


32603	Deliverable D7.3	
-------	------------------	---

Project Number: **IST-2001-32603**

Project Title: **6NET**

CEC Deliverable Number: **32603/TERENA/DS/7.3/A1**

Contractual Date of Delivery to the CEC: 31 July 2002

Actual Date of Delivery to the CEC: 8 July 2002

Title of Deliverable: Report on Joint 6NET/Euro6IX Workshop

Work package contributing to Deliverable: WP7

Type of Deliverable*: R

Deliverable Security Class**: PU

Editors: Kevin Meynell

Contributors: Guy Almes, Harald Alvestrand, Bruno Ciscato, Theo De Jongh, Steve Deering, Bernhard Fabianek, Antonio F. Gómez Skarmeta, Kevin Meynell, Juan Quemada, Jordi Palet Martinez, Christian Müller-Böhm, Paolo Pastorino, Carlos Ralli Ucendo, Pedro Ruiz, Sathya Rao & Thomas Scheffler

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


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

Abstract:

This document provides a report of the Joint 6NET/Euro6IX Workshop held on 5 June 2002 in Limerick, Ireland.

Table of Contents

Introduction	3
6NET: An IPv6 Testbed for the European Community	4
Euro6IX: The Pan-European IPv6 IX Backbone	4
European Initiatives on IPv6 - Future Perspectives	5
IPv6 Standards Update	5
Security Services on IPv6 Networks: PKIPv6 and IPv6-VPNs	6
ISABELv6	6
Internet2 IPv6 Update	7
User Projects Expectation from IPv6 Backbone Network	7
IPv6 Multimedia Adaptive Applications in the Framework of the MIND Project	8
IPv6 Services in LONG Network	8
Security Architectures for Mobile IPv6	8
IPv6 in the IST @Hom project	9
6WiN: IPv6 in DFN	9
IPv6 and the Internet Applications Suite	10
Panel Session	10

32603	Deliverable D7.3	
-------	------------------	---

Introduction

The Joint 6NET/Euro6IX Workshop was held on 5 June 2002 in conjunction with the TERENA Networking Conference in Limerick, Ireland. The objective was to publicise the 6NET and Euro6IX project activities, as well as discuss IPv6 developments elsewhere. It also provided an opportunity for feedback from the European research networking community.

Unfortunately, the workshop happened to coincide with a strike at Aer Lingus that created a few difficulties for some of the speakers and participants travelling to Limerick. However, only a couple of the programmed speakers were unable to attend and it was possible to replace them. The organisers would like to express their thanks to both Guy Almes and Christian Müller-Böhm who agreed to stand-in at short notice.

The workshop ran from 09.00 to 18.00 and was divided into four sessions. Presentations and approximate attendance figures were as follows:

09.00-10.30 Chair: Valentino Cavalli Attendance: 85

- 6NET: An IPv6 Testbed for the European Community - *Bruno Ciscato, Cisco*
- Euro6IX: The Pan-European IPv6 IX Backbone - *Jordi Palet Martinez, Consulintel*
- European Initiatives on IPv6 - *Bernhard Fabianek, European Commission*
- IP Standards Update - *Steve Deering, Cisco*

11.00-12.30 Chair: Jordi Palet Martinez Attendance: 45

- Security Services on IPv6 Networks: PKIPv6 and IPv6-VPNs - *Antonio F. Gómez Skarmeta, University of Murcia*
- ISABELv6 - *Juan Quemada, Universidad Politécnica de Madrid*
- Internet2 IPv6 Update - *Guy Almes, Advanced Systems*

14.00-15.30 Chair: Sathya Rao Attendance: 40

- User projects expectation from IPv6 backbone network - *Sathya Rao, Telscom*
- IPv6 Multimedia Adaptive Applications in the Framework of the MIND project - *Pedro Ruiz, Agora System*
- IPv6 Services in LONG Network - *Carlos Ralli Ucendo, Telefónica Investigación y Desarrollo*
- Security Architectures for Mobile IPv6 - *Thomas Scheffler, T-Systems Nova*
- IPv6 in the IST @Hom project - *Paolo Pastorino, Telecom Italia Lab*

