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Abstract:

This deliverable summarizes the status of IPv6 labs which have been deployed or are in the process of being deployed at the beginning of the 6DEPLOY-2 project. This deliverable presents the reservation system and other tools available to manage the 6DEPLOY-2 labs. This deliverable also details the lab improvements which will be performed during the 6DEPLOY-2 project lifetime.

Keywords:

IPv6 labs, IPv6 virtual lab, lab reservation system, lab management activity

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Executive Summary

This deliverable presents the status of IPv6 labs which have been deployed or are in the process of being deployed at the beginning of 6DEPLOY-2 project. The different lab statuses indicate if a lab is ready for use for training workshops and how the lab will be integrated into the 6DEPLOY-2 processes.

This deliverable also presents the existing reservation system and other available tools used to manage the 6DEPLOY-2 labs. There is further documentation available which assists new trainers discover how to use a lab and how to prepare hands-on training.

Due to the increasing amount of IPv6 labs, common rules will be adopted in order to facilitate their management. In addition, enhancements and new services will also be developed.

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1. INTRODUCTION

This deliverable describes not only the Lab Reservation Service, but also the status of the IPv6 labs inherited from the 6DEPLOY project and the way these labs are structured, configured and managed under WP2: “Globalisation of IPv6 Training Labs” and the specific Activities A2.1: “Extending the number of Labs” and A2.2: “Coordination of the Lab managers”. It also identifies the new labs being discussed, shipped or installed within 6DEPLOY-2.

This deliverable also mentions the improvements and changes already in place and planned in the framework of the 6DEPLOY-2 project.

Part of the information contained in this deliverable is derived from previous documents produced by the 6 DEPLOY-2 partners. In addition to this document, deliverable D2.2.1: “Initial status of the available exercises to be used with the lab equipment” presents and explains the content of the hands-on material, which makes use of the labs described here.

2. CURRENT LAB STATUS

2.1 IPv6 Labs locations

At the beginning of the 6DEPLOY-2 project, the following IPv6 Labs (also referred to as IPv6 test bed platforms) are either in operation or in the process of being installed.

Discussions are ongoing with further regions in the world to have new IPv6 labs installed in order to disseminate IPv6 knowledge and create centres of IPv6 expertise. The list of the labs and their status are shown below:

Region	Country	City	Organisation	Status
Europe	France	Paris	RENATER	Operational
Europe	Bulgaria	Sofia	BREN	Operational
Europe	Spain	Madrid	Consulintel	Operational *
Europe	Slovenia	Ljubljana	go6	Operational
Europe	Czech Republic	Prague	CESNET	Being installed *
Europe	Slovakia	Kosice	Technical University	Under discussion *
Africa	Mauritius	Ebene	AfriNIC	Operational
Africa	Kenya	Nairobi	KENIC	Being Installed *
Africa	Ghana	Accra	AITI	Ready to be shipped *
Asia	India	Bangalore	CEDT/IISc	Operational
Central Asia	Georgia	Tbilisi	GRENA	Operational
Central Asia	Kyrgyzstan	Bishkek	CGEIT	Operational
Central Asia	Kazakhstan	Almaty	KazREN	Under discussion *
Latin America	Colombia	Bogota	<i>TBD</i>	Under discussion *
Latin America	Argentina	Buenos Aires	<i>TBD</i>	Under discussion *

* New in DEPLOY-2

Table 2-1: List of IPv6 labs and deployment status



- Operational in 6DEPLOY
- Being installed in 6DEPLOY -2
- Under discussion

The following steps are taken prior to a lab becoming operational:

- *Under Discussion:* Prior to installing a lab in a new location, discussions must take place between the 6DEPLOY-2 project responsables and the organisation willing to host the new lab. The conditions of hosting and managing the equipment are checked for compliance with rules applied to the other platform locations.

These rules were originally informal, but – as the number of labs is increasing – they are being documented and made contractual.

- *Ready to be shipped:* After initial discussions regarding the decision to deploy a 6DEPLOY-2 lab in a new location, Cisco prepares the equipment for shipment and completes the export paperwork.
- *Installation:* Once the equipment is received, installation begins by following the procedures defined in 6DEPLOY-2. During this phase, some assistance can be provided by Cisco.
- *Installed:* A lab is considered as “installed”, when it is powered on and the routers can be accessed via Internet.
- *Operational:* A lab is considered in “Operational” status when it follows the rules defined in the 6DEPLOY-2 project (configuration, topology, etc). These common rules facilitate the usage of the labs.

