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Abstract:

This document describes the final improved scenarios updating Deliverable D2.5.

Keywords:

Eurov6 Fix Showcase, Eurov6 Nomadic Showcase, IPv6 Applications, IPv6 Devices, IPv6 Services.

Revision History

The following table describes the main changes done in the document since it was created.

Revision	Date	Description	Author (Organization)
v0.0	20/10/2003	Document creation	César Olvera (Consulintel)
v1.0	03/11/2003	Further content definition	César Olvera (Consulintel)
v1.1	19/11/2003	Added Configuration reference	César Olvera (Consulintel), Miguel Ángel Díaz (Consulintel)
v1.2	10/12/2003	Content update	César Olvera (Consulintel)
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v1.5	08/01/2004	Added Contributions	César Olvera (Consulintel)
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v1.7	27/01/2004	Updated Global IPv6 Service Launch Event demos	César Olvera (Consulintel)
v1.8	28/01/2004	Updated Global IPv6 Service Launch Event demos	César Olvera (Consulintel)
v1.9	21/02/2004	Final Review	Jordi Palet (Consulintel)

Executive Summary

The main objective of Eurov6 project is to show the usage of IPv6 products and services and their impact to anybody at anytime.

This deliverable gives the final improved scenarios as an update of D2.5 with all network components and applications acquired from the sponsors, projects and bought from commercial off the shelves components and services.

The improved scenarios for the second year include enhancements on devices, multimedia and peer-to-peer applications, Home Portals, Security, IPv6 on Cars, GPRS, AAA, DHCPv6, RAS, IPv6@Home, etc.

These scenarios are been available for IPv6 demonstration for both Fixed and Nomadic Showroom during the second year of the project.

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1. INTRODUCTION

The main objective of Eurov6 is to show the usage of IPv6 products and services and their impact to anybody at anytime. Realizing this objective will include:

- Bringing together vendors and sponsors to demonstrate and test their devices, applications and systems.
- Showing various users applications based on IPv6 products and services, permanently at in the Fix Showcases (Basel, Brussels and Madrid), which can be visited physically or accessed remotely through telematic means.
- Organizing temporally Nomadic Showcases at different locations and/or significant telecommunication industry events.

This Deliverable D2.6 describes the final improved scenarios described early in Deliverable D2.5.

The D2.5 document described the improved scenarios with all network components and applications acquired from the sponsors, projects and bought from commercial off the shelves components and services. These scenarios are been available for demonstration in both Fixed and Nomadic Showcases during the second year of Eurov6. In D2.5 document, for its main sections (devices, applications and services) there was an abstract on the items available in the different Showrooms by the first year and then there was a brief description of newer items that will be/were tested, integrated and demonstrated for the second year.

In this way this D2.6 contains the final scenarios description available by December 2003 and that will be used in the final phase of Eurov6.

Note on exact device/application configurations

As the exact configuration on hosts, routers, devices and applications tends to change very fast as newer IPv6 implementations out to public, and depending on the exact configuration of the Showrooms, it has been decided to put those configurations available in Eurov6 web site, http://www.eurov6.org, rather than a static version in the different Eurov6 deliverables that will become old very soon. This kind of “Eurov6 Configuration Cookbook” will allow to:

- Access remotely the configuration material in order to easily reproduce the showroom demonstrations in both new Fix and Nomadic Showcases.
- Upgrade periodically the configuration of the devices integrated in the showroom in order to cover the new IPv6 implementations.

2. DEVICES

As was already described in D2.3, D2.4 and D2.5, there are a number of devices already installed and used during the first year by Eurov6 in both kinds of Showrooms. These devices include:

- Host (Desktop, Laptop and Handheld PCs running different distributions and versions of Linux, FreeBSD, and Windows with IPv6 support).
- Routers (6WIND, Cisco and Hitachi for Unicast; FreeBSD for Multicast).
- Mobile Devices (Pocket PCs, Mobile telephones and Access Points with GPRS, Bluetooth, IrDA and Wireless LAN).
- PLC Devices: HE (Head-End) and CPE (Customer Premises Equipment).

Using these devices as base, the improved scenarios described in D2.5 and integrated for some demonstration in the second year of the project included:

- 6WIND: IPv6 features including: Autoconfiguration, Transition mechanisms, IP Security, VPN and QoS.
- Acunia: Telematics services communicating over IPv6. Acunia is developing an IPv6 version of their CarCube product to be embedded in a vehicle, http://www.acunia.com.
- Alcatel: IPv6 features over the Alcatel A7770 OBX core router.
- Ingineo: Wearable computing solutions especially developed for industrial applications, http://www.ingineo.net.
- Juniper: IPv6 features over a dual stack router.
- Mobistar: Mobistar is configuring its APN to support IPv6.
- Panasonic: IPv6 features in products like IP cameras.
- PSA/Citroën and MBDS: Wireless information services, based on WiFi and GPRS networks, available from the car, http://mbds-fr.org.
- Xybernaut: Wearable computer technology, hardware and related software, http://www.xybernaut.com.
- VTT Home networking devices: X10 Home automation systems.
- Home electronics systems from IntelliHome and Smarthome, in synergy with the NGN-LAB project.

Several of these items were showed for first time within Eurov6 during the Nomadic Showcase event organized in Brussels from 22nd September 2003, in parallel with an International Workshop on IPv6 Testing, Certification and Market Acceptance and with the 4th ETSI IPv6 Plugtests. For that Nomadic Showroom was remarkable the participation of 6WIND, Acunia, Alcatel, BELNET, Ingineo, Juniper, MBDS, Ericsson, Panasonic, PSA/Citroën and Xybernaut. The descriptions of some of these demonstrations are included in section 5 of this document.

