

# Testing Broadband Quality of Service Experienced (QoSE)



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# INTRODUCTION

- **Why test Broadband Quality of Service Experience?**
  - There are other metrics apart from download speed that affects a user's broadband experience
  - Diagnostics can be used to identify potential bottlenecks in the network
  - Value for money across packages can be compared
  - Consumer protection can be enhanced based on data
- **What is AT Tester?**
  - A tool developed by Lirneasia in collaboration with IIT Madras
  - Tests different parameters of quality affecting a users online experience

# PARAMETERS TESTED

Parameters	Definitions	Methods
Throughput (Download/Upload) (kbps)	The rate at which the data is sent/ received to/from a server  Min file size – 1MB (image file) Max time – 3mins	Download File size kb / (Download end time (s) – Download start time (s))
Latency (ms) (Round Trip Time – RTT)	The time taken for a packet to reach its destination and back (delays when packet transverse the network)	Average of 10 pings $\frac{\sum_{i=1}^{10} (X_i)}{10}$
Jitter	The Variation of Latency (RTT) – End to end delay from 1 packet to next in same packet stream/flow	Average of 10 pings $\sqrt{\frac{\sum_{i=1}^{10} (X_i - \bar{X})^2}{10}}$
Packet Loss	The fraction of packets that fail to reach its destination	
Network Availability	Number of times the Broadband link can be accessed within a given timeframe	(1-F/T) x 100% [where T = total number of attempts; F = number of failed attempts]

# How do the parameters affect in real time?

Service	Download (kbps)	Upload (kbps)	Latency (RTT – ms)	Jitter (ms)	Packet Loss (%)
Browsing (Text)	++	-	+	-	+
Downloading	+++	-	-	-	+
Online Shopping	+	-	+	-	+
Streaming Media	+++	-	++	++	++
VOIP	+	+	+++	+++	+++
Online Games	+	+	+++	++	++

+++ Highly Relevant; ++ Very Relevant; + Relevant; - Irrelevant

**RTT** has implications on client server interactive systems

**Jitter** adds to the noise of the transmission

**Packet Loss** affects streaming media

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# The Actual Test

- Multiple Days – weekdays including the weekends
- Different Time slots – ideally – 0800, 1100, 1500, 1800, 2000, 2300 hrs
- Varying Server Locations – ISP domain, National domain and International domain



# The AT Tester – Test Tab

## A T TESTER

**Test** Results Configuration Schedule FAQ About

**Select Service Provider**

Select Your Service Provider

Service Provider  Request for your service provider to be added to the list

Select Your Package

Your Email Address (Optional)

This is required if you want to retrieve your test results at a later date

**DOMAINS** \*At least one domain must be selected

ISP  National  International

To get the most accurate results, please close all other browsers and stop other processes that may slow down your connection

**METRICS** \*At least one metric must be selected

Download  Latency  Packet Loss

Upload  Jitter  Network Availability

**Run Test**

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**PROGRESS OF THE TEST**

Sub Process

Main Process

**Cancel**

# Mandatory Information Before Testing

A T TESTER

Test Results Configuration Schedule FAQ About

CONFIGURATION

Report View Graphical View Domain Configuration View Added Domains Admin Account Configuration Logout

ISP Name

Domain

Packages   
use comma to separate packages names

Domain Host URL   
eg: http://lirneasia.net/

Download File Location   
eg: assets/images/sample\_image.jpg

Upload File Location (Optional)   
eg: uploadsection/upload.php

- Information provided in this form is mandatory and vital for the application to run
- Need to enter the URL of a image file hosted on the ISP's Domain to test the ISP domain. File size should not be less than 1MB.

