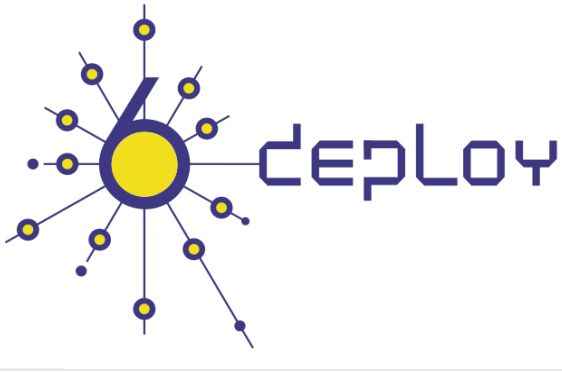
e-infrastructure



Title:	Document Version:
Deliverable D1.12 **Report from the 11th Workshop**	0.4

Project Number:	Project Acronym:	Project Title:
223794	6DEPLOY	IPv6 Deployment Support

Contractual Delivery Date:	Actual Delivery Date:	Deliverable Type* - Security**:
31/1/2010	31/10/2009	R – PU

- Type: P – Prototype, R – Report, D – Demonstrator, O – Other

** Security Class: PU- Public, PP – Restricted to other programme participants (including the Commission Services), RE – Restricted to a group defined by the consortium (including the Commission Services), CO – Confidential, only for members of the consortium (including the Commission Services)

Responsible and Editor/Author:	Organization:	Contributing WP:
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Abstract:

This deliverable presents a report from the workshop held in Budapest (Hungary) on June 25th 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, South Eastern Europe, 3G Demonstration

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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	25/08/2009	Added content provided by GRNET	Alvaro Vives (Consulintel)
v0.3	14/09/2009	Document revision	Alvaro Vives (Consulintel)
v0.4	30/09/2009	Document Revision	Sarah Kenehan (Martel)

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 presents a report from the workshop held in Budapest (Hungary) on June 25th 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, and d) an assessment of the opportunities for further co-operation and follow-up actions planned.

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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:

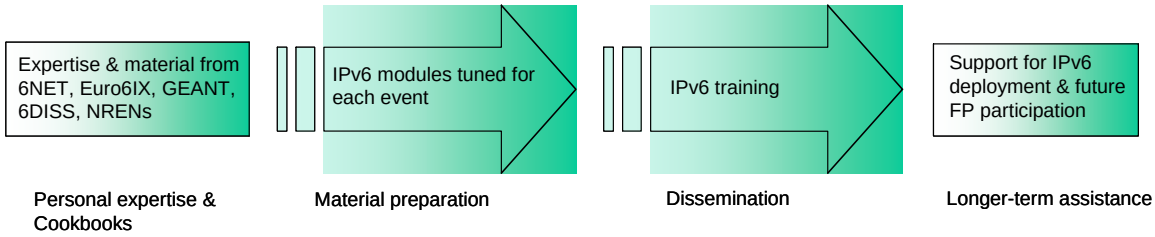

Figure 1-1: 6DEPLOY methodology (diagrammatically)

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".

This deliverable presents a report from the workshop held in Budapest (Hungary) in June 25th 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 the recommended 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 BUDAPEST (HUNGARY)

This 1st SEE (South Eastern European) IPv6 Workshop was held in Budapest (Hungary) on June 25th 2009. Hosting was provided by the Budapest University of Technology and Economics (BME). In the following paragraphs we provide information about the workshop, including descriptions of the attendees and their affiliations, the programme outline, and the material that was presented.

3.1 Overview

The event was organized by GRNET. The target audience was networking/IT researchers from SEE and included people from the EFIPSANS FP7 project (http://www.efipsans.org/), researchers from BME, and engineers from the department of Ericsson in Hungary. In addition to the theoretical presentations, a demo of IPv6 services over 3G networks was organized by the Mobile Innovation Center (MIK) laboratory in Budapest. The testbed in MIK was partially deployed in the framework of the IST Anemone project (http://www.ist-anemone.eu). Finally, there was a short presentation of the EFISPANS project and its objectives by the Technical Coordinator, Ranganai Chaparadza (FOCUS).

The SEE workshop was conducted by Athanassios Liakopoulos (GRNET) and Anastasios Zafeiropoulos (GRNET). All the presentations were conducted in English in order to accommodate the local audience.

The workshop included several sessions with presentations about IPv6 Basics, IPv6 Advanced Services, the main differences between IPv4 and IPv6, IPv6 and 3G networks, IPv6 and Sensor networks and Programming in IPv6. Special focus was given to the exploitation of IPv6 characteristics for the development of autonomic networking functionalities, since the EFIPSANS consortium was very interested in this perspective. Furthermore, emphasis was put on running IPv6 over 3G networks, as it was specially requested by the participants.

