



RNP Performance Measurement

MonIPÊ Project

Network performance measurement service expansion using low cost, small form-factor hardware

RNP
Research and Development Division

Outubro 2013

Ministério da
Cultura

Ministério da
Saúde

Ministério da
Educação

Ministério da
Ciência, Tecnologia
e Inovação

GOVERNO FEDERAL
BRASIL
PAÍS RICO É PAÍS SEM POBREZA

AGENDA

About MonIPÊ

- RNP's perfSONAR-based monitoring service
- Service architecture
- Measurement scenarios
- Types of measurements
- Network metrics
- Service infrastructure in the backbone
- Measurement kit for client institutions
- Measurements portal

Service Pilot

- Objectives
- Scenarios to be evaluated

Measurement services

Objectives

- High precision measurements of network performance
- Reports of regular measurements
- Last mile performance measurements
- An environment for verification and monitoring of network performance
- Coverage expansion of measurement points
- Instrumenting the network of end users

Measurement Scenarios

International (WAN)

- Regular measurements between RNP and other NRENs

Backbone (WAN)

- Regular measurements in all backbone links between the core network PoPs

Access and Last Mile (End users)

- Regular measurements between PoPs and their directly connected client institutions

Types of Measurements

All measurements have duration as one of their main characteristics:

On-demand

- Small timeframe measurements by any user that needs to diagnose end to end performance (e.g.: videoconferencing application for a meeting)

Periodic

- Scheduled and stored for evaluation of specific events and periodic diagnostics (e.g.: demos)

Permanent

- Unlimited duration, intended to support proactive network performance management

Metrics

Monitoring should be able to report

- One-way delay
- Bidirectional delay
- Packet loss
- Achievable bandwidth (in both TCP and UDP)

MonIPE Infrastructure

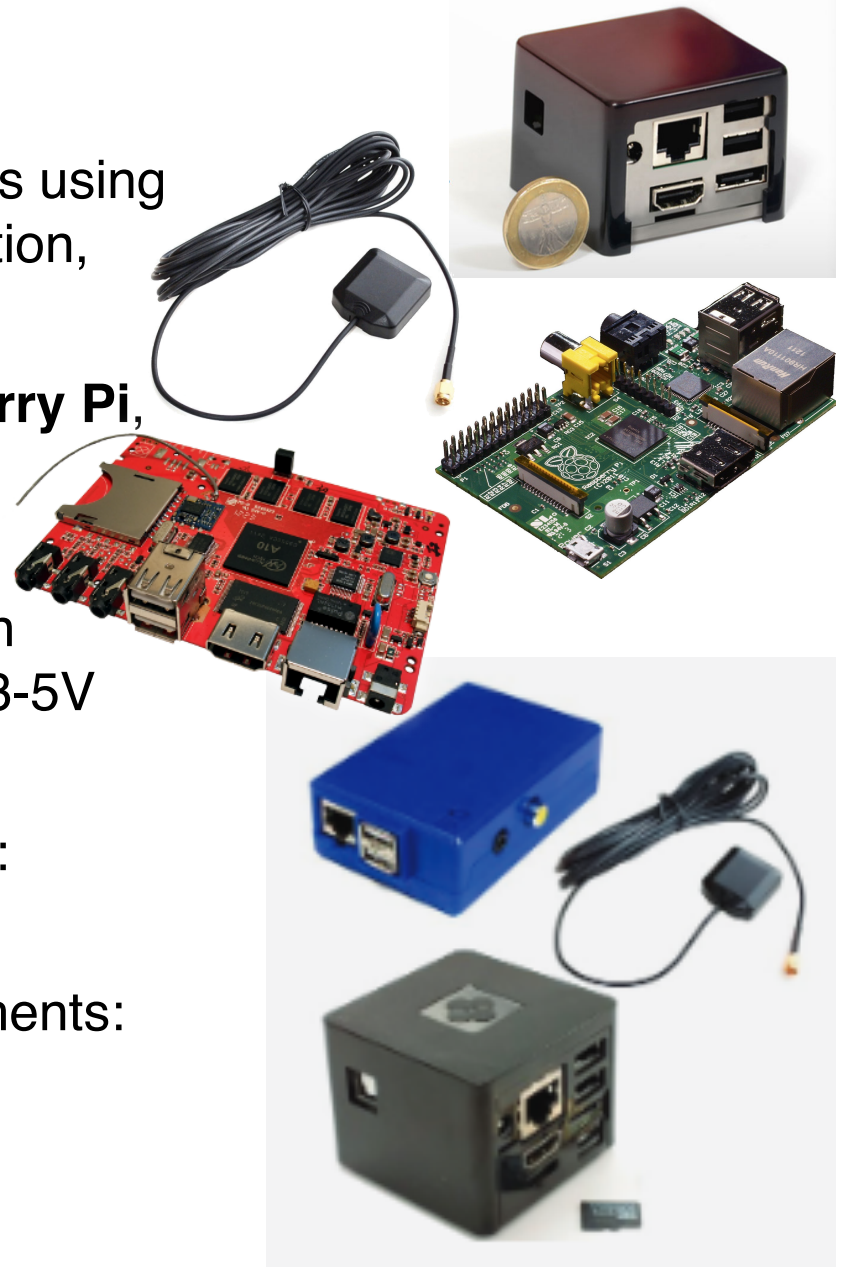
- Core network (Ipê Network) will have a measurement portal and information services by measurement points located at PoPs

