple and live mainly in the voice-domain, a similar function can be achieved via softswitch based architectures. However, these architectures do not offer the openness that IMS envisages. It therefore limits the possibilities going forward.

One of the important aspects an IMS architecture offers is an open applications enabling capability. It allows 3rd party developers to design new applications or Application Providers to provide their services through the basic components of the IMS, thereby taking advantage of subscriber management, security and billing capabilities that the platform offers.

It is believed that a large number of applications will be developed, but few will be real money-makers. Applications will have to be simple and straightforward for the service provider to introduce then into there portfolios. The low cost and efficiency of the IMS development platform allows application developers to innovate and take risks when brining new services to market, comfortable in the

knowledge that if the application does not succeed the losses will be manageable.

Question 5

Where and how should the balance between coverage and speed be struck?

Important roles for both wireless and wireline

'Wireline' services are those which are delivered to a specific address and we call wireline services a 'fixed' form of access. In this sense, the term wireline encompasses both fibre and copper cables. Alternately, 'wireless' services are those delivered without cables by means of radio.

Wireless access is important for several reasons. Firstly, it provides the only feasible method for supporting mobility, a capability we have all grown to depend upon and which is the cornerstone of the user centric vision of providing broadband access to every device, no matter what its location. Secondly, wireless access can be deployed rapidly and without the substantial cost of digging trenches and burying cables. Wireless is therefore generally the best choice for delivering broadband services where the cost of transforming wireline infrastructure has so far been prohibitive. For similar reasons, it is generally the preferred choice for competitive broadband access providers looking to invest in an independent delivery technology.

Despite these wireless advantages, wireline broadband cannot be dismissed. Contemporary wireline technologies are capable of sustaining between one and four orders of magnitude greater throughput than wireless. With appropriate engineering, wireline technologies achieve this with higher reliability and repeatability, independently of take up and varying levels of simultaneous usage. These characteristics are highly desirable and necessary for supporting mass market next generation multi-service demands.

Triple play (Voice, Video and Data) services for example exhibit high simultaneous usage with sustained high throughputs and generally rule out wireless as the primary form of broadband access in areas of medium and high subscriber density. In areas where the wireline business case doesn't stack up, particularly in lower population density areas, appropriately dimensioned wireless deployments can come close to matching the characteristics of a wireline network.

For all of these reasons, wireless and wireline access will need to play important roles along side each other. In order for a nation's infrastructure to remain internationally competitive and capable of supporting all next generation applications, the need for coexistence of wireless and wireline should to be recognised and explored by governments, regulators, the industry and the community alike.

In many markets, we have seen wireline and wireless infrastructure deployed independently by competing operators. There are also examples where operators have deployed both these forms of access to take a bundled service offering to market. The "any time, any place" aspects of integrated next generation access depend upon the technical unification of wireless and wireline access, at least from an application delivery perspective. Looking towards the future, next

generation subscribers are likely to increasingly seek collaborative or integrated service offerings between wireline and wireless operators.

Striking the balance

For the past decade, requirements for ever increasing throughput have been largely driven by the Internet. Recognising that the social and national benefits of investment often cannot be judged using the same criteria as the investor's business case, governments have played an important role in translating the capabilities of the new network into opportunities for the local information and communications technology industries. In the decade to come, the deployment of next generation applications promises to build upon the previous benefits of the Internet.

The defining network requirements for carriage of next generation traffic are:

(i) the need for sustained high downstream throughput, particularly for high resolution video
(ii) the needs for greater traffic symmetry and lower delay as required by interactive and communicative applications. The extent of the need for greater symmetry will vary from consumer to consumer and according to the expected evolution and emergence of new applications.
(iii) the simultaneous delivery of many different service streams on the one access connection. This is often called 'multiservice'.
(iv) the ability for the access network to openly support competing application providers.

Taken together, these characteristics of next generation access encourage us to rethink the role and the value of telecommunications services and infrastructure. Aspects of next generation transformation will challenge us to reconsider existing telecommunications legislation and regulation. Principles of open access and social equity, for example, encourage the flexible bundling and delivery of applications to as many locations as feasible so that as many consumers can benefit from as many of the available services or applications as possible.

Ideally, the compromise between speed and coverage should be avoided as much as possible so that all New Zealand businesses and consumers can enjoy all of the potential benefits that state of the art next generation access is capable of providing. Unfortunately, some compromise is virtually inevitable. Different access technologies have different capabilities and different optimal demographic and geographic targets.

