

**SIXTH FRAMEWORK PROGRAMME  
PRIORITY 2**



**Information Society Technologies**

**SPECIFIC TARGETED RESEARCH OR INNOVATION PROJECT**

***Deliverable D5.1 - "Validated OneLab platform"***

Project acronym: **OneLab**

Project full title: **An open networking laboratory supporting communication network research across heterogeneous environments**

Proposal/Contract no.: **034819**

Date of preparation of Deliverable: **August 31<sup>st</sup>, 2008**

## Document properties

<b>Document Number:</b>	IST-4-034819-OneLab-D5.1
<b>Document Title:</b>	Validated OneLab platform
<b>Document responsible:</b>	<b>Timur Friedman</b>
<b>Author(s)/editor(s):</b>	<b>Guthemberg Silvestre</b> <b>Thomas Borgeau</b>
<b>Dissemination level<sup>1</sup>:</b>	PU
<b>Security Type:<sup>2</sup></b>	Public
<b>Status of the Document:<sup>3</sup>:</b>	Draft
<b>Version &amp; Revision History</b> <b>This version: 1.0</b>	For publication

---

<sup>1</sup> Dissemination level as defined in the EU Contract:

PU = Public

PP = Distribution limited to 6<sup>th</sup> FP participants

RE = Distribution to a group specified by the consortium

CO = Confidential, only allowed for members of the consortium

<sup>2</sup>Security Type:

Confidential Internal circulation within project (and Commission project Officer if requested)

Restricted Restricted circulation defined in the document or dissemination level PP

Internal With no confidential content but intended for internal use

Public Public document

<sup>3</sup> Draft <#>, Draft <#> Reviewed, Final Draft, Released, Revised Draft <#>, etc

## **Table of contents**

<b>1.DOCUMENT DESCRIPTION</b> .....	<b>4</b>
<b>2. VALIDATION PLAN</b> .....	<b>4</b>
<b>3SCALE UP THE ONELAB PLATFORM</b> .....	<b>6</b>
3.1.GENERALIZED VALIDATION.....	7
3.2.INTEGRATED ONELAB VALIDATION .....	7
<b>4.VALIDATE INDIVIDUAL COMPONENTS</b> .....	<b>8</b>
3.1.WiMAX .....	8
3.2.UMTS .....	8
3.2.MULTIHOMED.....	9
3.2.WIRELESS AD HOC .....	9
3.2.EMULATION .....	9
3.2.MONITORING .....	10
<b>5.VALIDATION SUMMARY</b> .....	<b>6</b>
<b>6.CONCLUSION</b> .....	<b>12</b>
<b>7.REFERENCES</b> .....	<b>6</b>

## **1. Document description**

This deliverable is the output of the Task 5.1 “Scale up OneLab platform” and Task 5.2 “Validate individual components”, both tasks part of the Work Package 5 (WP5) “Validation”.

Task 5.1 is to progressively migrate the integrated OneLab platform (described in the Deliverable 2.5 [1]) to the publicly available platform, which is operated by WP1 Operations. In Task 5.2, the new components developed in WP3 Monitoring and WP4 New Environments are validated in real experiments in accordance with Deliverable 2.6, the Validation Plan.

The present document describes the various parts of the validated OneLab platform and it is organized as follows:

- ➔ The introduction Section 2 briefly describes the Validation Plan.
- ➔ Section 3 focuses on the process of scaling up the OneLab platform produced by D2.5, and migrating its nodes to the public PlanetLab-connected platform operated by WP1.
- ➔ Section 4 describes the procedures that were put into place to validate each component, and presents the results.
- ➔ Section 5 presents a summary of the main results.

## **2. Validation Plan**

OneLab has contributed to the core PlanetLab code, which is necessary to run the PlanetLab Europe test bed and has developed new components to be integrated into the PlanetLab Europe platform. In order to verify the robustness and stability of the platform and the new components, we prepared the Validation Plan, Deliverable 2.6 [2].

This plan consists of *requirements* and *experiments*. The requirements define the essential functionalities to be verified for each component. The experiments define the procedures to be performed in order to verify the requirements. This division into requirements and experiments and the associated methodology and terminology are based on well-known industrial validation models, such as CMMI and ISO 15504.