MPs at PoPs

- Measurement points (MPs) in virtual machines for delay and achievable bandwidth measurements
- MPs for measurements of achievable bandwidth up to 10Gbps will be built and deployed

End user client institution measurement points

- Project developed kits of measurement points for high precision delay measurements using low cost and power consumption, small form-factor hardware
- Evaluated platforms: **Raspberry Pi**, **CuBox** and **Hackberry**
- GPS antenna: **Adafruit GPS** used for clock synchronization (Adafruit GPS SMA Antenna 3-5V 28dB 5m - External, Active)
- MPs for delay measurements: **Raspberry Pi**
- MPs for bandwidth measurements: **CuBox**

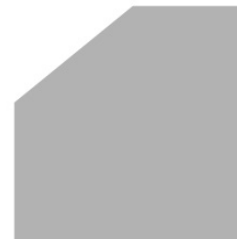


1. Raspberry Pi: <http://www.raspberrypi.org/>
2. CUBox: <http://http://cubox-i.com/>
3. MonIPE Components: <http://goo.gl/rNEFWO>

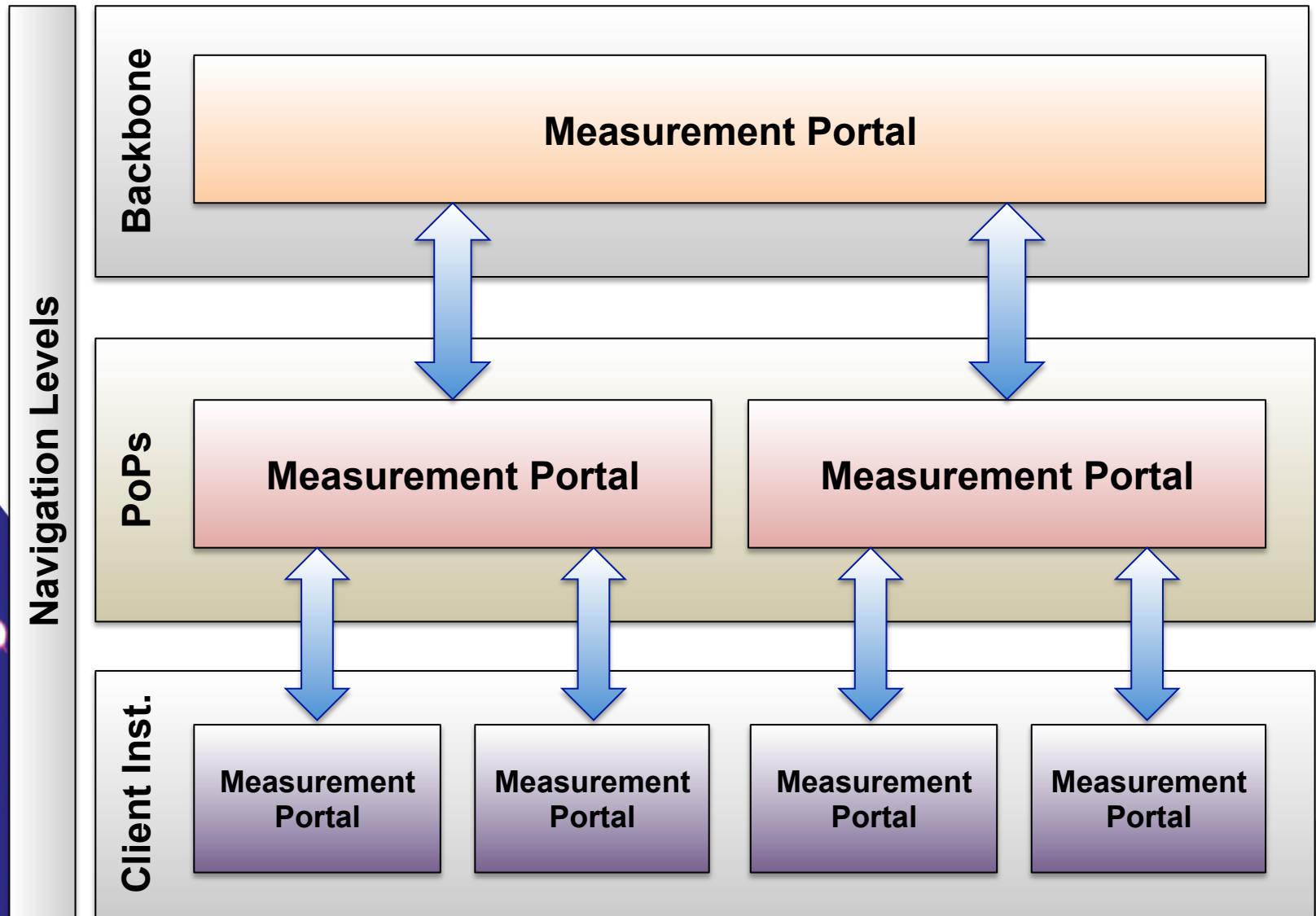
Measurement Portal

Some development premises

- Simplified deployment
- Measurement portal with seamless navigation
- Web based graphic user interface for:
 - Management
 - Kits configurations
 - Measurement tests scheduling



