
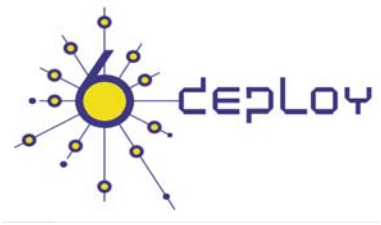

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Abstract:

This deliverable presents a report from the workshop held in Trieste (Italy) on 28th February 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, 6DEPLOY, 6DEPLOY-2

Disclaimer

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 deliverable presents a report from the workshop held in Trieste (Italy) on 28th February 2011. 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) hands-on exercises, e) an assessment of the opportunities for further co-operation and follow-up actions planned, and f) an analysis of the feedback questionnaires from the participants.

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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-2 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:

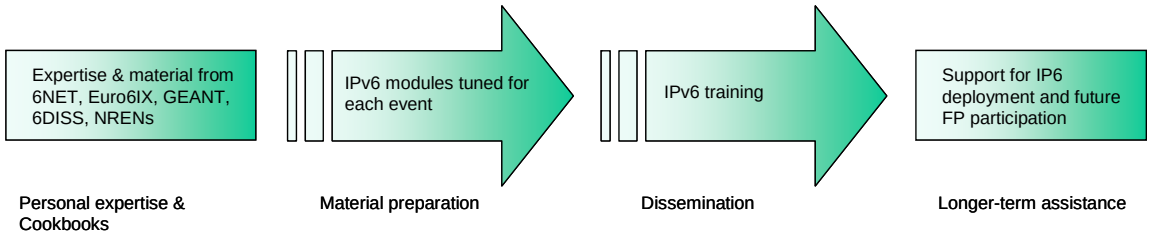

Figure 1-1: 6DEPLOY-2 methodology (diagrammatically)

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 Trieste (Italy) on 28th February 2011. The workshop comprised both slide presentations and hands-on exercises.

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. Chapter 4 identifies opportunities for further collaboration in the region and follow up actions, Chapter 5 summarises the analysis of the feedback questionnaires that were filled in by the participants, and Chapter 6 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-2 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-2, 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 TRIESTE (ITALY)

This IPv6 Workshop took place in Trieste, Italy, on February 28th and March 1st 2011. It was part of the "Workshop on Applications of Wireless Sensor Networks for Environmental Monitoring in Developing Countries" (http://wireless.ictp.it/?page_id=220). After that workshop there was also a "Conference on Wireless Sensors Technologies for Environmental Monitoring". In the following paragraphs we provide information about the workshop, including the programme outline, and the material that was presented.

Details of the workshop and the training material used could be found in 6DEPLOY's project web site:

http://www.6deploy.eu/index.php?page=20110228_trieste_italy

3.1 Overview

The 6DEPLOY-2 representative at the workshop was: Alvaro Vives, from Consulintel.

The attendees came from a wide range of professional backgrounds from networking and ICT as well as biologists, scientists, government staff, etc., due to the multidisciplinary nature of the entire event. Due to the mixed experiences of the attendees, a very basic introduction on networking and IP was presented as the base for the IPv6 content. The concern here was to prepare the attendees for the following IP wireless sensor session.

After the IP wireless sensors session, an introduction to IPv6 was given. Specific IPv6 material was presented, including an introduction to basic IPv6 issues: header, addresses, associated protocols, and autoconfiguration. In addition, DNS and coexistence with IPv4 modules were presented.

The last part of the workshop was a "hands-on" practice session, using local LAN and linux machines.

3.2 Attendees

Below is a list of people that attended:

No.	Name	Affiliation
1	ACKAH Michael	Ghana Atomic Energy Commission
2	ADESIJI Nkiruka Eunice	Department of Physical Sciences, Redeemer's University, Nigeria
3	ANDERSON Benjamin	University of Cape Coast, Ghana
4	ATETE Akeem Emiko	Nigerian Meteorological Agency
5	BAGOLIBE Damnam Kanlanfei	Togo's Regulatory Body
6	BOLIVAR Natalia	Universidad Nacional, Colombia
7	CHOWDHRY Bhawani Shankar	Mehran University of Engineering and Technology, Pakistan
8	CORDOVA BERNUY Cesar David	Pontificia Universidad Catolica de Peru
9	EKUWEM Emmanuel Efiong	Teledom Group, Nigeria
10	FAI Patricia Bi	University of Dschang, REPUBLIC OF CAMEROON
11	FAN Jun	Institute of Soil and Water Conservation, Chinese Academy of Sciences
12	GBEREGBE Laddah	NATIONAL DIRECTORALE OF METEOROLOGY OF GUINEA
13	GOMEZJURADO BENITEZ Maria Lorena	Escuela Politecnica Nacional, Quito, Ecuador
14	KARUNGA TJIUEZA Olga Mathilde	Namibia Meteorological Service
15	KIBICHII Samuel	Kenya
16	KONATE Guimba	MINISTRY OF COMMUNICATION, TELECOMMUNICATION AND ICT OF SENEGAL
17	LANZA RODRIGUEZ Sadia Iraisis	Earth Sciences Institutte, National Autonomous University of Honduras
18	MASINDE Euphraith Muthoni	University of Nairobi – Kenya
19	MATABISHI Lloyd	Zambia Information and Communications Technology Authority
20	MIRANDA BONOMI Fernando Alberto	Facultad de Ciencias Exactas y Tecnologia Universidad Nacional de Tucuman, Argentina
21	MOVSISYAN Anna Kamo	The Ministry of Nature Protection Environment Impact Mornitoring Center, Armenia
22	NTAREME Herve	Tanzania Communications Regulatory Authority
23	PAM TOK Lilian	Networking Unit, ICT Department, Independent National Electoral Commission, Nigeria
24	PERILLA JIMENEZ Carlos Andres	Centro Internacional de Fisica, Santa Fe de Bogota COLOMBIA
25	RAIS Sumbul	Department of Applied Sciences & Humanities, Faculty of Engineering and Technology, India
26	RUPASINGHE Ruvindee Tharaka	University of Moratuwa, Sri lanka
27	SABERI Nastaran	Department of Remote Sensing, Faculty of Engineering, University of Tehran, ISLAMIC REPUBLIC OF IRAN
28	SADIQ Nazia	University of Karachi, Pakistan

