



هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority

Fixed Broadband Analysis Report
01 April 2012 – 30 June 2012 between 00:00:00 and 24:00:00 Bahrain

Published 12 July 2012

Public Document

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TRA Fixed Broadband Analysis Report

Introduction

Broadband, defined as a technology that enables high speed transfer of data, is inextricably linked to the emergence of the Internet. Investment in and adoption of broadband increased exponentially around the world since the middle of the 1990s. Broadband benefit the economy of a country in different ways, direct contribution to the Gross Domestic Products (GDP), productivity gains and specific impact on the economy with the development of eCommerce.

Broadband is part of the Kingdom of Bahrain 2030 vision and it is the duty of TRA to ensure the necessary regulatory environment is in place that will pave the way to the future state of the art infrastructure and services in a healthy competitive environment for the general benefit of citizen and consumers

Whilst ISPs do provide the basic level of information required to allow customers to make decisions relating to price, expected download speed and download threshold, they do not make available information relating to the download, upload and browsing performance experienced on average by consumers.

Via this report TRA aim at providing consumers with data relating to the actual quality of service achieved by each of the monitored ISP Services to allow consumers to make informed decisions with respect to understanding what is likely to be provided by each ISP on the specific measured packages. It is not feasible for the TRA to monitor all the available packages from all ISPs and therefore the choice has been made to focus on the 2 Mbps packages for aDSL, Fiber and WiMax Services from the following ISPs:

aDSL:	2Connect, Batelco, Etisalcom, Kalaam, Lightspeed,
Fiber:	NueTel
WiMax:	Menatelecom, Zain

Beside the difference in access technologies between aDSL, Fiber and WiMax, other important elements such as network load and dimensioning, network capacity towards the global internet and ISPs internal engineering rules based on specific commercial objectives have all an impact on end user experience.

ISPs are continuously working at optimizing their respective networks, results between two specific measurement period are subject to change however after several consecutive quarterly measurements quarters TRA is confident that industry trends have established.

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Measurements Methods Overview

The primary objective of the Broadband Quality of Service monitoring platform is to conduct a pre-defined set of tests each hour of the day, 7 days a week, 52 weeks of the year using standard fixed residential broadband connections supplied by each of the Kingdom's ISPs. The results of these tests are transmitted in near real time to, and stored in a centralised database server.

From each ISP two internet connections have been purchased and are monitored using the Epitiro Broadband Quality of Service monitoring platform. Standardised tests are conducted from test probes that have been deployed on each of the broadband connections under this test program . The tests involve requests being sent towards a standard specified list of public websites as well as dedicated servers located in the Kingdom of Bahrain, USA , Asia and Europe.

To ensure the accuracy of the information gathered each probe is constantly monitored and any issues identified are recorded and resolved remotely by the contractor.

Diagram 1 provides a overview of the system that has been implemented. For the sake of simplicity only three of the nine ISPs connected to the platform and only one of the Epitiro Ltd endpoints have been illustrated.

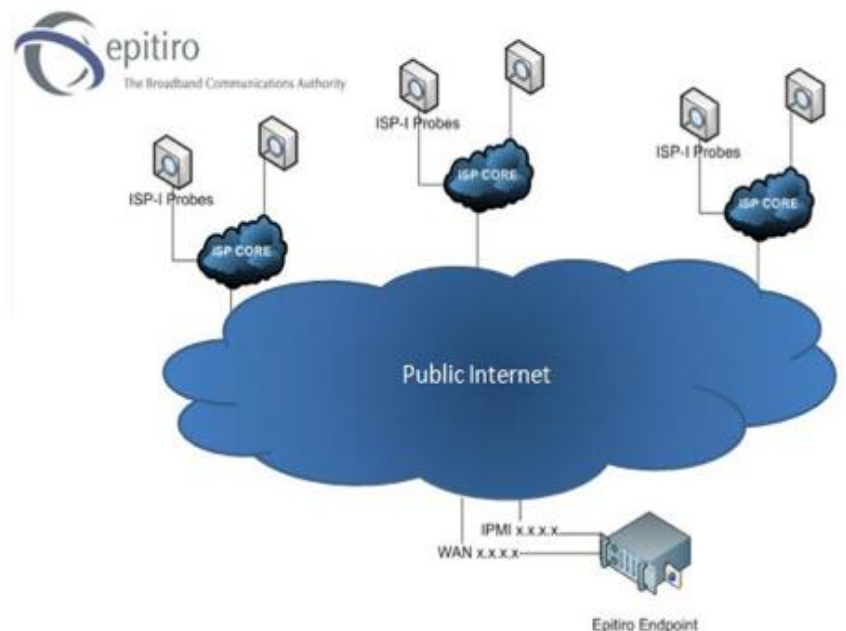


Diagram 1 - Broadband Quality of Service test platform overview

Noticeable events this Quarter

During this quarter, cross border interference with Kingdom of Saudi Arabia requested WiMax operators Menatelecom and Zain to alter the configuration of their respective networks, creating potential service performance degradation in specific areas.

Average **TCP download performance increased for the fourth quarter reaching 1.58 Mbps** from 1.50 Mbps previous quarter.

Average **TCP upload speed also increased resulting in industry average reaching 0.69 Mbps** from 0.58 Mbps previous quarter.

Average Domain Name Server resolution time improved from 50ms to 40ms compared to previous quarter.

Some volatility has been recorded on latency (ping) performance for Lightspeed and this is being investigated by the ISP.

