



GISELA

NETWORK RESOURCE PROVISION ASSESSMENT OF THE 1ST YEAR

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Abstract: This document presents the achievements of the Work package WP5 - *Network Resource Provision* - during the first year of the GISELA project (*Grid Initiatives for e-Science virtual communities in Europe and Latin America* - <http://www.gisela-grid.eu>), as well as the plans for the next reporting period.



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1. INTRODUCTION

1.1. PURPOSE OF THE DOCUMENT

This deliverable consists of the Assessment report produced by the Work Package 5 (WP5), containing information about the work performed during the first year of the GISELA project, featuring all relevant events and actions performed by this activity.

For a comprehensive view of the Project and of the GISELA Consortium, the Description of Work (DoW)¹ and the Consortium Agreement (CoA)² should be consulted.

1.2. DOCUMENT ORGANISATION

An executive summary is presented in Section 2. The Work Package activities are presented in Section 3 with a detailed description of every task: assessment of the network infrastructure, consolidation of a Network Service Centre, network support procedures, description of the monitoring platform and its deployment. The table of the current WP5 human resources follows in Section 4. Sections 5 and Section 6 present, respectively, the deviations from the original plan and the foreseen actions for the next reporting period. Conclusions are shown in Section 7.

1.3. APPLICATION AREA

The target audience for this document is:

- The members of the Project;
- The European Commission Services;
- The Project Reviewers;
- The CLARA community;
- The External Advisory Committee (EAC);
- The general public.

1.4. DOCUMENT AMENDMENT PROCEDURE

Amendments to this document can be requested by any Project Member to the Project Coordinator, via the Project Office (hlp-gisela@hlpdeveloppement.fr).

1.5. GLOSSARY

AS	Authentication Service
BWCTL	Bandwidth Test Controller
CLARA	Latin American Cooperation of Advanced Networks
CoA	Consortium Agreement

¹ <http://documents.gisela-grid.eu/record/32?ln=en>

² Consortium Agreement (CoA) available upon request to the GISELA Project Office (hlp-gisela@hlpdeveloppement.fr)

DANTE	Delivery of Advanced Network Technology to Europe
DoW	Description of Work
EU	Europe
GNSC	GISELA Network Support Centre
GT-Mediciones	Task Force for monitoring services of CLARA
HLP	HLP Développement SAS (France)
LA	Latin American (or Latin America)
LS	Lookup Service
MA	Measurement Archive
MonGISELA	Network Monitoring Service of GISELA
MP	Measurement Point
NOC	Network Operation Centre
NREN	National Research and Education Network
NSC	Network Support Centre
OWAMP	One-Way Active Measurement Protocol
PC	Project Coordinator
PoP	Point of Presence
RC	Resources Centre
TB	Technical Board
WP	Work package
WP5	Network Resource Provision
UDO	Universidad de Oriente - Venezuela
UIS	Universidad Industrial de Santander - Colombia
ULA	Universidad de Los Andes - Venezuela
UTP	Universidad Tecnológica de Panamá - Panamá
WP3	Work package3 - User Communities Support
WP5	Work package 5 - Network Resource Provision

2. EXECUTIVE SUMMARY

The main objective of the Work Package WP5 - Network Resource Provision - is to set up a Network Support Centre (NSC).

During the first year of GISELA, WP5 developed some elements for the consolidation of the NSC described in Section 3.2 of the current document. This NSC aims at supporting adequate collaboration procedures between GISELA and the network entities that compose its networking infrastructure.

The WP5 activities included:

- The networking coordination between the different network domains involved in GISELA (as discussed in Sections 3.2.3 and 3.2.4);
- The close collaboration with DANTE³ and GT-Mediciones.

To support the operational procedures of NSC, WP5 is also coordinating the deployment of the GISELA Network Monitoring Service (MonGISELA), described on Section 3.2.2. This platform started on May 2011, as an evolution of the MonEELA2 project. MonGISELA collaborates with the RedCLARA measurement working group (GT-Mediciones) to upgrade the existing monitoring systems in the involved network domains and to extend it to the RCs of GISELA, in order to help on the troubleshooting and monitoring of the network infrastructure available. This deployment is based on the perfSONAR technologies that are being adopted, among others, by GÉANT, RedCLARA, and European & Latin American NRENs.

