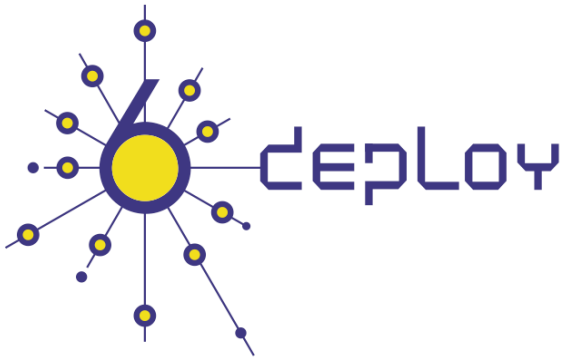
e-infrastructure



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Responsible and Editor/Author:	Organization:	Contributing WP:
Alvaro Vives	Consulintel	WP1

Authors (organisations):

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Abstract:

This deliverable presents a report from the workshop held in Marrakesh (Morocco) from April 20th to 23rd 2009. The presentation material is listed, the attendees and their affiliations are given, and the opportunities for further co-operation and follow-up actions are described.

Keywords:

IPv6, Support, Training, Testbeds, Modules, 6DISS, 6DEPLOY, Hands-on exercises

Disclaimer

Revision History

The following table describes the main changes to the document since created.

Revision	Date	Description	Author (Organization)
v0.1	23/06/2009	Document creation based on Martel's model	Alvaro Vives (Consulintel)
v0.2	10/08/2009	Added Marrakesh training information	B. Tuy (RENATER), Simon Muyal (RENATER)
v0.3	20/8/2009	Document revision	Alvaro Vives (Consulintel)

Executive Summary

One of the main activities in the 6DEPLOY project is to organise workshops to train the different Internet communities in the areas of IPv6 deployment, configuration, and usage. This project is a follow up of previous project activities within and outside the Framework Programmes of the European Commission.

This deliverable reports on workshop held in Marrakesh (Morocco) from April 20th to 23rd 2009. The following workshop details are described in this report: a) the workshop attendees and their affiliations, b) the programme outline, c) the material presented, d) an assessment of the opportunities for further co-operation and follow-up actions planned, and e) an analysis of the feedback questionnaires from the participants.

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1. INTRODUCTION

1.1 6DEPLOY Objectives

The following comprise the 6DEPLOY objectives:

- organize workshops for the e-Infrastructure community and give practical advice and hands-on support for deploying IPv6 in their environments;
- work on deployments in Europe and in developing countries, exchanging experiences and best practices;
- improve the competitiveness of European industry by sharing experiences from IPv6 deployments in other regions;
- gain expertise with which to support *more commercial* deployments in European industries (e.g. Emergency Services, Health, Broadcast, Transport, Schools, Environment, Gaming, etc.);
- help to build consensus between European researchers, by enabling and exploiting synergy among related projects (e.g. GÉANT-2, SEEREN-2, SEE-GRID, EUMEDCONNECT, CLARA, ALICE);
- encourage and enhance the effectiveness of the coordination between National and pan-European e-Infrastructure initiatives by being a focal point for IPv6 activities, giving IPv6 training, and supporting IPv6 deployments;
- open up the ICT programme to the participation of third country organisations in International Cooperation Partner Countries, including countries in Africa, Asia, and Latin America, by involving organisations that influence e-Infrastructures on those continents;
- improve scientific cooperation between Europe and the declared target regions (Africa, Asia, and Latin America) by exchanging knowledge and experiences through direct practical support for deployment, training events, etc. The project therefore also helps support other Community policies, most notably the development policy. Telecommunications infrastructures and the capability to access information worldwide are key measures of a country's progress. IPv6 has been a cornerstone of European Internet policy for several years; and
- support interoperability and standards by sharing information on the latest IPv6 standards, equipment hardware and software releases, and IPv6 policies (RIRs).

One of the main activities in the 6DEPLOY project is therefore to organise workshops to

train the different Internet communities in the areas of IPv6 deployment, configuration, operation, and management. This activity is a follow up of previous project's activities within and outside the Framework Programmes of the European Commission.