# 2012 Results Snapshot

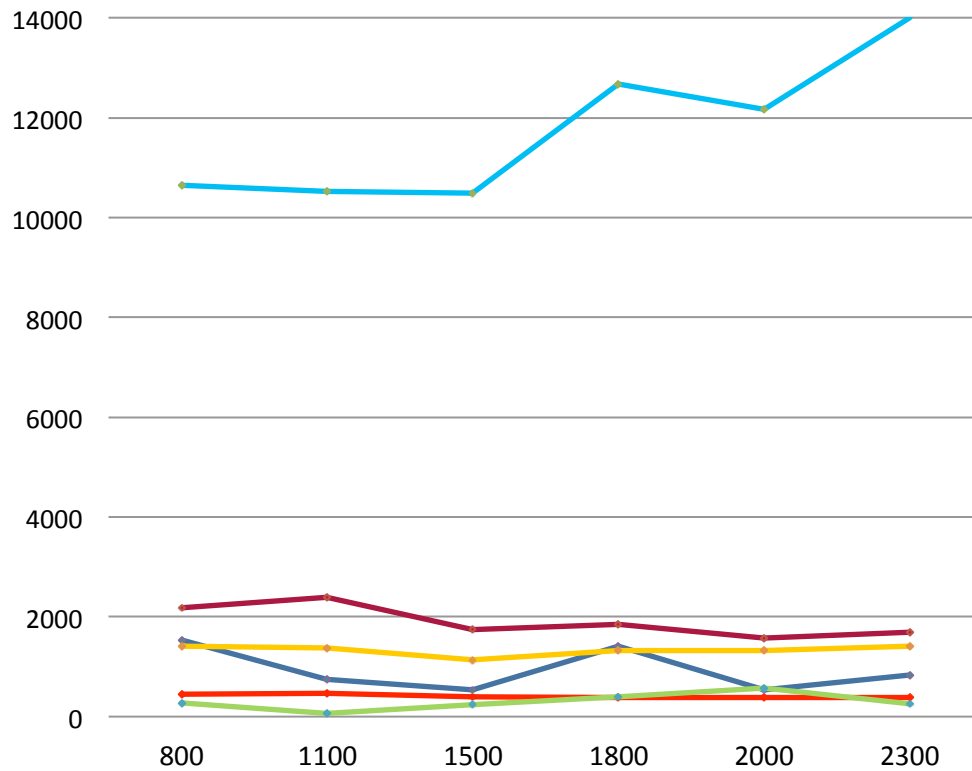
Around 50% of broadband costs are in international segment:

- **Hypothesis:**  
Performance WITHIN ISP DOMAIN > performance the INTERNATIONAL DOMAIN
- International performance may be affected because operators are economizing on the costly input of international backhaul