To the greatest extent possible, close attention should therefore be paid towards the dimensioning decisions as different access options are considered and deployed. High capacity shared access technologies (including the advanced wireless standards or PON) can replicate or emulate the sustained throughput of dedicated connections if engineered with carefully controlled sharing assumptions and backhaul. This might be achieved, or at least encouraged, by appropriately tying the level of government subsidy or government concessions to (for example) the measurable sustained per-subscriber throughput that a particular deployment is capable of achieving (as opposed to the theoretical peak maximum) and then auditing ongoing performance as take up of services evolve.

Question 6

Is industry consultation necessary on network design for NGN?

Agreement has to be reached between different parties sharing parts of the NGN on the definition of the interfaces and on the SLAs between parties. If regulation mandates openness of the network in different points, these points need to be clearly defined. Industry consultation is an excellent vehicle to achieve this. This however should not stop market players to engage on the basis of other interaction models than what is covered by regulation.

Question 7

i. How does the deployment of NGN change bottleneck characteristics?

NGN merges multiple networks onto one (IP-based) network. It therefore contains much more 'shared capability' than existed in the traditional architecture.

As a consequence of this 'sharing of infrastructure', networks that in the traditional architecture all had to be dimensioned and provisioned to support their peak-traffic requirements, can now share capacity and reduce the overall requirements. This is especially the case where services are very different in behaviour, like for example shifted in time. This simplification of dimensioning of a network is offset by the demands new services will have on these network resources. Some services will be very bursty in nature, others are very asymmetrical. All these aspects demand that a network is carefully designed and dimensioned to achieve the expected outcomes. This is in contradiction to the often heard idea that IP-networks are easy to build.

A few examples may help clarify the complexity of the situation:

- New mobile data capabilities allow users to download at speeds of tens of Mbps. Still all users in one cell need to share the same air-interface. As a consequence, these new services, if not carefully managed, have the possibility to dominate the spectrum usage in a cell, thereby denying service to other users or other services.
- Research is done in the field of using broadband communication networks to monitor elderly persons in their own home, thus offering comparable services to what will be achieved in a managed retirement facility, but with improved economies. This puts very stringent demands on the network in terms of availability.
- Emergency services need to be able to identify a caller or even more important, identify the location from where a call was made. Dynamic allocation of IP-addresses, nomadicity and mobility make this task more complex than before.

ii. Is access to the infrastructure still an issue? If not, what other elements could become important?

The geographical situation in the country still makes access a issue. Very small communities and rural dwellings remain difficult to serve in an economical way. At the same time, it has to be recognized that the country's major industry – farming – is suffering the most from this situation. As no access provider can economically justify such investments, it is only via regulation and government stimuli that ubiquitous access can be achieved.

In addition, we need to look at the aggregation and core networks to ensure that traffic that is offered to the network can also be handled. It is also important to understand customer perception and expectations. Although internet traffic is in theory a 'best effort' service and therefore, no SLA breach can exist in theory, in practice consumer expect more. A similar situation exists in mobile networks: text messaging is defined as a best effort store-and-forward service, but customers expect delivery of their messages instantaneously.

Question 8

Part of the BIF is targeted at deploying open access urban fibre networks and the Government has indicated that it will set aside $1.5 billion for open access FTTH rollout that will reach 75% of the population. What is your understanding about what is meant by open access?

Typically we see open-access refering to the provision of fibre for FTTH connectivity and supplying the home optical interconnect by a local access provider for a specific community. This access provider will then look to attract access seekers to interconnect with the regional or national backhaul network. The issue is that there are no defined technical standards for the configuration of that interconnect. For example how are VLANs configured? Is multiservice supported at all or is it just PPPoE internet/data? How is voice supported and configured? How is the point of interconnect dimensioned? There have been some efforts to develop an industry standard in countries such as Australia (ongoing) United Kingdom and USA,… and others which should be followed closely. These standards will help to define how open access interconnects can be achieved simply and quickly with multiple organizations. In addition they will help to define the interconnect of multiple access technologies such FTTH, VDSL2, FTTB, FTTN etc.

Another issue that is worth considering is the need to specify the physical location of the point of interconnect or whether each FTTH investor can do whatever they like. Practically, the regulator should supervise the discussion and agreement of the point of interconnect as well as a physical location at which the FTTH provider must either locate their box, or provide backhaul for each access seeker back to wherever their OLT is installed. Without this type of standards definition for the access providers to follow they may build out FTTH networks and expect that they can simply take a "build it and they will come" attitude to attracting access seekers and backhaul carriers. This could result in service monopoly and reduced choice for consumers.

