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Abstract:

This deliverable presents a report from the workshop held in Almaty (Kazakhstan) from July 20th - 22nd, 2011. 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

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Executive Summary

One of the main activities in the 6DEPLOY-2 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 report details the IPv6 lab opening and the workshop at KazRENA offices in Almaty (Kazakhstan) from July 20th - 22nd, 2011. The opening was performed by Boris Japarov (head of KazRENA) and the workshop was attended by technical staff from different national organisations from Kazakhstan. The workshop also received some national press coverage.

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.

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1. INTRODUCTION

1.1 6DEPLOY-2 Objectives

The following comprise the 6DEPLOY-2 objectives:

- to support the deployment of IPv6, in Europe and developing regions
- to sustain the wealth of 6DEPLOY training material (e-learning package with subtitles in national languages, presentation material, exercises, etc.)
- to create a catalyst of global IPv6 expertise through the installation of strategically-placed sustainable IPv6 training labs
- to synchronise with the training schedules of AfrinIC and LACNIC (and also APNIC) to exploit training opportunities cost effectively in Africa, Latin America and Asia
- to revive the IPv6 Cluster
- to describe deployment examples on the project Website
- to exploit the expertise and high quality training material from 6DEPLOY, including presentations, the e-learning course and the available IPv6 Labs, and - whilst continuing to offer professional training to organisations in Europe and developing countries - focus on supporting real deployments
- to maintain and update the 6DEPLOY material and include new training media, and multiply its training effectiveness through courses which educate other trainers about the basics of IPv6, so that they can teach others ("training trainers")
- to extend to global scale the IPv6 Labs. Sustainability is achieved initially through the careful selection of locations for the installations (e.g. within NRENs) where the connectivity, funding and qualified staff support are all secured
- to support the (human) networking between the Lab managers with regular workshops.

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-2 Workshop Methodology

The 6DEPLOY-2 methodology relating to the workshops is shown in the diagram below:

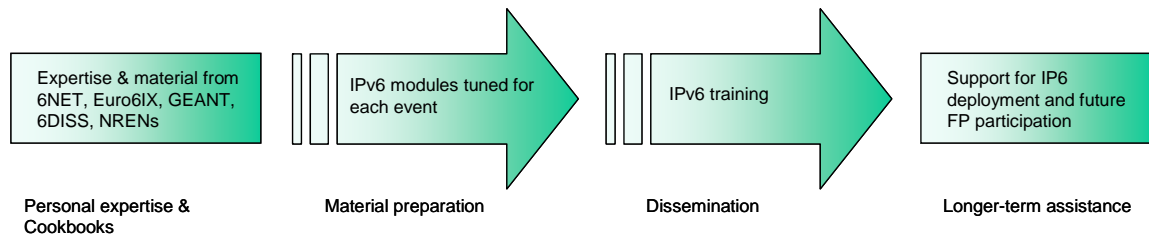


Figure 1-1: 6DEPLOY-2 methodology (diagrammatically)

The approach is to use course material available from 6DEPLOY 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-2 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 6DEPLOY 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 D1.1.1: "Report of the available training material and the assignment of partners responsible for maintaining each item".

This deliverable presents a report from the workshop held in Almaty (Kazakhstan) from 20th to 22nd July 2011. The workshop comprised both slide presentations and hands-on exercises (using local equipment and the local new 6DEPLOY testbed).

Chapter 2 of this document explains the general motivation for running IPv6 workshops, and Chapter 3 describe the specific details of this workshop, in terms of the

attendees, the modules that were presented, and the “hands-on” exercises that were performed, using both local equipment and the local testbed. 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-2 to transfer information and to build collaboration.

6DEPLOY-2 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, University networks and even on much larger scales. They 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-2 WORKSHOP IN ALMATY (KAZAKHSTAN)

This workshop was held in the Kazakh National Technical University (NTU) in Almaty from 20th to 22nd July 2011, and was organised by UCL with local support from KazRENA. The workshop is described below, including descriptions of the attendees and their affiliations, the programme outline, and the material that was presented. The details are given in Section 3.1.1. “Formal Lab Opening” including the formal opening of the IPv6 Laboratory donated by Cisco. Cisco has donated all the labs for this project as they have done in the previous 6DEPLOY project.

On the podium for the opening ceremony were Prof. Rakhman Alshanov (Rector, Turan University/President of the Higher Education Institutes Association), Prof. Sarsenbek Zhusupbekov (Deputy Rector, Kazakh National Technical University), Prof Bakhyt Kairakbay (Director of the Department of Science & International Cooperation, Kazakh National Technical University), the workshop organisers Peter Kirstein (UCL) and Boris Japarov (KazRENA) and Anel Sakhariyeva (KazRENA) acted as interpreter. The attendees for the Opening Ceremony included, in addition to the three lecturers Janos Mohacsi (NIIF), Piers O’Hanlon (UCL) and Talgat Nurlybayev (NTU), all the participants, and representatives from the Press and the British Council.

There was coverage of the opening ceremony from the local and national Press. Some typical examples are given in Annex A.

3.1 The Venue and Funding

KazRENA is located within the Kazakh-Korean Educational Center, which is part of the Kazakh National Technical University named after K. Satpaev (NTU). It has an extensive training programme in many aspects of IT including Operating Systems, Applications, Networks and Programming languages. The NTU IT training building was set up with help from a large grant from the Korean government. It has several computer rooms for training, and also hosts the national supercomputing facility (~10TFlops). The workshop was hosted in one of these computer rooms, where the equipment for the IPv6 laboratory was also temporarily located.