On the other hand, a full networked Home environment, called IPv6@Home, was prepared by Eurov6 and it was showed, along many amazing uses of IPv6, during the Nomadic Showroom held within the Global IPv6 Service Launch Event, http://www.global-ipv6.net, on 15th-16th January 2004 in Brussels. See further details in section 5 of this document.

It's important to remark that Eurov6 aims during the second year to show the new devices that are being integrated into networked world. The inclusion of specific devices will depend on the current availability for the Eurov6 Showrooms, from manufacturers, sponsors, etc. Here are some examples of such kind of devices:

- Security, surveillance, gas/fire detection, alarm systems.
- Electrical appliances such as lamps, fans, toys, etc.
- Cameras, telephone, TV; video and audio devices, games consoles.
- Microwave oven, coffee maker, freezer, etc.
- Vending machines.
- Pet care.

3. APPLICATIONS

In the same case as devices section explained above, there exist a number of applications already installed and used in Eurov6 in both kinds of Showrooms during the first year:

- HTTP Client and Server.
- FTP Client and Server.
- SSH (PuTTY on Windows 2000 and OpenSSH on Linux).
- Mail Transport agent (Sylpheed).
- ISABEL Multimedia Videoconference.
- Multicast Videoconference tools (RAT, VIC and SDR).
- VoIP with SIP.
- VoIP with H.323.
- VideoLAN.
- The Darwin Streaming Server (DSS).
- MPEG4IP.
- Windows Media Services and Media Encoder 9 Series on Windows 2003.
- Windows Media Player 9 Series on Windows 2000 and XP.
- Media Player on Linux.
- Tetrisnet.
- "Quake" Game Client for Windows.
- On-line Instant Messaging tool.
- Three Degrees - Peer to Peer Application on Windows XP (initial tests).
- Home network environment.
    - Appliances control.
    - Security monitoring.
    - Audio/Video control.
    - Monitoring (child care, animals' movement, disabled persons, etc.).

The improved scenarios integrated for demonstration in the second year of the project include the following applications.

3.1 Audio/Video Streams with IPv6

Mplayer, http://www.mplayerhq.hu/homepage/design6/dload.html, is the Linux equivalent application to Windows Media Player. It allows playing audio and video streams on Linux platforms over IPv6.

3.2 VoIP with IPv6 Gnomemeeting

Gnomemeeting, http://gnomemeeting.org, is a VoIP application based on H.323 protocol allowing video conferencing on Linux. The latest release supports IPv6 and although the application has not reached yet the final version, it is stable enough for having it in a test-bed scenario.

3.3 IPv6 Audio Player

Freeamp, now called Zinf, is a powerful audio player for Linux and Windows systems. It supports MP3, Ogg/Vorbis, WAV and Audio CD playback, SHOUTcast/Icecast HTTP streaming, RTP streaming. Linux and Windows binaries and source code are available on http://www.ipv6.polito.it/multimedia/freeamp-v6.htm.

3.4 IPv6 P2P with Three Degrees

Three Degrees application, http://www.threedegrees.com, works exclusively with IPv6 on Windows XP. This is the new kind of P2P application that runs only with IPv6 and would fail in networks built with NAT and Firewalls. Three Degrees connects people in small groups and they can share several kinds of files. The Eurov6 Showrooms had this application included in its demonstrations showing P2P applications for entertainment.

Figure 3-1: P2P Music Sharing with Three Degrees

3.5 Services Proxies between IPv4 and IPv6

46Bouncer application translates IPv4 packets to IPv6 packets and vice versa. It can be viewed as a proxy between IPv4 and IPv6 networks. It is available from http://netgroup-serv.polito.it/46Bouncer and it is developed for Windows 2000, Linux (2.4 kernel) and FreeBSD 4.3+. This application can be used for doing connections (HTTP, SSH, Telnet, …) between only IPv4 hosts and only IPv6 hosts.

PortForwarder application, http://win6.jp/PortForwarder, is also a proxy between IPv4 and IPv6 networks. An IPv6 host willing to connect to a service located at an only IPv4 hosts sends connection requests to the proxy IPv6 host that forwards such requests to the IPv4 host through a secure SSH connection. The application is developed for Windows 2000 (SP1 or newer), Windows XP and Windows Mobile 2003 for Pocket PC.

46Bouncer and PortForwarder are been used by Eurov6 for demonstrations where is needed a translation of IPv4 applications for their use in IPv6 networks.

3.6 IPv4/IPv6 Web Proxy as a Transition Tool

Telscom has implemented an IPv4/IPv6 Web proxy to facilitate the IPv4 users to reach the IPv6 website contents. This will facilitate the ISPs to opt for native IPv6 services, without disturbing IPv4 legacy users.

A web proxy server so implemented uses the HTTP protocol. The proxy server receives the request from the browser in the form of a URL. Then, the proxy server retrieves the requested information, converts it to HTML format and sends it on to the browser behind the firewall.

A web proxy acts as an interface between the client and the server. In fact it receives requests from IPv4 users, retrieves data from IPv6 web sites converts them, and send them back to the user. For this reason it can be seen as a transition tool from the IPv4 to IPv6 protocol.

The web proxy can be easily reached typing the Domain Name or the IPv4 address of the server. In the following picture, we can see that the user, through the IPv4 connection (showed as an IPv4 address in the URL line) connects to the IPv4/IPv6 Proxy Server.

Figure 3-2: IPv4/IPv6 Web Proxy

In order to browse an IPv6 web site the user only needs to type the URL in the appropriate field as shown on the top of the following figure. The page displayed shows that we are browsing an IPv6 web site since it visualizes the IPv6 address of the web server.

