TelstraClear Limited

Submission relating to

Next Generation Networks study

30 September 2008

PUBLIC VERSION

Introduction

1. TelstraClear welcomes the opportunity to comment on the Commission's Next Generation Network study. Next Generation Networks will deliver a range of services from private IP traffic to internet, voice and video conferencing. The diversity of services the next generation networks can deliver will add to the complexity of the technical and commercial environment.

2. The challenges of migrating to an all IP environment are being considered around the world, not only in respect of interworking between networks, but also ensuring that the regulation settings appropriately reflect competition requirements in a NGN environment.

3. TelstraClear considers that technical interoperability and standards in an all IP environment are best dealt initially through the Telecommunications Carriers' Forum. Where TCF members are unable to reach agreement on technical matters, the Commission will have a key role.

4. Existing regulation under the Telecommunications Act 2001 is also likely to require revision to reflect migration from PSTN networks to IP networks.

5. This submission provides:

    a. information to the Commission on TelstraClear's network, and
    b. responses to specific questions raised by the Commission relating to services, architecture, transition and the NGN environment.

6. This submission is public. Confidential information, identified in square brackets **[ ],** has been removed.

TelstraClear's network

7. This section describes TelstraClear's existing core and access networks architecture.

TelstraClear's core network

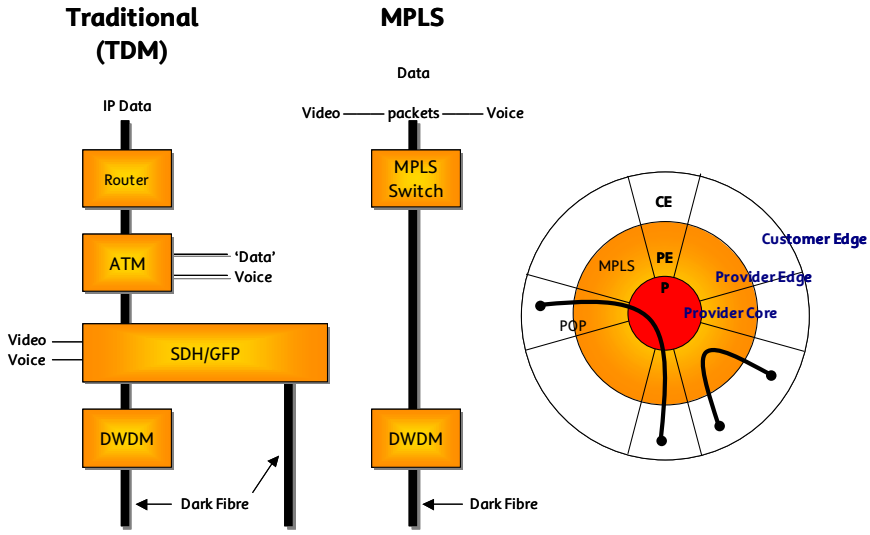
8. TelstraClear's network is an all-IP core, with significant capacity running up and down the country, providing network diversity across its core. The TelstraClear IP core network is a packet based network [ ], and is capable of providing quality of service to multiple applications.

9. The TelstraClear DWDM Optic Network reaches [ ], can provide fixed bandwidth and layered IP services, and will be [ ]. TelstraClear expect the network to have [capability within five years.

10. The guiding principle of IP core, the "fast and dumb" network:

> The Internet's original design is based on what is known as the "end-to-end argument" where the intelligence and processing power of a network reside at the outer edges while the inner network itself remains as simple as possible. The model proposed is a way to maximise the efficiency and minimise the cost of the network. The end-to-end argument explaining the relationship between the network and its end points has arguably been one of the key elements of the internet's success.[1]

11. Traditional networks, based on Time Division Multiplexing (TDM) can be contrasted with Internet Protocol (IP) / Multi-protocol Label Switching (MPLS) networks as follows:



[1] OECD, *Internet Address Space: Economic Considerations in the Management of Ipv4 and in the Deployment of Ipv6*.

12. Under the MPLS model:
    - Transport network provides point-to-point layer 2 links;
    - MPLS network provides packet transport
    - Psuedo-wires (ELAN/ELINE) provide intermediate, shared, connection oriented services on MPLS.

13. TelstraClear's core fibre network stretches from Whangarei to Invercargill, as end-to-end optical. All core traffic is on diverse rings, with [ ] diverse paths offering maximum service availability.

