Australian
Competition &
Consumer
Commission

Broadband performance monitoring and reporting in the Australian context

Position paper

June 2014

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Overview

Since late 2013, the ACCC has been consulting on the possible introduction of a monitoring and reporting program that would provide visibility over the comparative performance of different fixed broadband access networks and retail internet service providers (RSPs), and give consumers reliable and independent information on which to base their broadband purchase decisions. This position paper represents the conclusion to the initial consultation process and specifies the key attributes that any program the ACCC ultimately implemented would need to have.

The ACCC acknowledges the valuable contributions that interested parties including RSPs, network operators, consumer bodies and vendors of testing services have made to the consultation process. This paper does not respond to specific submissions or points of contention which arose during consultation, rather representing the ACCC's conclusions having taken the full range of views into account.

Background

The ACCC released a consultation paper on 14 August 2013 inviting comment on a possible model for implementation of a fixed broadband monitoring and reporting program.[1] This paper outlined the policy rationale for such a program, noted similar international examples and sought views on questions of methodology and reporting approach. The ACCC received 20 submissions in response to the consultation paper, these putting forward a range of views on the need for and preferred approach to broadband performance monitoring.[2]

Having considered submissions in response to the consultation paper the ACCC published an open letter on 29 October 2013 expanding on its policy objectives and responding to some of the issues raised in stakeholder submissions.[3]

Following the release of the open letter, the ACCC conducted a 'closed' consultation process from December 2013 through March 2014. This gave key industry stakeholders the chance to discuss their views with the ACCC in more detail and to provide further input on specific issues associated with the design and implementation of the proposed program.

A decision to go ahead with the proposed program has not been made and would be subject to funding. Should the ACCC ultimately proceed, implementation will not commence before calendar year 2015.

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1 Available at http://bit.ly/1j0VlaR.

2 Available at http://www.accc.gov.au/regulated-infrastructure/communications/monitoring-reporting/broadband-performance-monitoring-reporting-program/consultation-paper.

3 Available at http://bit.ly/1jFgCVZ.

Objectives

The proposed program would seek to achieve three main objectives:

1. Provide visibility over the performance of fixed broadband access networks including those operated by NBN Co and retail broadband services offered by RSPs to consumers over those networks.

2. Give consumers independent and reliable information on fixed broadband service performance to assist them in their purchasing decisions.

3. Promote effective competition on the basis of service performance between RSPs.

The rollout of the NBN is a key driver for the ACCC's consideration of a monitoring and reporting program. With higher potential service performance comes a greater risk of consumer detriment if expectations are created and not met. RSPs have an important role to play both in terms of how they construct and market specific offerings to consumers and in terms of their wholesale capacity provisioning decisions. However, RSPs are dependent on their access provider (whether NBN Co or another network operator) for the underlying network capability and as such the ACCC considers it important to provide visibility of any network-based performance issues.

The proposed program would achieve the access network monitoring objective by collecting performance-related data from a representative sample of consumers on all major fixed broadband networks. Analysis of results on a suitably aggregated basis (e.g. by access network, region etc.) would provide visibility over performance problems which are caused by the underlying network rather than the RSP. On the other hand, positive results would provide confidence in the performance of what will often be monopoly fixed-line access networks.

At the same time, data produced by the proposed program would enable specific conclusions to be drawn about the performance of individual RSPs. A decision by an RSP to either provision sufficient network capacity to meet end-user demand, or provision more limited capacity to reduce costs, would be clearly reflected in test results, particularly through peak-time metrics.

From a consumer information perspective, the ACCC notes that there is a lack of independent and reliable information on broadband service performance and in the ACCC's view, this is preventing full consumer engagement in the competitive process.

This leads to consumer harm by increasing product search and transactional costs, given that services are typically sold on a minimum term basis with early exit fees. The potential for this harm will become particularly relevant as the NBN rollout progresses due to the greater opportunity for product differentiation on the basis of technical performance and the heightened service performance expectations that it will bring. The multi-technology mix being adopted by NBN Co will arguably increase the need to manage consumer expectations as performance may vary between technologies.

Importantly, the proposed program would respond to this potential harm by providing information on the average network performance of RSP products; that is, it would

focus primarily on those elements of the network that RSPs can control. In this regard, providing transparency to consumers during the pre-purchase phase regarding the average performance of different types of broadband services and different RSP product offerings would better equip consumers to make judgements on whether a particular service is appropriate for their needs and budget.