1.2 6DEPLOY Workshop Methodology

The 6DEPLOY methodology relating to the workshops is shown in the diagram below:

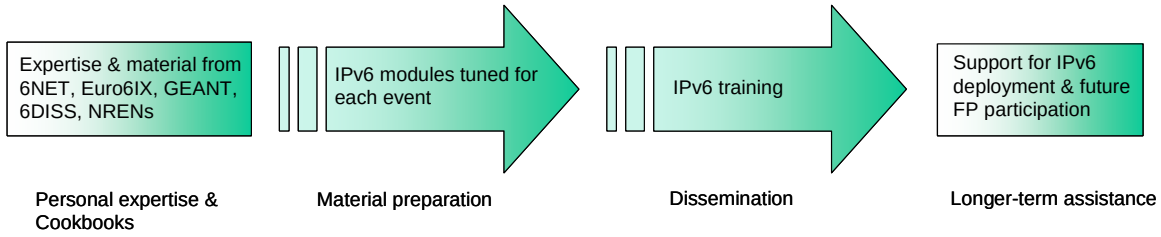

Figure 1-1: 6DEPLOY methodology (diagrammatically)

The approach is to use course material available from 6DISS and elsewhere that relates to IPv6, the e-learning course, and the 6NET IPv6 Deployment Guide book, together which will form the basis of the training material. This training material is supplemented with knowledge from partners' participation in events such as IPv6 Forum meetings, IPv6 Task Force meetings, Internet2 meetings, and the IETF, and from the experience of similar activities brought to the project by the representatives of the Internet Registries in North and South America, the Asia-Pacific region, Africa, and Europe. The knowledge is disseminated through training sessions that, for practical reasons, are often held in conjunction with AfriNIC, LACNIC, APNIC, AfNOG, APRICOT, and ISOC meetings.

After each workshop, feedback reports are collected from the participants, enabling 6DEPLOY to assess the impact of the presentations and to identify any areas that need improvement.

The full set of dissemination materials (including the e-learning course and 2 managed testbeds) is available from 6DISS and partners´ own sources. This includes presentation slides on all issues of Internet deployment and evolution; especially IPv4-IPv6 transition strategies, DNS, DHCP, routing, QoS, MobileIP, multicast, renumbering, auto-configuration, security, monitoring and management tools, and applications. This material was described in the deliverable D1.1: "IPv6 training material and related usage procedures".

The present deliverable reports on workshop held in Marrakesh (Morocco) from April 20th to 23rd 2009.

Chapter 2 of this document explains the general motivation for running IPv6 workshops, and Chapter 3 describes the specific details of the workshop, in terms of the attendees, the modules that were presented, and the “hands-on” exercises (if appropriate). Chapter 4 identifies opportunities for further collaboration in the region and follow up actions, and Chapter 5 provides some general conclusions.

2. THE WORKSHOPS (GENERAL)

Workshops are one of the main mechanisms used by 6DEPLOY to transfer information and to build collaboration.

6DEPLOY is structured to provide an ideal platform for the discussion of deployment scenarios and the exchange of best practices, thereby avoiding duplication of effort, by preventing the waste of time on techniques that are known not to have been deprecated, and generally making the most efficient use of the available resources in a region. Partners in 6DEPLOY have deployed IPv6 on a production basis in their own NRENs and University networks, and have documented their experiences in Cookbooks and in IETF informational/best common practice RFCs. The manufacturer in the consortium is building IPv6 products.

The workshops are not only intended to lead to an improved quality of the Internet infrastructure in developing countries, but will also raise the competence of the attendees and, in exploiting the personal contacts made through 6DEPLOY, facilitate and encourage the participation of their organisations in future FP7 calls and beyond.

Impacts from the workshops will include:

- a positive effect towards preventing the “brain drain” from developing countries by bringing interesting and state-of-the-art activities into these regions, thus making information and knowledge resources accessible to scholars both locally and globally;
- an expansion of the conditions for growth by enabling the exchange of ideas, launching joint experiments and projects, disseminating RTD results, and activating market forces; all of which are substantial elements in the process of regional development;
- making European research and industrial concerns aware of the highly skilled personnel who can contribute to the urgently needed improvement of ICT infrastructures, resulting in an increase of the demand for specialized services provided by the highly skilled academics and researchers of the region; and
- the identification of IPv6 deployment activities in the region and an exchange of information about deployment experiences.