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TelstraClear's Access Network

14. TelstraClear uses a range of access technologies to deliver services to our customers. This includes fibre to the premises (FTTP), fibre to the curb (FTTC) copper loops, hybrid fibre co-ax (HFC), wireless local loops, wholesale access service purchased from Telecom, and in the future, use of Telecom's unbundled copper local loops (UCLL).

Hybrid Fibre Co-ax (HFC) network

15. TelstraClear has deployed HFC in Wellington, Kapiti and Christchurch to deliver triple play (broadband, television and voice) to residential customers. This provides downstream speeds up to 25Mbps. Further upgrade capabilities using DOCSIS 3.0 will provide downstream speeds up to 100 Mbps.

Onnet Fibre to the premises and copper loops

16. TelstraClear has deployed fibre to the premises in CBD reached by TelstraClear's core network, [ ] TelstraClear also offers [

].

17. Diagrammatically, TelstraClear's onnet access technologies are:

[

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Offnet services

18. In those areas where TelstraClear does not have its own access network, TelstraClear purchases wholesale access services, including bitstream and residential and business resale, to access customers.

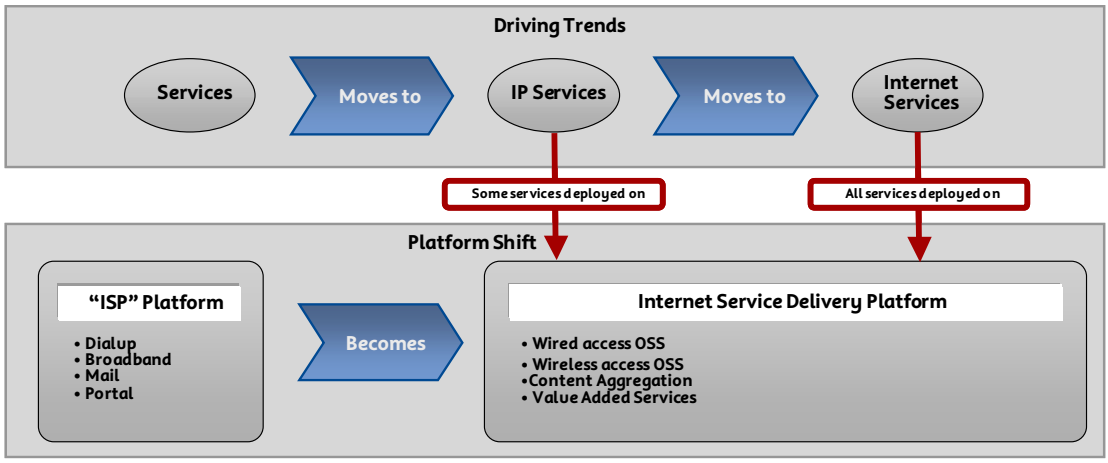
19. TelstraClear will also use unbundled copper local loops (UCLL), with TelstraClear DSLAMs co-located in Telecom's exchanges, which will allow TelstraClear to further differentiate services to customers not currently within reach of TelstraClear own access networks.

Moving to an all IP environment

20. The future is likely to be a converged network, with all services sharing the infrastructure. This includes voice, music, video, telemetry, interactive games, data, the web, and many new technologies as yet unconsidered.

21. In the future, all services are likely to move to IP. Many services are likely to also move to the internet. The concept of a pure Internet Service Provider (ISP) is outdated. ISPs are likely to morph into generic internet services platform for all internet based TelstraClear services.

22. This can be diagrammatically shown as:



Regulatory Impact of movement to NGN networks

23. In its submission on the draft Operational Separation undertakings, TelstraClear identified that the current regulatory settings would be likely to require changes.

24. With the emergence of NGNs, incumbents are investing in fibre to the node (FTTN) and fibre to the premises (FTTP) infrastructure which will deliver far greater capacity and speed to the broadband user.

25. TelstraClear agrees with Ofcom's views in its recent consultation paper on Next Generation Access Networks (NGAs) that regulatory policy settings should facilitate and encourage deployment of NGAs[2]:

> Ofcom considers that, in advance of deployments, the right regulatory regime needs to be in place to ensure that the incentives for investment are not distorted by regulation such that next generation access network deployments are not made, or made inefficiently late. As discussed, the timing of investments is not the only consideration - the regulatory environment should also seek, as far as possible, to encourage an efficient technology selection and reach for next generation access networks.