29	SAIFUZZAMAN Md	Remote Sensing Institute, Department of Geography and Environment, Jahangirnagar University, BANGLADESH
30	SAINE Maleh	Public Utilities Regulatory Authority, Gambia
31	SHARMA Dhirendra	Himachal Pradesh University, India
32	SMAILOU Moustapha	Institut National de Recherches Agronomiques du Niger
33	YOULO Tarlue Diah	Ministry of Posts & Telecommunications, Liberia
33	ZAFAR Fareeha	Government College University – Lahore, Pakistan

Table 3-1: Trieste (Italy) Workshop list of participants

3.3 Workshop programme

The agenda was agreed on after close 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 program of the workshop is presented in the following table:

Date	Time	Title of session
28/2/2011	14:00	From IPv4 to IPv6
28/2/2011	16:30	Introduction to IPv6 (IPv6 Introduction, IPv6 Protocol, IPv6 Addressing, IPv6 associated protocols)
1/3/2011	11:30	IPv6 (IPv6 Autoconfiguration, IPv6 DNS, IPv6 coexistence with IPv4)
1/3/2011	14:00	IPv6 Lab

Table 3-2: Trieste (Italy) Workshop program

3.4 Presentation material

The following material was presented:

Modules	Presented by	Affiliation
From IPv4 to IPv6	Alvaro Vives	Consulintel
IPv6 Introduction	Alvaro Vives	Consulintel
IPv6 Protocol	Alvaro Vives	Consulintel
IPv6 Addressing	Alvaro Vives	Consulintel
IPv6 associated protocols	Alvaro Vives	Consulintel
IPv6 Autoconfiguration	Alvaro Vives	Consulintel
IPv6 DNS	Alvaro Vives	Consulintel

IPv6 coexistence with IPv4	Alvaro Vives	Consulintel
IPv6 Lab	Alvaro Vives	Consulintel

Table 3-3: Trieste (Italy) Workshop list of modules used

3.4.1 Modules

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

- **From IPv4 to IPv6:** This module was a very basic introduction to data networks and packet switching. The aim was to equalize the knowledge of the attendees on these issues.
- **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, ICMPv6, MLD, etc.
- **IPv6 Autoconfiguration**: This module describes stateful (DHCPv6) and stateless (Router Solicitation/Router Advertisement) autoconfiguration mechanisms.
- **IPv6 DNS**: This module describes new Resource Records for IPv6 DNS, availability of IPv6 in the root servers zone and CC-TLDs, etc.
- **IPv6 coexistence with IPv4**: 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 understanding the IPv6 concepts and to have their first IPv6 experience, a simple hands-on lab was carried out over Ubuntu linux platforms connected on a local LAN. The IPv6 Lab is composed by the following exercises:

- Check IPv6 is installed on linux platform (ifconfig and proc/ information)

- IPv6 network configuration
- IPv6 pings and packet capture (wireshark), check Neighbor table
- Configure static routing, check routes table
- Enable RAs (radvd), check addresses and capture packets
- Enable DHCPv6 server and clients, check addresses and capture packets
- Connect to a web server over IPv6

3.5 Photographs taken at the event

Figure 3-1: Attendees to the workshop

Figure 3-2: Alvaro Vives (Consulintel) presenting

Figure 3-3: IPv6 Lab

Figure 3-4: Attendees to the workshop

4. OPPORTUNITIES FOR FURTHER CO-OPERATION

In all the workshops, the attendees were informed on how to stay in contact with the 6DEPLOY-2 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-2 remote labs and use these.

It is possible that in the future 6DEPLOY-2 could collaborate in other ICTP workshops or other wireless sensors' related events.

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.

Only 5 participants started to answer the on-line survey, but only one filled all the questions. This was because during the workshop attendees, in general, did not have a PC or laptop and access to Internet was difficult. The requests sent later to them did not result in more answers.

Because of this it is not considered useful to include here the questionnaire results.

6. 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 workshop took place in Trieste, Italy, on February 28th and March 1st 2011. This Workshop was held in collaboration with ICTP's Radio Communications Unit of the ARPL (http://wireless.ictp.it) organization who organized everything for the workshop. Thanks to previous projects and training activities, most of the IPv6 education material needed to start 6DEPLOY-2 workshop training was available from the very beginning. The material included some of the issues of Internet deployment and evolution, especially IPv6 introduction, addressing, and transition.

There were 33 participants from very different fields and several countries around the world. The topics presented were selected according to the participants' requirements, trying to fulfil their need for IP knowledge.

According to the comments from the participants at the workshop and the organizers, it is clear that the workshop was a success, and that there is significant interest in IPv6. The participants expressed positive comments on the workshop's usefulness and organisation.

During the 6DEPLOY-2 lifetime, stakeholders will continue to enhance today's "knowledge database". The reader and interested parties are referred to the 6DEPLOY-2 website to check for new material.

In summary, this workshop should be considered a success with regard to the dissemination of IPv6.

7. 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