The workshop included The EFIPSANS project (www.efipasans.org), which aims at exposing the features of IP version six protocols that can be exploited or extended for the purposes of designing or building autonomic networks and services. What this means is, a study of the emerging research areas that target desirable user behaviours, terminal behaviours, service mobility, e-mobility, context aware communications, self ware, autonomic communication/ computing/ networking will be carried out, and out of these areas desirable autonomic (self-*) behaviours in diverse environments, e.g. end

systems, access networks, wireless versus fixed network environments will be captured and specified. The vision is that given the specified autonomic behaviour specifications, the identified exploitable IPv6 features and new protocol and architectural extensions will be standardized in the long run, i.e. mature from drafts to standards.

After the end of the workshop late in the afternoon, a live demonstration of a native IPv6 UMTS/HSPA network was performed at the Mobile Innovation Center (MIK) laboratory in Budapest The demo complemented the IPv6 & 3G theoretical 6DEPLOY module presented during the workshop. During the demonstration, 3G mobile phones were given to participants in order test IPv6 services over 3G networks, e.g. web browsing. Mobile nodes could register to UMTS network, establish an IPv6 PDP context, obtain IPv6 addresses, and communicate over IPv6 content. The demonstration also included short presentations for the testbed architecture and the different subsystems (such as SGSN, GGSN, HLR).

3.2 Attendees

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

No.	Surname	First name	Affiliation
1	Melakessou	Foued	SnT University of Luxembourg
2	Rιtvari	Gabor	BME
3	Sonkoly	Balazs	BME-TMIT
4	Toth	Andras	Ericsson AB
5	Kulik	Ivett	TMIT - BME
6	Illιs	Csaba	Ericsson Hungary
7	Andody	Norbert	Ericsson Hungary
8	Sasvari	Antal	Ericsson Hungary
9	Kosa	Daniel	Ericsson Hungary
10	Fabian	Laura	Ericsson Hungary
11	Tancos	Ferenc	Ericsson Hungary
12	Paksy	Balint	Ericsson Hungary
13	Schlaffer	Viktor	Ericsson Hungary
14	Pintir	Gusztav	Ericsson Hungary
15	Olah	Lajos	Ericsson Hungary
16	Kantor	Robert	Ericsson Hungary
17	Fulop	Piter	Ericsson Hungary
18	Bertalan	Attila	Ericsson Hungary
19	Kovacs	Gergely	Ericsson Hungary
20	Gaspar	Csaba	Ericsson Hungary
21	Elzer	Zoltαn	Ericsson Hungary
22	Komar	Gabor	Ericsson Hungary
23	Sinka	Zoltαn	Ericsson Hungary
24	Pluhar	Gyorgy	Ericsson Hungary
25	Kosztovics	Adam	Ericsson Hungary
26	Laborczi	Zoltan	Ericsson Hungary
27	Meszaros	Andras	Ericsson Hungary
28	Jeney	Gabor	BME, Department of Telecommunications
29	Kis-Hegedós	Gabor	Evopro Kft.

30	Cinkler	Tibor	BME
31	Fekete	Attila	Ericsson Hungary
32	Berki	Peter	Ericsson Hungary
33	Bodnar	Peter	Ericsson Hungary
34	Foldesi	Laszlo	Ericsson Hungary
35	Domanj	Aniko	Ericsson Hungary
36	Novaki	Daniel	Ericsson Hungary
37	Onodi	Lorant	Ericsson Hungary
38	Orosz	Csego	Ericsson Hungary
39	Pinter	David	Ericsson Hungary
40	Komaromi	Kornel	Ericsson Hungary
41	Kompar	Krisztian	Ericsson Hungary
42	Marton	Gabor	Ericsson Hungary
43	Szabo	Agoston	Ericsson Hungary
44	Papp	Istvan	Ericsson Hungary
45	Csatari	Balint	BME VIK
46	Mezo	Richard	BME
47	Wodczak	Michal	Telcordia
48	Mıszaros	Gabor	BME
49	Vida	Gabor	Ericsson Hungary
50	Tisztaval	Viktor	Ericsson Hungary
51	Gergely	Viktor	Ericsson Hungary
52	Flach	Tibor	
53	Tcholtchev	Nikolay	Fraunhofer FOKUS
54	Baranyai	Jozsef	Ericsson Hungary
55	Ravasz	Peter	Ericsson Hungary
56	Petre	Razvan	Fraunhofer FOKUS
57	Vitoszki	Marta	Ericsson Hungary
58	Fekete	Robert	Ericsson Hungary
59	Radziszewski	Pawel	WUT
60	Vermes	Peter	BME
61	Boros	Peter	BME
62	Radziszewski	Jacek	WUT
63	Varga	Zoltan	Ericsson Hungary
64	Prakash	Arun	Fraunhofer FOKUS
65	Li	Yuhong	BUPT
66	Kiss	Gergely	Ericsson Magyarorszαg Kft
67	Jocha	David	Ericsson Hungary
68	Szabo	Karoly	BME
69	Chaparadza	Ranganai	Fraunhofer FOKUS
70	Quinn	Kevin	TSSG
71	Shi	Lei	TSSG
72	Kaldanis	Vassilis	Velti