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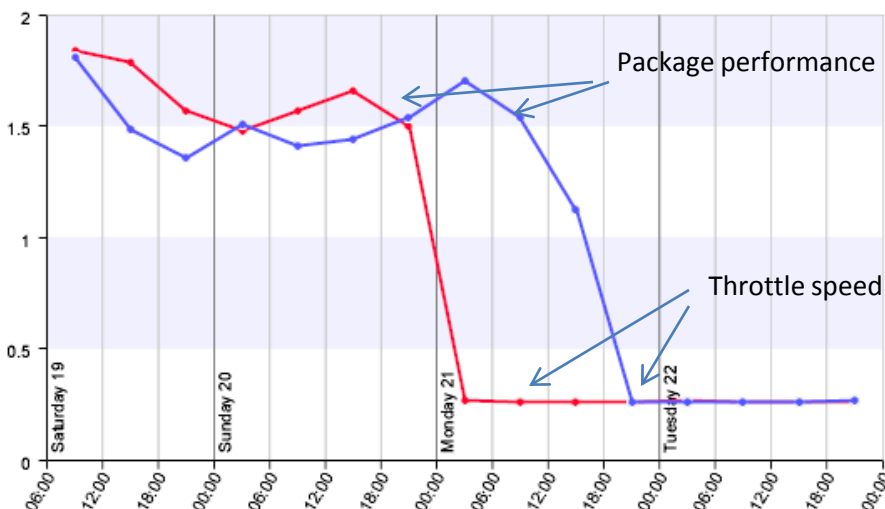
Highlight on Fair Usage Policy

Most Broadband packages in the Kingdom are delivered with FUP or download threshold levels, this means a fixed number of data packets, measured in Bytes (MB or GB), that can be downloaded as part of a specific data package. When the threshold is met, ISPs throttle down connection speed until the start of the next billing month. Consumer can choose to pay extra at published price to keep package performance.

The diagram illustrate FUP mechanism at work for two individual 2Mbps broadband packages being throttle at 256Kbps.

Fair Usage Policy when triggered can have a significant impact of the average performance of a service for the month.

In the example shown FUP was triggered on the 21st of the month, this represent 30% of the time.



For consumer, the presence (or absence) of Fair Usage Policy is an important element to take into account in the choice of a Broadband package. When using the service, knowing FUP consumption allow consumer to better manage download allocation and plan for upgrade to higher threshold level, if necessary, to maintain a continuous performance level throughout the month.

RESULTS

The following pages present the result of measurements taken every hour for each audited service during the period of Q2 2012, from 00:00:00 on the 1 April 2012 to 24:00:00 on the 30 June 2012.

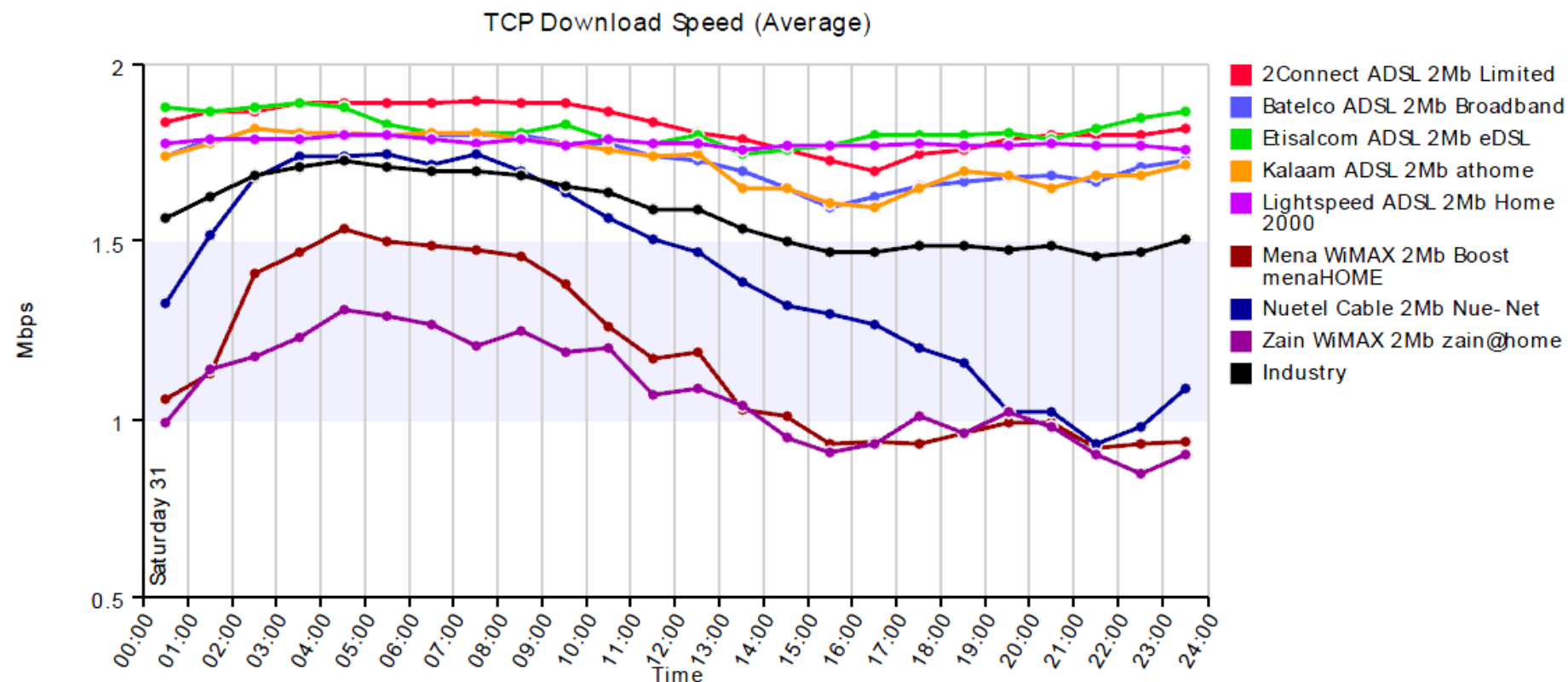
For each ISP, one set of measurements is taken each hour, 24 hours a day. In this report, results for a given hour are then averaged to determine the average QoS in that hour over the three month period. i.e. all results recorded between 8:00 and 9:00 for an ISP are averaged and reported as one observation on the graph that provide the average performance of this specific time period over a three month period.