26. However, at the same time, it is also important to recognize how the deployment of fibre-based NGAs will also transform current access models. While access seekers could previously install equipment at the exchange and then obtain access to the copper, when the incumbent deploys an FTTN, access seekers can only continue to use copper access if they install their own equipment in cabinets and use sub-loops.

27. This requires additional backhaul cost and is more economically challenging due to the smaller number of lines addressed by a cabinet. In effect, the "last mile access" provided by LLU in today's environment becomes "last 100 yards" access in an NGN world.

28. While sub-loop access is a regulated service in New Zealand, the commercial viability of installing equipment in most of Telecom's cabinets, even in many of the areas where full LLU would be economically feasible, is challenging.

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[2] Ofcom, *Future Broadband: Policy approach to next generation access*, Consultation, 26 September 2007. paragraph 5.4 (Ofcom NGA Paper).

29. Even in the much larger UK market, Ofcom has recognized that the use of sub-loop unbundling is likely to be limited[3]:

> Compared to LLU, the economic viability of this option is more uncertain given the greater number of locations that competitors would need to 'unbundle' – up to 88,000 cabinets as opposed to 5,500 exchanges. There are also a range of practical difficulties arising from sub-loop unbundling, including space in cabinets to locate active electronics and availability of power at cabinets.

30. Telecom has announced its FTTN programme, with a three-year rolling forecast of cabinetisation, with the first two years of each forecast binding. Telecom's FTTN deployment is designed for ADSL2+, where longer average loop lengths are feasible. As Chorus notes "customers within about 2km of these new cabinets should be able to connect at the faster ADSL2+ speeds subject to factors such as their broadband plan, home or business wiring, and their modem type".[4] A significant proportion of copper loops will continue to service end-users fed directly from Telecom's exchanges.

31. As discussed above, TelstraClear will use UCLL to deliver new and differentiated services to those customers who continue to be serviced from the exchange. For those customers who are provided service from cabinets, the current regulation provides two access mechanisms to deliver end-user services; namely sub loop unbundling and bitstream access.

32. While unbundling of local loops in New Zealand remains economically feasible in some areas by virtue of the loop length following FTTN and the significant number of customers that can continue to be serviced from the local exchange, it is likely that copper loops will continue to become shorter and ultimately be replaced by end-to-end fibre services, thereby meaning that local and sub loop unbundling will no longer be feasible or economic in the longer term.

33. If the use of unbundled local loops and sub loops is not economically feasible in many areas, access seekers, and regulators, will need to fall back to connectivity-based access services. Ofcom has described this as a shift from reliance on access to "passive elements" (i.e. LLU) to access to "active elements" (i.e. bitstream) as the cornerstone of the regulated access regime:[5]

> Passive access refers to wholesale products based on direct access to physical elements of the access network, but does not include any form of electronics. Examples include access to ducts, unbundled copper loops or dark fibre. These assets continue to be owned by the access network owner, but are rented by competitors. Active access refers to wholesale input products that are based on both the active electronics and the physical elements of the access owner's network. Examples include today's IPStream product offered by BT, which uses both BT's copper local loop and its electronics (DSLAMs) to provide a wholesale broadband service to competitors.

34. NGN active access services will differ fundamentally from current active access services provided over legacy networks. As the legacy networks were tightly vertically integrated, access services continued to more or less exhibit features of the downstream retail service. As Ofcom recognized in its NGA paper, the "innovation gap" between access to passive elements and access to active

[3] Ofcom NGA Paper, paragraph 6.4.
[4] http://www.chorus.co.nz/enhancing-the-broadband-network
[5] Ofcom NGA Paper, paragraph 6.4.

elements will close in an NGA environment, provided the bitstream service is properly configured[6]:

> our initial work indicates that the net benefit of passive input based competition over the active alternative may reduce under next generation access. This is partly because the relative static costs of passive based competition may be higher than today, and partly because the relative benefits in terms of scope for innovation it offers over active competition may be lower as the prospects for innovation from competition based on active inputs improves.

35. The critical requirement of access seekers, and of the overall competitiveness of the market, is the ability to access a product which is "raw" enough that it can be shaped by the access seeker into its own downstream service:

36. Access seekers need to be able to control their own quality of service (QoS) in order to have sufficient flexibility in product development and service delivery to be able to drive innovation and deliver differentiated products.