At the end of this document, some bandwidth values are presented as the result of the tests performed between several Latin American Resource Centres (RCs) and one GÉANT RC in Madrid.

Further WP5 work, to be carried out during the second year of GISELA, includes:

- The extension of the MonGISELA infrastructure to include more measurement points, in every PoP of RedCLARA and in every GISELA RC;
- The coordination of multi-domain network monitoring tests with perfSONAR-based systems deployed on GÉANT2, RedCLARA and EU & LA-NRENs;
- The consolidation of operational procedures in network provisioning, network performance monitoring and network troubleshooting.
- The compensation of the time lost during the first project-year for non-technical reasons, guaranteeing that ≥ 98 % of the issues will be acknowledged in time per VRC and that ≥ 98 % of the issues will be diagnosed in time per VRC.

³ www.dante.net

3. ACHIEVEMENTS

This section reports the work done in the Work package WP5 during the first project-year.

3.1. GISELA RELIES ON THE LA AND EU NETWORK INFRASTRUCTURES

The GISELA network infrastructure is based on the National Research and Education Networks (NRENs), on two regional networks, RedCLARA⁴ in Latin America and GÉANT2⁵ in Europe, and on an international link that interconnects these regional networks (ALICE2⁶).

In Latin America, CLARA (Cooperación Latino Americana de Redes Avanzadas), a non-profit International Law Organisation, develops and operates RedCLARA that enables Latin American collaborations for research, innovation and education. To date, the NRENs connected to the RedCLARA network are: InnovaRed⁷ (Argentina), RNP⁸ (Brazil), REUNA⁹ (Chile), RENATA¹⁰ (Colombia), CR2Net¹¹ (Costa Rica), CEDIA¹² (Ecuador), RAICES¹³ (El Salvador), RAGIE¹⁴ (Guatemala), CUDI¹⁵ (México), RedCyT¹⁶ (Panamá), RAAP¹⁷ (Peru), RAU2¹⁸ (Uruguay) and REACCIUN¹⁹ (Venezuela).

The backbone of RedCLARA consists of nine main routing nodes connected in a point-to-point topology. Each node characterises a Point of Presence (PoP) for RedCLARA, eight of them being located in a Latin American country, Sao Paulo (SAO - Brazil), Buenos Aires (BUE - Argentina), Santiago (SCL - Chile), Lima (LIM - Peru), Guayaquil (GYE - Ecuador), Bogota (BOG - Colombia), Panama (PTY - Panama) and Tijuana (TIJ - Mexico), while the ninth stands in Miami (MIA - USA). All LA NREN connections to the RedCLARA network are ending at one of these nine nodes.

The SAO PoP allows the RedCLARA backbone to be connected to GÉANT2, at 622 Mbps via a STM-4 link, with an entry point in Madrid (Spain) and to the US Atlantic Coast (Atlantic Wave) via Miami. The connection to the US Pacific Coast (Pacific Wave), with an entry point in San Diego -

⁴ RedCLARA: the advanced Internet network for Latin America interconnection - http://www.redclara.net/index.php?option=com_content&view=article&id=52&Itemid=423&lang=en

⁵ GÉANT: pan European advanced network - http://www.geant.net/About_GEANT/pages/home.aspx

⁶ ALICE2: <http://alice.dante.net/server/show/nav.2191>

⁷ <http://www.innova-red.net/>

⁸ <http://www.rnp.br/>

⁹ <http://www.reuna.cl/>

¹⁰ <http://www.renata.edu.co/>

¹¹ <http://www.cr2net.com/>

¹² <http://www.cedia.ec/>

¹³ <http://www.raices.org.sv/>

¹⁴ <http://www.ragie.org.gt/>

¹⁵ <http://www.cudi.mx/>

¹⁶ No Web site available.

¹⁷ <http://www.raap.org.pe/>

¹⁸ <http://www.rau.edu.uy/>

¹⁹ <http://www.reacciun.ve/>

CA, is made via the TIJ PoP. The American connections were made possible thanks to WHREN-LILA^{20, 21} Project (Western Hemisphere Research and Education Network Linking Latin America).