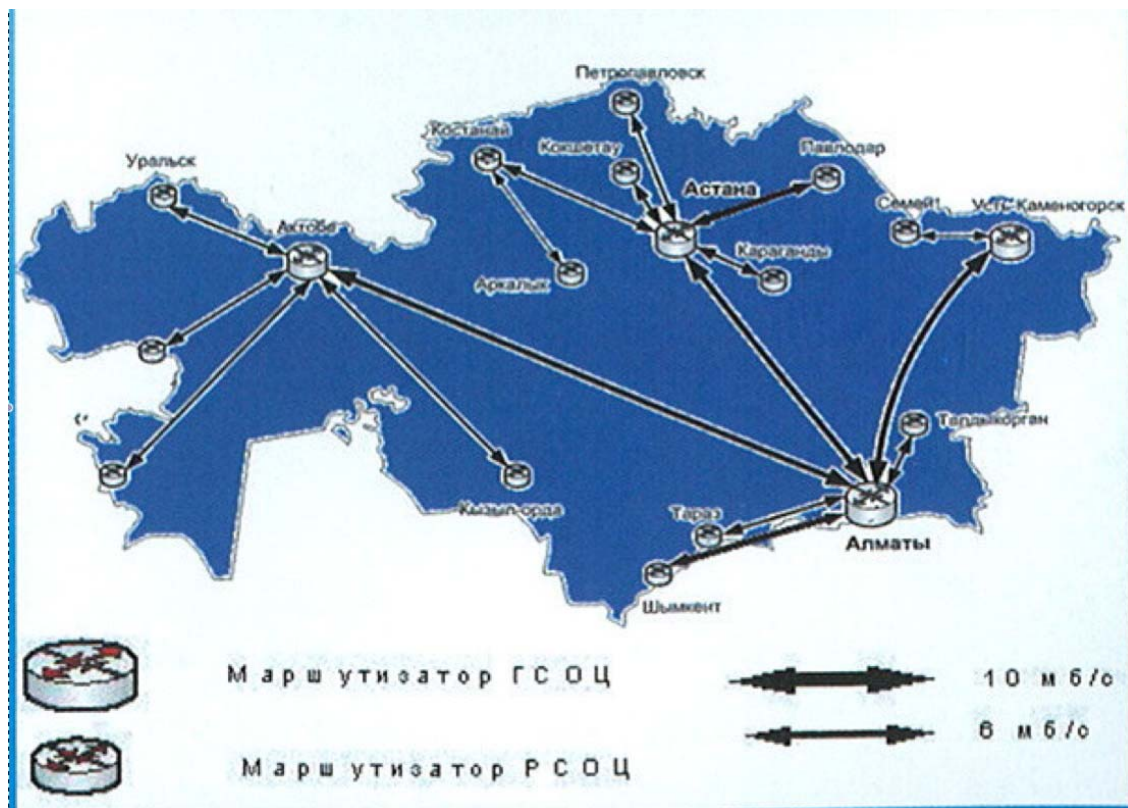


Figure 3-1: KazRENA network in 2009

The UCL 6DEPLOY-2 budget was used to defray the extra costs of lunches, one dinner and transport of the participants. The Kazakh NREN hosted a dinner for the attendees.

3.1.1 Formal Lab Opening

As is customary in this region, there was a formal Opening Ceremony on the 20th of July. For this session, there were visiting dignitaries, press and invited attendees.

On the podium for the opening ceremony were the following:

1. Prof. Boris Japarov - Director General, KazRENA
2. Prof. Rakhman Alshanov - Rector, Turan University/President of the Higher Education Institutes Association
3. Prof. Sarsenbek Zhusupbekov - Deputy Rector, Kazakh National Technical University
4. Prof Bakhyt Kairakbay - Director of the Department of Science & International Cooperation, Kazakh National Technical University
5. Professor Peter Kirstein
6. Anel Sakhariyeva (KazRENA) acting as interpreter.

The attendees for the Opening Ceremony included in addition to the three lecturers (Janos Mohacsi (NIIF), Piers O'Hanlon (UCL) and Talgat Nurlybayev (NTU), all the participants, and representatives from the press, the British Council and Kazakh Telecom.

After a welcome address from Prof. Sarsenbek, there were speeches from Prof. Japarov and Prof. Alshanov. This was followed by the formal opening of the lab by Prof. Japarov. During the press conference while Prof. Japarov and Prof. Kirstein answered questions, Prof. Sarsenbek Zhusupbekov conferred an honorary Professorship on Prof. Kirstein with the usual citation, cap and gown. Later, there was a talk by Prof. Kirstein on IPv6 and on the 6DEPLOY-2 project and its laboratory. The picture showing the members of the Podium after the conferment of the Professorship is shown in Fig, 3.3.

3.1.2 The IPv6 Workshop

The IPv6 workshop consisted of a number of presentations, interspersed with practical sessions enabling the students to have hands-on experience of IPv6, based upon the material from the lectures.

The NTU hosted the workshop and provided local computers with access to the IPv6 router lab, and the Internet via Kazakh Telecom, with an IPv6 tunnel to UCL. The workshop was conducted by Peter Kirstein, Piers O'Hanlon (UCL), Janos Mohacsi (NIIF), and Talgat Nurlybayev (NTU)

All the presentations were in English, except for Talgat Nurlybayev's presentation which was in Russian.

3.2 Attendees

Below is a list of participants of the workshop.

No	Name	Organization
1	Oksana Vepreva	Kazakh National Technical University
2	Saule Amanzholova	
3	Aigerim Mishina	
4	Khalicha Yubuzova	
5	Nurgul Seilova	
6	Andrey Bondarenko	
7	Adilbek Zhidebay	
8	Ruslan Utebaev	
9	Galya Abdikassova	
10	Farida Abdoldina	
11	Daniyar Nurseitov	
12	Dauren Sabitov	Kazakh National University
13	Zhetes Albayev	
14	Denis Arti	Kazakh-British Technical University
15	Nartay Artykbayev	
16	Ruslan Mendagaliev	
17	Saule Tusupova	Turan University
18	Alexandr Proskurin	
19	Olga Nauman	Pavlodar State University
20	Madina Khassenova	
21	Alexander Smurygin	Kazakhtelecom
22	Ilya Chernushenko	
23	Konstantin Kovalev	KazRENA
24	Sunkar Oshakbayev	
25	Malik Ainsanov	

Table 3-1: Almaty (Kazakhstan) Workshop list of participants

The attendees' technical background with IPv4 networking was rather heterogeneous. As a result some of the participants experienced difficulty in completing a number of the hands-on exercises.

The attendees consisted of a large proportion of women (approximately 50%) – larger than any other workshop that we have held in the Caucasus or Central Asia.