While IPv6 standards and services are quite stable, regional variations in practices and operations will require slightly different approaches for collaboration and dissemination. Therefore, the material for these workshops was collected, and the workshop schedules,

formats, and contents were tailored in conjunction with the local organisers so as to suit the type of participants, the subjects to be addressed, the location, the host organisation, the sponsors, etc.

3. THE 6DEPLOY WORKSHOP IN MARRAKESH (MOROCCO)

It may be useful to remind that 6DEPLOY participated (and organised) a lot of events in Morocco so far: Presentation at launch of Morocco IPv6 task force and two IPv6 trainings at *Institut National des Postes et Télécommunications* (INPT), Rabat.

This workshop was held in Marrakesh from April 20th to 23rd 2009, and was organised by RENATER with local support from *Université de Marrakech* and *l'Ecole Nationale de Commerce et de Gestion de Marrakech (ENCG)*. The workshop is described below, including descriptions of the attendees and their affiliations, the programme outline, and the material that was presented.

3.1 Overview

The event has been planned with two different parts: the first one took place on April 20th 2009, and was a tutorial on IPv6 basics. The second part, was the workshop itself and lasted 3 days as usual (April 21st to 23rd).

Audience for both parts was slightly different: non technical people joined for the first part, for instance. For the IPv6 workshop, attendees were university professors, network administrators and students, coming from several places in Morocco.

Both parts of this event were organised with the local support of Pr Said Raghay. *Université de Marrakech* hosted the first day, ENCG hosted the workshop itself, providing the computers to achieve the practical exercises of configuring IPv6 on the machines for the network services. Internet connectivity allowed the trainees to access 6DEPLOY remote testbeds, which have been used for IPv6 routing configurations.

The first day was a "two-men show" presentation series shared between Latif Ladid (IPv6 Forum Chair) and Bernard Tuy (RENATER). Then, the workshop was conducted by Simon Muyal and Bernard Tuy (RENATER).

All the presentations were conducted in French, in order to accommodate the local audience (even if all the training material is written in English).

3.2 Attendees

Below is a list of people that attended at least one session:

No.	Surname	First name	Affiliation
1	ABOUSSAID	Said	Groupe MEHARA, Marrakech

2	BOUDGUIG	Mohammed	Université Cadi Ayyad, FST, Marrakesh
3	EL HADAJ	Salah	ENCG Marrakesh
4	EL HAMZAOUI	Mustapha	Université Doukkali, El Jadida
5	EL HASSAN	Nabil	Université Hassan II Mohammedia
6	EL MONATASSIM	Anas	Faculté des Sciences et Techniques (FST), Seitat
7	JAMALI	Abdellah	INPT
8	KHARTOCH	Abdelkrim	Ecole Supérieure de Technologie de Fès
9	LAANAOUI	Mydriss	FST
10	LAGMIRI	Sonad Nojoua	Université Cadi Ayyad, FST, Marrakesh
11	RAGHAY	Said	Université de Marrakech et ENCG

Table 3-1: Marrakesh Workshop list of participants

Attendees' technical background with IPv4 networks was very heterogeneous (as the audience). Then, part of the hands-on exercises was more difficult to achieve by less experienced people, even if this people were asked to work with more experienced ones.

In section 3.6 more details about the attendees can be found based on their answers to the questionnaire.

3.3 Workshop programme

The workshop programme is presented in the following table:

Date	Time	Title of session
20/04/2009	am	IPv6 dans le Monde Déployer IPv6 : pourquoi, comment ? quels principes de sécurité appliquer ?
20/04/2009	pm	Peer to peer and GRID using IPv6
21/04/2009	am	Introduction à l'atelier IPv6 Présentation du projet 6DEPLOY Introduction à IPv6 Les formats d'en-têtes IPv6 et les options Adresses IPv6
21/04/2009	pm	TP : adressages des machines terminales Protocoles associés à IPv6 mécanismes d'autoconfiguration TP : Analyse des datagrammes NDP
22/04/2009	am	Protocoles de routage IPv6 présentation des plates-formes d'exercices TP : configuration des routeurs distants TP : configuration IGP et EGP
22/04/2009	pm	DNS et IPv6 Applications IPv6 TP : Applications et DNS