Question 9

What are the areas that are not likely to be commercially funded?

If we break up the business case in to three areas Urban, Suburban and rural and then look at each individually it becomes quite clear where investment in faster speed broadband becomes commercially viable.

- Urban: CBD's, commercial, industrial, and residential urban areas where demand is likely to be market driven and there is likely to be a fast service take rate with natural competition and a very positive business case.
- Suburban: This is again likely to be demand driven although the business case is likely to be more risky. However, where new sub divisions are being implemented FTTH is the strongly preferred option.

- Rural: The business case for rural is likely to have to be policy driven as an underserved broadband area it is likely to have higher cost per subscriber, tainting the business case and discouraging investment.

Question 10

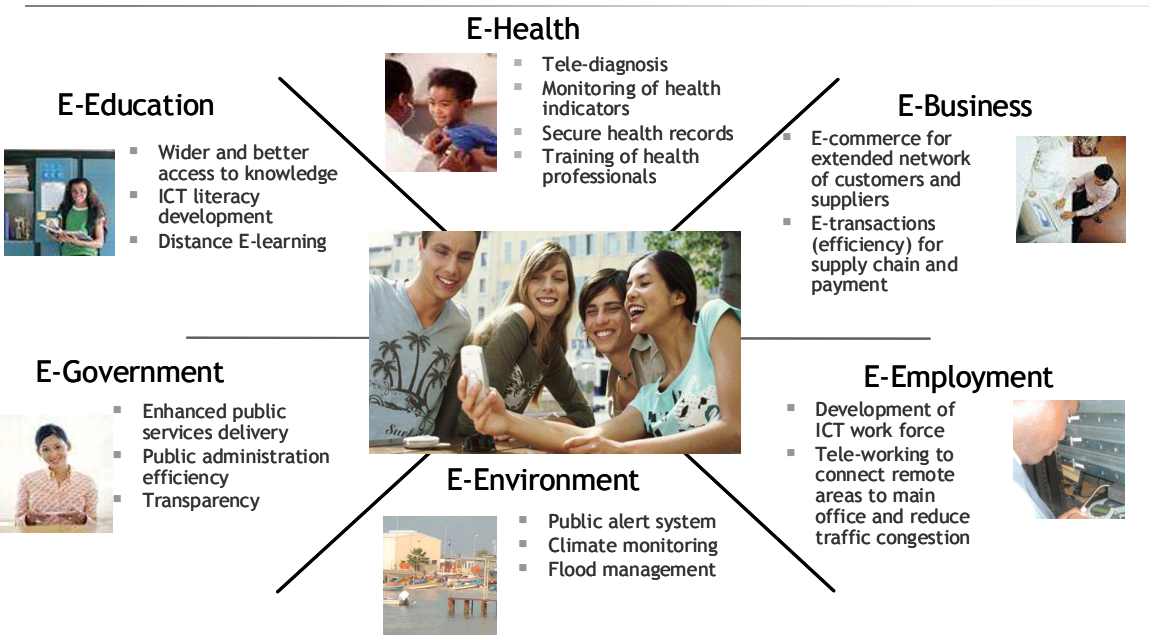
i. What do you believe is needed to drive broadband penetration and speed in the future in New Zealand?

In the realm of consumers there are a number of applications that are driving the need for faster speed broadband, for example music and film downloads, real-time applications like IPTV, and even telephony applications like voice over IP (VoIP). The faster the speed or the better the quality of the broadband connection makes these applications more attractive.

Since the 1980s, we have all experienced just how quickly information technologies evolve and become obsolete. Although 56 kbit/s Internet access was considered to be 'fast' in 1998, it requires 24 Mbit/s speeds to qualify as 'fast' today.

The social, economic and environmental benefits should also been seen as a driver for the penetration of broadband. Key issues facing society today such as combating climate change, increasing demand on the health care system as the population ages, the need to continually improve productivity and international competitiveness of companies and the need for infrastructure to support ongoing skills development and education are all drivers for faster broadband and broadband penetration.

The following figure shows some of the areas in NZ that will significantly underpin our future broadband penetration.



ii. Do you agree that cost savings are one of the core drivers for NGN deployment in New Zealand?

Transformation to an IP-based service delivery model is now considered a forgone conclusion by all kinds of service providers. To stay in the battle in the short term, service providers have responded by adding attractively priced bundles, high quality access, and multimedia content on demand. Key service provider drivers include OPEX and CAPEX optimization, services innovation, and long-term investment protection with seamless migration to all IP.