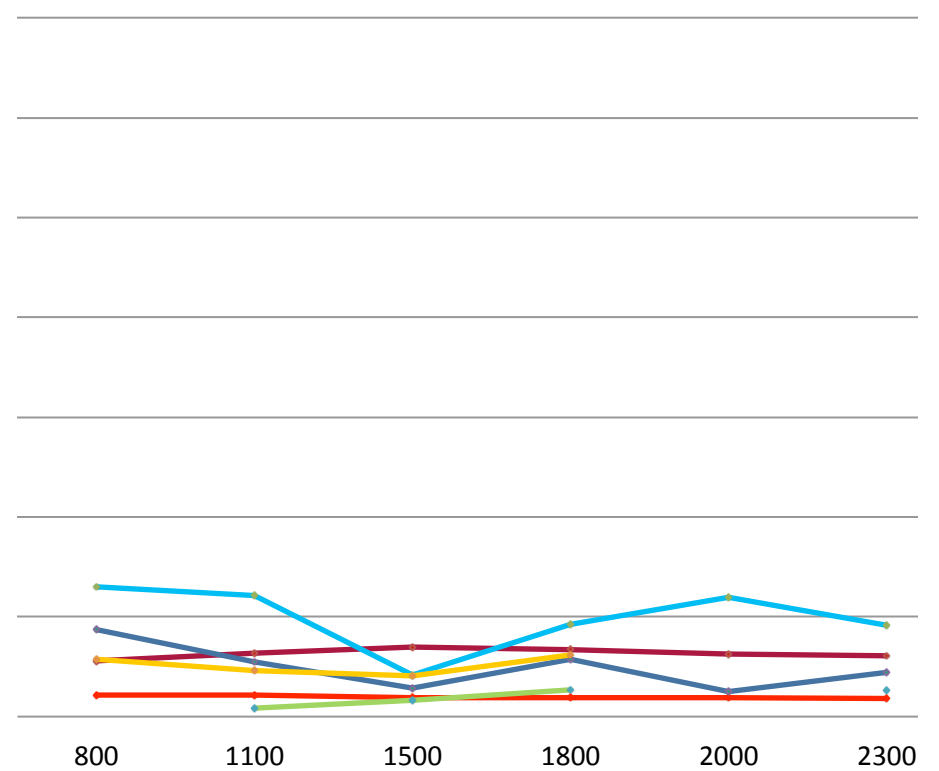


# Download speeds: ISP vs. International

Download from a server in the ISP domain (Kbps)



Download from a server in the International domain (Kbps)



- Dhiragu Fixed BB - MV
- Connect Internet Services - FJ
- Digicel - PNG
- Dhiragu Mobile BB - MV
- Vodafone - FJ
- Samoa.Ws - WS