Thanks to the connections between GÉANT2, TEIN2²² (Trans-Eurasia Information Network) and EUMEDCONNECT²³, RedCLARA can access both the Asia-Pacific and the Mediterranean regions. The link with San Diego allows the RedCLARA traffic to access the Asia-Pacific connections. It is worth noting that CLARA is an associated member of APAN²⁴, the Asian Pacific Advanced Network.

Figure 1 shows the RedCLARA current topology.



Figure 1: RedCLARA Topology

²⁰ <http://www.whren-lila.net/>

²¹

http://www.redclara.net/index.php?option=com_content&view=article&id=56&Itemid=427&lang=pt

²² <http://www.tein2.net/>

²³ <http://www.eumedconnect.net/>

²⁴ <http://www.apan.net/meetings/India2011/NRW2011.php>

GÉANT is managed and operated by DANTE²⁵ that also manages regional networking projects in Europe, Asia and the southern Mediterranean area.

The GÉANT partner countries (and NRENs) are: Austria (ACOnet), Belgium (BELnet), Bulgaria (BREN), Croatia (CARNet), Cyprus (CYNET), Czech Republic (CESNET), Estonia (EENet), France (RENATER), Germany (DFN), Greece (GRNET), Hungary (NIIF), Ireland (HEAnet), Israel (IUCC), Italy (GARR), Latvia (SigmaNet), Lithuania (LITNET), Luxembourg (RESTENA), Macedonia (MARNet), Malta (University of Malta), Montenegro (MRnet), Nordic region that includes Sweden, Finland, Denmark, Norway and Iceland (NORDUnet), Poland (PSNC), Portugal (FCCN), Romania (RoEduNet), Serbia (AMRES), Slovakia (SANET), Slovenia (ARNES), Spain (RedIris), Switzerland (SWITCH), The Netherlands (SURFnet), Turkey (ULAKBIM) and UK (JANET).

Figure 2 shows the topology of the GÉANT2 network.

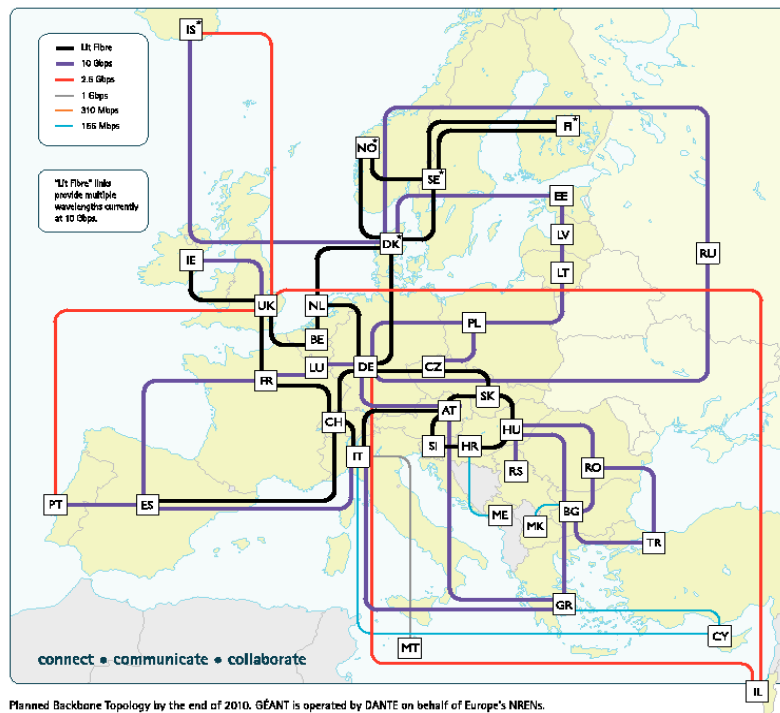


Figure 2: GÉANT2 Topology

3.2. THE GISELA NETWORK SUPPORT CENTRE

One of the main objectives of the Work Package WP5 - Network Resource Provision - is to set up a Network Support Centre (NSC), aiming at supporting adequate collaboration procedures between GISELA and all the organisations involved in the network infrastructure described in Section 3.1. In order to achieve this objective, WP5 is coordinating the deployment of a monitoring platform to supervise the network performance.