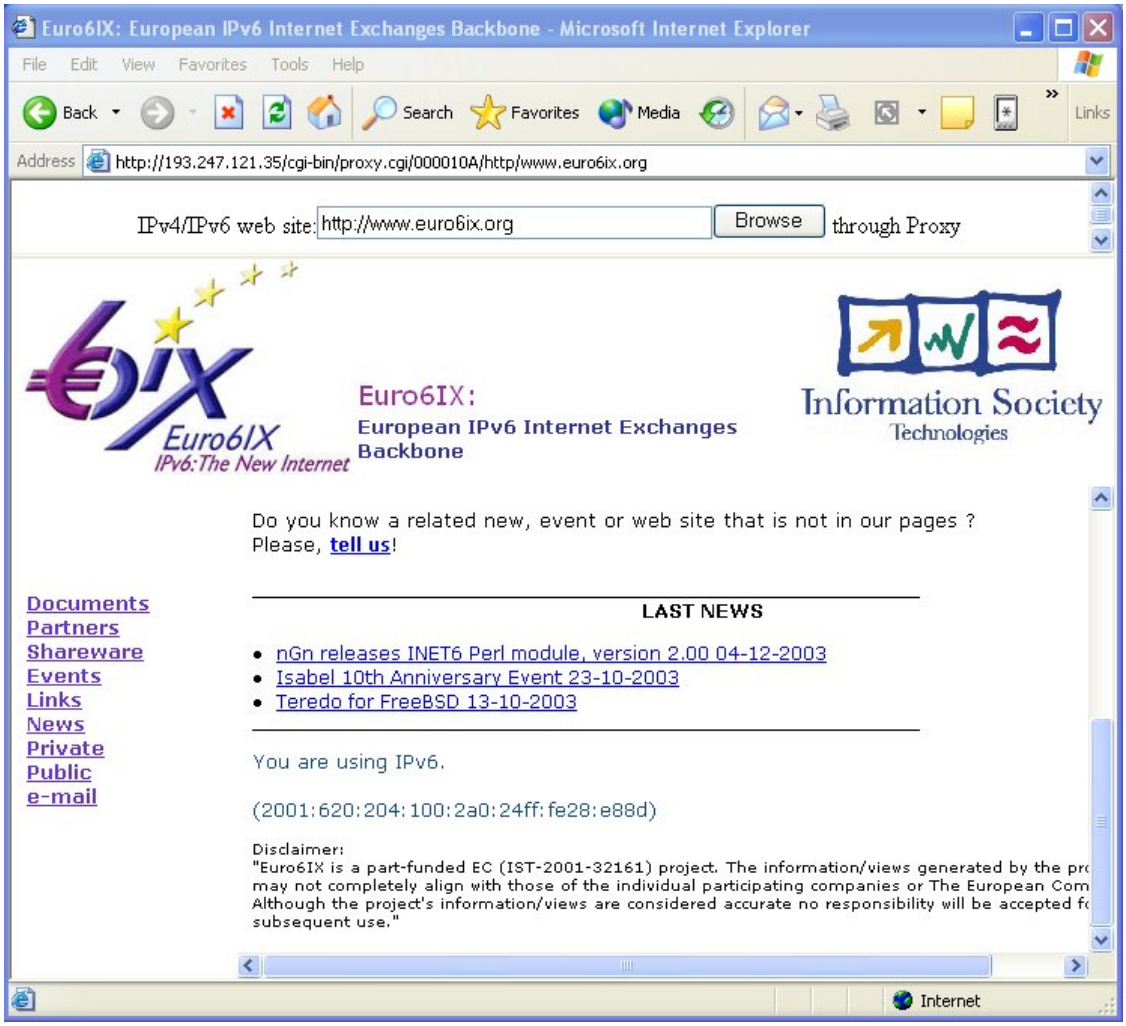

Figure 3-3: Using the IPv4/IPv6 Web Proxy

3.7 Home Portals

VTT in Finland has a Home portal, http://homeportal.ipv6.willab.fi, to enable connection to an IPv6 Webcam and switch on and off a lamp, TV, Video recorder, etc. In this way, using Windows Media Player 9 Series, which supports IPv6, the visitor to Eurov6 Showrooms can remotely visit the VTT Home portal.

Hence, a similar home portal application is locally available in the Basel Showroom, and is globally available trough http://www.eurov6.com web page.

3.8 IPv6 over GPRS

Several demonstrations of IPv6 applications over GPRS networks has been tested and showed. Mobistar is configuring its APN to support IPv6. This demonstration shows a laptop/PDA running basic IPv6 services like ping6 and ifconfig6 through a GPRS phone using the infrastructure provided by Mobistar. An IPv6 over IPv4 tunnel is built between ULB and Mobistar´s GGSN to test IPv6 applications. IPv6 was tested on the live network and needs further support from their hardware supplier.

There exist other demonstration leaded by Ericsson and showed in key Eurov6 Nomadic Showcases, as Brussels IPv6 event and IST2003. More details about this demonstration can be found in the section 5.1.4 of this document.

3.9 IPv6 Application on Windows Mobile 2003

The Windows Mobile 2003 software for Pocket PC includes several enhancements and new features, the most noticeable changes are in the areas of communications and multimedia:

- IPv6 support.
- Enhanced Connection Manager user interface.
- Zero Configuration connections.
- Always-on Bluetooth discoverability and use of Bluetooth modems.
- Wireless LAN support.
- IPSec/L2TP.
- Support for Multiple VPNs.
- 128-bit encryption strength for Crypto API.
- Windows Media Player 9 Series for the Pocket PC 2003.
- New version of Pocket Internet Explorer (pIE).
- New Pocket PC Phone Edition 2003 Features (GSM/GPRS and CDMA/CDMA1xRTT voice/data networks).

A Pocket PC running Windows Mobile 2003 has been integrated on different Eurov6 demonstrations using Web browsing, file transfer, audio/video streams, network access, security, etc.