The validation process was organised into two parts: (1) scale up OneLab platform and (2) validate individual components. Each part of the validation process was evaluated on the PlanetLab Private (PLP) test bed, run internally by the OneLab project, and the results are shown in a validation table that has the following format:

Experiment	Requirement	Status	Type

Table 1 – Validation table example

The columns have the following meanings:

**1.Experiment:** specifies the experiment reference title. Example: EXP\_ADHO\_01

**2.Requirements:** establishes the requirements that make up the experiment. Example: REQ\_UMTS\_01.

**3.Status:** shows the evaluation of the results of the experiment:

- **Succeed:** experiments that were successfully performed as defined. It means that all functionalities were tested and worked properly.
- **Not succeed:** when an experiment doesn't show the results that were expected, but some aims were achieved;
- **Failed:** The experiment couldn't achieve any expected result or functionality.

If the experiment status is *Not succeed* or *Failed*, a *Technical Error Description (TED)* has to be created. This description explains the reason why the experiment is in *Not succeed* or *Failed* status. Each TED has its own reference number that will be shown in the *Status* column.

**4.Type:** describes if the experiment was performed automatically (for instance, by scripts) or if it requires Manual tasks, such as setting up a network scenario.

The aim is to summarise each experiment of the validation process and to present the results in a simple and concise way. The requirements and the experiments that are reported upon in this document are described in D 2.6, which is therefore an essential companion document for reading this report. The *Technical Error Descriptions (TEDs)* are described in Section 5 of the present document.

All the experiment result files are publicly available through <http://www.one-lab.org/validation>. Each component has its own directory in that repository, where all the results files are stored. For example, the results of the experiment *EXP\_EMUL\_01* are stored at [http://www.one-lab.org/validation/emulation/EXP\\_EMUL\\_01/](http://www.one-lab.org/validation/emulation/EXP_EMUL_01/).

### **3. Scaling up the OneLab platform**

This section describes the procedures and results for the validation of the platform as a whole. According to D 2.6, there is one principal part to this validation process, which is called Generalized Validation. This procedure deals with the validation of the PlanetLab Europe platform

FP6-2004-IST-4 – OneLab: an open networking laboratory supporting communication network research across heterogeneous environments  
in order to verify the availability of PlanetLab Europe as a stable and correctly functioning public platform. The validation consisted in the following:

a) Testing the components and correcting them in order to ensure that they work correctly. We verified the functionalities of the latest version of PlanetLab Europe in the public environment. In order to verify the components, experiments were performed on management, federation, user access and infrastructure management and monitoring services.

b) The deployment of new PlanetLab sites in Europe.

Generalized Validation is composed of five main parts: 1) “MyPLC Installation and Configurations for PlanetLab Europe”, 2) “PlanetLab Europe population”, 3) “Federation”, 4) “PlanetLab Europe Access” and 5) “Monitoring Services”.

The following two sections present the final results of the Generalized Validation (3.1) and the Interactive Integrated Onelab Validation (3.2).

### **Generalized Validation**

The Table 2 below shows the validation results for the scale-up process.

<b>Experiment</b>	<b>Requirement</b>	<b>Status</b>	<b>Type</b>
EXP_GVIC_01	REQ_GVIC_01	Succeed	Manual
EXP_GVIC_02	REQ_GVIC_02	Succeed	Manual
EXP_GVIC_03	REQ_GVIC_03	Succeed	Manual
EXP_GVIC_04	REQ_GVIC_04	Succeed	Manual
EXP_GVIC_05	REQ_GVIC_05	Succeed	Manual
EXP_GVAD_01	REQ_GVAD_02	Succeed	Manual
EXP_GVAD_02	REQ_GVAD_01	Succeed	Manual
EXP_GVAD_03	REQ_GVAD_02	Succeed	Manual
EXP_GVAD_04	REQ_GVAD_02	Not Succeed <b>TED01</b>	Manual
EXP_GVPM_01	REQ_GVPM_01	Succeed	Manual
EXP_GVPM_02	REQ_GVPM_02	Succeed	Manual
EXP_GVPM_03	REQ_GVPM_03	Succeed	Manual
EXP_GVPM_04	REQ_GVPM_04	Succeed	Manual
EXP_GVNM_01	REQ_GVNM_01	Succeed	Manual
EXP_GVNM_02	REQ_GVNM_02	Succeed	Manual
EXP_GVNM_03	REQ_GVNM_03	Succeed	Manual
EXP_GVNM_04	REQ_GVNM_04	Not Succeed <b>TED02</b>	Manual
EXP_GVSM_01	REQ_GVSM_01	Succeed	Manual
EXP_GVSM_02	REQ_GVSM_02	Succeed	Manual
EXP_GVFE_01	REQ_GVFE_01	Succeed	Manual
EXP_GVFE_02	REQ_GVFE_02	Succeed	Manual
EXP_GVAC_01	REQ_GVAC_01	Succeed	Manual
EXP_GVAC_02	REQ_GVAC_02	Succeed	Manual