OPEX Reduction can include:

- Reduced real estate costs with industry leading capacity per footprint density ratio
- Reduced power and cooling requirements
- Operational efficiencies with centralized call servers and distributed media gateways
- Up to 50% backhaul transport cost reductions with optimized localized switching
- Voice transport cost reductions of up to 60% with the utilization of packet and bandwidth compression technologies
- Reducing overall transport costs

CAPEX Reduction includes:

- Highly scalable architecture for deployment flexibility
- Open IT platforms continuously benefiting from industry advances and innovation at large
- Shared network transmission facilities for all services

Question 11

Many are of the view that the pipes should be built first and services will then follow. Others believe that a lack of services and demand for broadband services are an issue. What is your view?

The content and applications sector see the absence of the pipes today as a real business inhibitor while the telco sector sees the risk of building the pipes as high. This is real “catch 22” situation. We have seen from many advanced markets like Korea, Japan, Singapore, Hong Kong, France, UK, Netherlands and many others, that indeed this should be encouraged as a virtuous cycle. Where these countries’ governments have taken an entrepreneurial approach the results have shown that business will innovate to develop applications to fill the pipes.

In all of these countries, broadband service penetration is very high, low cost and under pressure for more bandwidth. We see that as broadband ubiquity improves so does the business model for the content, applications and services businesses. Indeed in the longer term, services generally can be delivered more efficiently when the “old way” of delivering them can be completely removed in favour of delivering them online only. This is starting to happen already with the classified advertising of cars and property shifting to online rather than the old printed newspaper model. Another example is the potential being shown by e-health application and services to reduce cost and improve patient outcomes.

Question 12

Is content ownership or access to content a hindrance to the development of broadband in the New Zealand market?

There are still limiting factors to content access for New Zealand broadband service users: Due to the size of the country, the majority of content is available off-shore. At the same time, due to the country's geographical isolation, access to that content can happen only through a very limited number of fibre routes, which is expensive to deploy maintain and therefore access. This limits off-shore bandwidth availability and by consequence the broadband experience of New Zealand based users. Legislative and/or regulatory measures that favour on-shore content can help to address this issue.

A second issue relates to the long term locking of TV content: at this point in time it limits the possibility for new entrants to create compelling alternative offerings.

Question 13

How is the nature of New Zealand's subscription TV market likely to impact the development and take up of NGN in New Zealand?

The current model has two main TV distribution mechanisms: via terrestrial antennas or via satellite. In addition, there is cable in a few limited areas.

Both antenna-based transmission systems have the same inherent limitation: they are suitable for broadcast only. This can be translated into a number of services, like normal basic broadband, pay-per-view and nVOD, but both do not have the scalability to grow into real on-demand services.

Next generation access (NGA) will bring sufficient bandwidth to a large part of the population (theoretically to all, but this brings us back to the issues discussed under Question 7). Via this NGA, services like IPTV come within reach, including full-fledged on-demand services. This of course requires proper attention to multi service capabilities, open access, and the rest of the network (aggregation and core), as we are suddenly talking about an explosion of traffic demand, especially when moving into HD-TV.

Question 14

Is the service scenario approach seen as a useful one for the purpose of studying the New Zealand NGN market, and if so what would be the elements of practical and relevant scenarios?

Approaching the understanding of how and when services will be delivered by using service scenarios and or applications is a useful way to understand when technology needs to be made available and at what speed. The three service scenarios outlined align with end-user research that Alcatel-Lucent has undertaken. When delivering these scenarios there needs to be and end-to-end view of all the elements to be taken in consideration, below is a view of some of the key elements:

Network: Fixed and Mobile

- Speed
- Capacity
- Coverage
- Interoperability
- Security
- Reliability and availability

Content:

- Type, Sport/Movies/Entertainment
- Digital Rights Management
- Interactivity
- Availability

Device:

- Eco-friendly
- Battery life

The fourth scenario provides a different way of thinking. Rather than rolling out the network based on the application and the application needs, the network is rolled out based on a funding model and the maximum available network capability. Timing is the constant factor that needs to be taken into consideration throughout all of the scenarios, technology today can be redundant or at least seen as legacy within a period as quickly as 12 months. This is the expected way technology evolves and we anticipate this is the way it will continue for the foreseeable future. However, investment should not be delayed because technology continues to evolve; if we don't start we are likely to be left behind.

Question 15

What other implications for the value chain of traditional operators and suppliers can be expected when moving towards an all-IP environment?