Several tests have been done on IPv6 Web browsing, audio/video streams and network access. Those tests will be support Eurov6 applications and demonstrations on areas as Business, Home, Entertainment, Remote monitoring, Security and so on.

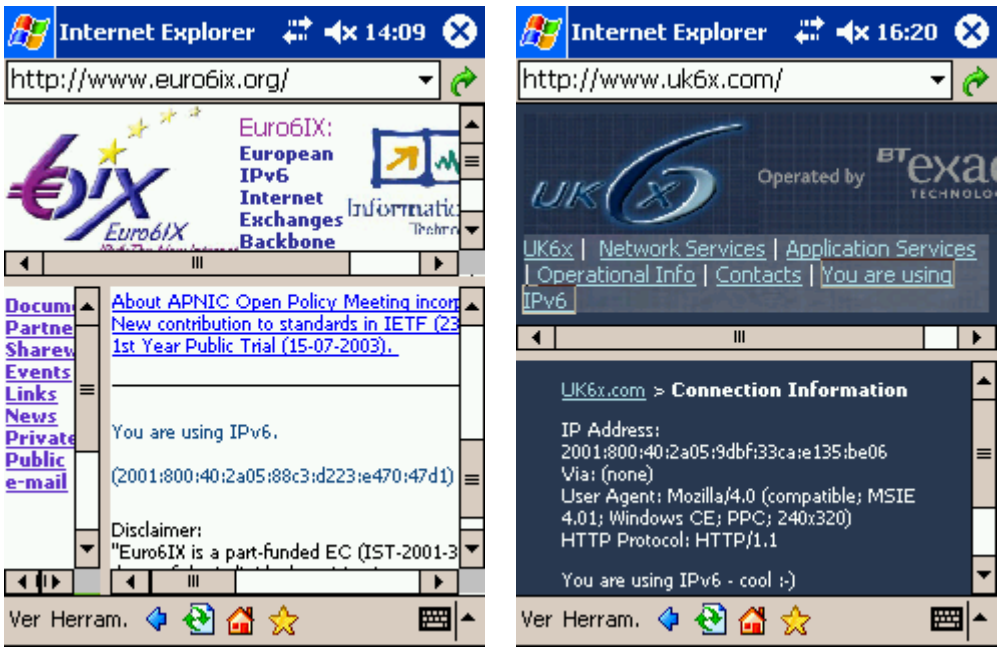

Figure 3-4: Web Browsing with IPv6 Enabled Pocket Internet Explorer

Using the IPv6 Internet Explorer for Pocket PC has been accessed several IPv6 enabled Web pages.

Using the IPv6 enabled Windows Media Player Series 9 for Pocket PC there have been accessed audio and video contents from a IPv6 streaming server (6stream.consulintel.euro6ix.org) evaluating the correct access and performance. The following figures show some images of these tests.

Note that the video can be accessed at mms://6stream.consulintel.euro6ix.org/day1_tutorial1.

Figure 3-5: Audio (left) and Video (right) playing with IPv6 enabled WMP series 9

3.10 Business Applications

Eurov6 has been tested and showed demonstrations of Business Applications with IPv6 using applications like 6VOICE (VoIPv6), Audio and Video conferencing, Audio/Video streaming (as Audio/Video on Demand), Web, FTP, Mail and News services, etc.

3.11 Remote Monitoring and Security Applications

Exploiting Panasonic IPv6 camera and Web browsers on Desktop and Pocket PCs some system for Remote monitoring and Security has been tested and showed. These elements can easily support systems on:

- Schools.
- Condominiums.
- Public Parking.
- Restaurants.
- Shop stores.
- Beaches.
- Real State.
- Zoo.

- Traffic.
- Warehouse.

3.12 Listen Documents Application

Consulintel has proposed "Listen Documents" service as part of Euro6IX project. As mobile devices (telephones, PDAs, wrist clocks) screens become smaller it is harder read documents, and this service aims to speech the documents to users in cars, trains, plains, etc. using its small mobile devices.

There is some software that can translate text-to-speech with acceptable quality (although with a metalic voice), obtaining a MP3 file that can be made public in an IPv6 server. In a first step this service uses already translated files, but later may be we can set up a real time and on-line service.

An implementation of this service is available at http://www.consulintel.euro6ix.com > Euro6IX Public > Listen Documents.

Using IPv6 Pocket Internet Explorer, Pocket Word and IPv6 WMP series 9, this service has been tested. The following figures show some images of this test.