All of the official 6DEPLOY IPv6 labs can be configured remotely for “hands-on” exercises such as addressing and routing and can be reserved by priority for the 6DEPLOY-2 training workshops. The labs can also be used for other local activities/projects according to their availability. The composition of each test bed is topologically similar. Thus, it is possible to use more than one lab during a workshop since they have the same exercises for all the trainees.

The RENATER lab is shown below as an example¹:

¹ Note that the test beds are only configured initially with IPv4 addresses, so it is up to the trainees to perform all the necessary actions to have it running over IPv6 and connected to the IPv6 Internet.

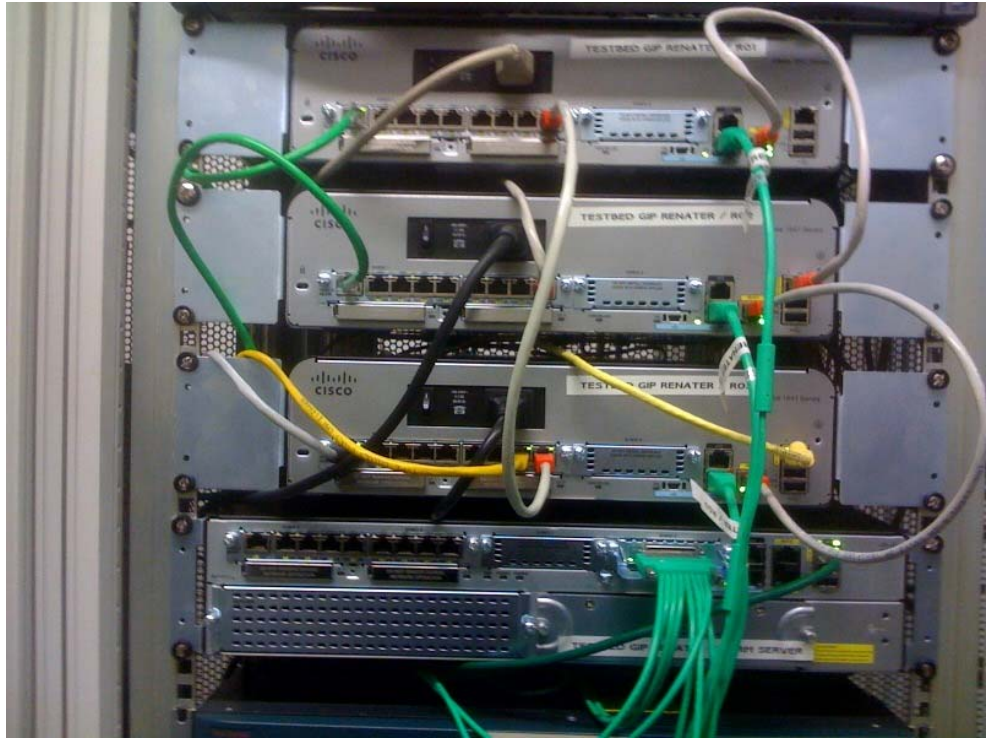


Figure 2-1: The initial configuration of the 6DEPLOY IPv6 lab at RENATER in Paris