MonIPE Portal Navigation Architecture



MonIPE User Interface: Bandwidth Test

Portal PoP-SC

Portal

Painel de Monitoração

Configurações

admin

BR

Outros Portais

TESTE SUA REDE

Vazão

Atraso Bidirecional

Atraso Unidirecional

Rota

AGENDAMENTOS

Ponto-a-Ponto

Ponto-a-Multiponto

Multi-a-Multiponto

VISUALIZAR

Meus Testes

Testes Agendados

Teste de Vazão

Tipo de Teste*

Vazão TCP BOTH - Modelo vazão TCP

Host A

200.237.196.135

Sentido



Host B

150.162.54.78

Interval

1

Duration

10

Executar

Resposta

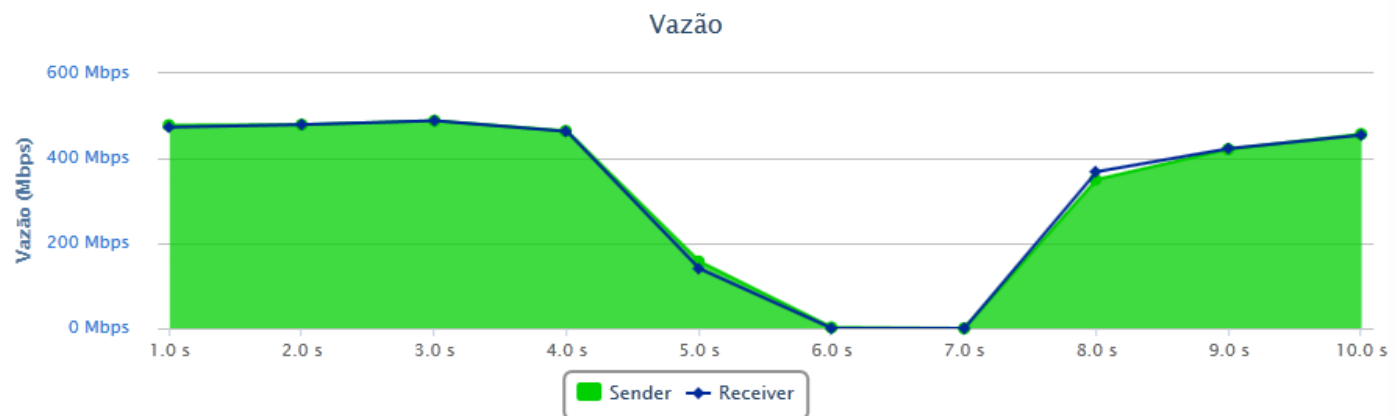
Gráfico

Tabela

Texto Simples

Requisição perfSONAR

Resposta perfSONAR



Salvar Resultado

Evento: Nenhum evento associado.

Tornar resultado público

MonIPE User Interface: One-way Delay Test

Portal PoP-SC

Portal

Painel de Monitoração

Configurações

admin

BR

Outros Portais

TESTE SUA REDE

Vazão

Atraso Bidirecional

Atraso Unidirecional

Rota

AGENDAMENTOS

Ponto-a-Ponto

Ponto-a-Multiponto

Multi-a-Multiponto

VISUALIZAR

Meus Testes

