

Simon Project Presentation

An open initiative for measuring latency and traffic within Latin America, aimed to improve regional connectivity.

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- We have been talking for a long time about
 - The lack of infrastructure within in the region
 - The lack of connectivity between networks
 - The lack of more content and application in the region
 - The future of The Internet in Latin America.
- However, there is no clear idea about the how good or how bad is the connectivity within the region.

- **Myths**

- We don't have exchanges in the region.
- It is very difficult to develop regional connectivity
- There is no traffic demand between our countries

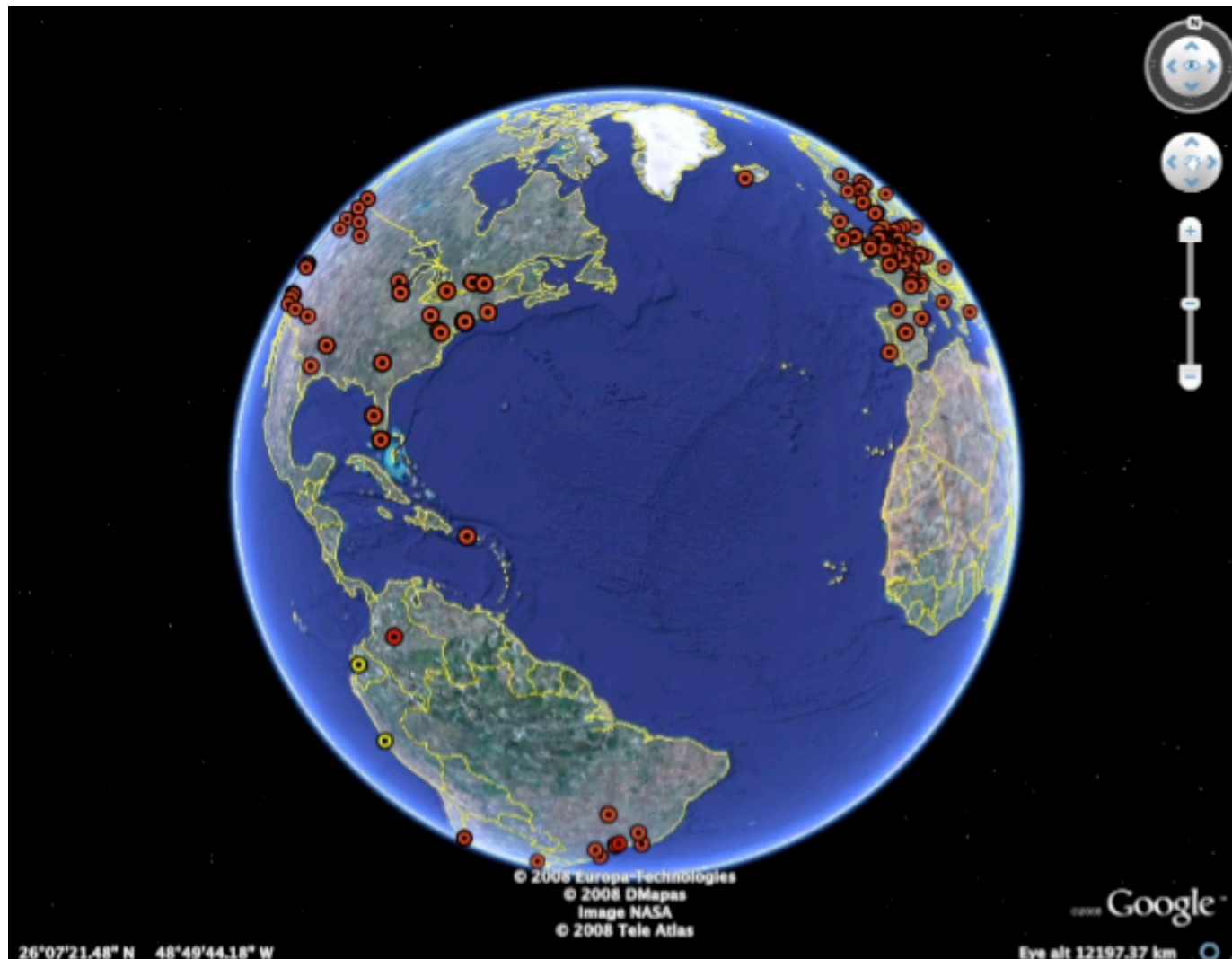
- **Truths**

- Connectivity within countries seems to be very good.
- Countries are not connected between them.
- Some regional backbones provide good RTT, but traffic between networks have very high RTT.
- Most traffic go to Miami and come back