EXP_GVMO_01	REQ_GVMO_01	Succeed	Manual
EXP_GVMO_02	REQ_GVMO_02	Succeed	Manual
EXP_GVMO_03	REQ_GVMO_03	Succeed	Manual
EXP_GVMO_04	REQ_GVMO_04	Succeed	Manual
EXP_GVMO_05	REQ_GVMO_05	Succeed	Manual

Table 2 – Generalized Validation

### ***Integrated OneLab Validation***

The goal of the Integrated OneLab Validation was to test the new functionalities and components created in OneLab. All new contributions provided during the OneLab project were successfully integrated into the OneLab software. The software was tested and validated in order to provide a stable version. The results of the Integrated OneLab Validation are presented in Table 3.

Experiment	Requirement	Status	Type
EXP_IVIC_01	REQ_IIOV_01	Succeed	Automatic
EXP_IVIC_02	REQ_IIOV_01	Succeed	Automatic
EXP_IVIC_03	REQ_IIOV_01	Succeed	Automatic
EXP_IVPM_01	REQ_IIOV_02	Succeed	Automatic
EXP_IVPM_02	REQ_IIOV_02	Succeed	Automatic
EXP_IVNM_01	REQ_IIOV_02	Succeed	Automatic
EXP_IVSM_01	REQ_IIOV_02	Succeed	Automatic
EXP_IVNI_01	REQ_IIOV_03	Succeed	Automatic
EXP_IVNI_02	REQ_IIOV_03	Succeed	Automatic
EXP_IVTA_01	REQ_IIOV_04	Succeed	Automatic

Table 3 – Integrated OneLab Validation

## **4. Validation of individual components**

This section describes the requirements, experiments and final results for the following components:

- I. WiMAX;
- II. UMTS;
- III. Multihomed;
- IV. Wireless ad hoc;
- V. Emulation;
- VI. Monitoring (passive and topology).

## **WiMAX**

Despite an administrative delay for acquiring the licence to transmit data over WiMAX, this component was validated, and the main results are presented in the Table 4. The full description of the validation process of this component, as well as the output files can be found in the publicly available repository <http://www.one-lab.org/validation/wimax>.

<b>Experiment</b>	<b>Requirement</b>	<b>Status</b>	<b>Type</b>
EXP_WIMA_01	REQ_WIMA_01	Succeed	Manual
EXP_WIMA_01	REQ_WIMA_02	Not Succeed <b>TED03</b>	Manual
EXP_WIMA_01	REQ_WIMA_01	Succeed	Manual
EXP_WIMA_01	REQ_WIMA_02	Succeed	Manual

Table 4 – WiMAX Validation Table

## **UMTS**

This component was properly validated, and the main results are presented in Table 5. The full description of the validation process of this component, as well as the output files can be found in the publicly available repository <http://www.one-lab.org/validation/umts/>. In addition to the validation results, a technical description of the UMTS component can be found as an annex in the validation repository <http://www.one-lab.org/validation/annexe/umts>.

<b>Experiment</b>	<b>Requirement</b>	<b>Status</b>	<b>Type</b>
EXP_UMTS_01	EXP_UMTS_01	Succeed	Manual
EXP_UMTS_02	EXP_UMTS_02	Succeed	Manual
EXP_UMTS_03	EXP_UMTS_02	Succeed	Manual

Table 5 – UMTS Validation Table

## **Multihomed**

This component was properly validated, and the main results are presented in the Table 6. The output files of this component can be found in the publicly available repository <http://www.one-lab.org/validation/multihomed>.

<b>Experiment</b>	<b>Requirement</b>	<b>Status</b>	<b>Type</b>
EXP_MULT_01	REQ_MULT_01	Succeed	Manual
EXP_MULT_02	REQ_MULT_02	Succeed	Manual
EXP_MULT_03	REQ_MULT_03	Succeed	Manual



EXP_MULT_04	REQ_MULT_04	Succeed	Manual
EXP_MULT_05	REQ_MULT_05	Succeed	Manual

Table 6 – Multihoming Validation Table

## **Wireless ad hoc**

This component was validated, and the main results are presented in Table 7. The full description of the validation process of this component, as well as the output files can be found in the publicly available repository <http://www.one-lab.org/validation/adhoc>.