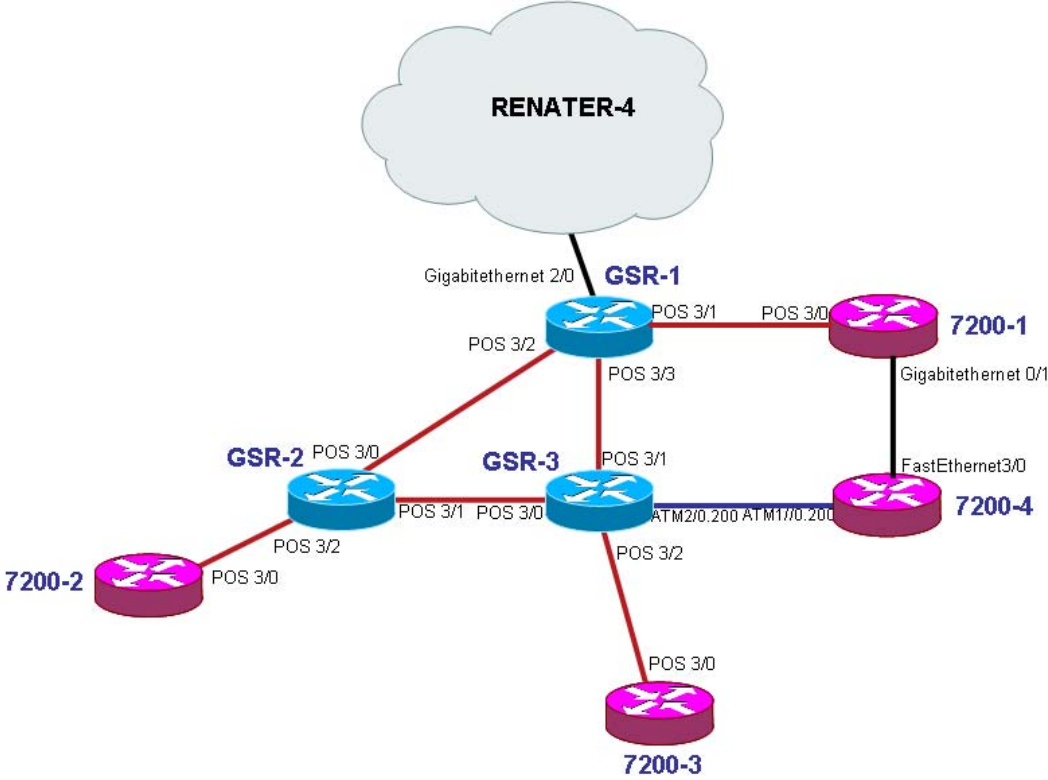


Figure 2-2: The RENATER lab configuration

2.2 IPv6 Labs reservation system and procedure

2.2.1 Central reservation interface

A one-stop-shop web interface has been established, allowing a workshop organizer to book the set of test beds needed for a dedicated event. The organizer simply needs to go to http://www.6deploy.eu/index.php?page=testbed_reservation2 to perform this reservation. A mailing list has been created to inform test bed managers when a reservation has been requested. The test bed managers also have a management interface where it is possible to accept or reject a reservation. Generally, some discussions will have taken place previously on the test bed manager mailing list, in order to determine which lab(s) - and how many - will be used for a given training session. The decision to use one lab or another depends also on the location (time zone) where the workshop is to take place and the availability of this (these) lab(s) regarding previous bookings.

Following is a list of pending requests. You can Accept or reject them and an e-mail will be sent to the user.

Filter the requests by: **pending:** **accepted:** **rejected:** [stats](#) | [logout](#)

ID | Status | Dates | User | e-mail

90	pending	15 and 16 October 2009	Alvaro Vives	alvaro.vives@consulintel.es	accept reject
Desired dates: 15 and 16 October 2009					
Trainees: 24					
Prefixes: Unknown yet					
Purpose: Hi Testbed managers, We have fixed the date for an IPv6 Workshop in Mauritius in October. We will need two testbeds, Mauritius and other for the desired dates. As we will have a maximum of 24 attendees, two people for each router would be great, what means that two testbeds with 6 routers each if perfect. Best regards, Alvaro Vives Consulintel					
Status: pending					
Created: 14 SEP 2009 18:31					

Please add your comments to the e-mail that will be sent to the user.

Figure 2-3: A reservation request to the Lab managers

2.2.2 Lab configuration management

In order to ease the management of the labs remotely, scripts have been produced by RENATER. These scripts are available via a web page and allow the restoration of various configurations - i.e. resetting of the initial configurations - made during a training session. In this way, the lab can be prepared for a new training session within a few minutes. This system is currently only available for the RENATER lab, but deployment is being planned for the other test beds. Another new feature is the possibility of saving the running router's configuration through a web interface. This operation can be useful at the end of a training session, for example, if the trainer or the trainees wish to have a backup of the finished exercises.

2.3 Associated Documents

In order to assist the IPv6 trainers in not creating their own exercises from scratch when using the 6DEPLOY-2 labs, a small set of documents has been written and is available on-line on the project website. These are:

- Paris (France) lab hands-on leaflet
- Sofia (Bulgaria) lab hands-on leaflet
- A summary of useful Cisco commands to help configure the routers for the set of proposed exercises
- Procedures for using the lab material (deliverable D.1.1 from 6DEPLOY).

3. IMPROVEMENTS AND CHANGES IN 6DEPLOY-2

3.1 IPv6 labs types and characteristics

In order to create a larger set of routers available for a single training and allowing a larger set of attendees to participate in a given workshop, a type of “Virtual Lab” idea has been discussed. This facility implies that a subset of the labs, which are geographically spread out worldwide, would be strictly coordinated and have their hardware and software configured in the same manner (topology, interfaces numbering, etc.)

In the former 6DEPLOY project, it was already possible to book a set of 3 labs for a single workshop, however, discrepancies about configuration, addressing and even topology or hardware still existed, thus resulting in an overload of work and preparation time for the trainers.

From the onset of 6DEPLOY-2, Cisco has agreed to install the same hardware and software in all the 6DEPLOY-2 project IPv6 labs, even renewing the “old” or already operational labs (RENATER, BREN, ...). This operation began in January 2011 by replacing the old RENATER lab equipment.

