**Questions on which the ACCC is seeking views:**

*Testing methodology*

1. Do you agree that a probe-based testing methodology would be the most reliable and accurate approach for the Australian context?
2. If you consider an alternative approach preferable, what approach do you prefer and why?

**Answers:**

Absolutely. Testing and assessing network and service quality can be performed either actively, through injection of test traffic or passively by monitoring actual customer traffic. We believe that in the context of the ACCC the active method is the only true method to accurately and efficiently meet the testing objectives:

* Active testing provides a continuous measurement of network and service performance, without having to rely on network activity to have a visibility of the performance. We refer to this as proactive monitoring.
* Active testing can be used to monitor all layers of the network from transport links to application performance. Passive monitoring typically focuses on signalling and does not necessarily provide visibility over the key KPIs such as latency, loss or even application quality of experience. We refer to this as total L2 to L7 visibility.
* Finally Active testing provides the closest possible simulation to an actual end-user, ensuring that the results measured represent what actual paying customers can expect. This is perfectly in line with the mission of the ACCC to ensure that all users receive the expected and contracted services.

The probe-based approach provides a pro-active method of measuring performance and guarantee quality at all times.

*Services*

1. What services should be included in the ACCC’s proposed performance monitoring and reporting program? In particular:
2. Do you agree that the ACCC should monitor ADSL, HFC and NBN-based broadband services?

**Answers:**

Yes, ADSL performance, HFC and broadband should be monitored for performance. Since each network has different architecture, network elements and configuration, it is important to measure and guarantee that performance is met for each sub network. It can also aid in segmenting results to determine what sub network is contributing to overall degradation.

1. Do you agree that the ACCC should monitor small business broadband services?

**Answers:**

Yes. Business pay a premium for guaranteed services and monitoring the delivery of said services should be a major part of the effort.

1. Are there any other services which you consider should be included in the proposed program? In your response, please outline reasons.

**Answers:**

While testing bandwidth is a good indicator of availability of services, it is important to also monitor the quality of experience that users can experience over the services. Broadband customers do not use their connection only for data transfer or for best-effort internet services, some such as business customers rely on their broadband service for business-critical applications such as VoIP (through dedicated VoIP applications or internet services such as Skype), Video Conferencing or high speed transfers. Broadband testing only provides a view of the quality of these applications as basic KPIs such as throughput jitter and latency will directly impact the performance of the services. Using proven and repeatable methods of testing application quality, typically referred to as QoE, should be an essential part of the performance monitoring scenario.

*Regions*

1. How should the ACCC determine which regions to monitor as part of any program? In particular:
2. How many Australian cities do you consider should be monitored as part of the proposed program? How could these be determined by the ACCC?

**Answers:**

Typically, performance degradation occurs for multiple reasons, but the two most common reasons for performance degradation are:

* Congestion, which typically occurs in large centers with a high number of users (medium and large cities) or
* Complex traffic paths, when traffic is processed by multiple devices or through multiple sub-network, which increases the likelihood of traffic loss, delay due to processing and failures due to operator errors

The ACCC should ensure that major city centers are monitored as part of the program. For rural areas, zones which are the furthest from the point of presence and typically require complex paths (microwave links, satellite links, long haul fibre or transport across multiple providers) should be monitored for performance.

**Answers:**

By implanting probes in sample areas where test traffic will be subject to these conditions, ACCC will be able to monitor performance and quality of the network and assess these metrics to a certain degree of confidence without having to monitor the entire networks.

1. Would you consider State or Territory regions which encompass rural and regional areas outside of each major city would be sufficient to provide information to consumers living in these areas on the performance of broadband services? For example, a Victorian rural/regional delineation which encompasses services outside of metropolitan Melbourne.

**Answers:**

It should be sufficient to monitor a sample of sites in rural areas. An approach would be to select a connection which are the furthest away from point of presence or that requires the most complex access network could be used as testing point as they can represent the worst-case performance for a particular region.

*Internet service providers*

1. How should the ACCC determine which ISPs to monitor for ADSL and NBN-based services? For example:
2. Should the ACCC monitor the largest ISPs by total market share in the Australian fixed-line broadband market?
3. Should the ACCC monitor the largest ISPs by market share for each technology?
4. Should the ACCC monitor the largest ISPs by market share for each region?
5. If you consider that another approach to determining which ISPs to monitor is preferable, what is it and why do you prefer that approach?

**Answers:**

The ACCC should monitor all ISPs that provide service to at minimum a certain percentage of the population for a given region. ISPs independently dimension their access network and by testing all major ISPs, the ACCC will guarantee that proper/advertised access performance is met for most users.

1. Should the ACCC monitor all providers of HFC in Australia, or limit testing to the two major networks operated by Telstra and Optus?

**Answers:**

HFC networks are typically used to efficiently transport triple play services to broadband customers. The ACCC should monitor all HFC providers to ensure proper quality of experience for all paying customers.

*Speed tiers*

1. Do you agree the ACCC should test both ADSL 1 and ADSL2+ services?
2. Should the ACCC test specific speed tiers for HFC and NBN-based services or should it test services falling within particular speed ranges? Please explain if and why you prefer a particular approach.