²⁵ www.dante.net

3.2.1. The GISELA Network Support Procedures

After the meeting held on 15th April 2011, between the manager of the CLARA Network Operation Centre (NOC) and the WP5 team, an initial structure of coordinated activities have been established:

- The NOC of RedCLARA will incorporate, in its monitoring platform, all the measurement points installed in the Resource Centres of GISELA.
- The NOC of RedCLARA has offered its ticket management system to:
 - Report network problems;
 - Manage network provisioning requests;
 - Follow up all the tickets.

To begin these activities, the CLARA NOC has requested an Operations Manual that describes all the procedures to be managed. The actions considered in this manual are:

- **Resource Centre Integration:** This procedure shows the different steps to incorporate a RC to the monitoring platform;
- **Issue Creation:** The list of all the steps that a system administrator must follow in order to open a ticket related to a network provisioning request or a network problem;
- **Issue Follow-up:** This section describes the actions that a system administrator must execute in order to follow up an open ticket;
- **Issue Closure:** The procedure that must be followed to consider an issue solved.

This manual is being written by the WP5 team and must be presented to the Technical Board for an initial revision in the third quarter of the current year.

3.2.2. The GISELA Network Monitoring Platform (MonGISELA)

The RCs that constitute the grid infrastructure of GISELA are interconnected through several networks (NRENs, RedCLARA and GÉANT2). Therefore, an end-to-end communication path will also traverse several network domains, including a transcontinental connection. This means that up to six domains can be involved: GÉANT, RedCLARA, two NRENs and the two campus domains. Figure 3 shows this situation.

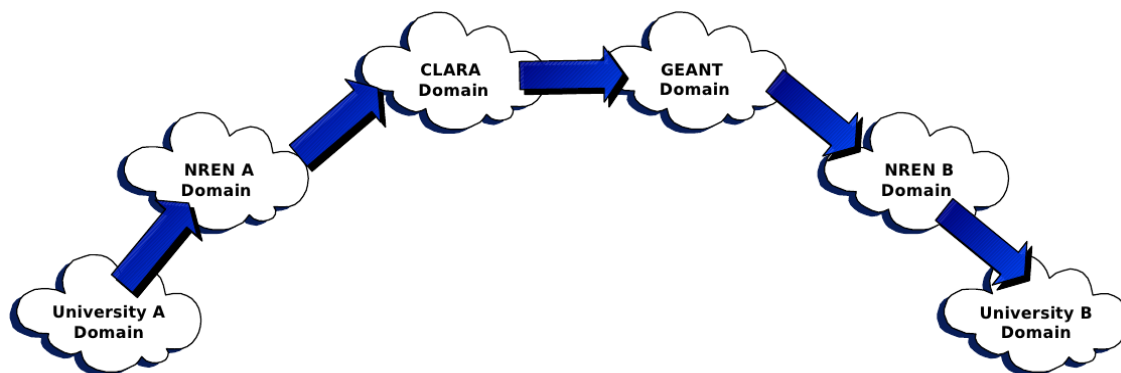


Figure 3: A multi-domain path between a RC in Europe and another one in LA

WP5 already did an assessment about the different monitoring tools in order to find out what could be the most suitable application to supervise such kind of network infrastructure. The outcome of this assessment led us to select perfSONAR²⁶ because is the only open source tool capable of supervising the performance of multi-domain networks. However, currently, there are two versions of this middleware:

- **perfSONAR-PS** (ps-PS)²⁷, developed by the Internet 2 group, which is a set of independent services that implement the perfSONAR protocols. It has been designed to be compatible with all other perfSONAR softwares.
- **MDM perfSONAR**²⁸, Multi-Domain Monitoring perfSONAR, which is the version developed by GÉANT.