This method has the advantage that it can show trends over an audited period as well as show variations during a 24h period.

TCP Download Speed (Average)

TCP Download Speed (Average) Line Chart (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain



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TCP Download Speed (Average) Line Chart Values (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain

	00:00, 31 Mar	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2Connect ADSL 2Mb Limited	1.84	1.87	1.87	1.89	1.89	1.89	1.89	1.90	1.89	1.89	1.87	1.84	1.81	1.79	1.76	1.73	1.70	1.75	1.76	1.79	1.80	1.80	1.80	1.82
Batelco ADSL 2Mb Broadband	1.74	1.79	1.79	1.79	1.80	1.80	1.80	1.80	1.80	1.78	1.78	1.74	1.73	1.70	1.65	1.60	1.63	1.66	1.67	1.68	1.69	1.67	1.71	1.73
Etisalatcom ADSL 2Mb eDSL	1.88	1.87	1.88	1.89	1.88	1.83	1.81	1.81	1.81	1.83	1.79	1.78	1.80	1.75	1.76	1.77	1.80	1.80	1.80	1.81	1.79	1.82	1.85	1.87
Kalaam ADSL 2Mb athome	1.74	1.78	1.82	1.81	1.81	1.80	1.81	1.81	1.79	1.78	1.76	1.74	1.75	1.65	1.65	1.61	1.60	1.65	1.70	1.69	1.65	1.69	1.69	1.72
Lightspeed ADSL 2Mb Home 2000	1.78	1.79	1.79	1.79	1.80	1.80	1.79	1.78	1.79	1.77	1.79	1.78	1.78	1.76	1.77	1.77	1.77	1.78	1.77	1.77	1.78	1.77	1.77	1.76
Mena WiMAX 2Mb Boost menaHOME	1.06	1.13	1.41	1.47	1.54	1.50	1.49	1.48	1.46	1.38	1.26	1.17	1.19	1.03	1.01	0.93	0.94	0.93	0.96	0.99	0.99	0.92	0.93	0.94
Nuetel Cable 2Mb Nue-Net	1.33	1.52	1.68	1.74	1.74	1.75	1.72	1.75	1.70	1.64	1.57	1.51	1.47	1.39	1.32	1.30	1.27	1.20	1.16	1.02	1.02	0.93	0.98	1.09
Zain WiMAX 2Mb zain@home	0.99	1.14	1.18	1.23	1.31	1.29	1.27	1.21	1.25	1.19	1.20	1.07	1.09	1.04	0.95	0.91	0.93	1.01	0.96	1.02	0.98	0.90	0.85	0.90

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TCP download measurements (Mbit/s)

TCP (Transfer Control Protocol) throughput tests measuring download speeds are conducted at a raw socket level (a socket that allows access to the underlying transport provider (ISP) that is supported by protocols such as IPv4 and IPv6) in order to test the full capacity of the connection. The probe is configured to initiate multiple TCP sessions and simultaneously use all of the open sessions for the transmission of data. This effectively “floods” the connection and reports the throughput capacity of the line.

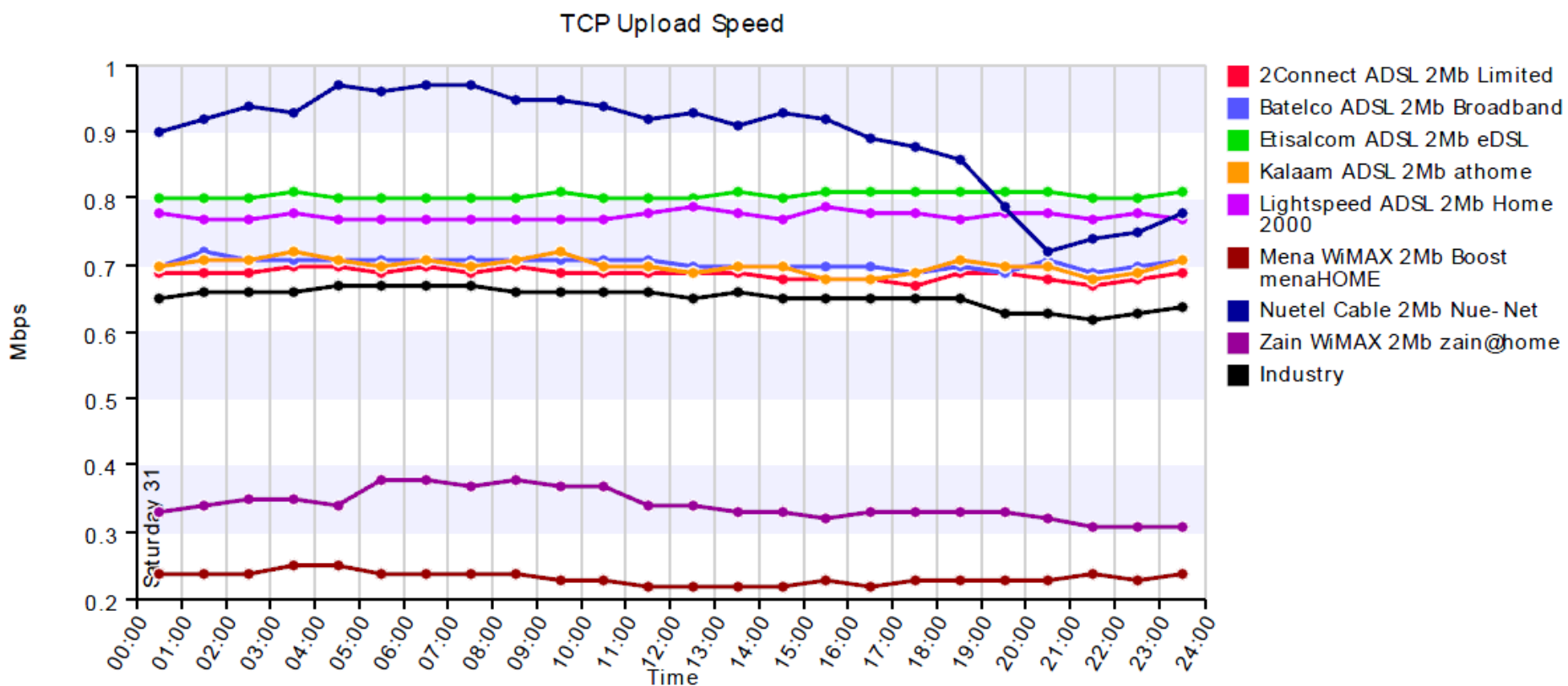
The test is conducted using a server endpoint running proprietary software that is hosted in a well peered data centre. Whilst the port through which the test is typically conducted is configurable, it is normal for port 80 to be used since this minimises the possibility of the traffic being managed or throttled during the test by an ISP. Once the session has been initiated standard data files are transmitted from the endpoint server to the probe and measurements taken of the download throughput of the connection. The test probe measures the time taken to transfer data and the volume of data transferred in a specific time. From these measurements the TCP download speeds can be derived.