- We have been walking in the “darkness”
 - Lack of information, prevent us
 - To have more agreements
 - To have more investments
 - To have more content/applications
 - To have a better internet



In-country traffic exchange



Internet exchange points, according to <http://www.peeringdb.com>

- **Some Numbers**

- According www.peeringdb.com (Nov/2008)

- Europe: ~ 100 Exchanges
- North America: 65 Exchanges
- Asia: 48 Exchanges
- Rest of the World: 20 Exchanges

- **South America: Countries with active Public Exchanges**

- Brazil (9)
- Colombia (1 → 2)
- Argentina (1)
- Chile (6)
- Peru (1)
- Ecuador (2)
- Others (Caribbean, and projects in other regions)

- **Concrete Numbers**

- **Population**

- ~ 435 Millions / 6,739 Millions = ~ 6% World Population

- **Exchanges**

- ~ 20 Exchanges / 233 Exchanges = ~9% World Exchanges

- **Comparison per Continent**

- Density (exchanges/million inhabitants)

- Coverage (% of population Served by Domestic IX)

Continent	Density	Coverage
NA	12.67%	64%
SA	5.46%	88%
EU	11.47%	92%
AS	0.89%	84%

- **So**

- We are not so bad 😊, actually we are in a good position

- .. and We should take advantage of that!!

- **But... what happens between countries?**

- How “*far*” are the other countries from Santiago, Chile?
 - Latency seems to be very bad
 - Sometimes, latency was 9x the theoretical latency

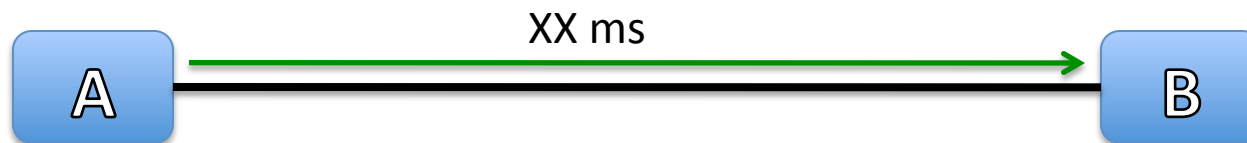
- Questions??

- Was it only me???
- What happen from other countries???
- How much traffic is affected?
- we don't know...
.... but we SHOULD KNOW

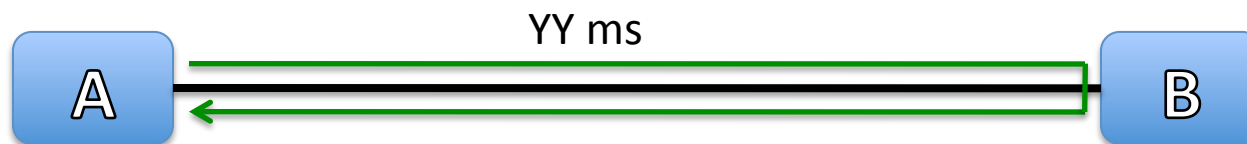
To	RTT
Argentina	~30 - 275 ms
Brazil	~162 ms
Bolivia	~137 ms
Colombia	~92 – 192 ms
Ecuador	~158 – 204 ms
Paraguay	~151 ms
Uruguay	~254 ms
USA	~130 ms

Test was done by pinging 3 or more important electronic newspapers in each country, from Santiago (from a network connected to a regional backbone)

- Network Latency:
 - It is the time difference between the moment the packet is **generated**, and the moment the packet is **received** on the other end.
 - Its is one of the quality attributes for the network.
 - **One-way** – Difficult to measure.