A perfSONAR Overview

PerfSONAR stands for PERformance Service Oriented Network monitoring Architecture. It is a services-oriented architecture for performance monitoring data exchange between networks, making it easier to solve performance problems occurring between 2 hosts, interconnected through several networks. In other words, it is a protocol, an architecture, and a set of tools that have been developed specifically to address the challenge of monitoring network performance in a multi-domain environment. This middleware was designed to enable the development of complete performance monitoring solutions for discovering, troubleshooting and solving network performance problems across different network domains. The services provided by perfSONAR are:

- **Lookup Service (LS)** that allows to check which web services are available on the network;
- **Authentication Service (AS)** that provides authentication to protect perfSONAR web services from unrestricted access;
- **Measurement Archive (MA)**, a service used to publish historical monitoring data that are stored in an archive. It acts as a wrapper around an existing data archive to provide data to the outside world;
- **The Measurement Point (MP)**, a service in charge of providing measurement data (if the measurements are currently being stored in an archive, it retrieves them).
 - BWCTL²⁹: The Bandwidth Test Controller is a tool to measure the bandwidth between two points of the network;
 - OWAMP³⁰: One-Way Active Measurement Protocol is used to determine one way latencies between hosts.
- **The User Interface**, that allows the display of the outcomes of the end-to-end tests (see Figure 4).

²⁶ <http://www.perfsonar.net/>

²⁷ <http://www.internet2.edu/performance/pS-PS/index.html>

²⁸ <https://forge.geant.net/forge/display/perfsonar/Home;jsessionid=3648EC43D7C2CB15656407583FE7D901>

²⁹ <https://forge.geant.net/forge/display/perfsonar/Home;jsessionid=3648EC43D7C2CB15656407583FE7D901>

³⁰ <http://www.internet2.edu/performance/owamp/>

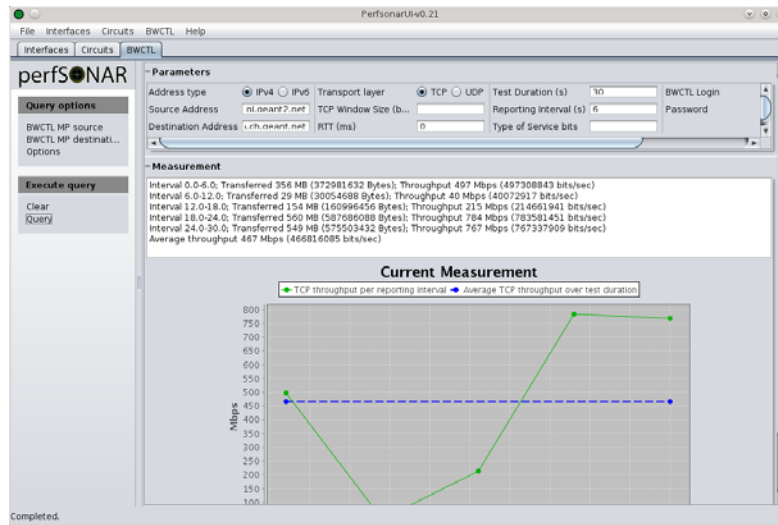


Figure 4: perfSONAR User Interface

Every NREN, RC and backbone should have a MP Service in order to measure Bandwidth, Jitter and Delay, in a proper way. All these values are collected by the user interface and shown as graphs. The perfSONAR MP service extracts and collates the network information from each NREN and presents it in a standardised format through the user interface. In this way, network administrators can access network metrics for their own network, or for any other participating network across the GISELA service area. This information can be stored for historical statistics in the MA service. Through the authentication service it is possible to establish an access control to the data. Figure 5 shows the architecture of this middleware.

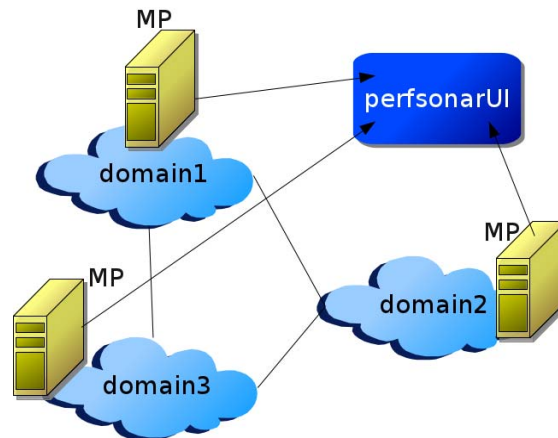


Figure 5: The perfSONAR Architecture

3.2.3. Monitoring Environment Deployment

CLARA-WP5 Joint Activities

During the CLARA TEC meeting held in Tegucigalpa (Honduras) on 23rd June 2011, the WP5 team made an agreement with the new RedCLARA measurement working group (GT Mediciones). The agreement comprises joint efforts as both entities share common goals, i.e. the deployment of the monitoring platform for a multi domain network.