The higher is the download speed the better is the performance.

TCP Upload Speed (Average)

TCP Upload Speed (Average) Line Chart (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain



TRA Fixed Broadband Analysis Report

TCP Upload Speed (Average) Line Chart Values (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain

	00:00, 31 Mar	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2Connect ADSL 2Mb Limited	0.69	0.69	0.69	0.70	0.70	0.69	0.70	0.69	0.70	0.69	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.67	0.69	0.69	0.68	0.67	0.68	0.69
Batelco ADSL 2Mb Broadband	0.70	0.72	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.70	0.70	0.70	0.70	0.70	0.69	0.70	0.69	0.71	0.69	0.70	0.71
Etisalcom ADSL 2Mb eDSL	0.80	0.80	0.80	0.81	0.80	0.80	0.80	0.80	0.80	0.81	0.80	0.80	0.80	0.81	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.81
Kalaam ADSL 2Mb athome	0.70	0.71	0.71	0.72	0.71	0.70	0.71	0.70	0.71	0.72	0.70	0.70	0.69	0.70	0.70	0.68	0.68	0.69	0.71	0.70	0.70	0.68	0.69	0.71
Lightspeed ADSL 2Mb Home 2000	0.78	0.77	0.77	0.78	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.78	0.79	0.78	0.77	0.79	0.78	0.78	0.77	0.78	0.78	0.77	0.78	0.77
Mena WiMAX 2Mb Boost menaHOME	0.24	0.24	0.24	0.25	0.25	0.24	0.24	0.24	0.24	0.23	0.23	0.22	0.22	0.22	0.22	0.23	0.22	0.23	0.23	0.23	0.23	0.24	0.23	0.24
Nuetel Cable 2Mb Nue-Net	0.90	0.92	0.94	0.93	0.97	0.96	0.97	0.97	0.95	0.95	0.94	0.92	0.93	0.91	0.93	0.92	0.89	0.88	0.86	0.79	0.72	0.74	0.75	0.78
Zain WiMAX 2Mb zain@home	0.33	0.34	0.35	0.35	0.34	0.38	0.38	0.37	0.38	0.37	0.37	0.34	0.34	0.33	0.33	0.32	0.33	0.33	0.33	0.33	0.32	0.31	0.31	0.31

TRA Fixed Broadband Analysis Report

TCP upload measurements (Mbits/s)

TCP (Transfer Control Protocol) throughput tests measuring upload speeds are conducted at a raw socket level (a socket that allows access to the underlying transport provider (ISP) that is supported by protocols such as IPv4 and IPv6) in order to test the full capacity of the connection. The probe is configured to initiate multiple TCP sessions and simultaneously use all of the open sessions for the transmission of data. This effectively “floods” the connection and reports the throughput capacity of the line.

The test is conducted using a server endpoint running proprietary software that is hosted in a well peered data centre. Whilst the port through which the test is typically conducted is configurable, it is normal for port 80 to be used since this minimizes the possibility of the traffic being managed or throttled during the test by an ISP. Once the session has been initiated standard data files are transmitted from the probe to the endpoint server and measurements taken of the upload throughput of the connection. The test probe measures the time taken to transfer data and the volume of data transferred in a specific time. From these measurements the TCP upload speeds can be derived.