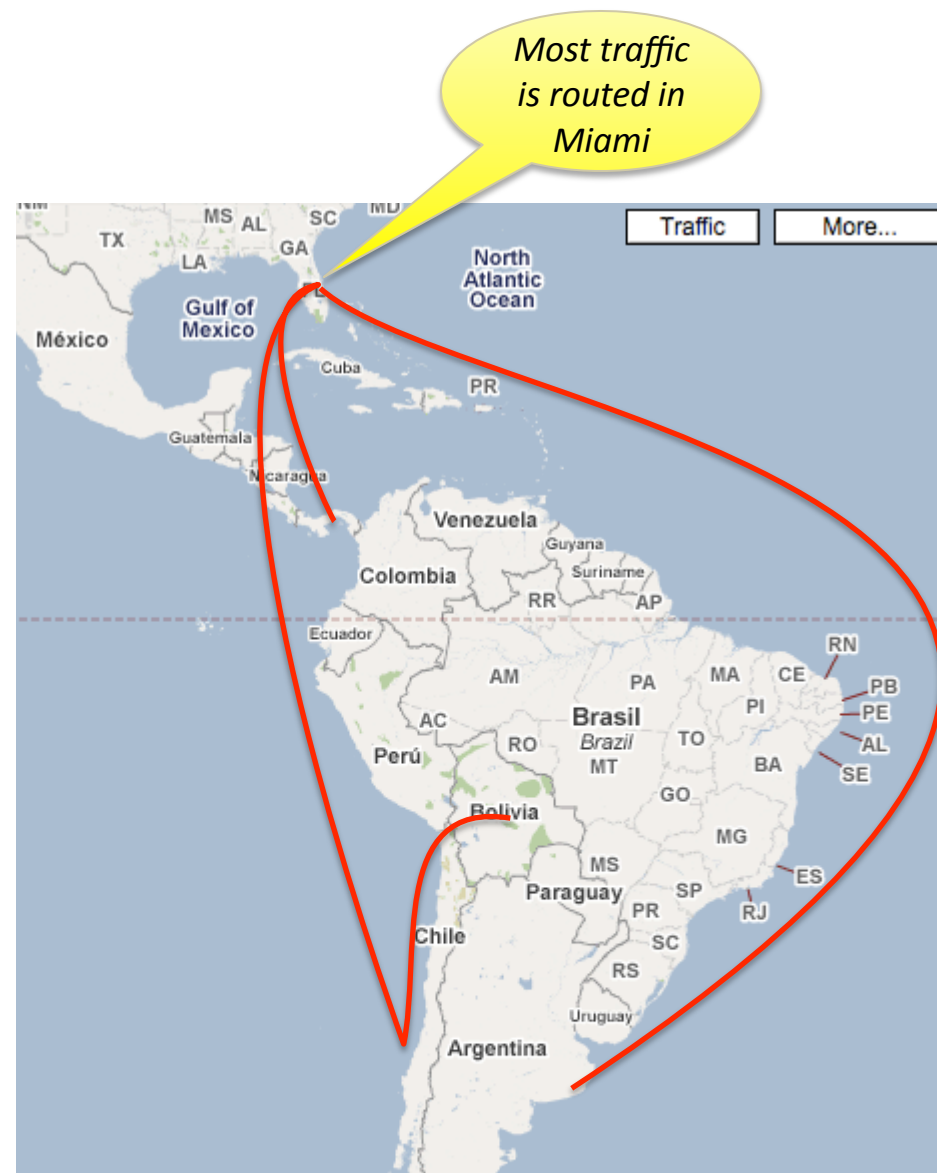


- **Round-trip-time (RTT)** – Easy to measure



Why latency is high?

- Basically, 3 reasons:
 - IP forwarding?
 - Not anymore
 - Congestion
 - Bandwidth is expensive
 - Sub-optimal routing
 - No enough “peering”
 - No enough infrastructure



Fictitious image, only for the purpose of illustrating the problem.

Simon Project

<http://simon.lacnic.net>

- **Objectives**

- Collect **Latency and Traffic** information for Latin America (and make it available)
- Provide information for help backbone providers to **interconnect**, locally
- Provide information for telecom companies willing to **invest in network infrastructure** within the region.