DANTE - WP5 Joint Activities

The WP5 team held four meetings with DANTE staff in order to get some advices about the new features of this middleware, interoperability between the two versions and hardware requirements for each component. During a meeting held on 24th May 2011, WP5 took the responsibility to investigate the available hardware sites can provide for the initial deployment phase. As a result, a service MDM perfSONAR was installed in the sites listed in Table 1.

Table 1: Current sites hosting MDM perfSONAR

Institution	Contact Person	Status
Universidad Politécnica de Panamá	Salvador Salado	Installed
Universidad de Los Andes – Venezuela	Gilberto Díaz	Installed
Universidad Industrial de Santander	Carlos Varela	Installed

In a meeting held on 28th June 2011, the DANTE staff recommended to reinstall these elements using the new version of the software that will be released mid-August 2011. Then, a general test will be programmed.

Besides, WP5 team have requested a personalised user interface for the GISELA project to the MDM perfSONAR developers who kindly accepted and they will provide it as soon as possible.

3.2.4. Monitoring Tests

Using the initial set of Measurement Points installed at GISELA RCs, several bandwidth tests were performed on the end-to-end network paths connecting those sites:

- RC - GÉANT test
- LA RC - LA RC test

Figure 6 shows a bandwidth test between the MP of the ULA-Mérida site and the MP located in GEANT Madrid.

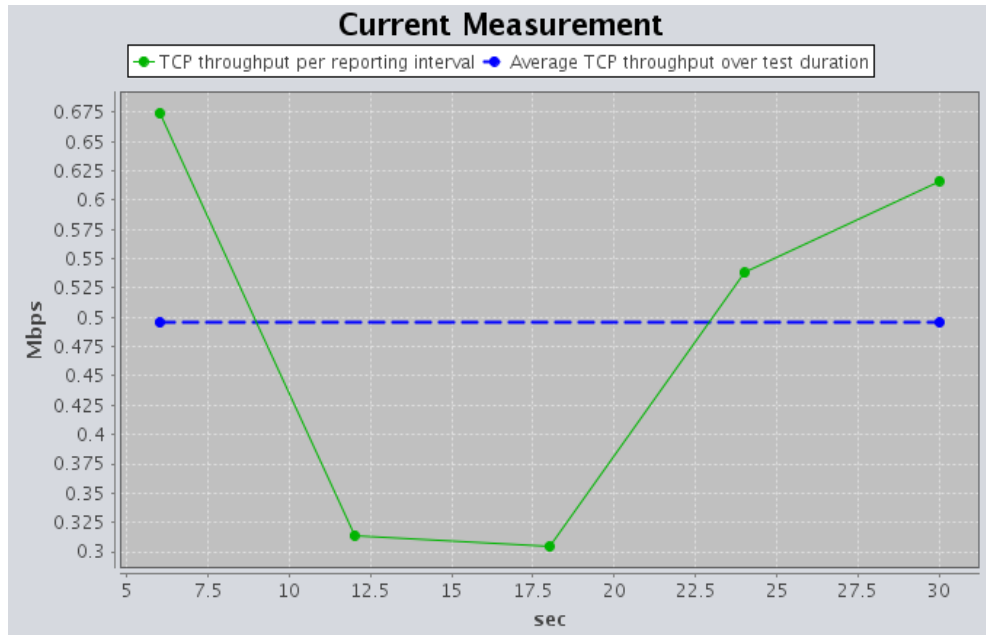


Figure 6: Bandwidth test between ULA-Mérida and GÉANT Madrid

In Latin America, the results shown in Table 2 have been obtained.

Table 2: Bandwidth Tests between RCs in LA

MPs participating in the test	Results
ULA (Venezuela) – UIS (Colombia)	2.16 Mbits/sec
ULA – UTP (Panama)	2.49 Mbits/sec
UIS – UTP	2.03 Mbits/sec

4. HUMAN EFFORT

Table 3 shows the persons who are currently involved in WP5 activities.