Today's networks that are owned by traditional operators and include elements of NGN are moving towards all IP that is allowing over the top players (OTT) easier access to end users. This model obviously takes away the end user from the operator and turns the operator into a bit pipe provider. From the end users perspective the value the operator brings is no longer visible. From the operators perspective investment into theses pipes is considerable and with potential revenues being eroded by the OTT player there may be a lack of impetus to invest in technology that bring no additional return.

Question 16

What other effects on the competitive environment could be expected when rolling out next generation networks?

The question really depends on who owns the network and whether open access rules apply. The low hanging fruit will be in the applications domain, with faster speed broadband being available applications developers will use the available bandwidth and develop suitable applications to leverage the capacity. So this is likely to be the first area where competition delivers significant consumer benefit.

Open access will stimulate competition in applications and online content. However, the lion's share of investment will fall in the domain of the access infrastructure and is a necessary precursor. If access investors cannot be assured of reasonable returns they will not invest. Industry regulation must assure reasonable returns for all investment or the benefit of NGN will be delayed.

Question 18

To what extent is symmetric speed or capacity necessary to provide future services to customers?

Asymmetric service was introduced in mobile and in fixed networks after extensive market research, which showed that consumers were more inclined to 'consume' information (downlink oriented) than to 'create' information (uplink oriented). As a result, symmetric services remain in the first place important for business users.
However, as users start generating more content themselves and as peer-to-peer traffic keeps growing, also on consumer side, there is a growing interest in increased uplink speeds.

Practically, the more important question is 'what is the degree of symmetry required both now and into the future'?

At this point, we do not foresee a need for truly symmetric access in the consumer marketplace – consumers will likely continue to require a high proportion of uni-directional traffic such as high definition video, streaming services and the largely uni-directional Internet access service. Symmetric consumer services will focus on communicative applications, but for the foreseeable future, the volume of traffic in communicative sessions is expected to be dwarfed by (for example) the volume of traffic consumed by a few real time high definition video streams.

It would be naïve to completely overlook the possibility of new applications emerging in the future. It would also be naïve to forget that businesses are increasingly being scattered throughout the community as more people choose to work from or operate small businesses from home. The access network therefore needs to be designed to support business services as well as purely consumer services and it is clear that attention must be directed to assuring the next generation network can deliver much higher levels of upstream traffic than are commonly available today.

Question 19

What are the most important and significant drivers of bandwidth demand?

The main bandwidth drivers today are video services. A few distinctions need to be made here: For services that are delivered to a PC, the bandwidth requirements still remain quite reasonable. Often the quality of the video is limited and by reducing the screen-size, the demand is not beyond what is today already available in the network.

When talking about video services that are delivered to a TV, a distinction needs to be made on service type: Broadcast services require limited capacity in the aggregation and core layers of the network, as they are distributed once to the access-node (DSLAM or GPON-LT) and from there sent on the access to each individual consumer.

On-demand services however need to be sent individually from the video distribution point to the end-user, requiring considerably more capacity in the aggregation and core layers of the network.

A second aspect needs to be taken into account: households move more and more in the direction of having multiple devices that consume bandwidth (multiple PCs, TVs, music systems, Voice Applications). Where each of these applications and devices can work very well on today's offered bandwidth, it is the fact that several of them

compete for simultaneous access that increases the demand for bandwidth in the NGA network, especially where multiple devices require a high QoS.

Question 20

Is a differentiation of classes of services an appropriate approach for solving QoS degradation for end-to-end services?

QoS differentiation is an important tool to avoid service degradation. However, it is not the only one. Design for reliability and resilience and availability are all also important parameters. The network has to be designed to have the availability required to achieve service requirements and has to be dimensioned to allow traffic to pass.

At the same time, Service providers can use QoS as a sales tool and as a differentiator with competition or between different service packages they are putting in the market.

Question 21

What issues and effects could possibly arise due to a differentiation of services classes?

On heavily loaded links, a situation could arise whereby best effort traffic (i.e. traffic with the lowest QoS) is (almost) not handled anymore. This may lead to a situation whereby the user experience becomes unacceptably low. The is particularly and issue when part of a network are experience faults, it can also be an issue in times of national emergency when traffic levels are high.

Another issue that may come up is contention between equally high QoS demanding services. All these issues can be addressed by proper network planning and design. However, due to the statistical behaviour of IP traffic and the bursty and/or asymmetrical nature of some traffic types, exact dimensioning as in a PSTN environment remains a challange.