Table 3-1: Budapest Workshop list of participants

The participants represented a wide range of the ICT community. They were technical people whose knowledge about IPv6 ranged from almost no knowledge at all to having significant experience with IPv6 deployment. Some had already performed IPv6 experiments or were planning some level of deployment at their institutions.

3.3 Workshop programme

The agenda was agreed on after close collaboration with the local organisers from BME and the EFIPSANS consortium. The meeting agenda and the related material were submitted in advance so that the local organisers could decide which topics should be prioritised and so manage the logistics accordingly. The program of the workshop is presented in the following table:

Date	Time	Title of session
25/06/2009	09:00-09:15	The 6Deploy Project
25/06/2009	09:15-09:30	The Efipsans Project
25/06/2009	09:30-10:30	Introduction to IPv6 – Part A
25/06/2009	11:00-12:00	Introduction to IPv6 – Part B
25/06/2009	12:00-12:20	IPv6 in Operating Systems
25/06/2009	12:20-13:00	IPv6 Software Development
25/06/2009	14:00-14:30	IPv6 and Sensor Networks
25/06/2009	14:30-15:00	IPv6 QoS
25/06/2009	15:00-15:30	Security in IPv6
25/06/2009	15:30-16:00	IPv6 Network Management
25/06/2009	16:30-17:00	IPv6 Routing
25/06/2009	17:00-17:30	IPv6 and 3G Networks
25/06/2009	17:30-19:00	Demo: IPv6 in 3G Networks

Table 3-2: Budapest Workshop program

3.4 Presentation material

The following material was presented:

Modules	Presented by	Affiliation
6Deploy Introduction	Athanassios Liakopoulos	GRNET
Efipsans Introduction	Ranganai Chaparadza (Project Manager)	FOCUS
IPv6 Introduction	Athanassios Liakopoulos	GRNET
IPv6 Protocol	Athanassios Liakopoulos	GRNET
IPv6 Addressing	Athanassios Liakopoulos	GRNET
IPv6 Associated Protocols	Athanassios Liakopoulos	GRNET
Equipment Configuration	Anastasios Zafeiropoulos	GRNET
How-to Guide for Developers	Anastasios Zafeiropoulos	GRNET
IPv6 and Sensor Networks	Anastasios Zafeiropoulos	GRNET
IPv6 QoS	Athanassios Liakopoulos	GRNET
IPv6 Security	Athanassios Liakopoulos	GRNET
IPv6 Network Management	Athanassios Liakopoulos	GRNET
IPv6 Routing	Athanassios Liakopoulos	GRNET
IPv6 and 3G Cellular Networks	Athanassios Liakopoulos	GRNET
Demo: IPv6 and 3G Cellular Networks	Gabor Jeney	BME

Table 3-3: Budapest Workshop list of modules used

3.4.1 Modules

Below is a brief description of each 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 addressed.
- **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, and how these are built and related to a layer 2 address.
- **IPv6 Associated Protocols:** This module describes new protocols associated with IPv6: e.g. Neighbour Discovery Protocol, SEND, ICMPv6, MLD, etc.
- **Equipment Configuration:** This module lists some examples of IPv6 configurations for hosts (Windows, Linux, etc) and routers (Cisco, Juniper,etc.).

- **How-to Guide for Developers:** This module explains how to implement IPv6 applications and how to update an IPv4 application in order to support IPv6 (porting issues, etc.)
- **IPv6 QoS:** This module describes how to implement IPv6 QoS with Classes of Services (configuration examples, performance tests) and discusses IPv6 Flow Label usage.
- **IPv6 Security:** Several issues are covered in this module, such as 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 a transition and a 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.
- **IPv6 Routing:** This module mainly describes the differences between IPv4 and IPv6 routing protocols for OSPFv3, EIGRP, RIPng, BGP4+, ISIS, and MPLS.
- **IPv6 and 3G Cellular Networks:** This module provides a short overview of the different kinds of cellular networks (GSM, GPRS, 3G) and the IPv6 services that can be deployed within them. Specific issues such as IPv6 address allocation using GPRS, transitioning scenarios related to Mobile Stations (MS), transitioning scenarios related to IP Multimedia Subsystem (IMS), and IPv6 MS implementation issues are presented in detail.