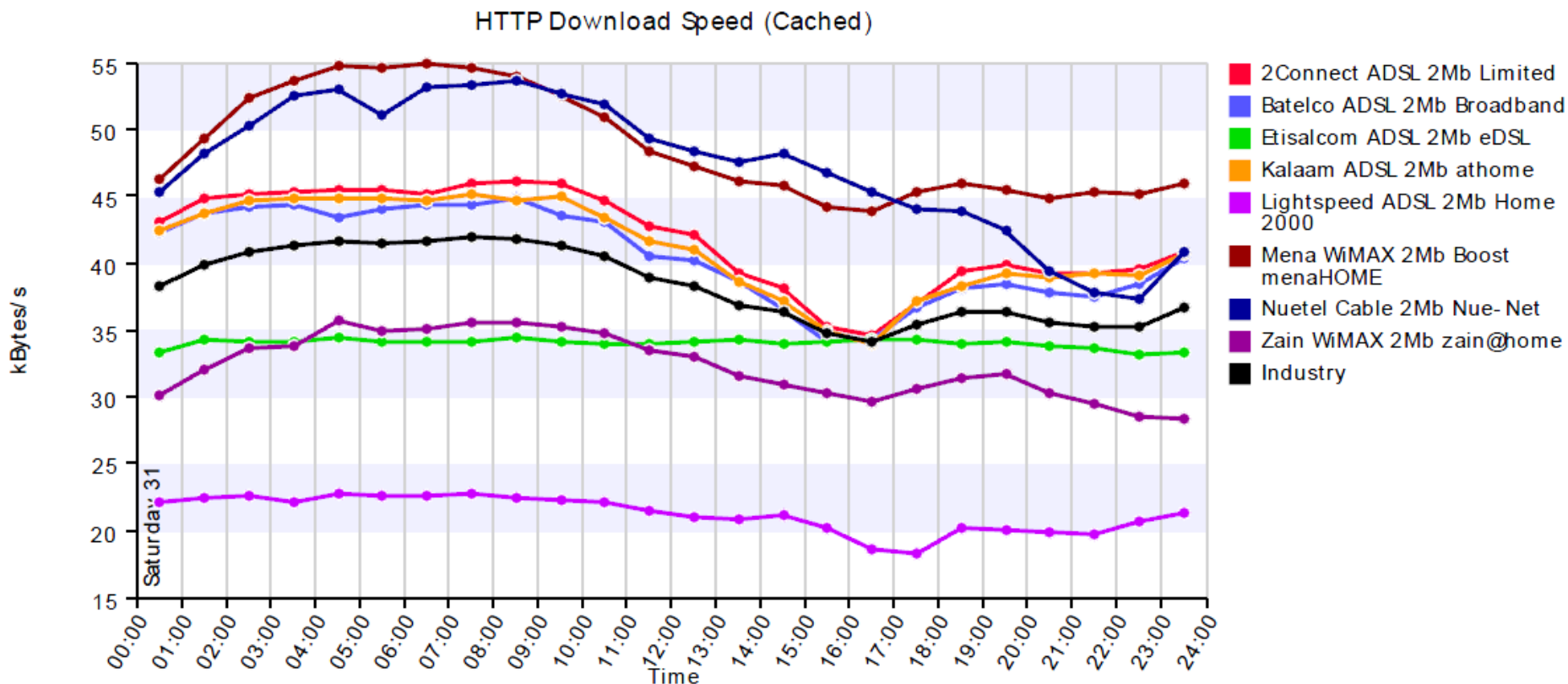
The higher is the upload speed the better is the performance.

TRA Fixed Broadband Analysis Report

HTTP Download Speed (Cached)

HTTP Download Speed (Cached) Line Chart (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain



TRA Fixed Broadband Analysis Report

HTTP Download Speed (Cached) Line Chart Values (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain

	00:00, 31 Mar	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2Connect ADSL 2Mb Limited	43.11	44.93	45.29	45.32	45.56	45.49	45.21	45.96	46.27	46.01	44.80	42.91	42.22	39.33	38.13	35.34	34.63	37.06	39.43	39.99	39.35	39.25	39.58	40.94
Batelco ADSL 2Mb Broadband	42.32	43.74	44.34	44.36	43.44	44.09	44.43	44.44	44.85	43.71	43.14	40.61	40.30	38.71	36.64	34.16	34.32	36.78	38.20	38.56	37.81	37.52	38.51	40.50
Etisalatcom ADSL 2Mb eDSL	33.40	34.33	34.18	34.22	34.54	34.16	34.20	34.23	34.59	34.21	34.08	34.10	34.13	34.40	34.06	34.18	34.30	34.43	34.10	34.13	33.94	33.64	33.19	33.44
Kalaam ADSL 2Mb athome	42.55	43.74	44.74	44.99	44.97	44.94	44.70	45.25	44.79	45.06	43.41	41.72	41.13	38.67	37.23	35.03	34.00	37.28	38.33	39.26	39.01	39.37	39.21	40.81
Lightspeed ADSL 2Mb Home 2000	22.12	22.47	22.67	22.22	22.81	22.73	22.66	22.85	22.59	22.39	22.14	21.52	21.01	20.95	21.21	20.23	18.64	18.43	20.21	20.17	19.98	19.86	20.81	21.36
Mena WiMAX 2Mb Boost menaHOME	46.38	49.47	52.51	53.67	54.90	54.65	54.92	54.75	54.11	52.61	51.02	48.51	47.33	46.14	45.94	44.30	44.03	45.41	46.03	45.52	44.93	45.36	45.26	46.08
Nuetel Cable 2Mb Nue-Net	45.41	48.31	50.36	52.66	53.04	51.10	53.19	53.34	53.78	52.80	51.97	49.47	48.39	47.69	48.28	46.88	45.43	44.11	43.88	42.49	39.42	37.81	37.39	40.87
Zain WiMAX 2Mb zain@home	30.20	32.11	33.68	33.88	35.72	35.06	35.22	35.71	35.67	35.27	34.79	33.50	33.02	31.69	31.02	30.29	29.69	30.60	31.49	31.73	30.35	29.50	28.62	28.52

TRA Fixed Broadband Analysis Report

HTTP Measurements (Download Speed - Cache) (Kbytes/s)

The HTTP (HyperText Transfer Protocol) test makes a request to a specified URL (Uniform Resource Locator) and records the time taken and the amount of data downloaded, from which the speed of the download is derived. Depending on the configuration of the test, test probe is also able to download the embedded content (e.g. images on a web page) in any HTML (HyperText Markup Language) that results from the HTTP request.

Any additional content downloaded is reflected in the captured timings and size of data downloaded. Additionally, the HTTP test can be configured to run in one of two modes of operation: cached and non-cached. When the test downloads from the specified URL in “cached” mode, the speed of the download could be impacted by any caching mechanisms implemented by the network provider.