- **Final Outcome**

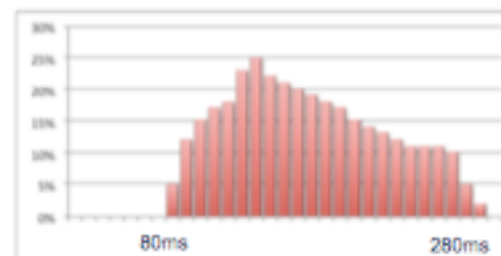
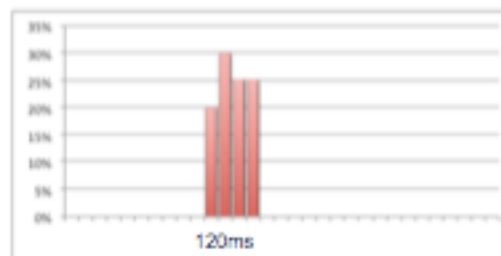
- **Improve connectivity** in Latin America.

- **Country Latency Matrix**

- A “aggregated” matrix, to understand the latency between each pair of countries.

- No specific details in a per ISP basis.
- Statistic parameters (min, max, avg, med, stdDev)

	Country 1	Country 2		Country N
Country 1				
Country 2	Average: xx ms Std Dev: xx ms			
Country 3				
.....				
Country N				

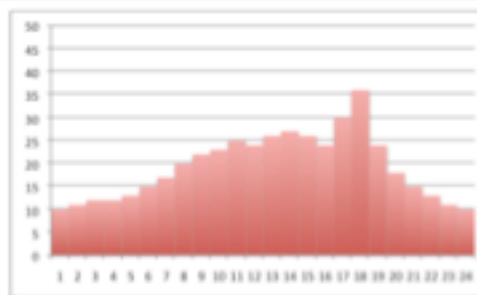
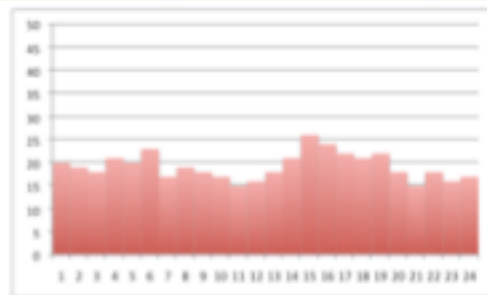


- **Country Traffic Matrix**

- A “aggregated” matrix, to estimate the traffic volumes between each pair of countries.

- No specific details in a per ISP basis.
- Just to provide an “order of magnitude”

	Country 1	Country 2		Country N
Country 1				
Country 2	Volume: xx GBytes Bandwidth: xx GB/sec			
Country 3				
.....				
Country N				



- **Collaboration!!**

- **Invite** users, ISPs, organizations, content providers, infrastructure providers, etc...
 - LACNIC will be the leading organization..
- **Develop** “tools” to automate the data collection.
- Ask participants to run the tests, and **Collect** “aggregated” information to the central repository.
- Provide **reports** to the participants.