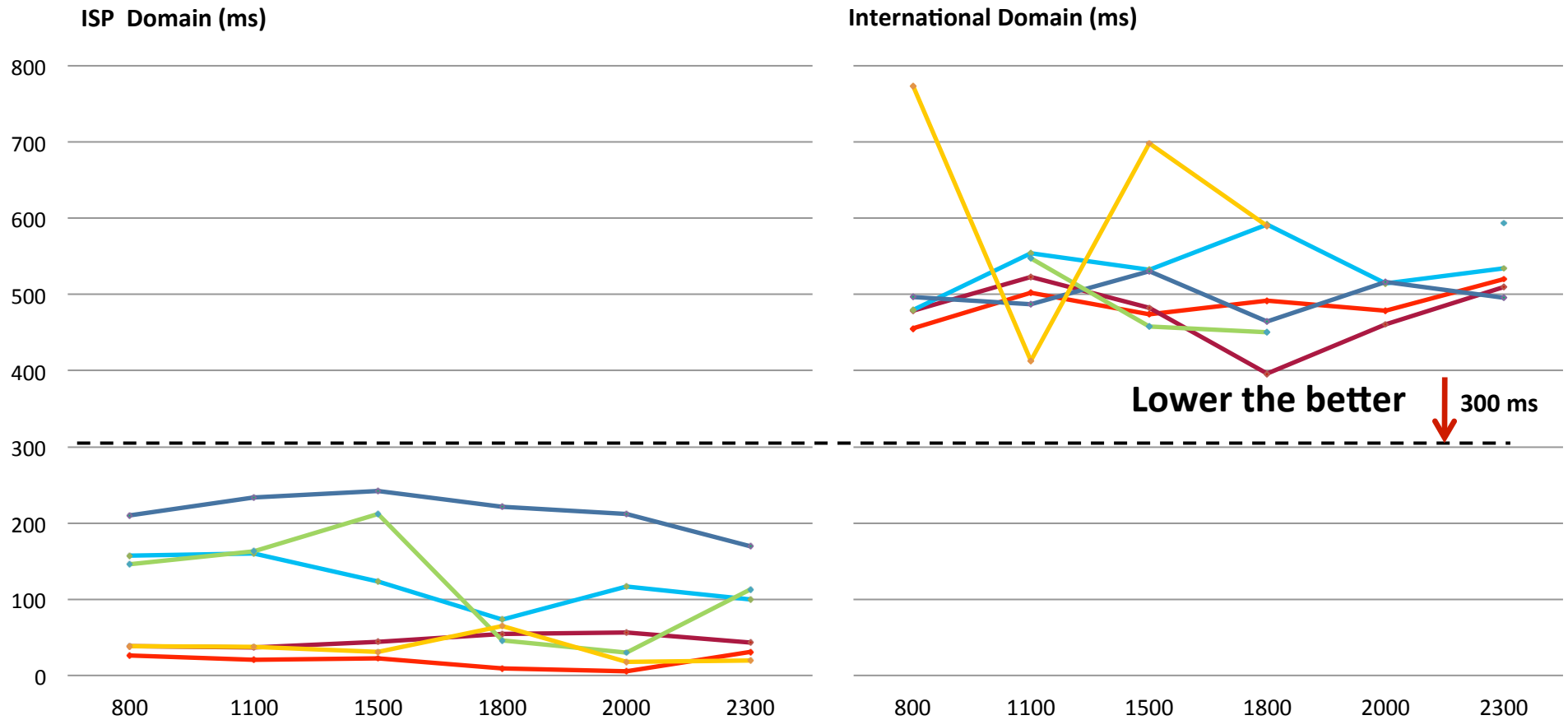
# Mixed Results

- Generally confirms the hypothesis
- But,
  - Unable to compare performance of Samoa package because of problems in data collection
  - PNG performance extremely poor in both international and ISP domains

## Return Trip Timing (RTT)

- Hypothesis: International performance likely to be lower than within ISP domain

# RTT: ISP Domain vs. International



- Dhiraagu Fixed BB - MV
- Connect Internet Services - FJ
- Digicel - PNG
- Dhiraagu Mobile BB - MV
- Vodafone - FJ
- Samoa.Ws - WS

## Bleak picture: Hypothesis confirmed

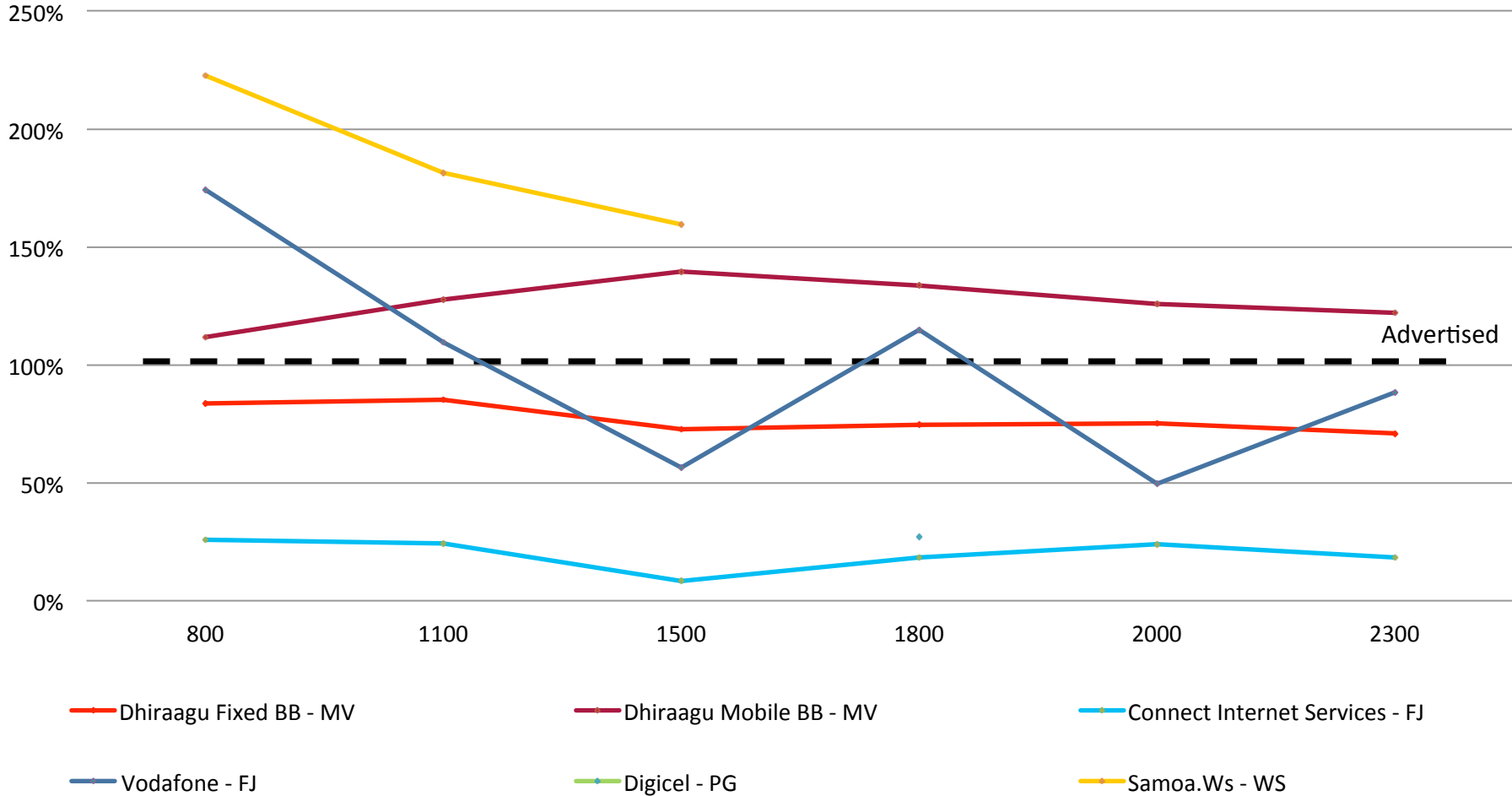
- Pretty much no tested package meets 300 ms standard
- PNG performance is the lowest