16.00-18.00 Chair: Jane Butler Attendance: 55

- 6WiN: IPv6 in DFN - *Christian Müller-Böhm, University of Münster*
- IPv6 and the Internet Applications Suite - *Harald Alvestrand, Cisco*
- Panel Session - *Harald Alvestrand, Steve Deering, Bernhard Fabianek & Jordi Palet Martinez*

The full proceedings of the workshop can be found on the 6NET website at:

<http://www.6net.org/events/joint-workshop/>

6NET: An IPv6 Testbed for the European Community

Bruno Ciscato, Cisco

6NET is a three-year IST project to demonstrate that continued growth of the Internet can be met using new IPv6 technology. It also aims to help European research and industry play a leading role in defining and developing the next generation of networking technologies.

The project is building a native IPv6-based network with both static and mobile components in order to gain experience of IPv6 deployment and migration from existing IPv4-based networks. This will be used to extensively test a variety of new IPv6 services and applications, as well as interoperability with legacy applications.

6NET exploits the synergy between European NRENs and major industrial partners, and cooperates with other IPv6 projects and activities, both in Europe and the rest of the world. The aim is for Europe to gain a technological advantage in the next-generation Internet and to create new business opportunities. There are currently 31 partners, although another 3 partners have recently been accepted into the project.

The project budget is EUR 17 million of which EUR 9.5 million is being provided by the European Commission. The total effort within the project equates to 1100 man-months.

The work is divided into seven work packages (plus coordination). An overview of the core network was provided, including information on routing protocols and address allocation.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/ciscato.pdf>

Euro6IX: The Pan-European IPv6 IX Backbone

Jordi Palet Martinez, Consulintel

Euro6IX is a three-year IST project to build a scalable and native IPv6 backbone of traffic exchanges across Europe. It aims to allow not just research users to gain real experience of IPv6, and to establish an IPv6 production transit service. The project consortium consists of 17 partners from the telecommunications, industrial, academic and NGO sectors.

The project is researching appropriate architectures and will deploy the first Pan-European network of Internet Exchanges. This infrastructure will then be used to research, test and validate IPv6-based applications and services in conjunction with specific user groups. Both Layer 2 and 3 interconnection and various routing protocols will be supported.

Other aspects of the project include defining mobility scenarios and identifying the access technologies to be used in the testbeds. Static VPN implementations will also be evaluated and deployed in the testbeds.

In addition, network management tools such as Magalia, intrusion detection and route servers will be trialed.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/paletmartinez.pdf>

European Initiatives on IPv6 - Future Perspectives

Bernhard Fabianek, European Commission DG-InfoSoc

The EU policy on research networks incorporates both the provision of networks for research, and research on the networks themselves. The GÉANT network already reached 32 countries and more than 3,000 universities, and there were plans to extend this further.

The EU was taking a coordinated strategy towards IPv6. The individual components first needed to be developed, then trialed in large testbeds. To advise on these activities, the European IPv6 Task Force had been created. This also worked closely with the global IPv6 Forum.

Large-scale testbeds were seen as the most appropriate way of integrating and consolidating European efforts on IPv6. The aim was to make Europe the focus for experimentation in IPv6, and to lead global efforts.

The forthcoming 6th Framework Programme would offer new ways of cooperation through the European Research Area (ERA). The budget had been doubled to EUR 300 million in order to reflect the importance of research networking. GÉANT would be maintained as the research backbone, but the aim was to upgrade it to 100 Gbps speeds and to extend its reach. At same time, advanced testbeds would be provided to help develop the next generation technologies.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/fabianek.pdf>

IPv6 Standards Update

Steve Deering, Cisco

The IETF IPv6 Working Group had recently appointed Margaret Wasserman (WindRiver) as a 3rd Co-Chair alongside Bob Hinden (Nokia) and Steve Deering (Cisco). It was also starting an effort to raise many of the 32 proposed standards to Draft Standard status.