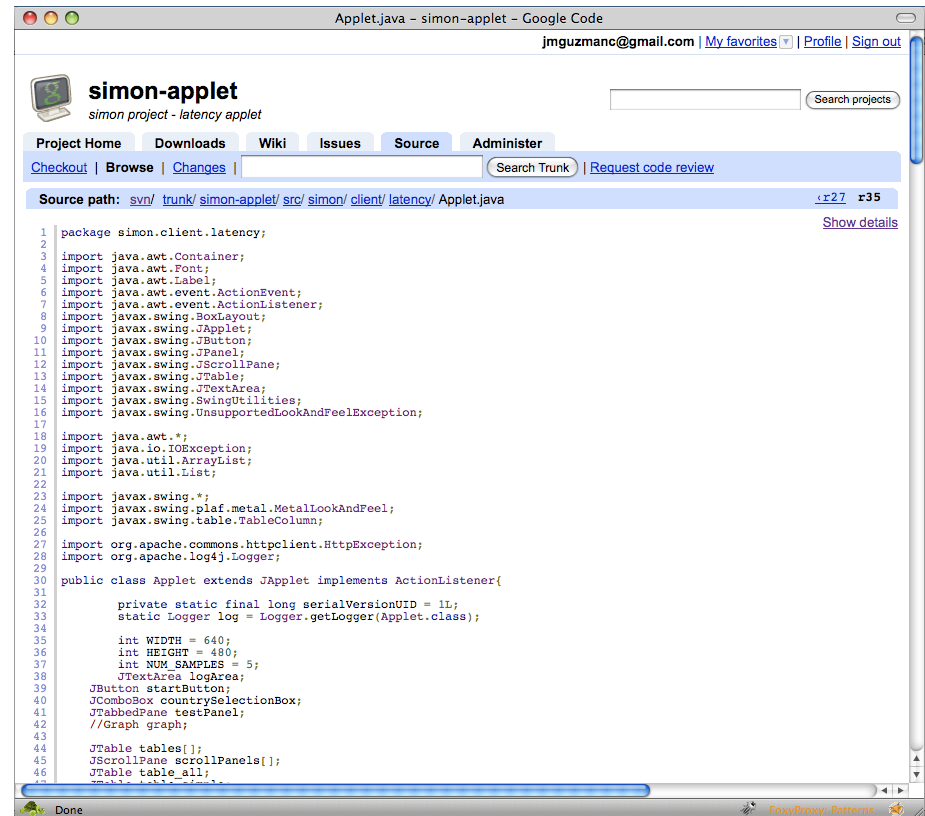
- **Latency Measurement**

- Java Applet to collect latency from user browsers and send to a central server.
- Central web site, to aggregate and report

- **Traffic Measurement**

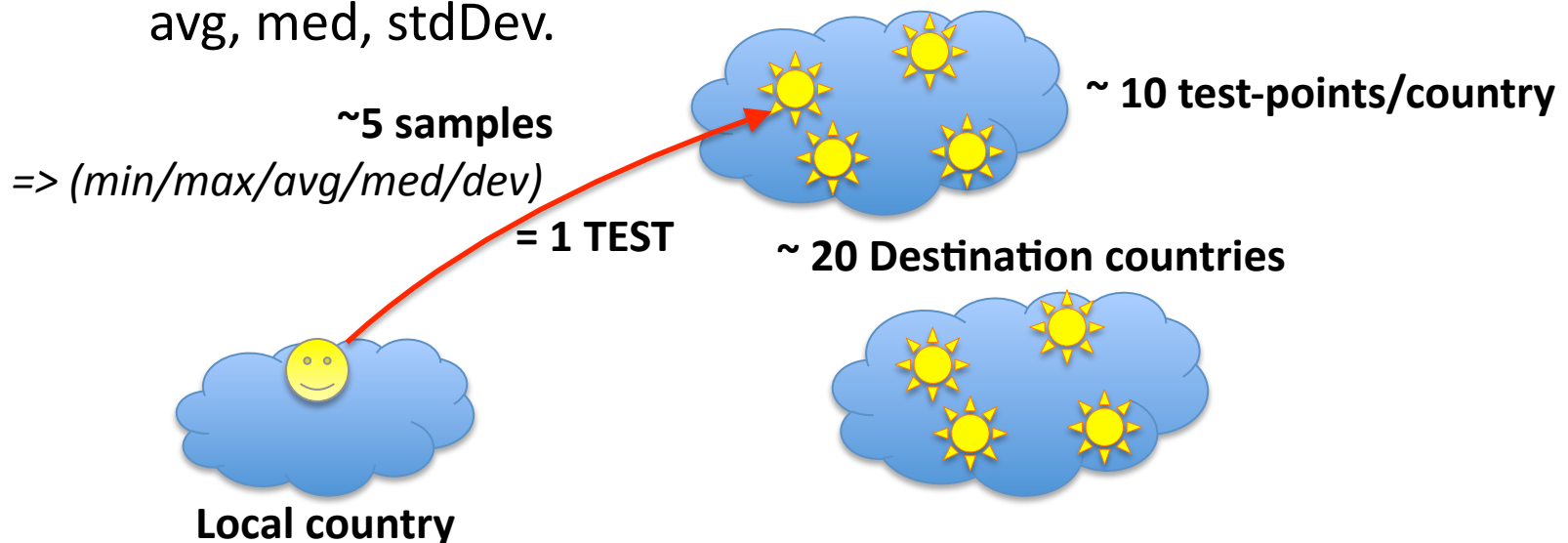
- Software component to capture Netflow information from routers, and produce aggregated information
- Central web site, to aggregate and report

