

Submission to ACCC

**Market Study into
Competition in evolving
communications**

**Submission by
Communications Experts Group Pty Ltd**



INTRODUCTION

This submission has been prepared by Communications Experts Group Pty Ltd who are Telecommunications consultants and who have provided engineering and consultation services to a number of West Australian organisations and persons. They also have a knowledge of the Telecommunications industry in Western Australia.

The case studies cited in the submission are drawn from research and experiences overseas and in Western Australia.

Dr Green was a Director of ATUG and has been a member of a number of committees providing Telecommunications Policy advice to the WA State Government and Federal Senate.

Dr. Green receives a number of enquiries and requests for advice on telecommunication services from a wide range of persons and is familiar with the telecommunication issues affecting Western Australian organisations and the community.

Dr Green and CEG have been responsible for the design of fibre services since 1989 and have substantial experience in the design and operation of other network technologies such as copper cable, coaxial cable and wireless networks.

The information given in this document is based on events that have occurred in Western Australia.

Response to Selected Questions.

Q 1. Changing Consumer Preferences and Impact on Communications

The increase in demand for streaming services such as voice, video-conferencing and entertainment on fixed line networks is being restricted by lack of suitable network characteristics. The superior quality of mobile voice connections is partially driving some consumers to use mobiles for voice services in place of fixed line connections.

The current Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) are optimised for web and email traffic i.e. short periods of high bandwidth with high tolerance to packet losses or data errors.

Both IPv4 and IPv6 are not suitable for streaming services because they require continuous (long duration) transmission at low data rates with little or no tolerance to packet losses or data errors.

The assumption that the adoption of advanced data and video compression will offer significant improvement is very unlikely to occur due to the upper limit on the amount of information that can be transmitted on a Data Channel. The upper limits are defined mathematically in Shannon's Law.

Most of the video and voice compression methods are already efficient and there is little scope for significant improvements. Attempts to use high levels of compression have been proven to be counter-productive because of the impact of errors that occur in all communication channels. This was proven when the G.723 voice compression method failed to supersede the less efficient but more robust G.729A voice compression method.

A second issue that is also not widely known is the "error amplification" effect of the Internet Protocol (or any other packet sharing protocol) where a single bit of error can result in 10,000 bits being discarded. This was clearly demonstrated in the failed European IPTV experiments where significant areas of the video (5 - 10% of the total image area) appeared as "blotches" or distortions every 5 to 20 seconds. (Users could only watch these TV channels for 20 minutes before having to take a break due to eye stress).

Shannon's Law also clearly explains why packet or Internet Protocols are unsuitable for streaming services such as video, voice or video-conferencing services. Attempts to develop a suitable internet streaming protocol (IPv5) were blocked by the USA Baby Bells because the widespread use of IPv5 would have caused them to lose billions of dollars in profits and incur large write downs in assets.

Summary

The current Internet Protocols are unsuitable for voice and video-conferencing, and one way video channels incur significant time delays (i.e. not suitable for medical or high risk applications).

The only way to get good quality TV distribution over fibre is to use separate channels using the Digital TV protocol.

The bit rates for streaming services are currently significantly under-estimated.

The above limitations are contributing to factors persuading consumers to use mobiles instead of fixed line services.

Q 3. Responding to Consumer Needs with Next Generation Network

The current backhaul network is far too small to service Australia data requirements.

The offered traffic from the NBN is 1,300 Tbits/sec with a potential to deliver 100Mbits/sec to each building. However the backhaul network does not have the capacity to satisfy the "Busy Hour" traffic created by the NBN. The Australian backhaul network will have to be substantially upgraded to cater for this demand.

For cost reasons, many Carrier Networks are not being built to deliver reliable services. The most common failure is to build star shaped networks with many single points of failure, instead of "ring" structures, that allow a diversity of paths and a small number of single points of failure. Ring networks can also withstand larger data surges or peaks that would disrupt a star network.

The current policy of making the RSPs pay the Customer Service Guarantee is encouraging the development of star networks.

The policy should be changed so that the infrastructure provider is required to pay a significant portion of the customer guarantee.

The lack of features and NBN Node Access Fees are also inhibiting the development and implementation of reliable network architectures.