In addition to developing an IPv6 Node Requirements specification in response to the appearance of several drafts for cellular hosts and low-cost network appliances, there had been some progress on older issues. The use of the flow label field, scoped address architecture, and default router preferences were all moving towards Proposed Standards. DHCPv6 had also finally been submitted as a Proposed Standard, whilst the IPv6 3GPP recommendations had been submitted for publication as an Informational RFC.

Unfortunately, there had been less progress on other issues. The IP version independent MIB work had stalled and was only just being reactivated. The anycast semantics and mechanics were still under debate and there was a proposal to form a new working group for anycast. There was also no consensus on DNS Discovery or Prefix Delegation techniques. The interim meeting in May 2002 felt that a description of the problems was needed first.

The IPv6 Working Group activities had been prioritised into work-in-progress that needed to be finished (e.g. default address selection, address architecture, APIs and ICMPv6), those urgent for deployment (e.g. DNS Discovery, prefix delegation and IPv6 MIBs), and longer-term activities (e.g. flow label specification and scoped address architecture). Other activities had been identified for other working groups, which included plug-and-play, multi-link subnet specification, and anycast architecture.

There had also been a major attempt to refocus the NGtrans Working Group which had generated many specifications and techniques. All current drafts-in-progress had been frozen, and the group had been asked to develop transition/interoperation scenarios to show how specific techniques would fit into these.

Finally, all the Regional Internet Registries had now adopted a revised common address allocation policy. The TLA/NLA structure and jargon had been dropped, a more liberal policy for allocating addresses to ISPs had been adopted, and additional allocations would be based on a HD-Ratio computation.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/deering.pdf>

Security Services on IPv6 Networks: PKIv6 and IPv6-VPNs

Antonio F. Gómez Skarmeta, University of Murcia

Security is an important issue in modern networks, particularly with respect to mobility. UPM is developing a PKI infrastructure for distributed IPv6 networks which provides support for LDAPv6 directories, smart cards, PKI certification, the OSCP protocol and web administration.

The project is also evaluating a number of open-source and commercial IPv6 VPN solutions for deployment in the Euro6IX and/or 6NET testbeds. It will consider the various security scenarios and run trials on each using a defined test suite. Finally, the project will consider how VPNs can be integrated with authentication servers and the PKI infrastructure.

The project has a tunnelled connection to University College London and is conducting interoperability tests over this. There are also plans for a native IPv6 connection with Euro6IX, and onward connections to the 6NET network.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/gomezskarmeta.pdf>

ISABELv6


Juan Quemada, Universidad Politécnica de Madrid

ISABEL is an advanced multiconferencing system that had been developed at UPM since 1993. It had subsequently been commercialised by Agora Systems.

The system allows groups of people to be interconnected via video, audio and shared workspaces and has been used for many events over the past ten years as well as for remote learning between Spanish universities. It had recently been ported to use IPv6 and the Global IPv6 Summit in Madrid had been the first event to be transmitted over IPv6 using the software.

When porting ISABEL to IPv6, a number of modules had to be redesigned as they were conditioned to the IPv4 architecture. It was therefore felt that a complete redesign of these modules would be more efficient. The amount of work this involved was not huge, although some additional work still needed to be undertaken in the areas of QoS, security and mobile IP.

When porting the application to IPv6, care needed to be taken to ensure enough memory was allocated for the new structures. In addition, fully qualified domain names should be used, application dependencies on IP addresses should be removed, and the loopback address needed to

32603	Deliverable D7.3	
-------	------------------	---

be changed. The IP address parser also needed to be modified to take the different address structure into account.

The Global IPv6 Summit was a realistic validation of an IPv6 transition scenario and had provided valuable feedback for improving the software. It also provided experience of how to port existing software to IPv6, and proving that it could be done in a reasonable time-frame.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/quemada.pdf>

Internet2 IPv6 Update

Guy Almes, Advanced Systems

Internet2 currently operates four IPv6 nodes based around Cisco 7200 routers. IPv6 is currently tunnelled over IPv4 between these routers and to the GigaPoPs and campuses. Unfortunately, the performance of these is limited.

The plan is to move to Juniper T640 routers with dual IPv4/IPv6 stacks when Abilene is upgraded to 10 Gbps. This will provide high-performance native IPv6 connectivity and will allow GigaPops and campuses to move away from tunnelled connections, hopefully by the end of the 2003 academic year.