3.3 Workshop programme

The agenda was agreed on after collaboration with the local organisers. 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 programme of the workshop is presented in the following table:

Date	Time	Title of session
Wednesday 20/07/2011	Lecture Session 1	
	11:00	Introduction to IPv6 (Peter Kirstein)
	11:45	IPv6 Overview (Talgat Nurlybayev)
	12:30	<i>Lunch</i>
	Lecture Session 2	
	14:00	Associated Protocols (Piers O'Hanlon, PO)
	15:00	Auto-configuration (PO)
	15:30	<i>Coffee Break</i>
	15:50	IPv6 Support in the DNS (Janos Mohacsi, JM)
	Lab Session 1: Host configuration	
	16:30	Lab Session 1: Windows and Linux host configuration
	18:00	<i>End of First Day</i>
	19:00	Workshop Dinner
Thursday 21/07/2011	Lecture Session 3	
	11:00	Transition mechanisms and Deployment considerations I (JM)
	11:30	<i>Coffee Break</i>
	11:50	Transition mechanisms and Deployment considerations II (JM)
	13:30	<i>Lunch</i>
	Lecture Session 4	
	14:30	Routing Protocols for IPv6 (JM)
	16:00	<i>Coffee Break</i>
	Lab Session 2: Routing Configuration	
	16:30	Lab Session 2: Routing Configuration
	18:00	<i>End of Second Day</i>
18:30	Workshop dinner	
Friday 22/07/2011	Lecture Session 5	
	9:30	Sensor networking (PO)
	10:30	Applications: Grid, VOIP, and Conferencing Case Studies (PO)
	11:30	<i>Coffee Break</i>
	12:00	Mobile IPv6 (PO)
	12:50	Security (PO)
	13:30	<i>Lunch</i>
	13:30	<i>End of Workshop</i>

Table 3-2: Almaty Workshop programme

3.4 Presentation material

The following 6DEPLOY modules were updated before the workshop and presented:

Modules	Hands-on exercises	Presented by	Affiliation
Introduction to IPv6		Peter Kirstein	UCL
IPv6 Overview (Non 6DEPLOY)		Talgat Nurlybayev	NTU
Associated Protocols		Piers O'Hanlon	UCL
Auto-configuration		Piers O'Hanlon	UCL
Host and Auto-configuration lab	LAB1	All	
IPv6 Support in the DNS		Janos Mohacsi	NIIF
Deployment and Transition mechanisms		Janos Mohacsi	NIIF
Sensor networking		Piers O'Hanlon	UCL
Mobile IPv6		Piers O'Hanlon	UCL
Applications: Grid, VOIP, and Conferencing Case Studies		Piers O'Hanlon	UCL
Routing		Janos Mohacsi	NIIF
Routing lab	LAB2	All	
Security		Piers O'Hanlon	UCL

Table 3-3: Almaty Workshop list of modules used

3.4.1 Modules

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

- **Introduction to IPv6:** This module explains why a new version for IP, IPv6, has been developed. A brief history of IPv6, its motivation and benefits are given.
- **Associated Protocols:** This module describes new protocols associated to IPv6: e.g. Neighbour Discovery Protocol, SEND, ICMPv6, MLD, DHCPv6, etc.
- **Auto-configuration:** This module describes stateful (DHCPv6) and stateless (Router Solicitation/Router Advertisement) autoconfiguration mechanisms.
- **IPv6 Support in the DNS:** This module describes new Resource Records for IPv6 DNS, availability of IPv6 in the root servers zone and CC-TLDs, etc.

- **Deployment and Transition mechanisms:** 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). The deployment scenarios are described various address allocation and address management strategies.
- **Sensor networking:** This module explains the 6LoWPAN protocol and shows some examples of sensor networks.
- **Mobile IPv6:** This module describes IPv6 mobility and new features compared to IPv4 mobility.
- **Applications: Grid, VOIP, and Conferencing Case Studies:** This module describes services and applications available for IPv6.
- **Routing:** This module mainly describes the differences between IPv4 and IPv6 routing protocols for OSPFv3, EIGRP, RIPng, BGP4+, ISIS and MPLS.
- **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. Security issues from transition and coexistence point of view are also provided.

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, have been designed. These exercises were performed on local equipment provided for the workshop (PCs), participant laptops, and the newly installed IPv6 router lab. Most of the trainees used the machines in the lab, whilst others used their own laptops.

The local PC lab consisted of one PC per trainee and was used for the IPv6 exercises on hosts and servers. Linux (Ubuntu) and Windows XP were used to support the exercises related to basic IPv6 configuration, and routing.

The router lab – as was the case for other 6DEPLOY workshops - was used for external (BGP) and internal (OSPFv3) routing protocols exercises.

IPv4 connectivity

Loopbacks in Bold

Interconnection as indicated

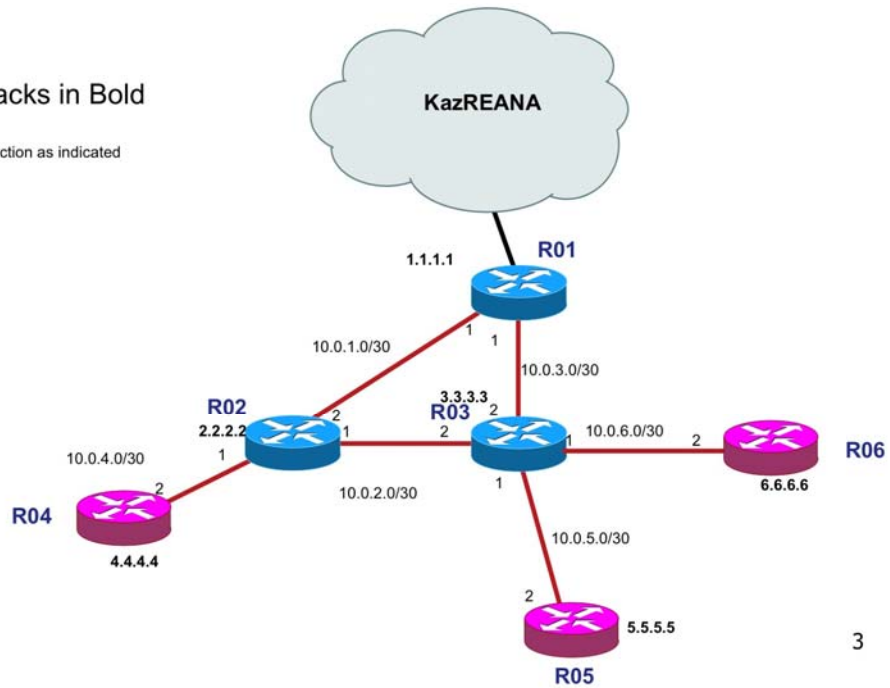


Figure 3-2: The Configuration of the Router Lab at Almaty, Kazakhstan

4. PHOTOGRAPHS TAKEN AT THE EVENT



Figure 4-1: Lab opening



Figure 4-2: Lecturers and students at the Almaty workshop



Figure 4-3: Lecturers and students at Almaty workshop -2



Figure 4-4: Presenting the workshop material

5. ANALYSIS OF THE FEEDBACK QUESTIONNAIRES

A questionnaire has been specially designed for the purpose of getting feedback from the participants regarding the suitability of the course material, and the presenters' ability to convey information, and the relevance of the information to the expectations of the attendees.