37. This flexibility is critical to the overall competitiveness of the market – if access seekers do not have the ability to control their own QoS, they cannot compete in a meaningful way, and the retail market effectively becomes a "market of one" (i.e. all service offerings are limited to, and will reflect the characteristics of, the offerings of the incumbent).

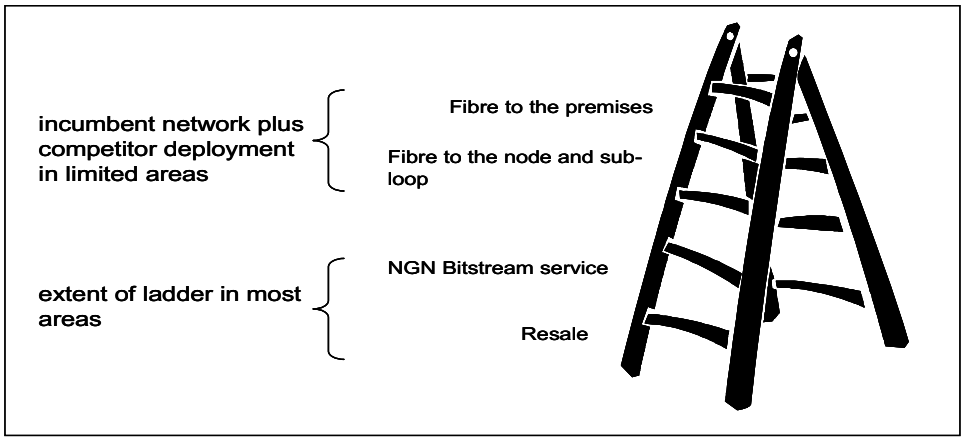
Fresh regulatory approaches required in the NGN world over the longer term

38. Recognising that the raw bitstream service is likely to be a key service of the future, a different regulatory approach is needed to verify equivalence for access seekers.

Question D4: Do you have a view on whether or how the "Ladder of Investment" model could operate in an NGN environment?

39. There has previously been a general assumption that bitstream is at a lower level on the "investment ladder" and LLU was higher because LLU required more investment in infrastructure and brought the access seeker's network closer to the customer premises. However, illustrated in an NGN world, bitstream may in fact be the top level that is realistically attainable – access seekers may never reach the LLU level, since it is simply not commercially viable when there is significant FTTN investment.

[6] Ofcom NGA Paper, paragraph 6.22.



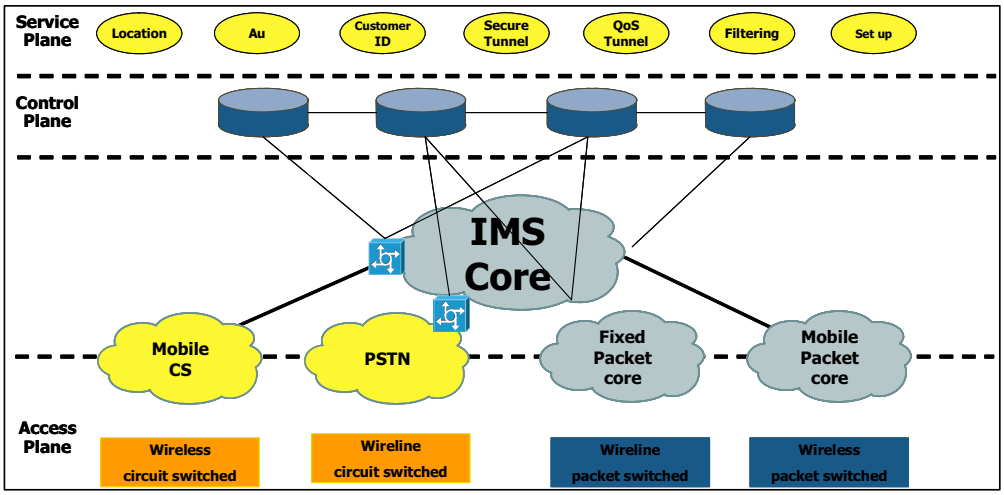
40. Operational separation models like the UK are premised on the historically accepted but increasingly outdated twin assumptions that services were tied to networks (e.g. PSTN provided over copper) and the copper access network itself was relatively stable and unchanging. NGN services can be provided seamlessly over a wide range of networks, including copper, FTTN, FTTP and wireless. Beneath the services layer, the physical network is likely to be in a state of flux for some time, and not only because of cabinetisation:

- greenfields estates will be wired using fibre to the home, as copper lines are damaged or wear out, it will often be cheaper to replace using a FTTP solution rather than new copper; and
- wireless may be more economical for the incumbent in some areas rather than upgrading the copper with fibre.