- All the tools are developed by using a **open source** approach.
 - Anybody can contribute and improve the tools
 - Anybody can see what the tools do
 - This tools can help other regions too.

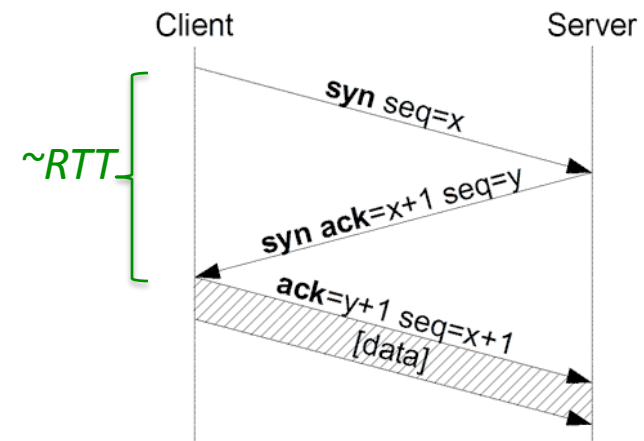


```
1 package simon.client.latency;
2
3 import java.awt.Container;
4 import java.awt.Font;
5 import java.awt.Label;
6 import java.awt.event.ActionEvent;
7 import java.awt.event.ActionListener;
8 import javax.swing.BoxLayout;
9 import javax.swing.JApplet;
10 import javax.swing.JButton;
11 import javax.swing.JPanel;
12 import javax.swing.JScrollPane;
13 import javax.swing.JTable;
14 import javax.swing.JTextArea;
15 import javax.swing.SwingUtilities;
16 import javax.swing.UnsupportedLookAndFeelException;
17
18 import java.awt.*;
19 import java.io.IOException;
20 import java.util.ArrayList;
21 import java.util.List;
22
23 import javax.swing.*;
24 import javax.swing.plaf.metal.MetalLookAndFeel;
25 import javax.swing.table.TableColumn;
26
27 import org.apache.commons.httpclient.HttpException;
28 import org.apache.log4j.Logger;
29
30 public class Applet extends JApplet implements ActionListener{
31
32     private static final long serialVersionUID = 1L;
33     static Logger log = Logger.getLogger(Applet.class);
34
35     int WIDTH = 640;
36     int HEIGHT = 480;
37     int NUM_SAMPLES = 5;
38     JTextArea logArea;
39     JButton startButton;
40     JComboBox countrySelectionBox;
41     JTabbedPane testPanel;
42     //Graph graph;
43
44     JTable tables[];
45     JScrollPane scrollPanels[];
46     JTable table_all;
47     JTable table_individual;
```

- **Hundreds of “Test Points”**
 - Spread across all the region.. and adding more.
- **Thousands of “Testers”**
 - Any user, with a java-enabled browser, from any country
 - **Each Tester**
 - Tests ~200 test-points across ~ 20 countries
 - For each test point, several samples, providing min, max, avg, med, stdDev.