Personal information was not mandatory, 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 and "hands-on" session, each participant was requested to assess "usefulness", "quality of presentation", "familiarity with the topic", "quality of the course documentation", "general organisation", etc.

5.1 General questions related to participants and IPv6

About the participants		
28 participants were present, 26 questionnaires were filled the online questionnaire and 17 of them are full and 9 partial		
Employment sector	Government	0
	University or other higher education	21
	Schools or further education	3
	Research	3
	Health	0
	Commercial	1
	Other (please specify)	(1)*
Job function	Government Advisor	0
	Senior Manager	0
	IT Manager	4
	Systems Administrator	10
	Network Administrator	9
	Researcher / Postgraduate	2
	Undergraduate	0
	Other (please specify)	(7)*
Usage of IPv6		
Do you use IPv6 yourself?	Yes	7
	No	15
Does your organisation use IPv6?	Yes	3
	No, but planned in this year	3
	No, but planned in the next year	4
	No, but planned in the longer term	12
	No, and no plans as yet	1

* See the graphics section for more information

Table 5-1: General questions related to participants and IPv6

5.2 Questions regarding the workshop

About the Workshop				
Usefulness of the topic	Very useful	Useful	Slightly useful	Not useful
Introduction to IPv6	12	6	0	0
IPv6 Basics: Protocol and Addressing	11	6	0	1
Associated Protocols and Autoconfiguration	11	7	0	0
IPv6 Support in the DNS	11	6	1	0
Deployment and Transition mechanisms	12	5	0	0
Mobile IPv6	13	5	0	0
Routing Protocols	13	4	0	0
Sensor Networking	12	5	1	0
Applications: VOIP, and Conferencing Case Studies	8	7	2	0
Security	14	2	1	0
Host Configuration laboratory	14	3	0	0
Routing Configuration laboratory	13	3	0	0
Quality of the presentation	Excellent	Good	Average	Poor
Introduction to IPv6	13	4	0	0
IPv6 Basics: Protocol and Addressing	12	4	1	0
Associated Protocols and Autoconfiguration	12	5	0	0
IPv6 Support in the DNS	12	5	0	0
Deployment and Transition mechanisms	13	3	0	0
Mobile IPv6	12	5	0	0
Routing Protocols	13	4	0	0
Sensor Networking	13	4	0	0
Applications: VOIP, and Conferencing Case Studies	11	5	1	0
Security	13	4	0	0
Host Configuration laboratory	14	3	0	0
Routing Configuration laboratory	14	2	0	0
Familiarity with the topic?	None	Some	Most	All
Introduction to IPv6	4	4	5	5
IPv6 Basics: Protocol and Addressing	5	7	2	4
Associated Protocols and Autoconfiguration	8	5	1	3
IPv6 Support in the DNS	7	7	0	3
Deployment and Transition mechanisms	9	6	0	1
Mobile IPv6	9	7	0	1
Routing Protocols	8	5	3	1
Sensor Networking	9	6	1	1
Applications: VOIP, and Conferencing Case Studies	10	5	0	1
Security	7	6	3	1
Host Configuration laboratory	6	7	3	1
Routing Configuration laboratory	7	5	2	2
Quality of the course documentation	Excellent	Good	Average	Poor
	10	6	0	0

General workshop organisation	Excellent	Good	Average	Poor
	11	7	0	0
Recommend to your colleagues?	yes	no		
	17	1		

Table 5-2: Questions regarding the workshop

5.3 Results graphics

Following are some graphics that represent the above results in a more friendly way, so as to ease their interpretation.

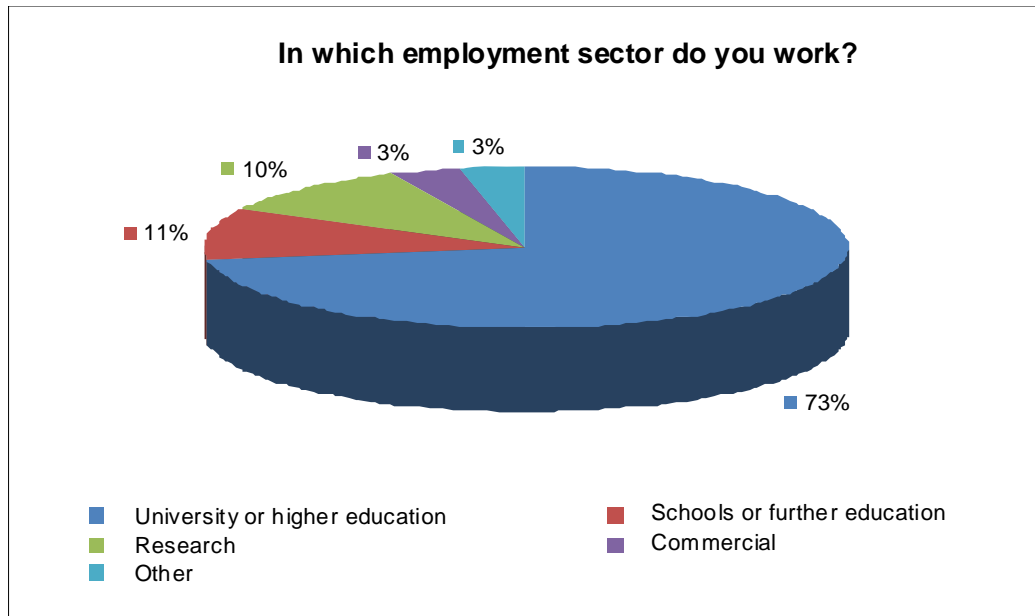


Figure 5-1: In which employment sector do you work?