41. Second, the NGN environment can simplify the required regulatory model, since it provides technological solutions for many of the problems which drive the complex operational separation regulatory models (including the UK operational separation model).

42. In the legacy environment, regulators were required to unbundle retail services into elements which did not necessarily have an equivalent within the incumbent's own network or internal supply chain. This required interfaces and access points for which there were no externally defined objective criteria. As concerns mounted about equivalence, operational separation models then were used to retrofit the incumbent's organisation to match these unbundled products, thereby creating notional internal supply handover points at which comparable supply can be measured (hence ANS is created to supply LLU).

43. By contrast, the NGN network architecture is inherently more unbundled, layered and open. As figure 2 illustrates, the network and service planes are independently defined and, importantly for access seekers, the interfaces between the planes use open, externally defined standards.



44. Many of the problems for which operational separation is meant to solve in a legacy environment will not arise if access is provided to a raw bitstream service at open interfaces which give access seekers the same level of control over QoS, functionality and speed as the incumbent's downstream units connecting at the same interfaces. Take for example product development.

45. Much of the UK operational separation model is directed at turning product development into a neutral process run by Openreach and BT Wholesale, including non-discriminatory development of new products and restrictions on availability within BT Retail of any advance information about new features and functions. This reflects the vertical configuration in the legacy services discussed. However, if the bitstream product gives the access seeker equivalent scope to shape downstream services, there is much less need to quarantine and control product development.

Current bitstream services does not provide raw access

46. The basic UBA (BUBA) service is a best efforts service, which is unrate-shaped, which allows the access seeker to determine speeds within its own network. However, the access seeker has no ability to set quality of services on an end-to-end basis.

47. The Enhanced UBA service (EUBA) is enhanced to the extent that it offers pre-set defined quality of service, through the 45, 90 and 180 kbps variants. However, the EUBA service description presets the channel capacity and service quality, with the result that:

- access seekers are only able to differentiate up to the level permitted by Telecom Wholesale in the preset options which could well be limited to the regulated service elements incorporated in Telecom's retail offering (i.e. it represents a "Telecom view of the world" as to the required service offerings); and

- while the QoS incorporated in the Enhanced Bitstream is capable of supporting services such as VoIP, the Enhanced Bitstream service provides little opportunity for access seekers to develop their own differentiated products outside of the preset parameters (e.g. in relation to multimedia video services).

48. The operational separation undertakings require that Telecom undertake NGN consultation to address longer term NGN issues within the industry. Telecom has commenced its "Dialogue" consultation that will enable further discussion around the industry requirements and issues.

49. TelstraClear supports this initiative, and to the extent that the industry is able to address such NGN challenges as identified above, this will impact the regulatory backstop required in an NGN environment.

Responses to specific questions raised in the Commission's paper

Question A1: What are your views on the appropriateness or otherwise of retaining the existing commercial models (e.g. PSTN interconnect) in the NGN environment?

50. PSTN interconnection is technically well understood. Historic disputes have related to the pricing of interconnection services. Schedule 1 of the Telecommunications Act currently provides for the regulation of price and non-price terms for:

- interconnection with Telecom's fixed PSTN; and
- interconnection with fixed PSTN other than Telecom's.

51. The description of service for interconnection with Telecom's fixed PSTN is:

> Origination and termination (and their associated functions) of voice and data calls (including dial-up internet calls) on Telecom's fixed PSTN.

52. Similarly, the description of service for Interconnection with fixed PSTN other than Telecom's is:

> Origination and termination (and their associated functions) of voice and data calls (including dial-up internet calls) on a fixed PSTN other than Telecom's.

53. The Commission has determined a number of interconnection disputes, which notably have focussed on the price rather than technical interoperability issues.

54. The current interconnection definitions and pricing principles are framed in the context of PSTN networks, and will therefore require amendment through a Schedule 3 review in the IP interconnection environment. However, TelstraClear considers that it is appropriate for the TCF IP interconnection processes to be finalised prior to its commencement.

55. As the IP interconnection workstream is at an early stage, it remains unclear whether specific matters will arise that the working party is unable to resolve, or matters that would be inappropriate for the working party to deal with.