In order to start creating this large virtual IPv6 lab, the labs have been categorised into the following types:

- Virtual IPv6 lab sites
- Potential (or near future) Virtual IPv6 lab sites
- Regional IPv6 labs

To begin quickly implementing this virtual IPv6 lab concept, the most experienced lab managers will be invited to be part of the first category. At the same time, requirements and management rules will be clearly defined so that other lab managers (from the “Potential Virtual Labs” category) can know what they have to comply with, in order to join the “Virtual Labs” group. This way, the strongly coordinated management and usage of these lab categories will allow the trainers to organize workshops for larger audiences. An example of this coordination is that it would allow 48 trainees to work together in a given workshop since every lab site is configured with six Cisco routers C1941, and integrating four lab sites into the virtual lab would allow 24 routers to be used simultaneously.

The following table shows the initial classification of the IPv6 labs that are currently operational, being installed, or ready to be shipped:

Region	Country	City	Organisation	Category
Europe	France	Paris	RENATER	Virtual lab
Europe	Bulgaria	Sofia	BREN	Virtual lab
Europe	Spain	Madrid	Consulintel	Virtual lab
Africa	Mauritius	Ebene	AfriNIC	Virtual lab
Europe	Slovenia	Ljubljana	go6	Potential virtual lab
Central Asia	Kyrgyzstan	Bishkek	CGEIT	Potential virtual lab
Central Asia	Georgia	Tbilisi	GRENA	Potential virtual lab
Europe	Czech Republic	Prague	CESNET	Regional lab
Africa	Kenya	Nairobi	KENIC	Regional lab
Africa	Ghana	Accra	AITI	Regional lab
Asia	India	Bangalore	CEDT/IISc	Regional lab

Table 3-1: List of IPv6 labs deployed and category

The lab managers of the so-called “Virtual labs” are all 6DEPLOY-2 partners and will be closely coordinated. They will become effectively the central hub in their regions for supporting the other lab managers.

3.2 Lab managers’ activity coordination

Creating a strong community among the lab managers is important in order for the lab equipment to be efficiently used. During the former 6DEPLOY project, a coordination activity led by RENATER was proposed and initiated. That coordination activity allowed the lab managers to provide and maintain the same level of services to the IPv6 trainers who were able to use the same material for their IPv6 workshops. Moreover, it allowed the opportunity to exchange experiences, ideas and make progress jointly.

From the onset of the 6DEPLOY-2 project, an important objective was to strengthen this activity. This will be accomplished by defining the objectives that every IPv6 lab needs to achieve and by stating the rules for working in a coordinated way, and then harmonising the training resources as much as possible.

3.3 IPv6 labs and associated services

3.3.1 Desktops and virtual machines

At the end of the former 6DEPLOY project, RENATER and BREN installed desktops connected to the Cisco routers. The goal was to create virtual machines connected to the set of routers in a given IPv6 lab. These machines should help set up new activities for the trainees (for instance, IPv6 multicasting or IPv6 flow monitoring hands-on). Alternately, these virtual machines could serve as a terminal for an audience when there are no available computers. It would take a trainer a minimum of preparation and configuration since every equipment could be configured beforehand.

3.3.2 Telecommunication means

Cisco has started to provide the IPv6 labs with IP Phones and a videoconferencing tool will also be investigated as another solution. EVO software (Enabling Virtual Organizations) from Caltech and WebEx from Cisco will be trialled. These will allow the lab managers to better coordinate their activities.

3.3.3 New hands-on topics

Since IPv6 deployment in different market sectors is expected to increase because of the scarcity of the IPv4 address resources, the 6DEPLOY-2 partners felt the need to propose new hands-on activities for the IPv6 workshop attendees. In this category, we are considering to create exercises for a set of transition scenarios. And as soon as the telephony over IPv6 and the videoconferencing systems become fully IPv6 compliant, both could become new hands-on topics too.

4. SUMMARY AND CONCLUSIONS

The deployment of new labs is a key activity in the 6DEPLOY-2 project. The lab manager's activity is specifically intended for the coordination of this deployment activity taking into consideration each location's specificities. The reservation interface tool will be enhanced as necessary for additional visibility in the usage of the labs, to ease the booking process and add new tools. Moreover, new services are being deployed on the labs (virtual machines, video and voice services) and new hands-on activities will be written to extend the exercises that can be used during the training.

5. REFERENCES

Project web site : <http://www.6deploy.eu>

Testbed reservation: http://www.6deploy.eu/index.php?page=testbed_reservation2