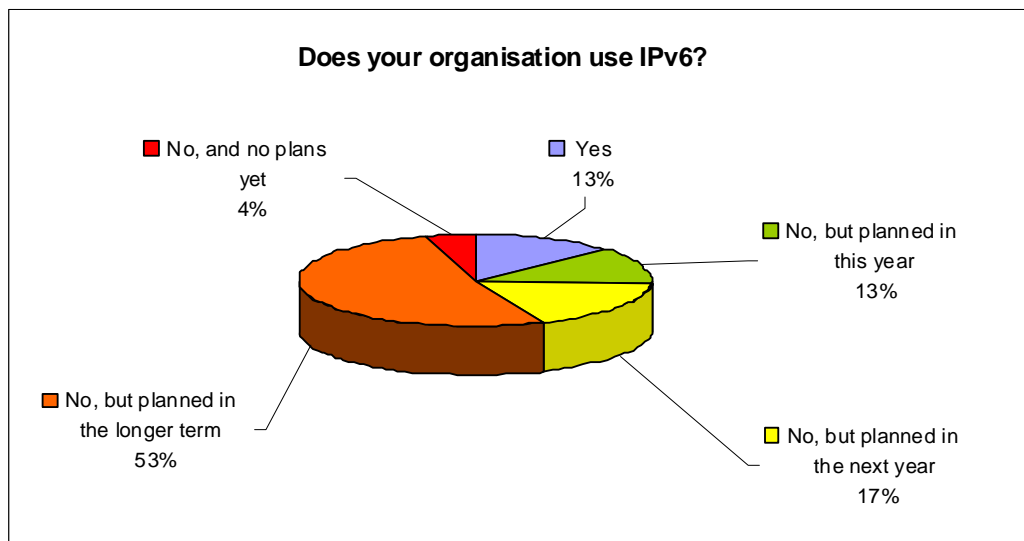


Figure 5-2: Does your organisation use IPv6?

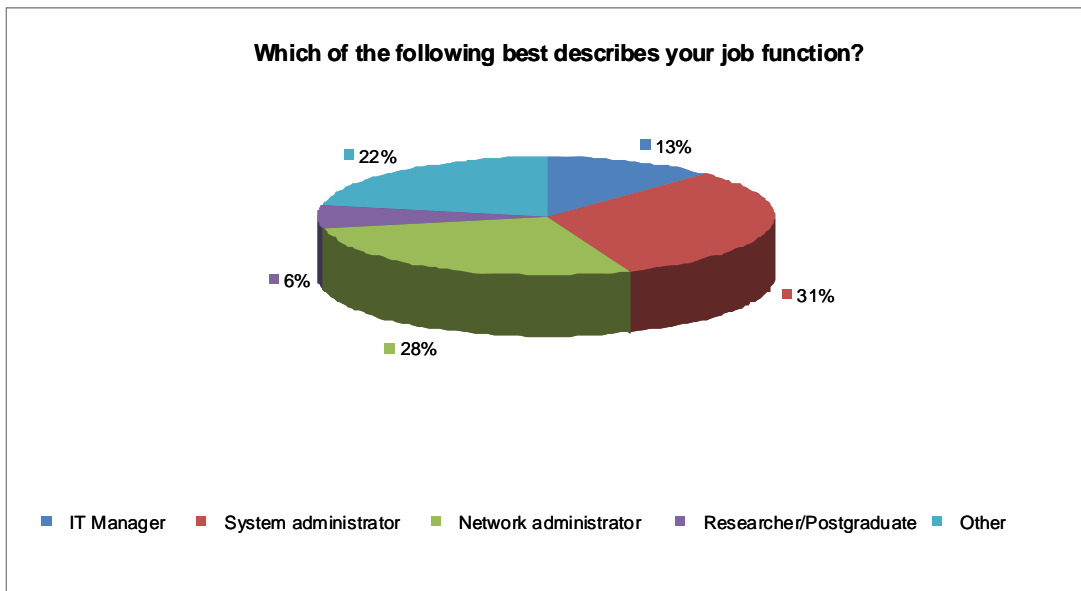


Figure 5-3: Which of the following best describes your job function?

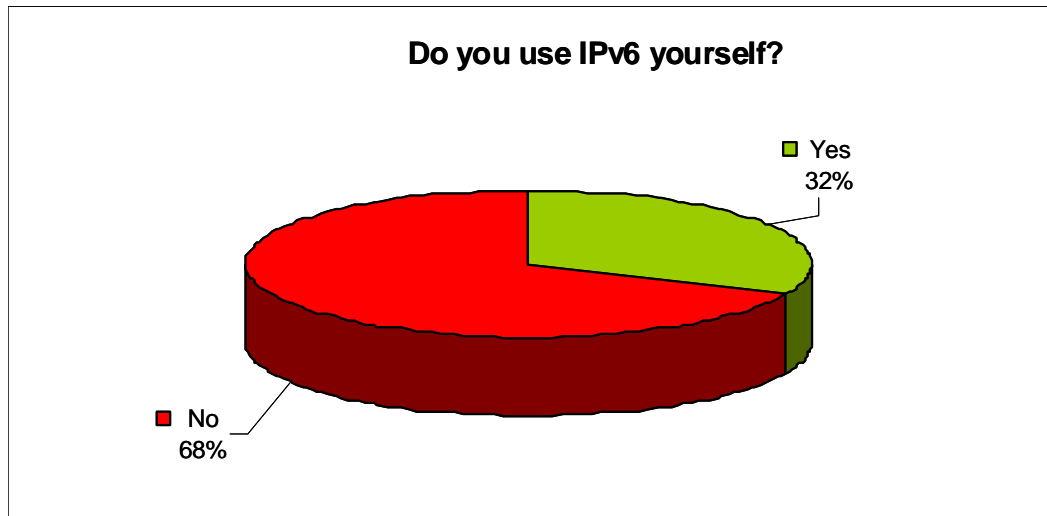


Figure 5-4: Do you use IPv6 yourself?