**Answer:**

The ACCC should test both ADSL and ADSL2+ simply because ADSL performance degrades significantly with distance. As providers sell services it is important to ensure that they receive the bandwidth that they purchase (for example selling an ADSL2+ service to a customer which does not have better performance than ADSL)

The ACCC should test HFC and NBN services for all speed tiers. Operators typically use muxing techniques where multiple customers share the same uplink. Using traditional statistical burst models, where it is assumed that all end-users do not burst at the same time, user performance can be severely impacted on the network if the too many customers share the same uplink. During low utilization periods, performance degradation should not appear, but during high usage/business hours, customers performance can be severely impacted.

The monitoring system can be used to periodically measure performance and ensure that minimum SLAs are met at all times, for high utilization and low utilization periods.

*Sample size*

1. What is the minimum number of probes which would be required to provide robust results on the broadband performance likely to be experienced by consumers acquiring a particular ISP package or offering in a particular region (i.e. per sample set)?

**Answers:**

A very good approach is to provide a scenario as close as possible to a typical user by acquiring services in a particular region and using a probe per region for testing. This will ensure that the performance measured will be very close to what an actual target customer will experience. It will also provide anonymity to the test process, as the ISP cannot differentiate between a regular user and the ACCC feed unless publicized.

1. Which of the variables (ISP, geographic region, speed tier or size of each ‘sample set’) is most important and why?

**Answers:**

A combination of variables should be used since ISPs, geographic regions and speed tiers should all be considered important as they directly influence the measurement of user performance. ISP performance is expected to vary since ISPs have different level of investment and loading in their networks, geographic region will impact as user density and the size of the area of service can also impact performance and finally speed tiers which can influence what technology is used to deliver the service.

Sample set is less important since it’s mostly for statistical representation, but should be considered during the establishment of the test scenario.

*Metrics*

1. What information regarding download and upload data transfer rates (or ‘speeds’) would be most useful for ISPs and for consumers? In particular:
2. Do you agree that the ACCC should monitor both peak and off-peak data transfer rates?
3. What is the daily peak or ‘busy’ period for demand on broadband bandwidth in Australia?
4. To what extent are ‘burst’ speeds available for consumers in Australia and should they be accounted for in the ACCC’s proposed testing program?

**Answers:**

ACCC should monitor peak and off-peak data transfer rates. Peak and off-peak are relative to the application: for example peak local internet hours will differ from business hours for a company which does international business and requires availability during North American day time. It is important to measure performance at all times to guarantee that services are available.

As for burst speeds, these could also be measured but should not necessarily be accounted by the ACCC program. Burst availability is usually extra or on-demand resource availability and are typically not counted as part of the SLA (Service Level Agreement) negotiated between the provider and the end-user.

1. What additional quality of service parameters should the ACCC monitor so as to obtain rich and meaningful information regarding the performance of broadband services in Australia? In your response, please state each factor which you consider should be tested and why.

**Answers:**

As noted earlier, a variety of additional metrics above the regular bandwidth/delay and delay variation KPIs could reveal customer experience. These include:

Internet Infrastructure quality: Internet quality is severely impacted by the availability of the network infrastructure, such as DNS and DHCP servers. Even with a high availability, low latency network the unavailability of these services, which are typically maintained by the ISP, will severely impair the Internet experience of users.

VoIP quality: Voice over IP is a fast-growing business and consumer tool enabling universal communications over the global IP network. VoIP consists of digitized voice segmented and transported via packets. VoIP applications require both a control plane to establish calls and a data plane to transport the actual VoIP packets. Quality of VoIP is severely impacted by frame loss and frame delay variation from a network perspective and by signalling capabilities. In order to properly measure the ability of a network to support VoIP applications, an actual VoIP exchange should be simulated, either between probes or to a particular service to measure quality and service performance.

Web access: It is critical to measure the availability and performance of web access using common websites/tools used by the end-user. These are typically a good gauge of the customer experience and can consist of the average download time of most-used web resources such as Google.com, youtube.com and so on. Network performance will impact web access, but ultimately the performance of these sites will vary per ISPs and will impact user experience.

*Reporting*

1. What do you consider is the best approach to reporting on broadband performance in Australia? In particular:
2. How often should the ACCC report on the results of its broadband performance testing?
3. Do you agree that the ACCC should provide detailed observations, commentary or analysis on the results of testing?

To what extent would industry (e.g. ISPs) value access to the raw data collected by any testing program and want to have access to it?

**Answers:**

ACCC should report daily on the broadband performance with reporting at specific hours. This allows for a fine granularity to establish daytime and night time performance. Commentary and analysis can be limited since most of the KPIs are easily explainable. ISPs will highly value the raw data collected since it accurately represents performance experienced by a customer.

ACCC should also look into the possibility of providing dashboards to simplify the presentation of performance data. With a high quantity of metrics collected, using dashboard provides an easy-of-use and an understandable method to present complex network metrics. Dashboard could be user accessible through special public portals with multi-levels of display: basic, key metrics and KQI for public users and detailed performance for ISPs with specific logins.