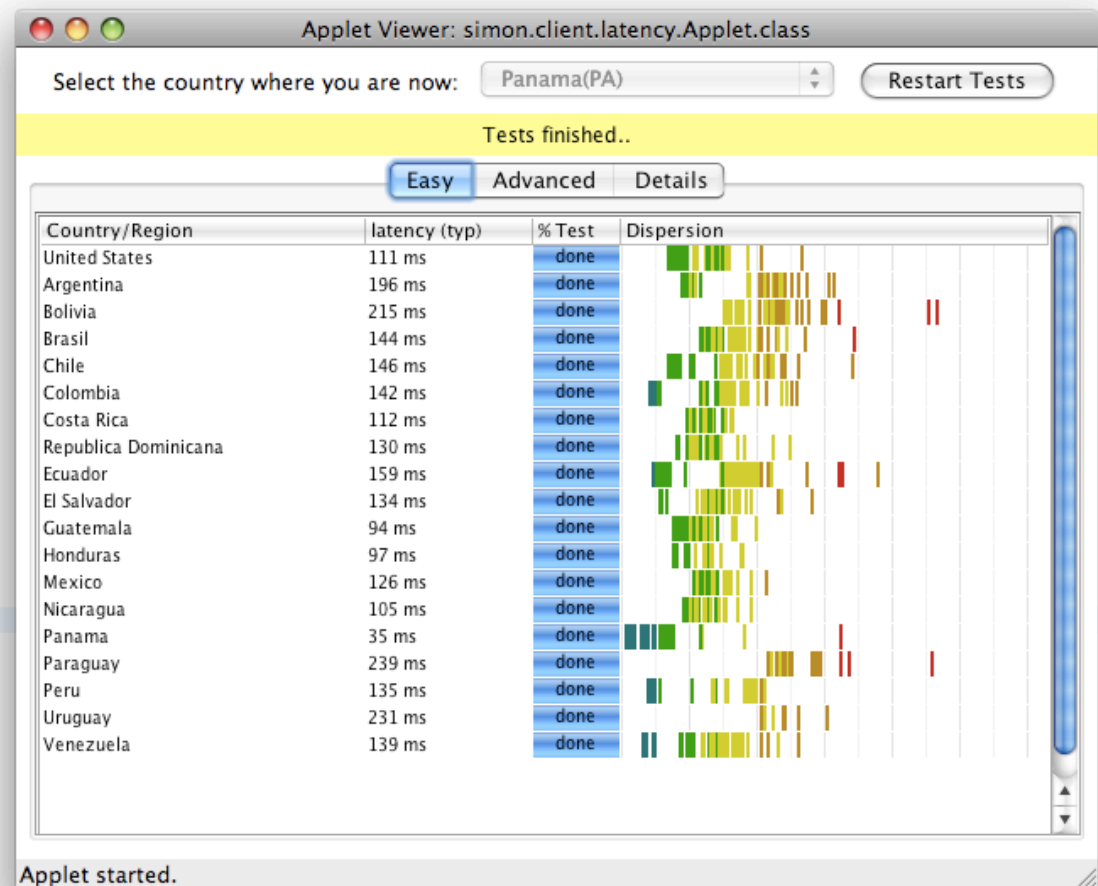
- **Test Protocols**
 - **No ICMP (ping?)**
 - Low priority traffic
 - Not supported by Java ☹
 - We use **production Traffic**
(no low-priority traffic)
 - **NTP** (UDP)
 - **TCP** (TCP handshake)



Demo

<http://simon.lacnic.net>

- Simon-Applet: Latency Measurement
 - ~ 30K tests from 10 countries, in 1 week!



- Countries with better connectivity from USA

Pais de Origen: UNITED STATES

Pais Destino	RTT				Muestras
	Min	Med	Prom	Max	
COSTA RICA	90 ms	156 ms	184 ms	1212 ms	204
ECUADOR	104 ms	197 ms	225 ms	1882 ms	192
GUATEMALA	80 ms	128 ms	159 ms	702 ms	187
NICARAGUA	92 ms	192 ms	224 ms	1506 ms	153
URUGUAY	228 ms	303 ms	344 ms	1225 ms	46
BRAZIL	158 ms	211 ms	240 ms	715 ms	203
ARGENTINA	156 ms	228 ms	265 ms	731 ms	346
PARAGUAY	201 ms	274 ms	306 ms	1219 ms	118
EL SALVADOR	53 ms	136 ms	170 ms	654 ms	191
BOLIVIA	145 ms	251 ms	277 ms	740 ms	186
CHILE	157 ms	199 ms	228 ms	727 ms	204
VENEZUELA	90 ms	160 ms	200 ms	1105 ms	76
PERU	127 ms	195 ms	227 ms	1166 ms	204
MEXICO	30 ms	127 ms	156 ms	612 ms	199
DOMINICAN REPUBLIC	56 ms	138 ms	163 ms	696 ms	192
HONDURAS	80 ms	119 ms	149 ms	535 ms	85
UNITED STATES	20 ms	75 ms	79 ms	1394 ms	58
AMERICAN SAMOA	104 ms	226 ms	225 ms	329 ms	55
PANAMA	37 ms	141 ms	170 ms	716 ms	168
COLOMBIA	97 ms	163 ms	193 ms	696 ms	204

SimonProject Analysis

- Quality is not symmetrical?