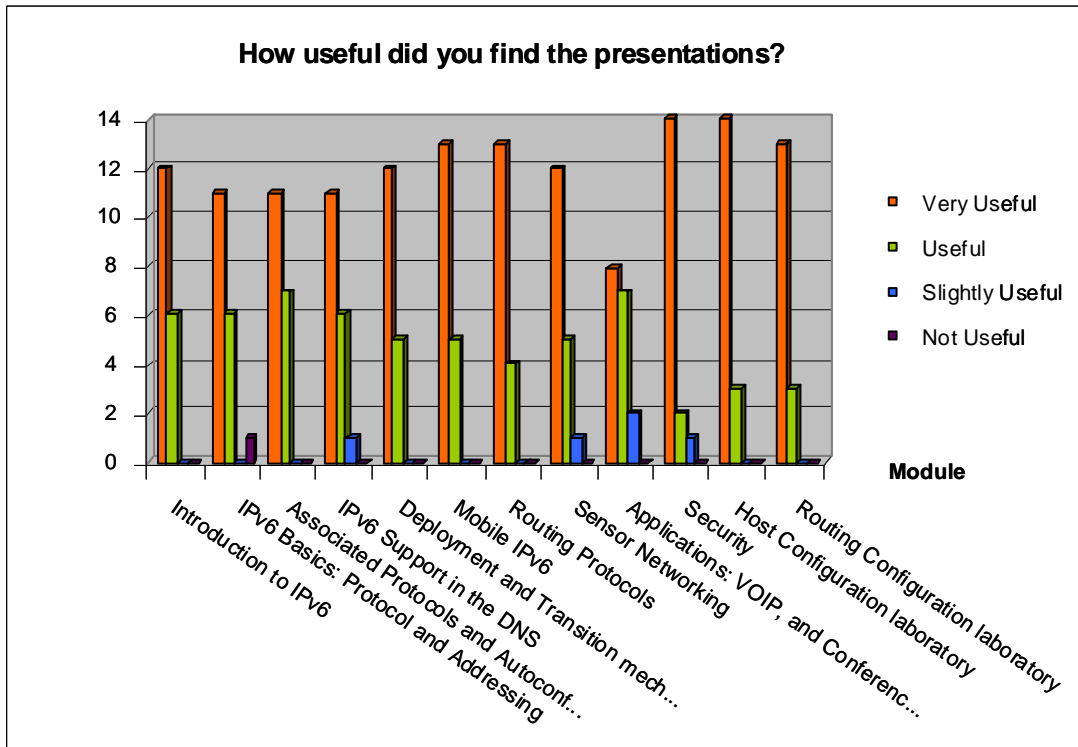


Figure 5-5: How useful did you find the presentations?

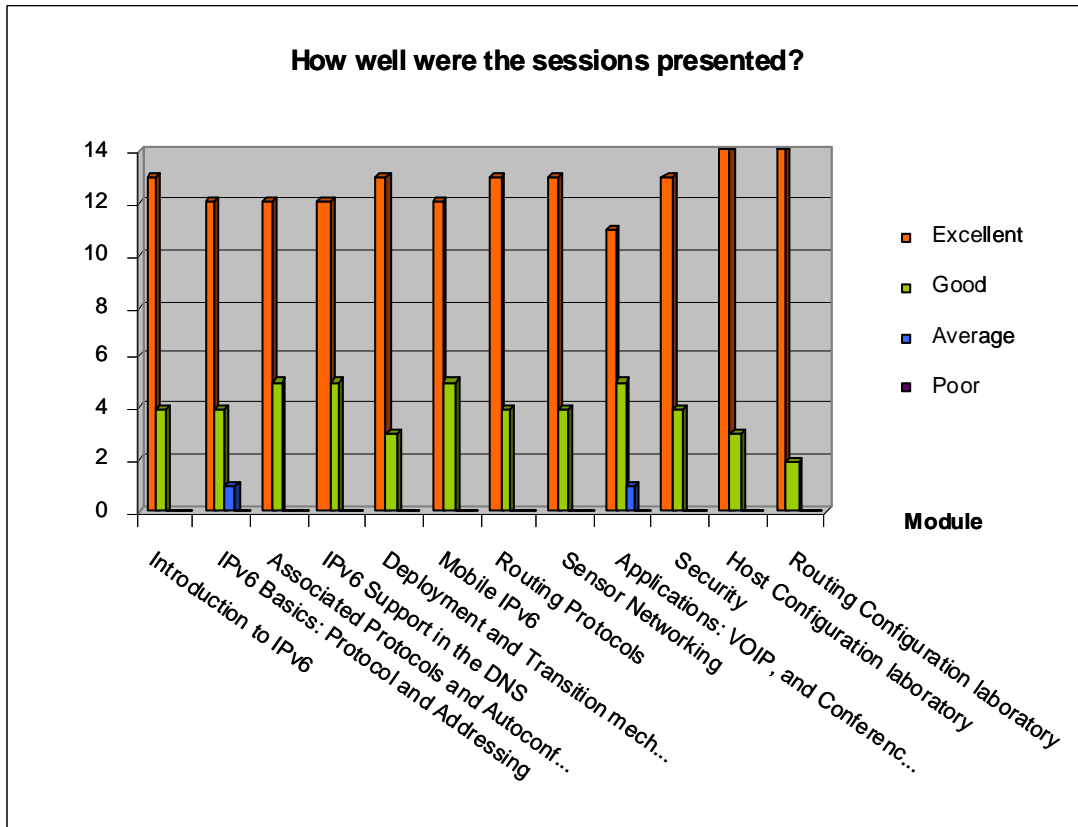


Figure 5-6: How well were the sessions presented?