This would provide clear incentives to RSPs to accurately represent the technical performance capability of the products during the pre-purchase stage and where necessary to take further operational measures to improve the technical performance of their products. It would not be feasible or necessary to provide tailored advice to individual end-users about their likely end-to-end broadband experience with a particular product in order for this consumer benefit to arise.

Similarly, RSPs and access network operators would gain a broad insight through the program into how their own investment and operational decisions translate into end-user service quality, which will become increasingly valuable as industry moves to wholesale-only models for access network operators.

From a competition perspective, robust data on the relative service performance of RSPs from a trustworthy and independent source would better enable RSPs to compete through performance-based differentiation. This is because RSPs would be rewarded through market outcomes where they developed and offered technically superior products that consumers demanded and valued, which would not be the case where consumers were not well placed to make product choices on this basis.

The proposed program would seek to promote competition by drawing out broadband service performance as an important competitive parameter alongside price, customer service and value added features. This market-based mechanism would have clear potential to avoid the need for standards-based regulation of technical requirements for end-user services.

Summary of requirements

The proposed program specifications that follow cover both the testing methodology and data analysis and reporting requirements. They cover technical approach (focusing on parameters that are material to the reliability and accuracy of results), measures to minimise the impact of monitoring on volunteers, the expected test sample including geographic, technology and RSP dimensions, data processing and validation and the types of reporting that any program would need to support.

These ‘minimum requirements’ are not fully prescriptive and there are various points of detail that would need to be addressed if the ACCC were to proceed to tender. However, the specifications do provide a clear sense of how the ACCC would seek to implement a monitoring and reporting program should it decide to proceed.

Enquiries and further information

Enquiries should be sent to broadbandperformance@accc.gov.au.

Proposed program specifications

This section outlines the ACCC's position on a range of methodological, technical and reporting questions that arise when considering implementation of a systematic broadband performance monitoring and reporting program. As the position paper represents the conclusion to a consultation process that has spanned around nine months, the ACCC does not at this time seek to re-enliven debate on the particulars of the proposed program by discussing the different views of stakeholders in detail.

It is worth noting that the proposed program specifications that follow do not represent the level of detail that would be required in any tender process. Should the ACCC progress to the tender stage, RSPs and other relevant stakeholders will be given further opportunity to assist in the development of the program.

Testing methodology

Submissions to the ACCC's consultation process discussed a number of methods for monitoring fixed broadband service performance. The most important criteria for the ACCC when considering a methodology is the robustness and reliability of test results. In this regard, the ACCC considers that a hardware probe-based testing approach is likely to be the most appropriate for the proposed program. Hardware probes have been widely adopted in similar programs implemented internationally, and do not suffer from some key limitations associated with software-based approaches.[4] However, the ACCC would consider a hybrid or entirely software-based approach if it could be clearly demonstrated that the alternate solution was able to deliver the required results.

A. Technical approach

Based on submissions to the consultation process, further discussions with key stakeholders and the ACCC's own research, the following are the minimum technical requirements that any monitoring and reporting program would need to satisfy:

A.1 The test setup must be technology neutral i.e. compatible with all forms of fixed broadband including ADSL, VDSL, HFC cable, FTTP, fixed wireless and satellite.

A.2 The test setup must be able to provide accurate information for services with headline data transfer rates in excess of 100Mbps.

A.3 Testing must be automated (requiring no end-user input after initial setup) and able to be performed on a defined schedule including both peak and off-peak times.

[4] In particular, hardware probes can be 'inserted' into the end-user service configuration at a point which permits 24/7 automated test schedules and eliminates distortions caused by end-user devices.

A.4 Test results must not be unduly affected by volunteers' in-home network configurations (e.g. Wi-Fi and/or access devices).

A.5 The test setup must generate traffic to simulate end-user behaviour rather than just passively monitoring existing end-user traffic.

A.6 The test setup must be capable of running both simple metrics such as peak/off-peak downstream and upstream data transfer rates, webpage load times and video streaming performance as well as more technical quality of service metrics including TCP/UDP/ICMP[5] latency and packet loss, jitter and DNS[6] resolution and failure rates. Other metrics such as specific application testing would be considered optional.[7]

A.7 The test setup must be able to identify changes to the end-user's service configuration e.g. increases or decreases in subscribed data transfer rate, churn to another RSP etc.