Question 22

Will the approaches to pricing change for NGN, particularly where different classes of service are offered?

Evolving to a next-generation network can be formidable. Financial pressures of the converged world have many executives considering new business models. These new business models are being driven by market requirements and end-user demand for services.

Market research shows end users are willing to pay a premium for personalized or optimized context aware services (e.g., work, home, travelling) which can be delivered in an NGN environment. They are also willing to pay for services that allow them to blend capabilities or features that enhance their lifestyles and productivity again enabled by NGN.

Question 23

Beyond the costs for NGN core, access, CPE and drop lead, are there additional costing elements to be taken into account? If so, what is their likely impact?

Two important cost elements need to be taken into account: Migration to a NGN network has to imply a business transformation all the way from the top (product offerings) via the IT systems in OSS and BSS down to the network layers. As discussed in question 3, IT systems typically have higher Opex component than network elements.

The second aspect is the cost of migration itself, mainly the cost of the field force to perform the actual migration. Also customer interaction costs (advising customers of a change in service, helpdesk, fault management) are very considerable. The practical nature and cost of migration and operations could to be anticipated higher than theoretical estimations.

Question 25

What is your view on the benefits and constraints of PON (Passive Optical Network) and P2P (Point to Point)?

Technology improvements are continuing to achieve higher split ratios over longer fibre distances and such improvements are expected to continue for the foreseeable future. Thus in almost all practical configurations in urbanised and metropolitan deployments, the PON architecture is able to achieve greater cost and environmental efficiencies than the P2P fibre architecture. Specific examples however can be raised to demonstrate the case in favour of one approach or the other.

Some New Zealanders are located in highly remote regions and situations will arise where the longer reach of the P2P architecture will be preferred. There will be an inevitable trade off between choosing to deploy a special technology solution for these cases (and bear the cost of the workforce to manage it and the cost of spares and maintenance) versus deploying the mass-market technology solution knowing that it is sub-optimal in a small number of cases (but which avoids the need for additional training, management and maintenance).

Having said this, Alcatel-Lucent strongly urges policy makers to leave decisions about specific technology choice to the investors and operators of next generation networks. It is of far greater importance for policy makers to focus upon defining

(i) minimum capabilities and performance requirements for next generation infrastructure,
(ii) reliability and resilience requirements,
(iii) environmental targets for both the network infrastructure and (even more importantly) the consumer premises equipment.

Policy makers have a critical role to implement and oversee the deployment of well defined Point Of Interconnection (POI) to facilitate open access. These requirements should be chosen with the understanding that access technologies will continue to evolve at a rapid pace and the Open Access regime will likely outlive the technology it will be built upon.

We believe it is within New Zealand’s best interests to strive to develop technical requirements for the open access regime in a technology-neutral and uniform manner. The objective should be to target delivery of next generation services to all New Zealand consumers in all locations. By assuring a uniform technical implementation at all Points of Interconnection, access seekers will not encounter avoidable disincentives to limit their service coverage because of (for example) technical incompatibility with particular POI implementations. Thus from an access seeker

perspective, the particular variety of access technology for any one consumer should be irrelevant providing policy makers have assured appropriate and uniform capability requirements.

Question 29

What are the implications for these issues in New Zealand? Are there specific regulatory issues anticipated?

The issues identified are key to the success of NGN deployment in most countries. Through our experiences additional issues can arise with regards to operational management and business support systems. As multiple systems and agencies become involved in a single goal an over seeing body which will define and manage the use of design and engineering standards will be critical. This will help to ensure that an NGN continues to be deployed in a highly available and manageable manner by following a set of standards that do not limit the ability of participating organization to be competitive and offer new services.

The emergence and ongoing development of multi-service technologies indicate a trend towards consolidation of access / carriage options. This will inevitably impinge upon local competition and industry policies (and likewise will itself be constrained by the same). Importantly, even in the presence of vigorous competition, the trend towards multi-service and bundled services highlights the increasing dependence that any one particular consumer will have upon their chosen and specific infrastructure provider. Appropriate performance standards should be established and audited to assure that New Zealand consumers can remain confident that infrastructure will remain robust and reliable, even in times of national emergency.

In markets where more than a single infrastructure player emerges, particularly where the access or carriage industry segment is separated from the application or content segment, the issue of technical standards and technical uniformity at points of interconnect becomes far more critical than it is has traditionally been. Government has an important role to play in setting and maintaining appropriate standards for interconnect, including both the technical capabilities of the interfaces as well as managing their physical location and the terms and conditions associated with interconnection and collocation.