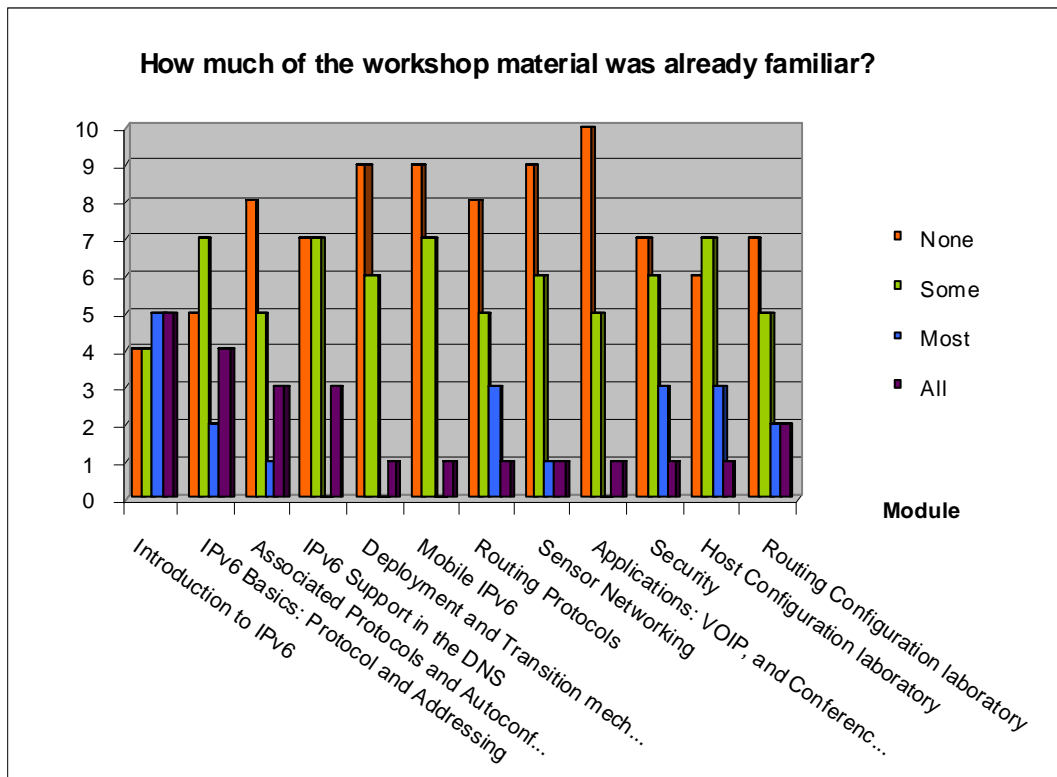


Figure 5-7: How much of the workshop material was already familiar?

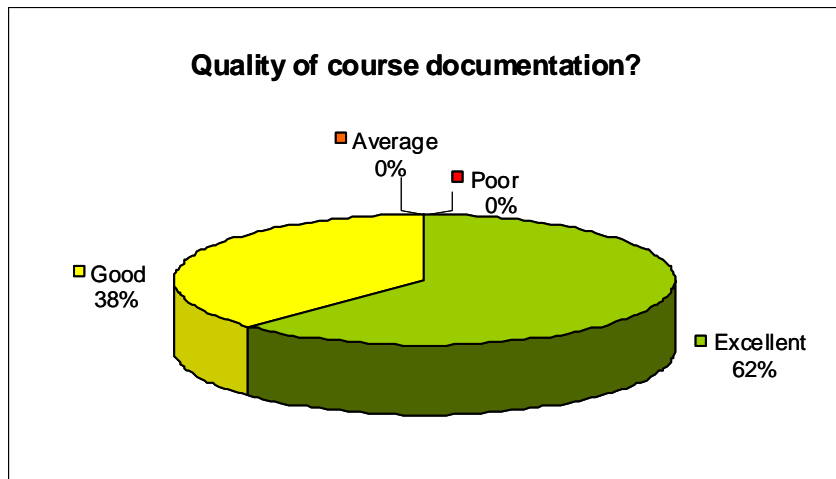


Figure 5-8: Quality of the course documentation?

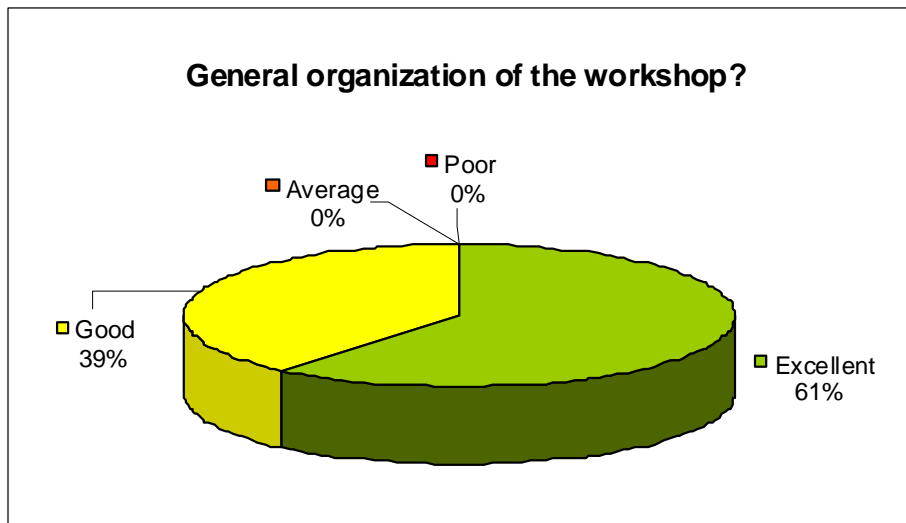


Figure 5-8: General organization of the workshop?

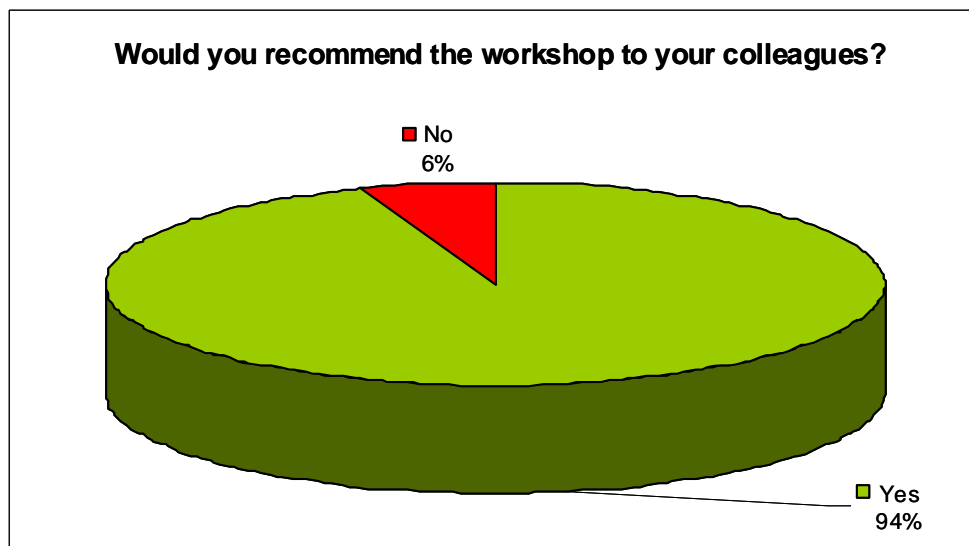


Figure 5-9: Would you recommend the workshop to your colleagues?