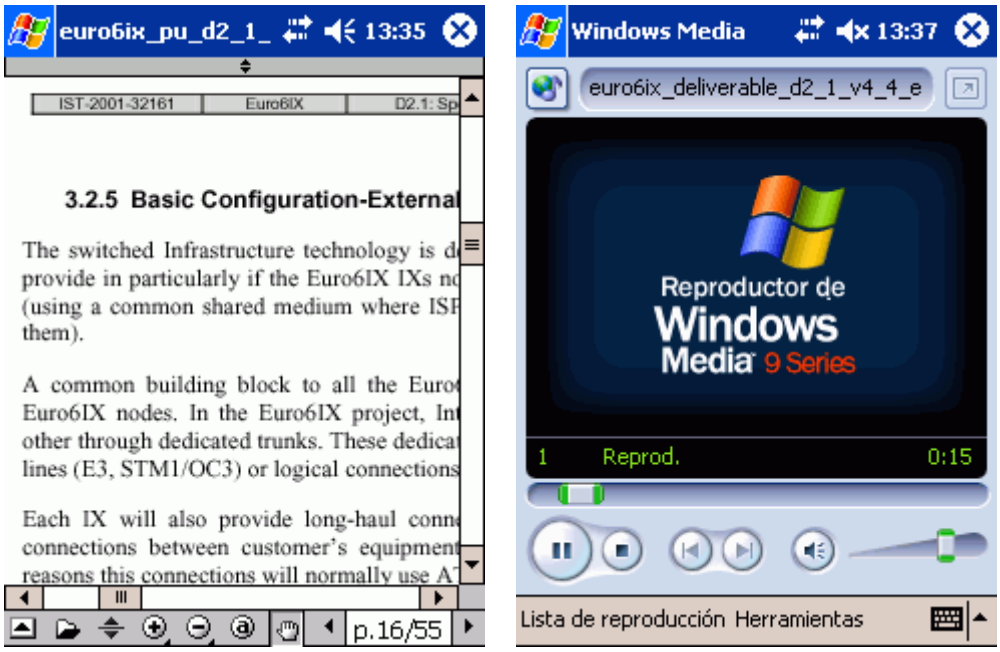

Figure 3-6: Document on Pocket Word and its correspondent speech on IPv6 WMP

3.13 Weather Information via IPv6

Consulintel offers "Weather Info" service as part of Euro6IX project. The users of this service can reach via IPv6 Web pages information of the weather in many places of the world.

This service is available at http://www.consulintel.euro6ix.com > Euro6IX Public > Weather Info.

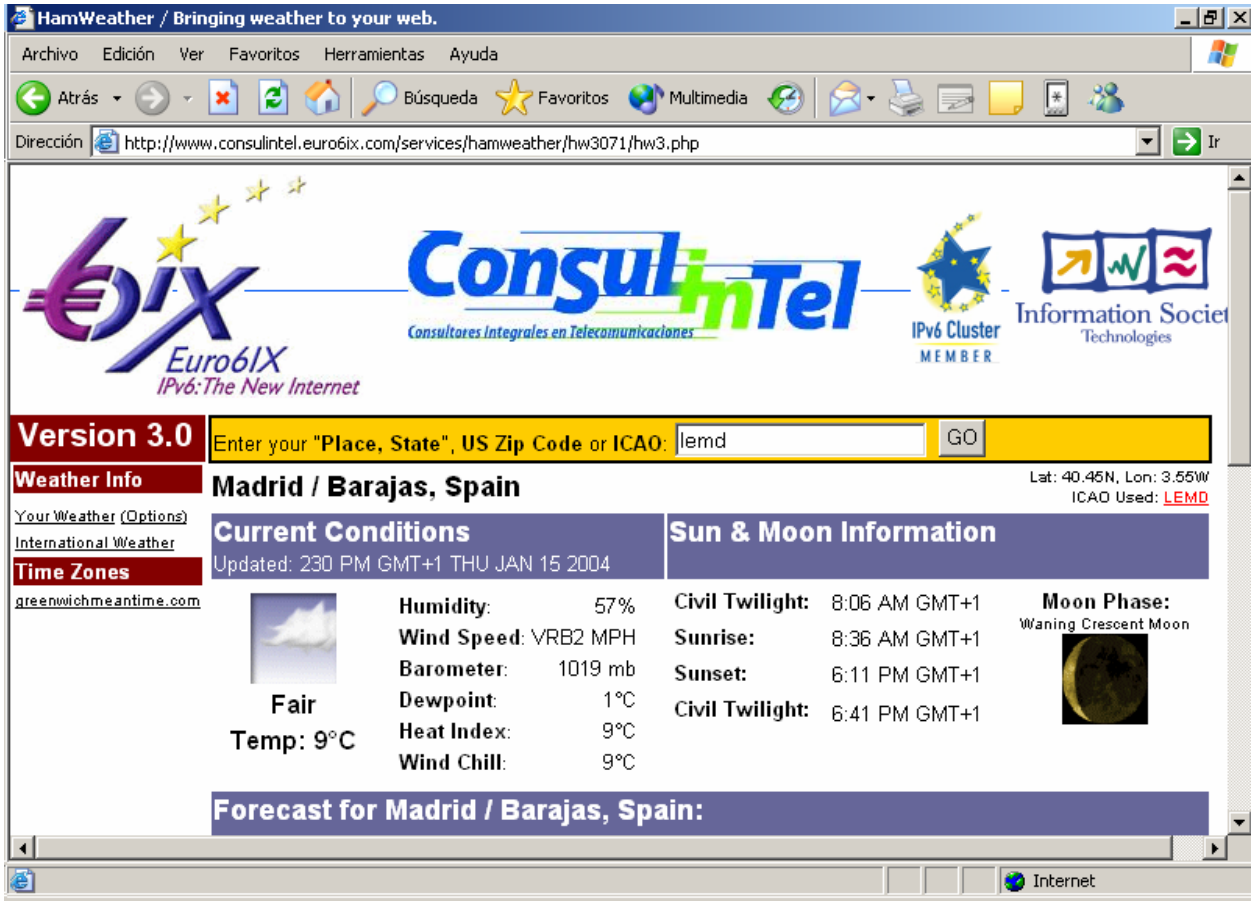

Figure 3-7: World Weather information accessible via IPv6

3.14 DVTS

DVTS is a hardware/software architecture allowing to send the digital video (DV) over Internet. It is a product of the Japanese WIDE project and has been widely used for videoconferencing. It is available at http://www.sfc.wide.ad.jp/DVTS/.