Testes Agendados

Teste de Atraso Unidirecional

Tipo de Teste

Atraso USM Default - Modelo de Atraso Unidirecional Sum...

Host A

200.237.196.135

Sentido

➔

Host B

200.237.196.141

Count

10

Executar

Resposta

Gráfico

Tabela

Texto Simples

Requisição perfSONAR

Resposta perfSONAR



Salvar Resultado

Evento: Nenhum evento associado.

Tornar resultado público

MonIPE User Interface: Scheduler

Portal PoP-SC

Portal

Painel de Monitoração

Configurações

admin

BR

Outros Portais

TESTE SUA REDE

- Vazão
- Atraso Bidirecional
- Atraso Unidirecional
- Rota

AGENDAMENTOS

- Ponto-a-Ponto
- Ponto-a-Multiponto
- Multi-a-Multiponto

VISUALIZAR

- Meus Testes
- Testes Agendados

Testes agendados

Nome da Agenda: Matriz RASP
Tipo de Agenda: Multi-a-Multiponto
Tipo de Teste: Atraso Bi.
Data: 13-09-2013 14:51:19

Parâmetros
count: 10

Última hora Últimas 24 horas Últimos 7 dias Último mês

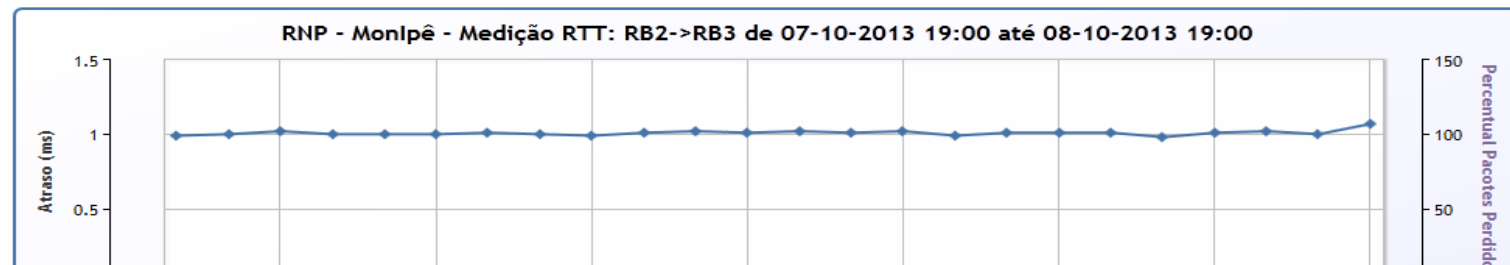
Data de Início: 07/10/2013 Hora de Início: 19:00 Data de Fim: 08/10/2013 Hora de Fim: 19:00