3.5 Photographs taken at the event

Figure 3-1: Presentation of the 6DEPLOY Project

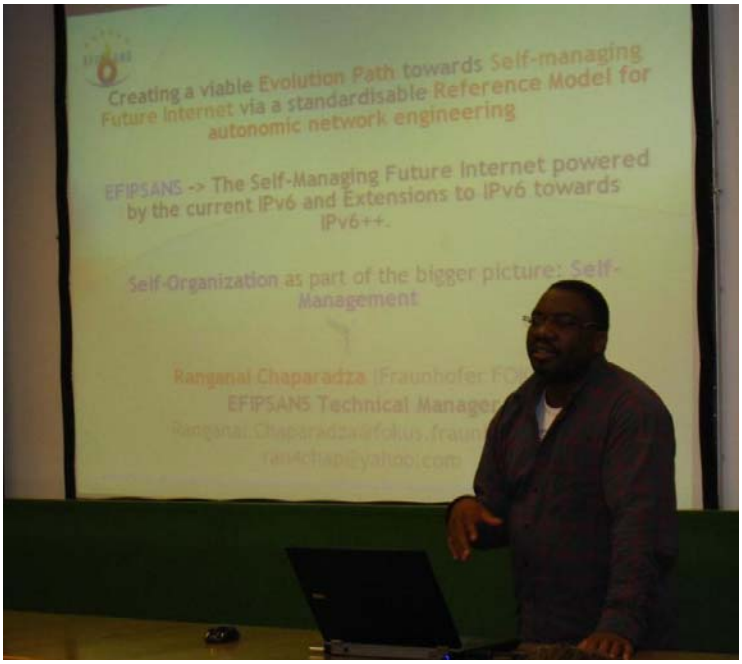

Figure 3-2: Presentation of the Efipsans Project by Ranganai Chaparadza

Figure 3-3: Participants in the Budapest Workshop

Figure 3-4: Presentation for IPv6 Equipment Configuration

Figure 3-5: Presentation of 3G Demonstration

Figure 3-6: 3G Equipment Demonstration

Figure 3-7: 3G Equipment Demonstration

Figure 3-8: IPv6 over 3G in mobile phone

Figure 3-9: IPv6 over 3G in mobile phone

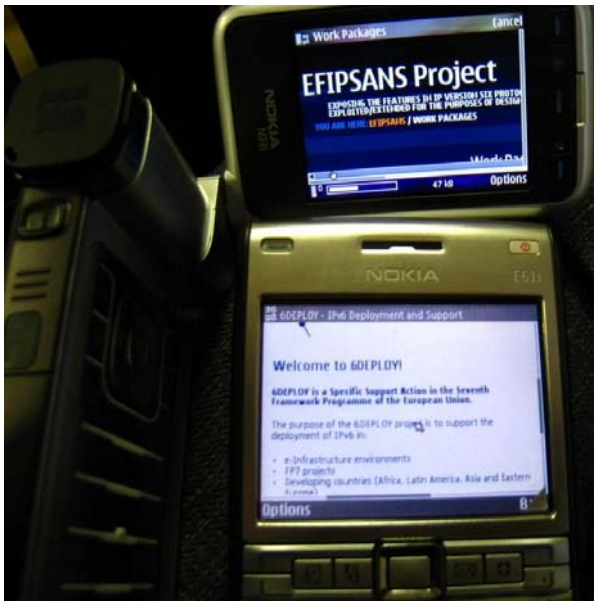

Figure 3-10: IPv6 over 3G in mobile phone

3.5.1 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). A lot of them were very interested in IPv6 and 3G networks, since they are closely related with this field, while people from the EFIPSANS consortium were interested in all the IPv6 advanced services (e.g. mobility) and their correlation with the deployment of autonomic functionalities. Depending upon their background, some participants would have preferred to have a "hands-on" session related the presented issues. It is also worth mentioning that a number of participants from BME requested the use of 6Deploy training material for educational purposes, e.g. lectures.

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 deliverable presents a report from the workshop held in Budapest (Hungary) on June 25th 2009. GRNET, as a 6DEPLOY representative, collaborated with local authorities. 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 addressed most of the issues of Internet deployment and evolution, especially IPv4-IPv6 transition/co-existence strategies, DNS, Autoconfiguration, Routing and Applications.

A good number of people participated.

In the first SEE workshop, based on the comments from the participants, it is clear that there is significant interest in the region for IPv6 technology. The participants offered positive comments regarding the workshops' usefulness and organisation. They also requested that 6DEPLOY organise more workshops in the SEE region with more specific technical subjects. Furthermore, some of the attendees expressed interest in participating in any subsequent "Training the Trainers" courses. In summary, this workshop should be considered a success with regard to the dissemination of IPv6 in the SEE Region, though this is only the first of many steps towards the deployment of real IPv6 networks and services in the region.

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

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/