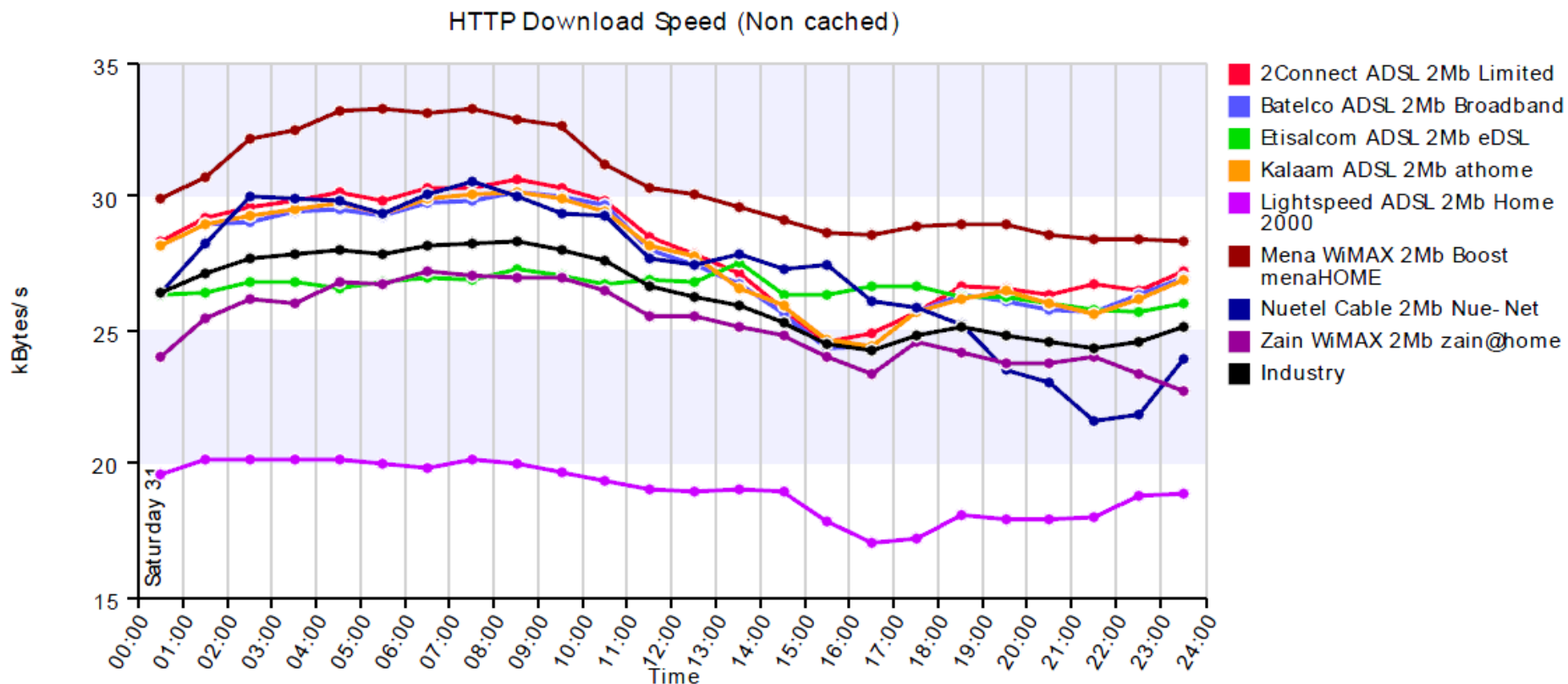
The higher is the download speed the better is the performance.

TRA Fixed Broadband Analysis Report

HTTP Download Speed (Non cached)

HTTP Download Speed (Non cached) Line Chart (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain



TRA Fixed Broadband Analysis Report

HTTP Download Speed (Non cached) Line Chart Values (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain

	00:00, 31 Mar	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2Connect ADSL 2Mb Limited	28.40	29.27	29.65	29.88	30.16	29.91	30.34	30.34	30.71	30.35	29.85	28.52	27.86	27.16	25.83	24.61	24.93	25.71	26.69	26.57	26.38	26.75	26.51	27.23
Batelco ADSL 2Mb Broadband	28.19	29.03	29.08	29.49	29.58	29.31	29.78	29.91	30.16	30.00	29.69	28.01	27.45	26.75	25.64	24.40	24.46	25.70	26.37	26.11	25.81	25.74	26.36	26.96
Etisalatcom ADSL 2Mb eDSL	26.33	26.42	26.81	26.80	26.60	26.87	27.01	26.92	27.29	27.10	26.75	26.91	26.83	27.53	26.34	26.36	26.66	26.69	26.25	26.27	26.04	25.77	25.73	26.02
Kalaam ADSL 2Mb athome	28.24	28.99	29.35	29.53	29.79	29.41	29.94	30.13	30.22	29.96	29.47	28.16	27.77	26.58	25.94	24.68	24.43	25.68	26.23	26.49	26.00	25.66	26.18	26.91
Lightspeed ADSL 2Mb Home 2000	19.66	20.22	20.22	20.17	20.24	20.07	19.91	20.18	20.04	19.72	19.39	19.06	19.01	19.08	19.03	17.85	17.11	17.22	18.11	17.98	17.93	18.05	18.85	18.95
Mena WiMAX 2Mb Boost menaHOME	29.95	30.75	32.19	32.50	33.20	33.28	33.17	33.31	32.88	32.66	31.24	30.37	30.12	29.65	29.18	28.65	28.61	28.95	29.01	29.02	28.61	28.43	28.42	28.33
Nuetel Cable 2Mb Nue-Net	26.45	28.29	30.07	29.93	29.91	29.39	30.09	30.57	30.06	29.36	29.29	27.72	27.46	27.84	27.34	27.45	26.12	25.85	25.23	23.54	23.05	21.68	21.88	23.99
Zain WiMAX 2Mb zain@home	24.01	25.46	26.21	26.07	26.84	26.75	27.27	27.07	27.01	27.01	26.52	25.59	25.56	25.17	24.81	24.05	23.40	24.62	24.20	23.79	23.83	24.03	23.42	22.76

TRA Fixed Broadband Analysis Report

HTTP Measurements (Download Speed - Non Cache) (Kbytes/s)

The HTTP (HyperText Transfer Protocol) test makes a request to a specified URL (Uniform Resource Locator) and records the time taken and the amount of data downloaded, from which the speed of the download is derived. Depending on the configuration of the test, test probe is also able to download the embedded content (e.g. images on a web page) in any HTML (HyperText Markup Language) that results from the HTTP request.