Mostrar Resultados Voltar

Medição Atraso Bidirecional 07-10-2013 19:00 a 08-10-2013 19:00

Pacotes Perdidos	P (Pacotes): Total / Perdidos / % Perda	% Perda:	0% a 1%	1% a 20%	20% a 50%	> 50%	Sem dados
Variação	V (Variação): Mínima / Média / Máxima	V. Máxima:	< 4ms	4ms a 10ms	10ms a 20ms	> 20ms	
Atraso	A (Atraso): Mínimo / Média / Máximo	(Máx - Mín):	< 10ms	10ms a 20ms	20ms a 50ms	> 50ms	
Testes Perdidos	T (Testes): Total / Perdidos / % Perda	% Perda:	0% a 1%	1% a 20%	20% a 50%	> 50%	

	CB1	CB2	RB1	RB2	RB3	RB4
CB1		█	█	█	█	█
CB2	█		█	█	█	█
RB1	█	█		█	█	█
RB2	█	█	█		█	█
RB3	█	█	█	█		█
RB4	█	█	█	█	█	



MonIPE Portal Administrative Interfaces

The screenshot displays the MonIPE Portal Administrative Interface in a browser window. The browser tab is labeled "Portal perfSONAR". The interface has a dark navigation bar with "PROTOTYPE" on the left and "Portal", "Monitoring Panel", and "Configurations" in the center. On the right of the navigation bar, it shows "rnp" and "EN".

On the left side, there are three menu categories:

- SYSTEM**
 - Users
 - Environment
 - Firewall
- MANAGEMENT**
 - Hosts** (highlighted)
 - Groups
 - Events
- MODELS**
 - Schedule
 - Testes

The main content area is titled "Hosts" and features a search bar with the placeholder text "Search...". Below the search bar is a table with the following columns: Organization, ID, Hostname, Active, and Edit. The table contains six rows of data, each with a checkbox in the first column.

<input type="checkbox"/>	Organization	ID	Hostname	Active	Edit
<input type="checkbox"/>	ABC	Host não identificado	nms4.jp.apan.net	✘	✎
<input type="checkbox"/>	ABC	Host não identificado	perfsonar.ncsa.illinois.edu	✘	✎
<input type="checkbox"/>	ABC	Host não identificado	nms1.jp.apan.net	✘	✎
<input type="checkbox"/>	ABC	Host não identificado	mp2.pop-mg.rnp.br	✘	✎
<input type="checkbox"/>	ABC	Host não identificado	200.237.193.207	✘	✎
<input type="checkbox"/>	ABC	Host não identificado	200.131.1.62	✘	✎

At the bottom of the table, there are two buttons: "Save" (blue) and "Delete" (red).