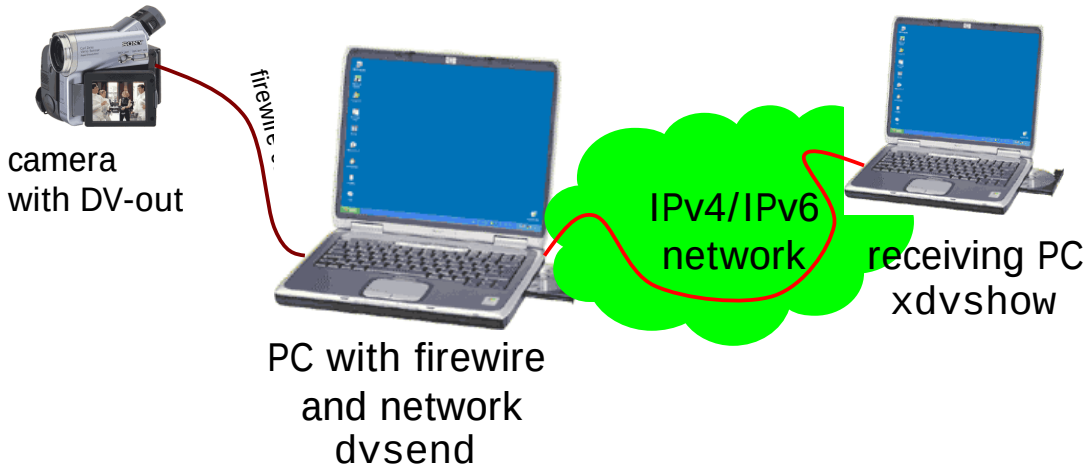

Figure 3-8: Basic setup of the DVTS architecture

The above figure presents basic setup of the architecture. This installation has been prepared and demonstrated at the September Brussels IPv6 event. Visitors were able to see themselves live

with the video taken directly from digital output of the camera and fed into the network by the server.

3.15 News Services over IPv6

News6 is a single bnc ipv4 to ipv6 software that can be used for read news letters in IPv6 using news6.ngnet.it server. news6 is used for relay the connection between localhost and news6.ngnet.it on 119 port. Thus the program sends all packets sent to localhost at 119 to news6.ngnet.it at port 119 using IPv6.

In addition of all those applications there exist other actions under way:

- Investigations and collection of data from possible application sponsors (Microsoft, Japanese companies, etc).
- Promotion of the cooperation agreement with China, Korea and India.
- Contacts with several Japanese and US organizations for their participation in the project.

4. SERVICES

This section enlists the currently network services already available in the different Showrooms, and then gives a brief description of newer network services that are been used for support the demonstrations running in both Fixed and Nomadic Showrooms during the second year.

4.1 Network Services

In addition of Network Services already used in Eurov6 during the first year:

- Mobility.
- Multicast.
- Security/VPN.
- PKI.
- Basic QoS.
- DNS.

The improved scenarios integrated new services as:

4.1.1 AAA with IPv6

Authentication, Authorization and Accounting (AAA) provides not only identification facilities but also accounting tools for billing issues. RADIUS is a well-known example of AAA system which has several implementations on Linux and commercial products. Although AAA has been used for long time from now, this is not true for IPv6 networks because of their recent deployment. However, this is changing thanks to efforts made within other IST projects, like Euro6IX, where an AAA implementation for Linux with IPv6 support has been developed using as base the Freeradius implementation. Such IPv6 support allows not only communication through IPv6 packets but also new Attribute Value Pairs that are defined on RFC 3162, "RADIUS and IPv6", and they are related to IPv6 parameters.

Madrid Showroom has installed such IPv6 RADIUS server, which can be found at radius.consulintel.euro6ix.org.

4.1.2 DHCPv6 Autoconfiguration

The most common autoconfiguration mechanism used by IPv6 is stateless autoconfiguration, which consists of Router Advertisement messages sent by routers. But there is also a stateful autoconfiguration mechanism based on DHCPv6. It allows both dynamic and static address assignment, DNS information deliveries and prefix delegation mechanism for router autoconfiguration.

There is an implementation of DHCPv6 for both client and server, which can be downloaded from http://sourceforge.net/projects/dhcpv6. It is developed for Linux, and Madrid Showroom has successfully installed such application on its demo room for stateful autoconfiguration and prefix delegation mechanism. This service is enforcing new demonstrations for the second year.

4.1.3 IPSec VPN

Eurov6 project has received and installed the 6WIND gate router as a sponsoring which is now operational in the Showcase with VPN scenario for demonstrating security features. Further deployments for IPSec VPN over IPv6 between Brussels and Basel are underway.

4.2 Network Infrastructure

Regarding network infrastructure, this section describes the already available infrastructure in the different Showrooms, and then gives a description of newer item that are been used for support the demonstrations running in the Eurov6 Showrooms during the second year.

4.2.1 Network Connectivity

As was already stated, the Eurov6 project interconnects three operative Showrooms in Brussels (University of Brussels), Basel (Telscom) and Madrid (Consulintel) via native IPv6 or tunneled IPv6 links. Connectivity is extended worldwide via Euro6IX, GÉANT and 6Bone, and multicast links to the M6Bone multicast project. This connectivity infrastructure allows distributing demonstrations among Fixed and Nomadic Showrooms and other remote sites.

There are not foreseen major changes in this connectivity rather than the needed links for the future Nomadic Showroom demonstrations.