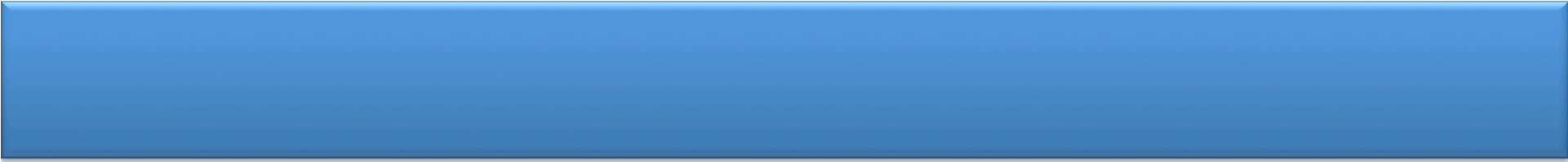


Is there truth in advertising?

PIRRC

# Download from an international server: Actual vs. advertised speeds



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- Fiji exceeds promise, most times of day
  - Samoa over 75 percent consistently
  - PNG has serious problems
  - No truth in advertising in Maldives



# Achieving advertised speeds 80% of the time?

City, Country	Male, MV		Suva, FJ		Port Moresby, PNG	Samoa
Package	Dhiraagu, 512 Kbps	Dhiraagu 3G, 1 Mbps	Connect, 10 Mbps	Vodafone, 1 Mbps	Digicel, 2 Mbps	Samoa.ws, 512 kbps
8:00 AM	428.46	1117.62	2592.6	1743.53		1140.5
11:00 AM	436.67	1277.08	2422.81	1096.3	170	929
3:00 PM	372.69	1395.46	825.62	563.22	322.5	816.5
6:00 PM	381.46	1336.00	1846	1149.66	542	1231
8:00 PM	384.67	1258.69	2390.85	495.57		
11:00 PM	363.25	1219.15	1825.5	883.83	520.5	
Average	394.53	1267.33	1983.9	988.68	388.75	1029.25

Red = performance < Advertised speed

Thank You

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