

QOS STANDARDS FOR RETAIL BROADBAND INTERNET ACCESS SERVICE

This is applicable to **Broadband Access Service Providers (BASP) providing retail xDSL and cable modem broadband services** to residential and/or business end users.

- BASPs who offer higher or equivalent Service Level Agreements or Guarantees to their end users can request for an exemption from complying with the QoS framework. A BASP can also request for an exemption if it can demonstrate that its end users have agreed to accept a lower QoS standard.
- Where the BASP is exempted from compliance, the BASP has the responsibility to inform the end user of the service level it will be providing and the fact that it does not comply with IDA's minimum quality of service standards.

(A)	Performance Indicators (For Compliance ¹)	QoS Standards
(1)	Network Availability²	> 99%
(2)	Network Latency (for round-trip) [see *] In cases where more than one network latency figure is available for either the local or international network, BASPs must also submit <u>one weighted average network latency figure</u> for the relevant segment of the broadband network.	
(a)	Local Network Latency ³	≤ 85 msec
(b)	International Network Latency ⁴	≤ 300 msec
(3)	Bandwidth Utilisation⁵ [see *] (for connections within the <u>local</u> network) For any one segment of the broadband network with more than 1 link, the BASP will be required to submit bandwidth utilisation figures for each individual link in that segment. In addition, in these cases, the BASP must also submit <u>one weighted average peak bandwidth utilisation figure</u> for the relevant segment of the broadband network. [see attached diagram]	
	Segment between A-B	≤ 90% [not to exceed 90% for 3 or more consecutive months]
	Segment between B ₁ -E ₁	
	Segment between B ₂ -C	
	Segment between D-E ₂	
	Segment between F-G	
(B)	Performance Indicators (For Monitoring)	IDA's Comment
(1)	Service Activation Time⁶	For monitoring.
(a)	% of service accounts activated within 5 working days or on date agreed/specified by customers	
(b)	Total no. of applications received for the period	
(2)	Customer Service Support	For monitoring.
	No. of customer complaints received per 1000 subscribers ⁷	
(3)	International Bandwidth Utilisation [only for Internet Exchange Service Providers (IXSP) to provide on the behalf of BASPs]	For monitoring.

Please indicate if the QoS submissions include the QoS performance results of residential only or residential and business broadband services. Please differentiate where possible.

* Frequency of Measurement: BASPs are required to make "test-calls" at 5-minute intervals during the 3 busiest consecutive hours for broadband Internet usage everyday. The "busiest hours" (or "peak hours") refer to the 3 busiest hours of a working week, excluding Sundays and public holidays. BASPs must inform IDA of their 3 busiest hours when submitting their first QoS report – IDA reserves the right to review the 3 busiest hours to determine if they should be changed, based on the MRTG Graphs and any other supporting documents.

¹ For each instance of non-compliance, a financial penalty of S\$5,000 per standard per month may be imposed.

² Network Availability is the measure of the degree to which the access network is operable and not in a state of failure or outage at any point of time. It measures the total downtime of the network, including the ATM switches, multiplexers, routers, e-mail facilities (if provided) and connection to 1-NET and Internet backbone over a month. All scheduled downtime for the purposes of maintenance and upgrading of the network system will be excluded from the calculation. However, all BASPs must keep their users informed of such maintenance times. Please note that reported downtime should include any downtime caused by upstream service providers.

$$\text{Network Availability} = \frac{(\text{Total operational minutes} - \text{Total minutes of service downtime}) \times 100\%}{\text{Total operational minutes}}$$

³ BASPs are required to send a PING packet from its test point to a router at the IX, i.e., from point A to point G (see Annex B). For the avoidance of doubt, PING packets are ICMP echo requests, which are 32 bytes in size for MS DOS and 56 data bytes for UNIX/MAC. The data for each month should be arranged in an ascending order and the 95th-percentile reading must be taken. The measurement, in "x msec", represents the maximum network latency (for round-trip) experienced by end-users for 95% of the time during peak hours and it should be less than 85msec in order to meet IDA's QoS standard.

⁴ BASPs are required to send a PING packet from its test point to a router at the first U.S Point-of-Presence, i.e., from point A to point I (see Annex B). However, BASPs should only take the readings from point H to point I (from beyond the domestic broadband local network up to the first point of presence or entry into the U.S. - see Annex B) along the trace routes for international network latency computation. The data for each month should be arranged in an ascending order and the 95th-percentile reading must be taken. The measurement, in "y msec", represents the maximum network latency (for round-trip) experienced by end-users for 95% of the time during peak hours and it should be less than 300 msec in order to meet IDA's QoS standard.

⁵ Highest Bandwidth Utilisation = (peak utilisation level in each segment) / (total bandwidth available for that segment). BASPs are required to run "Daily" MRTG Graphs at 5 minute average during peak hours. The highest bandwidth utilisation is the peak utilisation level in each segment (see Annex B) for each month. BASPs are required to run "Monthly" MRTG Graphs to obtain average bandwidth utilisation for each month for every segment. The Monthly Graphs are to be submitted to IDA.

BASPs should closely monitor their links when the loading level exceeds 75%. However, BASPs will only be required by IDA to purchase additional bandwidth if the bandwidth utilisation of the terrestrial links exceeds the 90% loading level for a period of at least 3 months and if there is no better alternative plan to maintain the QoS.

Should a BASP have more than one link within one segment of the broadband network, it will be required to submit bandwidth utilisation figures for each individual link in that segment. For example, if a BASP has 3 separate links to its IXs (i.e., 3 separate links within the F-G segment), it should submit separate bandwidth utilisation returns for each of the 3 links. In addition, in these cases, the BASP must also submit one weighted average peak bandwidth utilisation figure for the relevant segment of the broadband network. For instance, in the above example, the BASP must also submit one weighted average peak bandwidth utilisation figure for the F-G segment, taking into account the peak bandwidth utilisation of each of its 3 separate links to its IXs.

⁶ Service Activation Time should be computed from the date of application to date of service activation.

⁷ A "complaint" is defined as any expression of dissatisfaction with the BASP's service, product, advertisement or policy via oral or written communication that requires some action by the BASP beyond the initial contact.

BROADBAND ACCESS NETWORK