The core network infrastructure is relatively easy to upgrade, but the challenge is get campuses to do the same as they have more routers, servers and people to train. A number of two-day workshops are therefore being hosted by the GigaPoPs which provide hands-on experience of IPv6 addressing, routing, DNS and applications.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/almes.pdf>

User Projects Expectation from IPv6 Backbone Network

Sathya Rao, Telscom Consulting

The IPv6 Cluster represents a number of IST projects addressing IPv6 technologies, including 6NET and Euro6IX. It aims to identify the users who require access to IPv6 networks, and assist projects to better target their deployment. End-users will ultimately drive the demand for IPv6 services, so it would make sense to try and include them in the initial pilots.

Users expect the IPv6 backbone to have full functionality to guarantee end-to-end features since the Internet has no core network and routing is unpredictable. There should be full interoperability with legacy networks, IPv6 networks should be plug-and-play, and QoS and security features must be present. All these features should also be available whilst roaming.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/rao.pdf>

IPv6 Multimedia Adaptive Applications in the Framework of the MIND Project

Pedro Ruiz, Agora System

The presentation was made by Juan Quemada on Pedro Ruiz's behalf would was unable to reach Limerick due to the Aer Lingus strike.

The MIND project involves Europe's leading telecom operators and manufacturers and is investigating the integration of wireless and fixed networks. It follows-up the BRAIN project that developed a framework for the deployment of high-bandwidth access technologies. IPv6 is a key element in the trials as it offers many features required in future wireless networks.

Unfortunately, macro-mobility solutions (MIPv6) do not offer enough performance for some kinds of applications. Micro-mobility solutions such as HMIPv6, Cellular IPv6 and BCMPv6 are therefore necessary. BCMPv6 was developed in BRAIN, but MIND is dealing with the handovers between the physical, middleware and application layers. In particular, network conditions are not always controllable, so a network must be adaptive when providing QoS.

MIND is testing adaptive mechanisms using ISABEL-lite, a mobile-optimised version of ISABEL, on various testbeds. The interim results are promising, but more extensive tests still need to be conducted.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/ruiz.pdf>

IPv6 Services in LONG Network

Carlos Ralli Ucendo, Telefónica Investigación y Desarrollo

The LONG project is building a distributed IPv6 laboratory for adapting current services to IPv6, and deploying new services in IPv6 networks. This will provide developers and standardisation bodies with feedback.

The network links several sites in Spain and Portugal over both native and tunnelled connections, using a variety of physical media. There are also onward connections to both the 6Bone and GÉANT.

A number of basic services (e.g. DNS, web, mail, IRC and LDAP) are used for testing IPv4-IPv6 integration, whilst more advanced services (e.g. IPv6 mobile, multicast and QoS) are used for testing IPv6 only. In fact, videoconferencing (using ISABEL) and IRC are used for most project meetings, and there are plans to start using IPv6-based mail as well.


This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/ralliucendo.pdf>

Security Architectures for Mobile IPv6

Thomas Scheffler, T-Systems Nova

The 6WINIT project aims to validate the introduction of the wireless Internet based on IPv6, GPRS and later UMTS/3GPP. It will investigate the problems of providing trans-national wireless delivery services, will undertake early IPv6 testing, and will implement applications and edge devices.

32603	Deliverable D7.3	
-------	------------------	---

Mobile networks provide users with freedom to roam, but this also creates many security issues. Providers need to have the ability to authenticate, authorise and account use across administrative domains, whilst preventing eavesdropping and denial-of-service attacks.

Unfortunately, the project has discovered that many critical components of Mobile IP (MIP) are still missing. These include PKI, AAA and policy servers, and of course, every host also needs to be able to support MIP. However, the project plans to undertake interoperability tests, integrate MIP and IPsec gateway on one host, integrate AAA and PKI and thoroughly validate security.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/scheffler.pdf>

IPv6 in the IST @Hom project

Paolo Pastorino, Telecom Italia Lab

The objectives of the IST @Hom project are to define and demonstrate an end-to-end open network architecture based on the OSGi (Open Services Gateway Initiative) framework. It is investigating how to provide homes with high data rate services, and is evaluating the impact of IPv6 on these services. It will also demonstrate these services in trials across Europe.