5.4 Participants 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).

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 (number put between parentheses).

Here are some comments provided by the trainees:

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

- (4) *IPv6 security*
- (3) *IPv6 mobility*
- (2) *more practice*
- (1) *Sensor systems, IPv6 NAT, IP cleaning, IP routing, IPv6 network management*
- (1) *I wish we could hear more updated 2010-2011 info, instead of 2008-2010*

*What topics would you have liked to **hear less about**?*

- (1) *IPv6 Basics lecture was too much concentrated on what we already know, as Kazakhstan is in the transition stage. More focus on advanced topics would be preferable, and perhaps 3 days are not enough.*

*Any **other comments**:*

I'd like to have more practice concerning IPv6 configuration

Thanks

Practice exercises were very useful.

Overall, the workshop was very good. Many thanks!

Thank you so much for the excellent organization and great presentation

6. 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.eu 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.

Peter Kirstein had several discussions with both Boris Japarov and Talgat Nurleybayev on what was expected of the training programme of a 6DEPLOY-2 laboratory. He also sketched out the advantages and requirements for becoming a "Standard Laboratory" of the 6DEPLOY-2 project.

Talgat Nurleybayev also discussed with Janos Mohacsi, Peter Kirstein and Piers O'Hanlon about the KazRENA and NTU intention to have a more intensive cooperation with European NRENs in several fields including grid and super computing, security and exchanging best-practices information about NREN service management.

7. 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.

The 6DEPLOY workshops provide an important role of informing and enabling the adoption of IPv6. With particular emphasis on the technical aspects of IPv6 the workshops enable participants to go out and deploy IPv6 in their networks and services.

This workshop saw the deployment of an important IPv6 lab in the region providing a key building block to enable its adoption. Kazakhstan has a keen interest in being involved in IPv6 and we identified the steps necessary to enable their and other networks to enable IPv6. Kazakhstan said that it plans to join CAREN next year and this project aims to establish a high-capacity Internet network for research and education in Central Asia.

The feedback from the workshop was provided via the online feedback questionnaire. All the workshop attendees were presented with a certificate of attendance, which they viewed as an important part of the workshop.

During the presentations it was made clear that IANA has handed out the last IPv4 addresses from the global IPv4 address space registry of the Regional Internet Registries which makes IPv6 deployment ever more important.

The impact of the workshop was very positive in Kazakhstan with involvement of leaders from the local universities, as well as from industries and Kazakh Telecom. The event attracted positive coverage by the national press. The knowledge and experience gained will be vital in the continued expansion of the Internet into this country.

8. REFERENCES

6DEPLOY-2 website: <http://www.6DEPLOY.eu>

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

Hands-on modules: <http://www.6DEPLOY.eu/index.php?page=hands-on>

How-to organise an IPv6 workshop:

<http://6diss.6DEPLOY.eu/workshops/workshop-guidelines.pdf>

Training the trainers workshop: <http://6diss.6DEPLOY.eu/workshops/ttt/>

e-learning package: <http://www.6DEPLOY.eu/index.php?page=e-learning>

6DEPLOY-2 Workshops Agenda and detailed information:

<http://www.6DEPLOY.eu/index.php?page=workshops2>

Kazak Technical University: <http://www.kazntu.kz/en/node/2418>

ANNEX A: PRESS COVERAGE

There was coverage of the event in local and regional press.

This is an article from a Kazakh publication, Panorama.kz, which is distributed in hard copy around the region and also on the Internet. It is written in Russian and has a circulation of around 20000 per week:

<http://panoramakz.com/archiv/2011/28.htm>

Here is a Google Translated version of the article (with minor corrections):

In Kazakhstan, opened the first laboratory-IPv6

On Wednesday in the Kazakh-Korean educational center at the Kazakh Scientific and Technical University Satpayev opened the 12th in the world and first in the country IPv6 laboratory.

Consumption IPv4 protocol now has the potential end: as soon as possible with your Internet provider will end the free IP-address. After you have obtained a 4.3 billion IP-address of this protocol will be replaced by IPv6, which will generate trillions of IP-addresses, said a renowned expert in networking Peter Kirstein. The main feature of the new protocol - this is the address length of 128 bits instead of 32. "Right now, the network address of the web site, built over IP, is an entry in the form of four decimal numbers (0 to 255) separated by dots. In the sixth version of the IP-address (IPv6) is divided by colons, the address space will be much more that will ultimately help address the shortage of addresses, "- said Professor KIRSTEIN. The new protocol was adopted as the next stage of Internet development in the mid 90s of last century, and the transition to IPv6 should not cause any technological shocks, assured the expert. Meanwhile, according to the director of the Association of users of scientific and educational computer network in Kazakhstan (KazRENA) Boris Japarov, "will look like the future of the World Wide Web, to imagine it is very difficult."

According to Russian media, all modern operating systems and network devices already support IPv6. No additional configuration is required, so for most end users will move quickly. In connection with the transition to IPv6, ISPs will be able to provide all users with a unique network addresses. In addition, the new protocol will help fight off viruses and spam, when each user will have a unique IP-address, it will allow the

various Internet services to more accurately assess the number of visitors. And if one of the computers on the network is a virus that sends spam, the block-lists of email services do not fall the whole network, but only a specific computer. Thus, the World Wide Web will be even more perfect. However, in view of Kazakh IT-specialists, the situation with the implementation of the protocol in Central Asia are not encouraging. "There is still no clear plan of action, the test network for testing," - said Mr. Japarov. In this regard, he said, KazRENA took the initiative to hold a three-day training, "Go to IPv6 protocol", which kicked off the opening day of the lab. "This training is conducted in Kazakhstan for the first time. Specialists, trained, will pass on their knowledge to colleagues and students of higher educational institutions" - said Mr. Japarov. Led the team coach Peter Kirstein. "Given his unique work in the development of information communication technology, scientific advice KazNTU decided to give him the title of distinguished professor of higher education institutions" - said the acting rector of the university Sarsen ZHUSIPBEKOV, handing a honorary diploma and the mantle of professor to Mr. Kirstein.

by Svetlana Shesterneva