MonIPE Pilot

Objectives

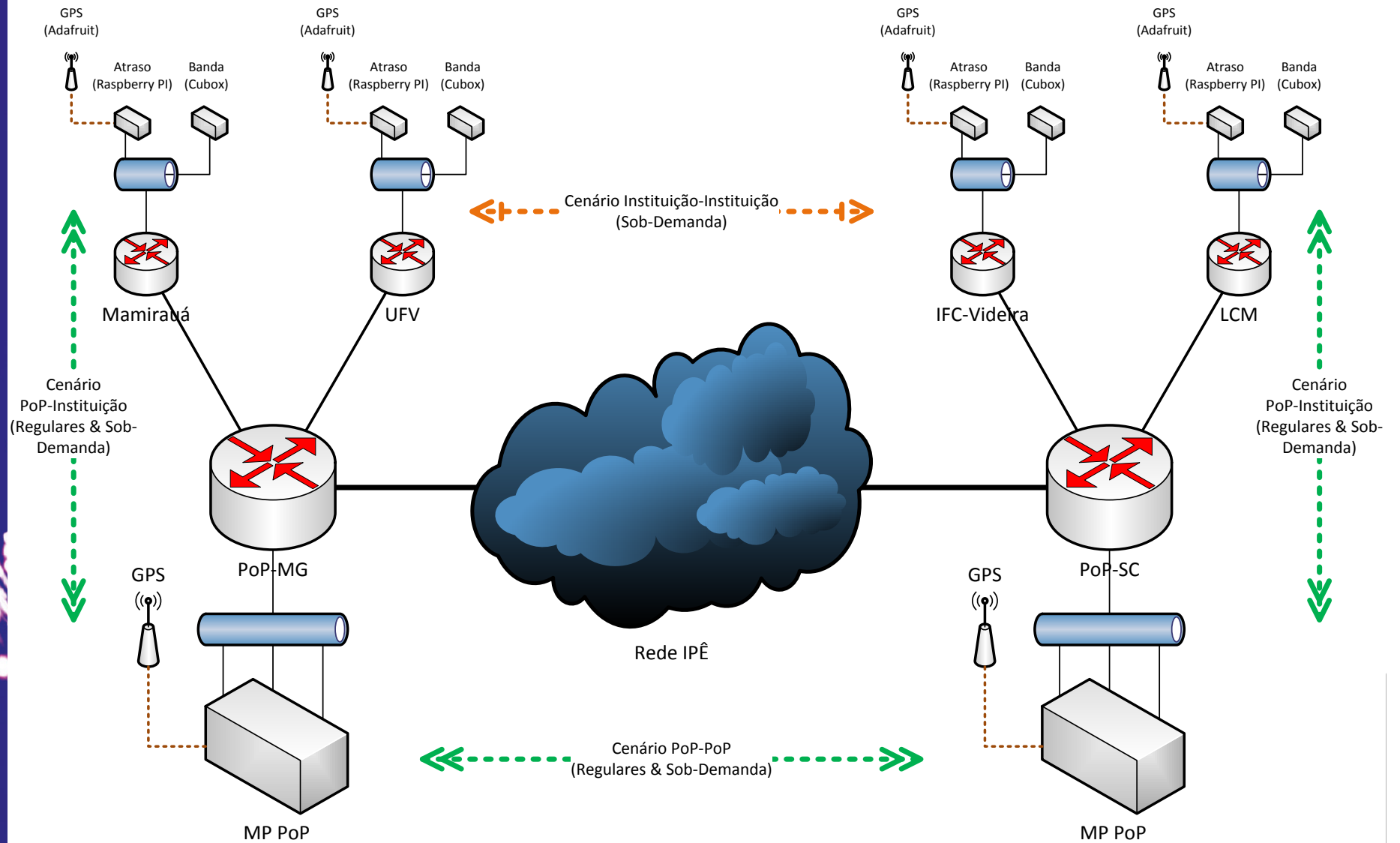
- 1. Service model validation:** deploy MonIPE infrastructure at RNP PoPs and end user institutions
- 2. Service tests between domains**
 - Schedule regular bandwidth and delay tests between RNP's PoPs
 - Schedule regular bandwidth and delay tests between PoPs and user institutions
- 3. Perform on-demand tests between end user institutions**
- 4. Get feedback from end users for fixes and improvements**

Pilot Evaluation Scenarios

- **PoP to PoP**
 - Test scheduling between PoPs
 - On-demand tests
- **PoP to Clients**
 - Test scheduling between PoPs and user institutions
 - On-demand tests requests
- **Client to Client**
 - On-demand tests requests

MonIPE Pilot Scenario

Data: 16/10/2013
Autor: Fausto Vetter



Project Timeline

- Start: October 14th
 - Preparations (25 days)
 - Servers deployment: Oct. 14th to Nov 1st
 - Build of kits: Oct. 28th to Nov. 8th
 - 2 PoPs: SC and MG: Oct. 28th to Nov. 8th
 - Client institutions (5 days)
 - Laboratório de Camarões Marinhos – LCM (*Sea Shrimp Lab*)
 - Instituto Federal de Videira
 - Instituto de Desenvolvimento Sustentável Mamirauá (IDSM) (satellite link)
 - RNP PoP-MG (Belo Horizonte, Minas Gerais)
- Tests (22 days): Nov. 18th to Dec. 17th

MonIPÊ Pilot Roles

PoPs

- Deploy and configure the PoP's MP server
- Support kit deployment at client institutions
- Perform scheduled and on-demand tests according to test plan
- Evaluate and give feedback about the service

Client institutions

- Deploy the kit and GPS antenna
- Perform the basic kit configurations
- Perform on-demand tests following the test plan
- Evaluate and give feedback about the service

Thank you!

Alex Moura

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RNP

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Research and Development**

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