In addition to the validation results, a technical description of the ad hoc component can be found as an annex in the validation repository <http://www.one-lab.org/validation/annexe/adhoc>.

Experiment	Requirement	Status	Type
EXP_ADHO_01	REQ_ADHO_01	Succeed	Manual
EXP_ADHO_02	REQ_ADHO_01 REQ_ADHO_02 REQ_ADHO_03	Succeed	Manual
EXP_ADHO_03	REQ_ADHO_01 REQ_ADHO_02 REQ_ADHO_03	Succeed	Manual

Table 7 – Ad Hoc Validation Table

## **Emulation**

The Emulation component was properly validated, and the main results are presented in Table 8. The output files of this component can be found in the publicly available repository <http://www.one-lab.org/validation/emulation>.

Experiment	Requirement	Status	Type
EXP_EMUL_01	REQ_EMUL_01 REQ_EMUL_02 REQ_EMUL_03	Succeed	Manual
EXP_EMUL_02	REQ_EMUL_01 REQ_EMUL_02 REQ_EMUL_03	Succeed	Manual

Table 8 – Emulation Validation Table

## **Passive Monitoring**

The Passive Monitoring component was properly validated in the private PlanetLab, and the main results are presented in the Table 9. The output files of this component can be found in the publicly available repository [http://www.one-lab.org/validation/passive\\_monitoring](http://www.one-lab.org/validation/passive_monitoring)

Experiment	Requirement	Status	Type
EXP_PMON_01	REQ_PMON_01 REQ_PMON_02 REQ_PMON_03 REQ_PMON_04	Succeed	Manual
EXP_PMON_02	REQ_PMON_01 REQ_PMON_02 REQ_PMON_03 REQ_PMON_04	Succeed	Manual
EXP_PMON_03	REQ_PMON_01 REQ_PMON_02 REQ_PMON_03 REQ_PMON_04	Succeed	Manual
EXP_PMON_04	REQ_PMON_01	Succeed	Manual
EXP_PMON_05	REQ_PMON_01	Succeed	Manual

Table 9 – Passive Monitoring Validation Table

## **Topology Monitoring**

The Topology Monitoring component was validated on PlanetLab Europe, and the main results are presented in the Table 10. The output files of this component can be found in the publicly available repository [http://www.one-lab.org/validation/topology\\_monitoring](http://www.one-lab.org/validation/topology_monitoring).

Experiment	Requirement	Status	Type
EXP_TMON_01	REQ_TMON_01	Succeed	Manual
EXP_TMON_02	REQ_TMON_02	Succeed	Manual
EXP_TMON_03	REQ_TMON_03	Succeed	Manual
EXP_TMON_04	REQ_TMON_04	Succeed	Manual
EXP_TMOA_01	REQ_TMOA_01 REQ_TMOA_02	Succeed	Manual
EXP_TMOA_01	REQ_TMOA_03	Not Succeed <b>TED04</b>	Manual

Table 10 – Topology Monitoring Validation Table

## **5. Technical Error Descriptions (TEDs)**

Table 11 presents a summary of the Technical Error Descriptions (TEDs) that have been raised during the validation process. There are 3 columns in the Technical Error Description table. The TED number column and the Experiment column give a reference to the issues observed during the validation process. The Description column gives an explanation of each issue encountered during the validation process. This description also describes whether the issue is a major or a minor one.

TED number	Experiment	Description
TED01	EXP_GVAD_04	<p>The deployment of new PlanetLab sites in Europe was intended to extend the number of nodes of PlanetLab Europe platform. It was expected in the Description of Work to host 60 nodes on PlanetLab Europe, however just 53 nodes were installed until the month 24 of the project. Among the main reasons of having fewer nodes than expected were the absence of the PlanetLab Europe Consortium and the delay in proceeding with the migration of PlanetLab nodes through PlanetLab Central in Princeton. This error has a minor impact on the overall project as the main goal of the experiment was to scale up the number of nodes of PlanetLab Europe. This goal has been almost reached as we are close to the number of nodes expected in the Description of Work. Moreover, with the Consortium in place, the administrative obstacles to incorporating industrial partners should largely disappear, and PlanetLab Europe continues to grow.</p>
TED02	EXP_GVNM_04	<p>The goal of this experiment was to install and configure the WP4 New Environments components as a site technician. Some components (UMTS, Ad Hoc and Multihomed) needed an access to the “root context” in order to configure the components. In order to access to the “root context”, we had to give an administrator role to the partners. As this role is dedicated to PlanetLab Europe administrators, we couldn’t allow our partners to have this access for security reason as this role gives you an access to all PlanetLab Europe nodes. As all New Environment components have been successfully validated on the Private PlanetLab with an administrator access, we know that they work properly in this case. We are working with Princeton on a secure access to the root context for each site technician that don’t need administrator privilege. This mechanism is called Vsys [3]. We couldn’t test the Vsys mechanism as it came as a new feature during the validation process.</p> <p>This error is a major issue for deploying the</p>