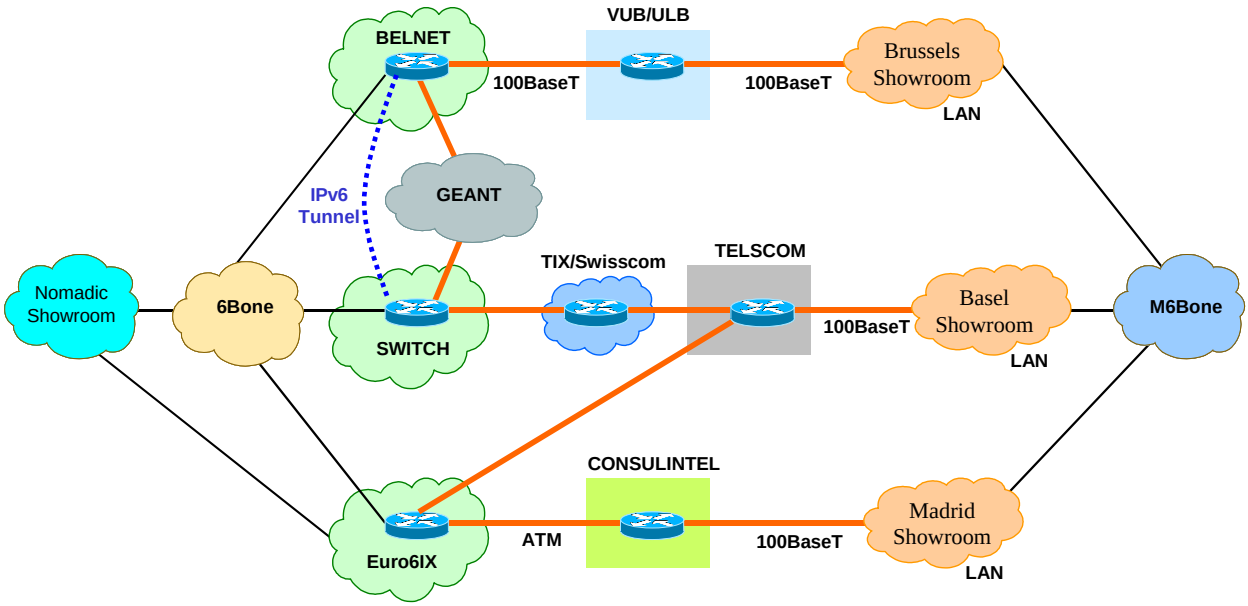

Figure 4-1: Eurov6 Showrooms Interconnection

4.2.2 Wireless Access

The Wireless access infrastructure is already deployed and used in the different Eurov6 Showcases, including:

- Bluetooth.
- IrDA.
- WLAN.
- GPRS.

Hence, the major change for the improved scenarios will be the deployment and test of a enhance GPRS demonstrator, and probably a UMTS one in the future.

Nokia has developed a solution that enables a PDA to build an IPv6 link directly. The IPv6 feature is implemented in GGSN. Mobistar has a plan to test the IPv6 feature on Nokia GGSN node and will soon make a join-test with Brussels Showroom. As Mobistar has no IPv6 connectivity, they will connect their GGSN to Brussels Showroom through the tunnel. In a first phase, the aim is to run some streaming applications over the network.

Also Ericsson AB has a solution for IPv6 over GPRS, and it has been demonstrated during the second year in some Nomadic Showcases. The Ericsson IPv6 reference network (6Ref) team has proposed a gradual introduction that may allow mobile operators to first adopt the new technology in a limited part of their network and then, when confidence and service offering is established, decide for a full IPv6 adoption. It is important to note that this can be done with no impact on existing service offering over IPv4.

4.2.3 Remote Access Server with IPv6

For offering native IPv6 connectivity to domestic users (without transition mechanisms like tunnels) most efforts are focused on links with more bandwidth like xDSL lines, due to the exploitation of the IPv6 features that improve the network performance. These kinds of links use the point-to-point protocol over Ethernet (PPPoE) as link protocol in order to set up the IPv6 link. However, all the users cannot afford this kind of links and they choose the legacy telephone lines in order to get IPv6 connectivity. For this, a telephone Remote Access Server (RAS) using the PPPv6 protocol is needed.

Madrid Showroom has deployed a native IPv6 RAS on Linux allowing remote users to get IPv6 connectivity using phone lines, allowing demonstrations of this kind of access to IPv6 applications. This service is available calling to the phone number +34 911518197.

4.2.4 Network Management

Regarding Network Management tools deployed for demonstrations support, Madrid Showroom has installed and tested several tools. As examples are:

SmokePing

SmokePing is a monitoring tool that uses ping6 packets to verify multiple network connectivity points (http://people.ee.ethz.ch/~oetiker/webtools/smokeping/index.en.html).

With SmokePing can be measured latency, latency distribution and packet loss in IPv6 networks. SmokePing maintains a long-term data store and draws pretty graphs, giving up to the minute information on the state of each network connection.

IPv6 MRTG

An IPv6 enabled MRTG application has been tested in order to get network traffic statistics on Showroom connections.

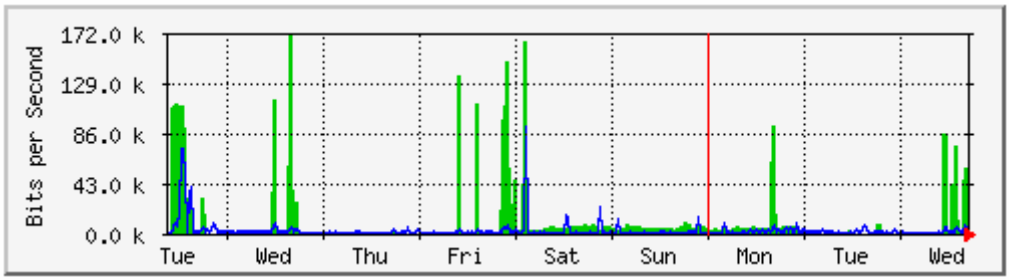

Figure 4-2: IPv6 Enabled MRTG Graph for IPv6 Traffic

5. NOMADIC SHOWROOMS

This section details some of the scenarios and applications demonstrated or will be demonstrated during key Nomadic Showrooms carried out during the second year of Eurov6 project.

5.1 Brussels IPv6 Event

During the Brussels IPv6 Showcase, 23rd-26th September 2003, ULB/VUB and the Eurov6 partners showed native IPv6 Videoconference tools (VIC, RAT, SDR, ISABEL), VideoLAN, Windows Media Server and Player, Three Degrees, Web server (Apache2 on Linux), DNS (Bind-9.2.1 on Linux), SSH (PuTTY on Windows 2000 and OpenSSH on Linux), Home automation system, etc.