23/04/2009	am	Sécurité pour les réseaux IPv6 TP : mise en œuvre de la sécurité IPv6 administration des réseaux Ipv6
23/04/2009	pm	TP : adminsitration de réseaux IPv6 mécanismes d'intégration avec IPv4 Déploiement d'IPv6 dans un campus Questionnaires sur le déroulement de l'atelier et discussion générale Recommendations et références pour la suite

Table 3-2: Marrakesh Workshop programme

3.4 Presentation material

The following material was presented:

Modules	Hands-on exercises	Presented by
6DEPLOY training session introduction		Bernard Tuy
6DEPLOY project overview		Bernard Tuy
IPv6 Introduction		Bernard Tuy
IPv6 protocol (headers & options)		Bernard Tuy
IPv6 addressing		Simon Muyal
IPv6 Hosts addressing	*TP 1*	Simon Muyal
IPv6 associated protocols		Bernard Tuy
IPv6 autoconfiguration		Simon Muyal
NDP packets analysis	*TP 2*	Simon Muyal
IPv6 routing protocols		Bernard Tuy
Configuring router interfaces and routing protocols	*TP 3*	Simon Muyal
IPv6 DNS		Bernard Tuy
IPv6 Applications		Simon Muyal
IPv6 applications and DNS set up	*TP 4*	Simon Muyal
IPv6 Security		Simon Muyal
IPv6 security	*TP 5*	Simon Muyal
IPv6 Network Management		Simon Muyal
IPv6 network management	*TP 6*	Simon Muyal
IPv4 – IPv6 coexistence		Bernard Tuy
Campus deployment considerations		Bernard Tuy

Table 3-3: Marrakesh Workshop list of modules and hands-on exercises used

3.4.1 Modules

Below is a brief description of each theoretical module's content:

- **IPv6 Introduction**: This module explains why a new version for IP, IPv6, has been developed. A brief history of IPv6, its motivation and benefits are given.
- **IPv6 protocol**: This module describes IPv6 protocol: IPv6 packet header, extensions headers and differences with IPv4 headers. Packet size issues and upper layer considerations are also treated.
- **IPv6 addressing**: This module explains the IPv6 addressing architecture, the different types of addresses (unique local IPv6 addresses, interface IDs, multicast addresses), their textual representation, how these are built and related to a layer 2 address.
- **IPv6 associated protocols**: This module describes new protocols associated to IPv6: e.g. Neighbour Discovery Protocol, SEND, ICMPv6, MLD, etc.
- **IPv6 autoconfiguration**: This module describes stateful (DHCPv6) and stateless (Router Solicitation/Router Advertisement) autoconfiguration mechanisms.
- **IPv6 routing protocols**: This module mainly describes the differences between IPv4 and IPv6 routing protocols for OSPFv3, EIGRP, RIPng, BGP4+, ISIS and MPLS.
- **IPv6 DNS**: This module describes new Resource Records for IPv6 DNS, availability of IPv6 in the root servers zone and CC-TLDs, etc.
- **IPv6 Applications**: This module explains how to implement IPv6 applications and how to update an IPv4 application in order to support IPv6 (porting issues, etc.).
- **IPv6 Security**: Several issues are covered like the IPsec model, privacy extensions, ND threats, IPv4 vs. IPv6 Threat Analysis, IPv6 security issues, practical IPv6 security issues and firewalling IPv6. The distributed security model is introduced. Security issues from transition and coexistence point of view are also provided.
- **IPv6 Network Management**: This module explains how to manage an IPv6 network. The different ways to retrieve management information are described (MIBs, IPv6 flows) and some IPv6 management tools and platforms are presented.
- **IPv4 - IPv6 coexistence**: This module explains different approaches to deploy IPv6 in an IPv4 environment. Transition concepts are introduced and several transition mechanisms are covered: Dual Stack, tunnels, tunnel broker, 6to4, Teredo, Softwires and translation (at various layers).

3.4.2 Hands-on exercises

To help ensure that the workshop attendees will be able to install IPv6 in their own environment after the course is over, a set of practical exercises, known as hands-on modules, has been designed. These exercises were performed on local equipment available in the workshop room (PCs) and using remote RENATER lab (routers) based in Paris. Few trainees used also their own laptop to perform some hands-on modules.