Any additional content downloaded is reflected in the captured timings and size of data downloaded. Additionally, the HTTP test can be configured to run in one of two modes of operation: cached and non-cached. When the test downloads from the specified URL in “non-cached” mode a random query parameter is appended to the end of the URL, which will result in the request bypassing any caches present in the network, and the request will be serviced by the web server specified in the URL as opposed to any cache.

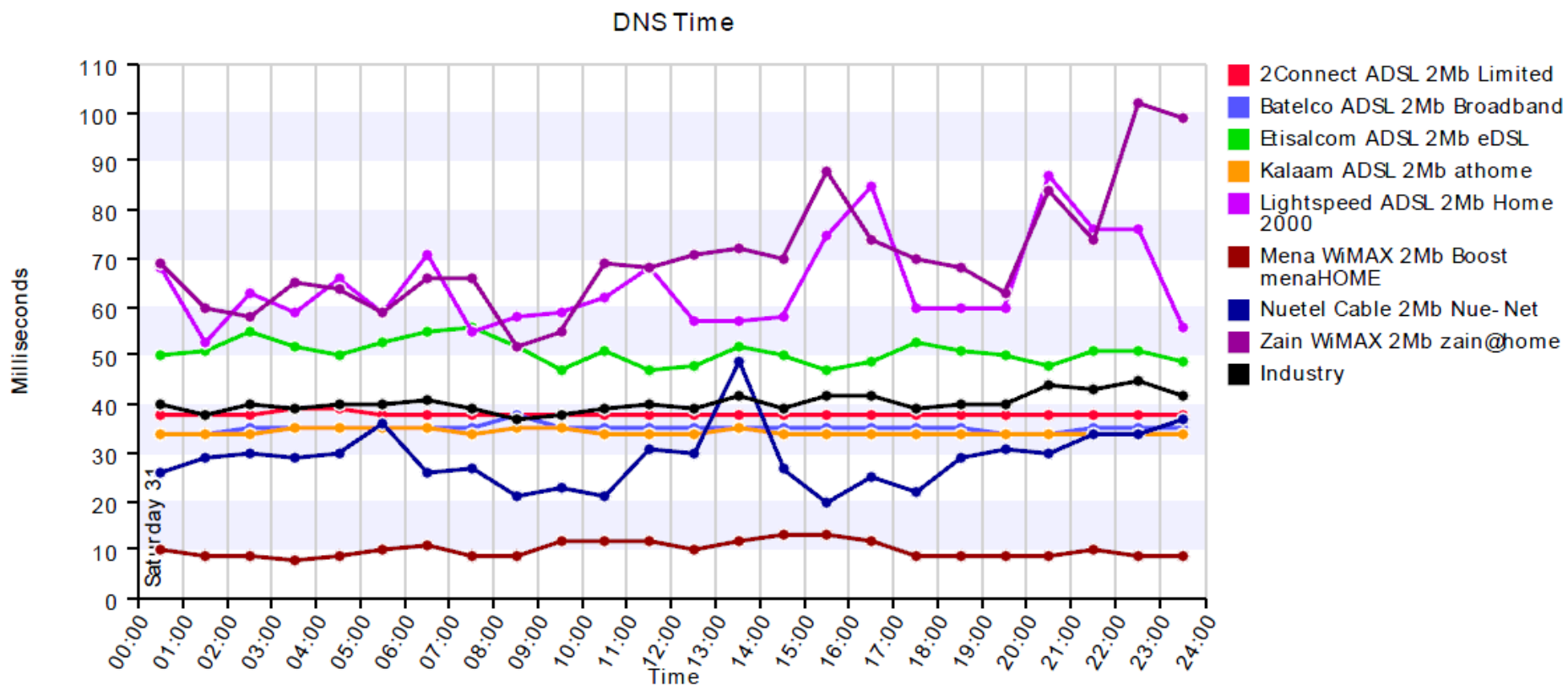
The higher is the download speed the better is the performance.

TRA Fixed Broadband Analysis Report

DNS Time

DNS Time Line Chart (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain



TRA Fixed Broadband Analysis Report

DNS Time Line Chart Values (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain

	00:00, 31 Mar	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2Connect ADSL 2Mb Limited	38	38	38	39	39	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Batelco ADSL 2Mb Broadband	34	34	35	35	35	35	35	35	38	35	35	35	35	35	35	35	35	35	35	34	34	35	35	35
Etisalatcom ADSL 2Mb eDSL	50	51	55	52	50	53	55	56	52	47	51	47	48	52	50	47	49	53	51	50	48	51	51	49
Kalaam ADSL 2Mb athome	34	34	34	35	35	35	35	34	35	35	34	34	34	35	34	34	34	34	34	34	34	34	34	34
Lightspeed ADSL 2Mb Home 2000	68	53	63	59	66	59	71	55	58	59	62	68	57	57	58	75	85	60	60	60	87	76	76	56
Mena WiMAX 2Mb Boost menaHOME	10	9	9	8	9	10	11	9	9	12	12	12	10	12	13	13	12	9	9	9	9	10	9	9
Nuetel Cable 2Mb Nue-Net	26	29	30	29	30	36	26	27	21	23	21	31	30	49	27	20	25	22	29	31	30	34	34	37
Zain WiMAX 2Mb zain@home	69	60	58	65	64	59	66	66	52	55	69	68	71	72	70	88	74	70	68	63	84	74	102	99

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DNS Time (Domain Name System) (Milliseconds)

The DNS test records the time taken (in milliseconds) to resolve a fully qualified domain name to a corresponding IP address. The DNS servers used for the query are the DNS servers (primary and secondary) dynamically assigned by the service provider when the network connection is initiated. Alternatively a specific DNS server can be configured for use during DNS tests. The test probe disables the Windows DNS Client Service responsible for caching the results of DNS requests so that the DNS query is performed on the DNS servers, and not returned from any local cache.