Pais de Origen:

Pais Destino	RTT				Muestras
	Min	Med	Prom	Max	
COSTA RICA	180 ms	219 ms	246 ms	1638 ms	60
ECUADOR	92 ms	260 ms	272 ms	1905 ms	60
GUATEMALA	158 ms	222 ms	233 ms	1620 ms	77
NICARAGUA	173 ms	236 ms	240 ms	590 ms	70
URUGUAY	26 ms	97 ms	124 ms	518 ms	8
BRAZIL	37 ms	195 ms	211 ms	1600 ms	60
ARGENTINA	6 ms	46 ms	65 ms	1398 ms	59
PARAGUAY	24 ms	78 ms	96 ms	908 ms	34
EL SALVADOR	139 ms	218 ms	233 ms	1132 ms	60
BOLIVIA	73 ms	320 ms	341 ms	1734 ms	65
CHILE	27 ms	196 ms	200 ms	543 ms	60
VENEZUELA	117 ms	204 ms	224 ms	1227 ms	23
PERU	60 ms	238 ms	255 ms	1256 ms	72
MEXICO	200 ms	265 ms	290 ms	1373 ms	55
DOMINICAN REPUBLIC	134 ms	218 ms	238 ms	1314 ms	71
HONDURAS	160 ms	208 ms	220 ms	1128 ms	30
UNITED STATES	156 ms	228 ms	243 ms	1571 ms	55
AMERICAN SAMOA	316 ms	421 ms	431 ms	1440 ms	77
PANAMA	151 ms	207 ms	230 ms	1348 ms	40
COLOMBIA	124 ms	228 ms	237 ms	1650 ms	84

Pais de Origen:

Pais Destino	RTT				Muestras
	Min	Med	Prom	Max	
COSTA RICA	114 ms	242 ms	254 ms	1158 ms	364
ECUADOR	214 ms	312 ms	328 ms	1669 ms	360
GUATEMALA	180 ms	235 ms	242 ms	1835 ms	330
NICARAGUA	207 ms	271 ms	286 ms	1754 ms	270
URUGUAY	3 ms	48 ms	58 ms	984 ms	60
BRAZIL	259 ms	303 ms	307 ms	625 ms	360
ARGENTINA	18 ms	247 ms	258 ms	1398 ms	360
PARAGUAY	114 ms	215 ms	230 ms	1258 ms	250
EL SALVADOR	152 ms	230 ms	237 ms	853 ms	359
BOLIVIA	262 ms	354 ms	363 ms	910 ms	330
CHILE	259 ms	295 ms	298 ms	640 ms	360
VENEZUELA	228 ms	245 ms	265 ms	1169 ms	52
PERU	245 ms	303 ms	317 ms	1588 ms	360
MEXICO	216 ms	280 ms	286 ms	649 ms	275
DOMINICAN REPUBLIC	161 ms	246 ms	255 ms	970 ms	360
HONDURAS	114 ms	200 ms	204 ms	570 ms	170
UNITED STATES	181 ms	233 ms	235 ms	434 ms	332
AMERICAN SAMOA	350 ms	456 ms	460 ms	1017 ms	330
PANAMA	114 ms	223 ms	231 ms	1256 ms	320
COLOMBIA	204 ms	252 ms	258 ms	639 ms	360



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We believe on “**people**” driving changes!

In this case “*people*”

is not “*other people*” ...

is You!

Take the challenge.. Help your region!

SimonProject

Thanks!

ProyectoSimón

Gracias!

SimonProject

Thank you!

ProjetoSimão

Obrigado!