The local lab, which consisted of one PC per trainee, was used for exercises on hosts and servers. Linux operating system (Ubuntu) and Windows XP were used to support the exercises related to basic IPv6 configuration, usual network services, security and management tools.

The remote lab – as we did it for other 6Deploy workshops - were used for external (BGP) and internal (OSPFv3) routing protocols exercises.

Generally, the Sofia lab (BREN) is also used in this kind of training but due to some local filters, it was impossible to access the BREN lab. This issue was solved gathering 2 trainees per router.

The following figure shows the local network topology:

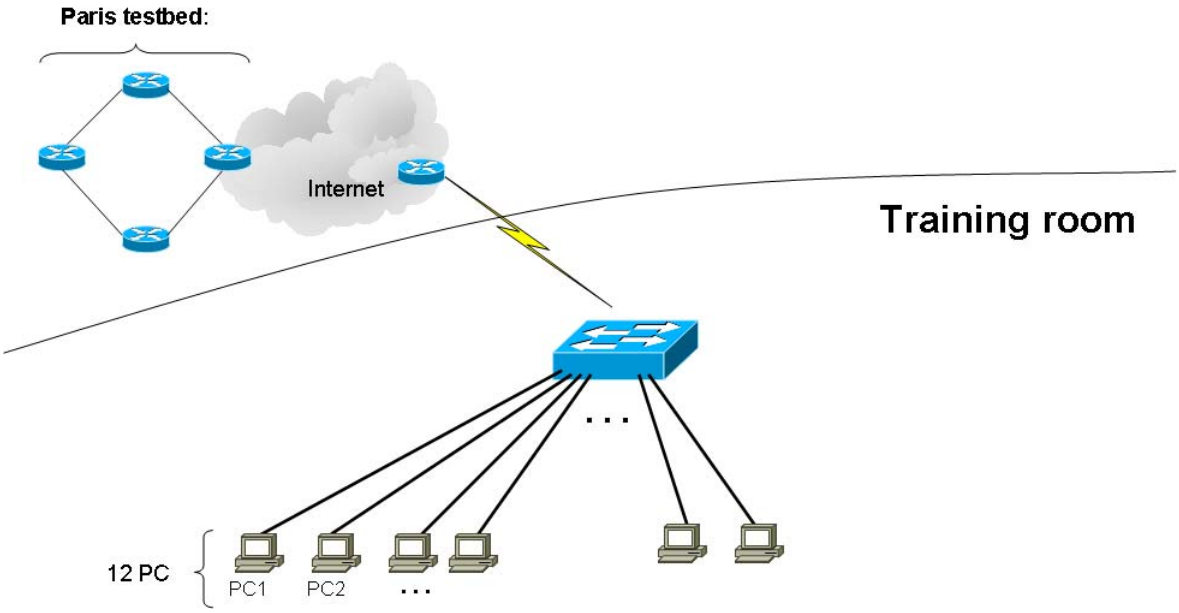

Figure 3-1: Local Network at Marrakech, Morocco.

The following figure shows the Paris lab:

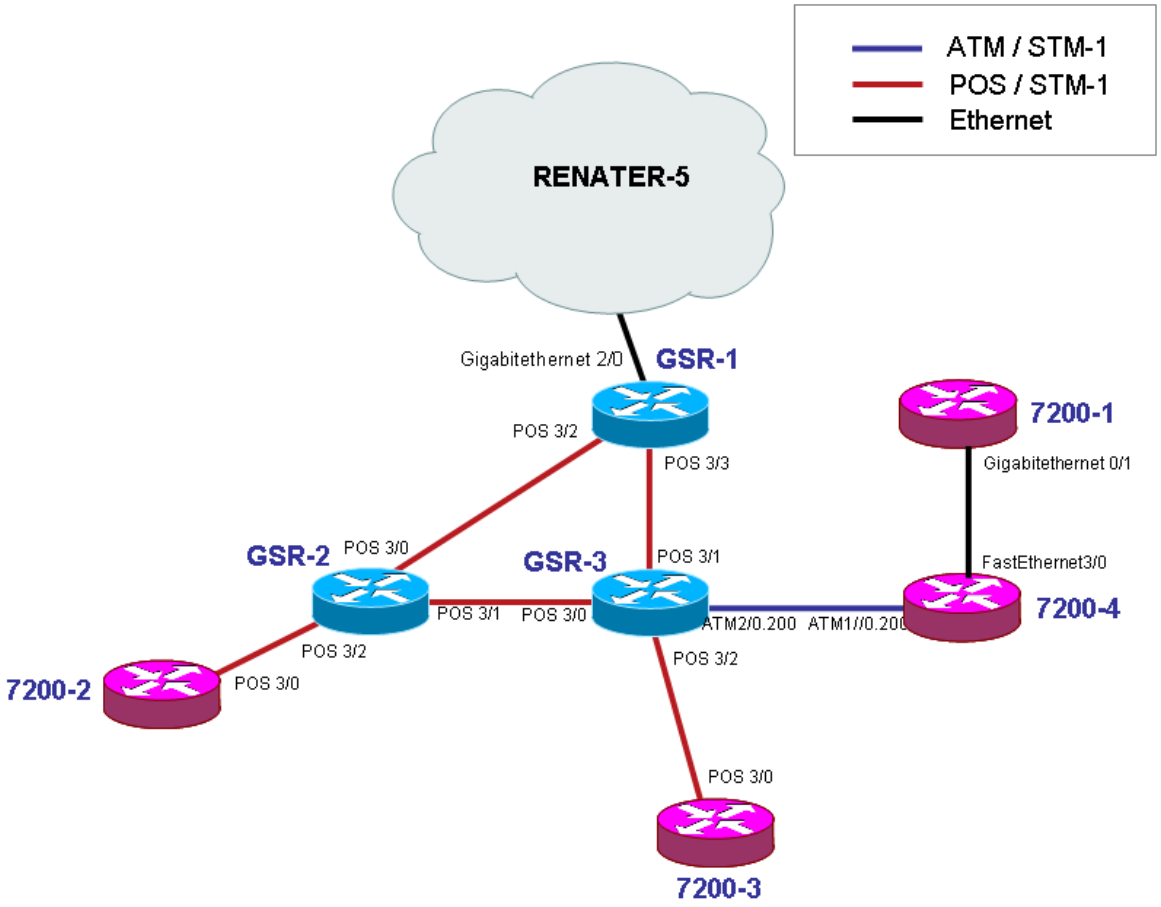

Figure 3-2: Paris lab.

3.5 Photographs taken at the event

Figure 3-3: Presenting the Marrakesh Workshop material

Figure 3-4: Attendees to the Marrakesh Workshop

3.6 Analysis of the Feedback Questionnaires

A questionnaire has been specially designed for the purpose of getting feedback from the participants with regard to the suitability of the course material, the presenters´ abilities to convey information, and the relevance of the information to the expectations of the attendees.

Offering personal information on the questionnaire was not mandatory for the participants, so as to allow for anonymous responses.

Each participant was first asked to indicate:

- his/her organisation and job responsibilities, and
- his/her plans for IPv6 deployment in his/her organisation.

Then, for each theoretical presentation, each participant was requested to assess "usefulness", "quality of presentation", "familiarity with the topic", "quality of the course documentation", "general organisation", etc.

3.6.1 General questions related to participants and IPv6

About the participants 38 participants were present, 38 questionnaires were returned		
Employment sector	Government	
	University or other higher education	9
	Schools or further education	
	Research	
	Health	
	Commercial	1
	Other (please specify)	1 (anonymous)
Job function	Government Advisor	
	Senior Manager	
	IT Manager	
	Systems Administrator	2
	Network Administrator	
	Researcher / Postgraduate	
	Undergraduate	2
	Professors & university staff	6
Usage of IPv6		
Do you use IPv6 yourself?	Yes	2
	No	8
Does your organisation use IPv6?	Yes	1
	No, but planned in the next year	
	No, but planned in the longer term	9
	No, and no plans as yet	

Table 3-4: General questions from Morocco's Workshop participants

3.6.2 Questions regarding the workshop

About the Workshop				
Usefulness of the topic	Very useful	Useful	Slightly useful	Not useful