		New Environment components in PlanetLab Europe but we are working on Vsys functionalities in order to resolve this issue.
TED03	EXP_WIMA_02	This experiment was dedicated to using real measurements to tune the WiMAX parameters in the link emulator. As some administrative delays occurred for acquiring the licence to transmit data over WiMAX, the real deployment of WiMAX nodes began at the end of July 2008. Since that time, WiMAX experiments have been carried out in real conditions, but as the project ended one month later, we didn't have the time to compare the real WiMAX results to the emulated component. This error has a minor impact on the WiMAX component as the main goal was to have WiMAX nodes available and running at the end of the project
TED04	REQ_TMON_04	The goal of this experiment was to test the wired topology monitoring tool on the wireless ad hoc network. We had a technical issue due to the MadWifi driver used on the wireless ad hoc network as we couldn't have the raw socket access in order to test the wired topology monitoring tool on the ad hoc network. This is a minor issue for the Topology Monitoring component as we have successfully tested it under real wired conditions and the issue for using it under wireless conditions is based on a bug in the MadWifi driver that we can't resolve ourselves as it is an external component of the project.

Table 11 – Technical Error Description

## 6. Validation Summary

The Table 12 presents a summary of the validation process. There are 5 columns in the summary validation table. The Validation Process Component column describes the name of the component, the TED column shows the Technical Error Description numbers per component, Final Status presents the evaluation of the results of the component, Work Package points to the work package to which the component belongs, and Related Deliverables indicates the OneLab Deliverable that provides a detailed description of the component.

Validation Process Component	TED	Final Status	Work Package	Related Deliverables
Generalized OneLab Platform	TED01 TED02	Almost Validated	WP1 – Operations	D1.1 D1.2 D1.3
Interactive validation	No TED	Validated	WP2 – Integration	D2.1 D2.2 D2.3 D2.4 D2.5 D2.6
WiMAX	TED03	Validated	WP4 – New Environments	D4A.1
UMTS	No TED	Validated	WP4 – New Environments	D4B.1 D4B.2
Multihoming	No TED	Validated	WP4 – New Environments	D4C.1 D4C.2 D4C.3
Wireless AD HOC	No TED	Validated	WP4 – New Environments	D4D.1 D4D.2
Emulation	No TED	Validated	WP4 – New Environments	D4E.1 D4E.2 D4E.3
Monitoring	TED03	Validated	WP3 – Monitoring	D3A.1 D3A.2 D3B.1 D3B.2

Table 12 – Validation summary

According to the Table 12, all the Validation components went through the validation process and all the WP4 and WP3 components were validated on the private PlanetLab. Table 11 indicates that only one experiment, *EXP\_GVNM\_04*, had a major issue due to administrator access for configuring some New Environment components on PlanetLab Europe. The three other issues that were explained in Table 11 are minor as they don't affect the general functionalities of the tested components. All the programs delivered by the OneLab partners are under a BSD-like license,

FP6-2004-IST-4 – OneLab: an open networking laboratory supporting communication network research across heterogeneous environments meaning that they are freely available for installation and modification. All OneLab component code is available from the public repository <http://www.one-lab.org/components>

## **7. Conclusion**

This document has summarized the main results of the validation process and presents the final validation status of each component. Despite some operational problems, the main functionalities of the PlanetLab Europe were properly validated.

## **8. References**

- [1] Thierry Parmentelat (INRIA). D2.5, Embryo of the PlanetLab Platform, August 2007.
- [2] Thomas Bourgeau (UPMC). D2.6, Validation Plan, September 2007
- [3] Vsys, <http://www.cs.princeton.edu/~sapanb/vsys/>