Table 3: WP5 Human Resources

Name	Role	Partner
Gilberto Díaz	WP5 Manager ULA Site Administrator	ULA (Venezuela)
Leandro Ciuffo	WP5 Deputy Manager (until M11)	RNP (Brazil)
Nelson Vicuña	TWP5.2 Task Leader	UDO (Venezuela)
Carlos Varela	UIS Site Administrator	UIS (Colombia)
Salvador Salado	UTP Site Administrator	UTP (Panama)

5. OPEN ISSUES AND / OR DEVIATIONS FROM THE WORK PLAN

WP5 faced some issues trying to leverage previous efforts done in the network infrastructure:

- The move of the CLARA's NOC from Mexico to Chile delayed by several months the WP5 installation;
- As soon as the EELA-2 project was closed, the operations of its Network Service Centre (ENSC) stopped. Both ticket system and the network support procedures became unavailable. The measurement points of the EELA-2 monitoring platform (MonEELA)³¹ are not available either;
- The task force of CLARA for the deployment of a monitoring platform (GT-Mediciones) has finished its operations in 2011 and the measurement points installed by this group are not more available³².
- L. Ciuffo, WP5 Deputy Manager, took the responsibility of the WP3 Management on M11, on request of the Project Management, not being able to collaborate with WP5;
- The discontinuation of the ENSC after EELA-2, partially caused by the low start of RedCLARA in WP5, can be appointed as the main cause of not reaching the first-year success thresholds envisaged in the DoW (see Table 4).

Table 4: Success Thresholds for WP5

Quality Metric	After Year 1	After Year 2
Coordination Meetings	≥12	≥24
Monitoring reports	≥12	≥24
Maximum number of issues per VRC	≤12	≤24
Fraction of issues acknowledged in time per VRC	≥95 %	≥98 %
Fraction of issues diagnosed in time per VRC	≥95 %	≥98 %

Nine (9) Coordination Meetings have been organised:

- GÉANT - WP5: 4
- WP5 Team: 2
- GT-Mediciones - WP5: 2
- WP5 -Technical managers of the Latin American NRENs

The late starting of effective measurements, a couple of months ago, had two consequences:

- Only 1 Monitoring Report was produced;
- It has not yet been possible to assess the 2 last success thresholds of Table 4.

³¹ <http://wiki.rnp.br/display/MonEELA2/Measurement+points>

³² http://wiki-gtmediciones.reuna.cl/wiki/index.php/Working_nodes_at_GT-Mediciones

6. PLANS FOR THE NEXT REPORTING PERIOD

During the next project-year the staff of WP5 will perform the following activities:

- Continue the deployment of the monitoring environment on the GISELA infrastructure;
- Update (new measurements) the WP5 section of the GISELA Web site;
- Develop a web application to store/retrieve statistics of the network performance;
- Incorporate the system administrators of the RCs into the ticket system of RedCLARA;
- Finish the operation manual that describes the maintenance procedures of the monitoring platform;
- In collaboration with WP3 and WP6, perform an assessment to determine the network requirements of the applications installed in the grid platform;
- Last but not least, fulfil the second-year WP5 success thresholds described in the DoW.

7. CONCLUSIONS

This document reported the WP5 achievements during the first year of GISELA, including the description of its results and a brief assess.

It presented the details of the activities performed to set up the GISELA Network Support Centre (GNSC) and the liaison with LA network providers and the NOC of CLARA team in order to negotiate the deployment of GNSC operational procedures.

The description of the Network Monitoring Service (MonGISELA) and its current status of deployment have been provided.

Further WP5 work to be carried out during the second year of GISELA includes:

- The expansion of the monitoring platform to include more measurement points, to reach, as many as possible, GISELA sites. This action will involve more human resource from RCs and NRENs;
- The coordination of multi-domain network monitoring tests with perfSONAR-based systems deployed on GÉANT2, RedCLARA and EU & LA NRENs;
- The determination the network requirements of the applications installed in the grid infrastructure;
- The compensation of the time lost during the first project-year for non-technical reasons, guaranteeing that ≥ 98 % of the issues will be acknowledged in time per VRC and that ≥ 98 % of the issues will be diagnosed in time per VRC.