A.8 Testing should be conducted primarily between the end-user modem or router and domestic test servers located within each capital city. This is to minimise the effect of network elements outside the control of RSPs and network operators.[8]

A.9 RSPs should be encouraged to host 'on-net' test servers. The data generated by tests on such servers would provide additional validation of broader results but would not be included in public reports.

B. Impact on volunteers

The following requirements would protect volunteers and ensure that testing did not have a negative impact on their broadband service performance:

B.1 The testing tool must be easy for volunteers to install and/or setup and must only require technical support from the program manager in limited circumstances.

B.2 To avoid disruption or degradation to volunteers' broadband services, tests must only be performed when services are not being actively used.

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5 TCP: http://en.wikipedia.org/wiki/Transmission_Control_Protocol
UDP: http://en.wikipedia.org/wiki/User_Datagram_Protocol
ICMP: http://en.wikipedia.org/wiki/Internet_Control_Message_Protocol

6 DNS (Domain Name Server): http://en.wikipedia.org/wiki/Dns

7 Voice over IP mean opinion score (MOS) would likely be included but can be inferred from purely statistical metrics.

8 Certain metrics such as load times for popular international websites would involve network elements outside of RSP control. Reporting on such metrics would provide appropriate contextualisation and caveats to account for this.

B.3 The testing regime must not consume a large amount of data as this may increase costs for volunteers. The test setup should include a mechanism for tailoring the testing regime based on the volunteer's subscribed data quota e.g. to run a more limited suite of tests or to run tests less frequently where quota is an issue.

B.4 The testing tool must not log volunteers' personal data and the testing company should have appropriate safeguards in place to ensure that security and confidentiality of personal data is maintained.

C. Sample size and selection

Should the proposal proceed to implementation, the ACCC would determine the relevant sample sizes for testing during the formal tender process. At a minimum the program would require statistically significant samples incorporating each of the following dimensions:

C.1 **Geographical:** defined segments such as Large City (Sydney, Melbourne, Brisbane, Perth, Adelaide), Medium City (Gold Coast-Tweed, Newcastle-Maitland, Canberra-Queanbeyan, Sunshine Coast, Wollongong), Small City (Hobart, Geelong, Townsville, Cairns, Darwin). Additionally, an aggregated national regional/rural segment measuring results across the range of RSPs, technologies and speed tiers for volunteers in areas with limited broadband infrastructure.[9]

C.2 **Service types:** NBN-based services including FTTP, FTTN, HFC, fixed wireless and satellite, as well as non-NBN services such as ADSL and potentially FTTP.[10] While included in the program, ADSL services would be tested at a more aggregated level with results across all RSPs being combined to provide general guidance on performance rather than more specific comparative guidance.[11]

C.3 **RSPs:** at least the top five RSPs by subscribers within each defined geographic segment, as well as the top five RSPs by subscribers in the broadly defined regional/rural segment.[12] To ensure a representative

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[9] The single 'rural/regional' segment would include volunteers from all states and territories. Whether an area had 'limited broadband infrastructure' could be determined by backhaul transmission competition or lack thereof, or by another measure if more appropriate.

[10] Inclusion of non-NBN FTTP, VDSL or HFC services would be dependent on the availability of a statistically significant sample.

[11] The ACCC considers that general guidance on ADSL performance would benefit consumers as the NBN is deployed, as it would demonstrate the extent of expected benefits to be obtained through migration to NBN VDSL, HFC or FTTP as applicable. For consumers remaining on ADSL longer term, general guidance would also assist in managing performance expectations.

[12] In Australia, the four largest RSPs accounted for over 90 per cent of subscriber share in the provision of fixed-line broadband services as at December 2013. Source: publicly reported subscriber numbers, data obtained under the ACCC's CAN and Infrastructure Record Keeping Rules. The iiNet Group is counted as a single RSP for present purposes.

sample, any other RSP for which a sufficient number of volunteers opted in would also be included.

C.4 **Speed tiers:** defined segments including 'up to 24Mbps', '25 to 50Mbps' and 'greater than 50Mbps'. These segments would only inform how many samples are required for each RSP and how retail plans are grouped when presenting results.