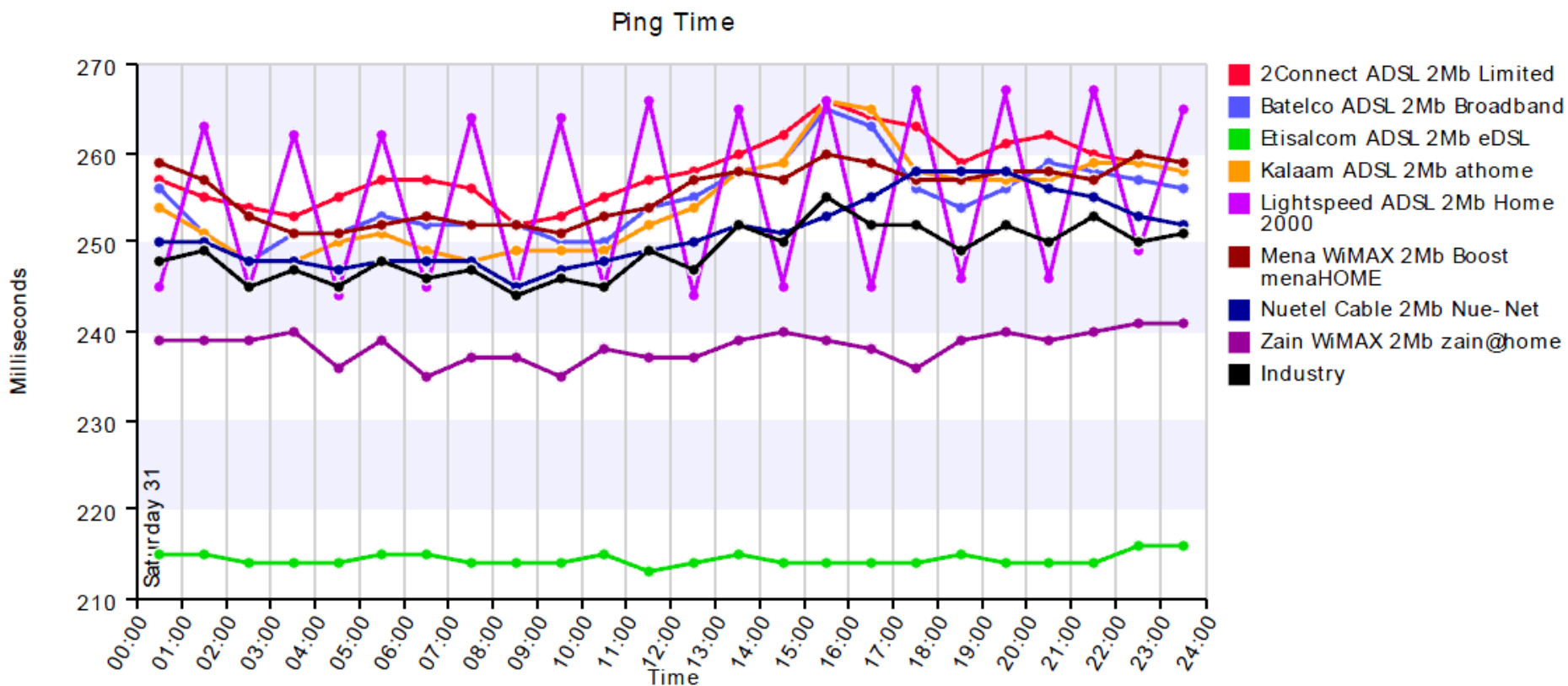
The shorter the DNS resolution time is the better is the performance.

TRA Fixed Broadband Analysis Report

Ping Time

Ping Time Line Chart (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain



TRA Fixed Broadband Analysis Report

Ping Time Line Chart Values (Peer view)

01 Apr 2012 - 30 Jun 2012, between 00:00:00 and 24:00:00 Asia/Bahrain

	00:00, 31 Mar	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2Connect ADSL 2Mb Limited	257	255	254	253	255	257	257	256	252	253	255	257	258	260	262	266	264	263	259	261	262	260	259	258
Batelco ADSL 2Mb Broadband	256	251	248	251	251	253	252	252	250	250	250	254	255	258	259	265	263	256	254	256	259	258	257	256
Etisalatcom ADSL 2Mb eDSL	215	215	214	214	214	215	215	214	214	214	215	213	214	215	214	214	214	214	215	214	214	214	216	216
Kalaam ADSL 2Mb athome	254	251	248	248	250	251	249	248	249	249	249	252	254	258	259	266	265	258	257	257	257	259	259	258
Lightspeed ADSL 2Mb Home 2000	245	263	245	262	244	262	245	264	245	264	245	266	244	265	245	266	245	267	246	267	246	267	249	265
Mena WiMAX 2Mb Boost menaHOME	259	257	253	251	251	252	253	252	251	253	254	257	258	257	257	260	259	257	257	258	258	257	260	259
Nuetel Cable 2Mb Nue-Net	250	250	248	248	247	248	248	248	245	247	248	249	250	252	251	253	255	258	258	258	256	255	253	252
Zain WiMAX 2Mb zain@home	239	239	239	240	236	239	235	237	237	235	238	237	237	239	240	239	238	236	239	240	239	240	241	241

TRA Fixed Broadband Analysis Report

Ping Time (Latency) (Milliseconds)

The Ping test measures network latency by sending an ICMP (Internet Control Message Protocol) echo request to the specified server. The time recorded by test probe is the total round trip time (in milliseconds) from the request to the echo response being received from the server. The measurements reported are the average time for tests to servers located in Bahrain, Europe and the USA.

The shorter the Latency is the better is the performance.

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