IPv6 is of particular interest for home networks as it offers autoconfiguration features and a large address space that will allow devices to have unique and public IP addresses. It also supports mobility features that allow users to access their resources whilst away from home.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/pastorino.pdf>

6WiN: IPv6 in DFN

Christian Müller-Böhm, University of Münster

JOIN is a project funded by DFN (the German NREN) based at the University of Münster. It has worked on IPng/IPv6 issues since 1994 and is a centre of expertise within Germany. It is a 6NET partner, a major 6Bone site, and is currently working with T-Nova on an IPv6 Showcase.

Since the beginning of 2001, DFN has been assigning production IPv6 prefixes to its members. At the present time, 32 prefixes have been assigned, whilst 12 sites actually have connectivity using these prefixes. The intention is to connect all sites with production prefixes to the 6WiN, the native IPv6 backbone which is currently being rolled-out. The 6Win will also be connected to 6NET, and there are plans to peer with Euro6IX via links in Berlin and Münster.

A number of services are available including an IPv6 tunnelbroker, an IPv6-IPv4 gateway, a FTPv6 server and an IRCv6 server. However, these are not currently being heavily used and the project is looking for more users to generate some traffic.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/mueller-boehm.pdf>

IPv6 and the Internet Applications Suite

Harald Alvestrand, Cisco

The Internet applications suite encompasses interpersonal services such as mail and news; client/server services such as HTTP, FTP, SSH and NFS; and middleware services such as DNS, NTP, routing and DHCP. DNS uses the same namespace for both IPv4 and IPv6 hosts, with clients simply requesting records of the appropriate type. Other services require transition mechanisms.

There are different methods by which this can be achieved: dual-stack hosts running both IPv4 and IPv6, half-NAT hosts running IPv4 locally and IPv6 globally, hosts behind a translation gateway, and hosts that don't need IPv4. There are additional complications with IPv6 in that interfaces can have multiple addresses, local addresses are preferred, and addresses have limited lifetimes.

Applications based on a client/server relationship are relatively easy to fix as they are able to connect using the appropriate protocol and/or translators. Experience of existing Network Address Translation techniques demonstrates what works.

Application meshes are much more difficult to deal with. For example, there are problems sending e-mails via SMTP where destination addresses are a mixture of IPv6 and IPv4. The DNS has similar problems as most records are IPv4-compliant only and resolvers will need to support both types. There are ways around these issues, but they require careful planning and configuration.

RFCs 2893 and 2766 should be of interest to those working on transition mechanisms. A number of relevant Internet Drafts and mailing list archives are also available.

This presentation can be found on the web at:

<http://www.6net.org/events/joint-workshop/alvestrand.pdf>

Panel Session


Harald Alvestrand, Steve Deering, Bernhard Fabianek & Jordi Palet Martinez

The workshop concluded with a 45-minute session where the audience was invited to put questions to a panel of speakers. This proved extremely productive with many topics of interest being covered.

The discussions started with the issues of barriers to IPv6 deployment. There was a clear understanding of the technical issues, the costs involved in the transition, and the current lack of a business case combined with user-friendly applications. It was noted that few IPv6 applications are superior to IPv4 legacy applications and that most of the technological limitations of IPv4 have workarounds. It is therefore important that the EU and national governments provide their political patronage to those working to deploy IPv6.

The 6NET and Euro6IX projects are committed to providing production-level features in the backbone and access networks to support useful applications. In this context, both projects have activities that focus on application development, but very close co-operation with other user-oriented projects also needs to be established.

IPv6 standards are now moving actively and deployment is possible. Vendors already have products available, but without a convincing business case, ISPs will not implement deploy them. The case for IPv6 has also not been helped by the recent economic downturn.

32603	Deliverable D7.3	
-------	------------------	---

The European Commission is committed to IPv6 and is putting more resources into IPv6 technology, whilst promoting the technology at the political level. However, market development is ultimately down to the vendors, service providers and users.