The overall sample would need to be representative across the geographical, service type and speed tier dimensions, and ensuring this would be part of the sample selection exercise. There would also be a threshold minimum number of valid observations per sub-segment (e.g. Large City end-users with RSP #1 on HFC at 50+ Mbps); this threshold would be set based on the accuracy and margin for error of the testing solution ultimately deployed.

D. Volunteer recruitment and management

The volunteer recruitment and management exercise would be an important part of any monitoring and reporting program. The ACCC would work with the successful tenderer to develop the volunteer management approach, but at a minimum it would need to meet the following requirements:

D.1 Volunteers would be recruited through a public campaign, including social media, and would be strictly opt-in.

D.2 The testing company must collect and validate critical consumer data from volunteers including their street address, RSP, broadband technology and subscribed 'speed' tier.

D.3 For ADSL and VDSL services, the length of the copper line from the relevant DSLAM (whether in a node or exchange) to the volunteer's premises must be determined. Samples for ADSL and VDSL services would be narrowly defined such that only volunteers whose copper line lengths fell within a specified range would be accepted.[13]

D.4 Volunteers must not receive monetary compensation in return for their participation in the program and they may exit the program as they wish. However it would be open to the testing company to provide non-monetary incentives such as access to real-time and historical data on the volunteer's own connection to encourage participation.

D.5 The testing company must not disclose a volunteer's identity to their RSP.

D.6 The testing company must manage the distribution of the test solution (whether hardware or software) and monitor the volunteer base to ensure that samples remain active and representative.

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[13] This is necessary to minimise the variability in performance due to line length which is characteristic of ADSL and VDSL services. Line quality issues (e.g. corrosion) can be separately accounted for through statistical measures—see section E.

D.7 The testing company must provide complaint handling and technical support services for volunteers as part of the day-to-day management of the program.

Data analysis and reporting

The ACCC considers that any reporting on broadband performance should make summary information available to consumers in a way that would assist them in assessing the commercial offers that are available to them. It should also provide RSPs with transparency over both their own offerings and those of rivals to enable them to compete on quality and make decisions on investment in capacity.

The ACCC acknowledges there is a trade-off between the level of detail that can be reported and the frequency with which data can be made public. The requirements in section F seek to balance these competing priorities.

E. Data analysis

Test data generated by the program would need to be validated and converted into a manageable format before provision to the ACCC and (potentially) other interested parties. The following minimum data analysis requirements would need to be satisfied:

E.1 Results must be collated and 'washed' through statistical analysis to ensure that outliers and/or errors are removed. For example, tests run after shaping or throttling due to excess data usage would need to be removed to avoid skewing the overall results.

E.2 In the case of ADSL and VDSL services, statistical methods would need to be applied to address potential variance based on copper line quality. This requirement is additional to the sample selection requirement described in section D.3.

E.3 Ownership of the raw data generated by the testing program would reside with the ACCC, and this would be used for other purposes and/or disclosed to other parties as the ACCC considered appropriate.

F. Reporting approach

International broadband monitoring and reporting programs adopt a range of different reporting approaches. The form and timeliness of public reporting would have a significant bearing on the usefulness of the information to consumers and other stakeholders. The ACCC considers that any program would need to meet the following requirements in order to ensure timely and meaningful reporting:

F.1 The reporting of results would be managed by the ACCC rather than the company retained to conduct the testing and preliminary data analysis.

F.2 The testing and data analysis setup would need to support a 'hybrid' reporting approach whereby the ACCC would publish summary results on

a limited set of metrics monthly, and a more fulsome report once or twice per year.

F.3 Monthly summary data would be presented primarily in graphical form (potentially via an interactive website) with some standing commentary, explanatory statements and disclaimers but no detailed commentary. At a minimum the metrics covered would include average peak-hour and 24-hour throughput both numerically and as a proportion of advertised speed. Broader 'quality of service' metrics would also be included, but a decision on which metrics to include would be made once the overall 'shape' of the testing program had been finalised.

F.4 Detailed reports would include trend analysis, full explanation of more technical metrics, commentary from RSPs represented in the reports and supplementary information on the testing methodology and the sample characteristics.

F.5 The ACCC would not seek to incorporate pricing or plan configuration data into either the monthly or detailed reports due to the frequency with which these change.

F.6 The ACCC would seek the cooperation of other organisations such as ACCAN and the TIO to help promote the program to consumers.