Theoretical Presentations (all modules)	8	1	2	0
Hands-on exercises (all “TPs”)	9	2	0	0
	Excellent	Good	Average	Poor
Quality of the presentations	9	2	0	0
Quality of the course documentation	Excellent	Good	Average	Poor
	2	6	3	0
General workshop organisation	Excellent	Good	Average	Poor
	6	5	0	0
Will you attend a follow up session ?	Yes	No		
	8	3	0	0

Table 3-5: Questions regarding the Marrakesh Workshop

3.6.3 Participant comments

It should be noted that the participants had different technical backgrounds. For example, some were network engineers (and therefore more interested in routing protocols and troubleshooting practices), while others were system administrators (and therefore more interested in applications and monitoring tools). Depending upon their background, some participants would have preferred to spend more time on Management or Applications “hands-on”. It is also worth mentioning that a few attendees remarked that the sessions where too short, and that they would have been happy to work much later in the evening on more “hands-on” exercises.

Within the questionnaire there were three open questions where the trainees could give their feedback on the workshop. Below are almost all of the responses. Note that some are repeated (indicated by the number in parentheses).

Here are some comments provided by the trainees:

== Begin of the excerpts

*What topics would you have liked to **hear more about**?:*

- *(3) DNS*
- *(3) Security*
- *(2) Network management*
- *(2) Mobility*
- *(2) QoS*
- *Teredo*
- *Multicast*
- *ToIP*
- *Addressing*

What topics would you have liked to hear less about?

- *(3) Nothing*
- *(1) Routing*
- *Theoretical part*

Any other comments:

- *Prepare training rooms in advance*
- *Define clearly the requirements before the training*
- *More hands-on*
- *Great training*
- *Good workshop to discover IPv6 and how it works!*

End of the excerpts ==

4. OPPORTUNITIES FOR FURTHER CO-OPERATION

In all the workshops, the attendees were informed on how to stay in contact with the 6DEPLOY partners in case they have questions regarding IPv6 deployment, addressing plans, etc. In this respect, the role of the *helpdesk* was explained as being the way to submit questions. An e-mail to helpdesk@6deploy.org will be distributed to a mailing list composed of volunteers who are available to answer (or forward) any kind of questions, requests, etc. Also a web form can be used to send requests to the project.

Additionally, the attendees (and trainers from the region) can follow the e-learning course and/or check the availability of the 6DEPLOY remote labs and use these.

5. CONCLUSIONS

Workshops are a key mechanism through which information, knowledge, and know-how are transferred to less experienced countries and participants. The workshops enable us to build constituencies and raise awareness; disseminate, benchmark, and validate the research results from the EU's Framework Programmes; promote European technologies; exchange best practices; and offer information related to standards and interoperability issues.

This workshop held in Marrakesh (Morocco) continues with the good work being done by RENATER on Morocco. It may be useful to remind that 6DEPLOY participated (and organised) a lot of events in Morocco so far: Presentation at launch of Morocco IPv6 task force and two IPv6 trainings at *Institut National des Postes et Télécommunications* (INPT), Rabat. Thanks to previous projects and training activities, most of the IPv6 education material needed to start 6DEPLOY workshop training was available from the very beginning. The material included most of the issues of Internet deployment and evolution, especially IPv4-IPv6 transition/co-existence strategies, DNS, Autoconfiguration, Routing and Applications.

During the 6DEPLOY lifetime, stakeholders will continue to enhance today's "knowledge database". The reader and interested parties are referred to the 6DEPLOY website to check for new material.

In summary, this workshop should be considered a success with regard to the dissemination of IPv6, though this is only the first of many steps towards the deployment of real IPv6 networks and services in the region.

6. REFERENCES

6DEPLOY website: http://www.6deploy.org

6DISS website: http://www.6diss.org

Paris Testbed: http://www.renater.fr/spip.php?article439&lang=en

Hands-on modules: http://6diss.6deploy.org/publications/deliverables/hands-on.pdf

How-to organise an IPv6 workshop:

http://6diss.6deploy.org/workshops/workshop-guidelines.pdf

Training the trainers workshop: http://6diss.6deploy.org/workshops/ttt/

e-learning package: http://6diss.6deploy.org/publications/multimedia/e-learning.iso

e-learning on-line: http://6diss.6deploy.org/e-learning/