56. TelstraClear recommends that the Commission continue to monitor the progress of the TCF IP interconnection working party. Once such issues become clear, the Commission should intervene. Otherwise, there is a risk that early Commission intervention would reduce the likelihood of practical commercial resolution.

Question B4: Do you envisage any issues in NGN interconnect or in relation to current peering arrangements?

57. The TCF IP Interconnect working party has been established to develop an IP Interconnection code of practice and to facilitate the consultation process between Telecom and Service Providers in regard to the approach of IP interconnection services. Where the industry is able to agree a workable solution to IP interconnection, this is to be preferred to an imposed regulated outcome.

Question B7: Do you envisage any issues around agreement on appropriate parameters and values relating to the Quality of Service in the NGN environment?

58. As discussed above, with the development of NGN access, and the development of fibre closer to customer premises, it is possible that future dependence will increase on layer 2 bitstream services. The existing standard terms determinations for bitstream have defined quality of service parameters that may not provide sufficient flexibility of access seekers to differentiate the services they offer in the future.

Question C1: Can you comment on the need or timing to migrate from IPv4 to IPv6 and any role you see for government in this transition?

59. TelstraClear's view is that emphasis is required for the industry to be capable of transitioning from IPv4 to IPv6. TelstraClear currently considers that a transition to IPv6 is likely to be required by 2011. During the transition period, there will be a need for carriers to be able to interconnect from one version to another.

60. TelstraClear considers that the transition to IPv6 is best deal with as an industry-wide issue overseen by the TCF.

Question C2: Can you comment on the need for revisions to numbering plans for new services, and the need or otherwise for non-geographic codes recognising increasing user nomadicity?

61. TelstraClear considers that the Commission should look to international jurisdictions for guidance on numbering issues facing transition to an NGN environment.

62. The NGN environment will be required to support non-geographic numbers and to be able to differentiate non-geographic services. Non-geographic number codes will be required. 0508 and 0800 services are likely to require IP address prefixes to enable intelligent routing to ensure calls are linked to the correct terminating number. Other issues that will require further study are support for lawful interception and the complexities around number portability.

63. The existing designated multi-network services under Schedule 1 of the Telecommunications Act are likely to require revision, as the distinction between portability of "fixed" and "mobile" numbers becomes increasingly blurred in an IP environment.

Question C4: Do you have a view on emergency service, mains powering and location information in an NGN environment?

64. The TCF Emergency Services Working Party is developing an industry code of practice in relation to standards for calls to emergency services to agreed handover points to assist in providing the general public with the reassurance of a responsible industry approach to emergency services. This working party is considering the impact on services delivered over NGN access particularly access to emergency services and the provision of location information.

65. PSTN service has historically been maintained at a customers premises even where a power outage occurs at the customer premises, due to PSTN services being powered from the local exchange. PSTN exchanges generally have alternative backup power sources (including generators and battery backup),

meaning that short duration power cuts do not impact PSTN service. In contrast, NGN access services require power supply at the customer premises as well.

66. However, for many PSTN customers, the failure of a voice service as a result of a power cut at the customer premises, exists today. Many existing PSTN customers use DECT cordless phones, which rely on mains power to operate.

67. Maintaining an auxiliary power source at customer premises to reduce the impact of power cuts is likely to be expensive. It is unclear that the benefit of mandating auxiliary power source for all NGN connections would justify the significant costs involved, particularly as many customers have alternative access using mobile phones during a local phone outage.

68. TelstraClear considers that consumer education will be essential, to ensure that customers understand that new NGN devices will not operate without a local power source. Consumers can then make independent and informed choices as to whether auxiliary power is required. Consumer decisions may be determined by access to alternative communications in the event of a local power failure (e.g. cellular phones); and any medical dependence for a guaranteed access service.

Question D3: Do you have a view of the role of the regulator and other industry bodies (e.g. TCF) in the evolving NGN environment?

69. The transition to an NGN environment is an issue that is being dealt with around the world, and the issues and challenges faced in New Zealand are not unique. As part of the operational separation undertaking, Telecom is required to consult on NGN transition. At the request of Telecom, the TCF is taking a central role in this process.

70. TelstraClear is very supportive of the TCFs role in these issues. To the extent that the TCF is able to identify the key issues and develop a practical and workable solution, with Commission oversight, that is likely to be the preferred option.