Q 4. Beneficial Information for Consumers

Background

The complexity of evaluating telecom services using shared infrastructure is a difficult issue, both from a measurement perspective and mathematical analysis. A hundred years ago, this problem was resolved by adopting the concept of a "Busy Hour" or "Busy Period" which is the period where the demand is at the highest level. The use of the "peak" traffic or demand is useless because the "peak" will always be maximum capacity of the link or infrastructure.

One of the reasons the early regulators chose to use the "Busy Hour" concept was because of the un-acceptable marketing and service delivery tactics used by the early telephone and telex companies.

Information about traffic levels and congestion points are critical for the safe and reliable operation of a telecom network. This information should be made available in a standardised format to consumers.

Carriers and Service Providers should be required to specify the performance or quality of services during the "busy hour" instead of quoting the misleading figure of the maximum values of equipment that can be measured in a laboratory e.g. for ADSL 24 Mbit/sec download and 2 Mbit/sec is advertised, but in practice the busy hour performance is less than 5 Mbit/sec download and 0.8 Mbit/sec upload.

A second useful parameter is the highest degree of aggregation that occurs in the network they are using.

For services using the Internet protocol, an important measurement that is a good proxy for detailed statistical analysis is the aggregation ratio or the ratio of the offered traffic to the maximum capacity of the link or infrastructure. Experience has shown that when the aggregation ration is more than 10:1 consumers start to complain. In some regional centres the aggregation is as high as 25:1

because of the high cost of backhaul charges. It also explains why regional carriers are blocking Bit Torrent download services.

A major contributor to the congestion and slow internet speeds observed in Australia is due to the insufficient capacity in the backhaul network.

Recommendation

That RSPs, Carriers and Mobile operators be mandated to publish "Busy Hour" performance figures and that optimum or maximum performance figures should be banned.

Q 6. New Consumer Information Requirements

Businesses and some Residential Customers that need higher data transmission requirements are aware that they need a reliable service. However no information is made available to consumers to enable them to make informed choices.

For example, two RSPs can offer services with similar prices and data rates, however aggregation, packet loss and the number of single points of failure details will enable them to select the RSP that better suits their needs.

Q 13. Data Traffic Management Issues

Regional carriers are blocking Bit Torrent download services due congestion and high aggregation ratios on their backhaul links.

The lack of bit torrent services is often a cause of friction between consumers and regional RSP's, even though the "Busy Hour" download speed is as high as 10Mbit/sec.

Q 14 and 16. Traffic Prioritisation

Traffic Prioritisation is very difficult with the IPv4 and IPv6 protocols due to the traffic patterns generated by web and email applications. e.g. a small government department had a similar pattern to the total government traffic.

There are two instances where the traffic prioritisation claims of a large switch manufacturer were proven to be misleading.

Q 19 and 20. IoT and M2M Developments

The current claims and estimates about IoT are substantially misleading for the following reasons;

- a) In many cases the volume of data from IoT devices is based on the user component only and excludes the additional traffic needed to manage IoT devices. The management overhead is expected to be a 1000 to 10,000 times the user data component. The additional cost of expanding the backhaul network to cater for this demand will be too high for many consumers.
- b) IoT Security issues are still a major concern and will add a significant level of complexity to any IoT network. Other concerns relate to the power consumption requirements for an IoT device with estimates of 5 to 20 watts to operate a firewall and other security services. Current passive IoT devices will not be able meet basic security requirements.

The above deficiencies in IoT claims are unlikely to be solved, and alternative methods to achieve

the same goals of M2M [and the IoT subset of requirements for] connectivity are currently under consideration. All of them substantially reduce the backhaul and power requirements as well as providing adequate security from internet attacks. The data demand for M2M services is likely to be larger than the more efficient IoT devices data requirements.

The major impediment for implementing M2M applications is lack of a standardised protocol and proprietary solutions are currently being used.

Q 54. Factors limiting further substitution between mobile and fixed-lines

Most of the improvement in the performance of 4G and 5G mobile networks is based on the simultaneous use of multiple base stations. The Busy Hour marginal improvement in 4G services is due to the small increase the number of base stations that have been introduced. There are areas where 3G subscribers have a better performance than 4G subscribers.

It is estimated that for 4G to reach its full potential that the number of 4G base stations will need to double, and that for 5G networks, the number of base stations will have to quadruple.

A review of nearly all the current fibre optic network design methodologies have shown that they do not cater for future 4G or 5G base stations or other emerging community needs.

If the required number of base stations are implemented then consumers are more likely to readily migrate to wireless networks.