Participating companies demonstrated new IPv6 Internet Showcases such as IPv6 Routers from 6WIND and Juniper, Mobile Telematics Services from Acunia, Video Streaming from Alcatel, IPv6 over GPRS from Ericsson, IPv6 Internet Car from MBDS and PSA/Citroën, IPv6 Cameras from Panasonic, and Wearable from Xybernaut.

Figure 5-1: Brussels Eurov6 Booth – September 2003

5.1.1 IPv6 Internet Car – MBDS and PSA/Citroën

MBDS, a graduate degree of the University of Nice Sophia-Antipolis (http://mbds-fr.org), in partnership with PSA-Citroën (http://www.psa-peugeot-citroen.com) develops a project with support from Steria (http://www.steria.com) and Microsoft (http://www.microsoft.com) in order to integrate IPv6 with Wi-Fi and GPRS in a car, permitting to passengers experiment wireless services on a PDA in addition of Microsoft prototypes based on .NET platform: live TV (Pier-Net.TV, HP), multimedia information in real time (AFP Multimedia), geo-dependant

commercials (NavTech, Opteway), 3L Interactive and D-Link settled the Wireless LAN infrastructure. A Citroën C3 Pluriel was demonstrated during the Brussels event, this car may very well considered as the first native IPv6 car in Europe. In the following figure is the Citroën C3 Pluriel Wi-Fi in front of the hotel Le Plaza.

Figure 5-2: IPv6 Citroën C3 Pluriel

5.1.2 The W3C3TV project

The project, Wireless 3rd Generation C3TV, aimed at implementing a prototype illustrating mobiles services in a moving car.

The Steria-MBDS prototype presents Internet services in a vehicle using an iPAQ. The application runs on an iPAQ, linked to hands-free GSM equipment in the car. The communication is over GPRS and WLAN.

The communicating car concept is to open all the possibilities and services for tomorrow users of cars (drivers and passengers).

Services that could be offered are:

- Off-board navigation.
- Real time TV.
- Downloading games for children entertainment.
- Hotel booking.
- Calling the emergency service and transmitting medical information.

Peugeot-Citroën demonstrated the Citroën C3 Pluriel Wi-Fi which enables the car passengers to experiment wireless services on an iPAQ. The iPAQ pocket PC is installed in the car and provides the services developed.

The Eurov6 demonstration requires the installation of IPv6.

All iPAQ Pocket PCs which run on Windows Mobile 2003 for Pocket PC do support IPv6 (iPAQ h1930, h1940, h2210, h4150 and h5550). For older iPAQs, you need to install an upgrade to Windows Mobile 2003 in order to support IPv6. (e.g. for the iPAQ h3850, h3870, h3950, h3970 and h5450).

5.1.2.1 Configuration for W3C3TV

The iPAQ Pocket PC 5450 was used and configured as follows:

- MBDS used Visual Studio .NET 2003 from Microsoft to implement the application for the iPAQ. The application files provided by MBDS are:
  - Clp.dll: Application extension
  - ELANTTS_ESASspeechCtrl.ARM: Cabinet File
  - ELANTTS_Engine.ARM: Cabinet File
  - ELANTTS_Frf_Mono.ARM: Cabinet File
  - NAtiveFunctions.dll: Application extension
  - Regsvr2: Application
  - W3C3TVprojectv3_PPC.ARM Cabinet File
  - Netcf.core.ppc3.arm
  - And the platform .Net for the iPAQ
- The iPAQ is connected to the IPv6 Wi-Fi hotspot installed within the Eurov6 Showroom and can experiment IPv6 Internet connectivity.

5.1.2.2 Applications

While the application was launched several services could be demonstrated.

- Mail: Enables the user to send emails.
- Photo: Allows the user to visualize the pictures stored in the device and then send them via emails.
- Localize: Enables the user to receive information regarding activities and services located near the hotspot, such as the nearest train station, hotels, etc.
- Memo: Enables the user to record voice and send it via email.
- Information: Enables the users to receive the latest news via a server (FTP to AFP server).

Figure 5-3: Steria-MBDS W3C3TV Interface

The application principal display interface is displayed at Figure 5-3.

The functionalities that could be demonstrated are:

- Mail: Reading mails.
- Memo: Recording voice and listening to the message recorded.

Figure 5-4: Steria-MBDS W3C3TV Interface – Mail (left) – Memo (right)

5.1.3 Xybernaut IPv6 Showcase

The Mobile assistant is a wearable technology developed by Xybernaut http://www.xybernaut.com.

Figure 5-5: Xybernaut Mobile Assistant MA V

5.1.3.1 Configuration of MA V

The Mobile Assistant uses Windows 2000 as operating system. The Microsoft IPv6 stack was installed on the MA V and network parameters were configured to make it a fully IPv6 node. The MA V was connected to the IPv6 wireless access point via a wireless card.

5.1.3.2 Applications

The applications that that could be demonstrated are

Using Internet Explorer to Access IPv6 Web Sites

The new IPv6 Internet extensions brought by the installed IPv6 pack, allow the web browser to access IPv6-enabled web servers. The Plaza Eurov6 Showcase included an IPv6 web server, http://plaza.ipv6event.be, reachable with IPv6 only and specifying the address used to access the web page.

The MA V connected to the Plaza IPv6 network accessed the web page http://plaza.ipv6event.be.

The Mobile Assistant at the hotel Le Plaza Eurov6 Showcase is shown in the following figure.

Figure 5-6: MA V at the Exhibition

Multicast Videoconference tools

The multicast applications such as RAT (audio), VIC (video), NTE and SDR (Session Directory Tool) were downloaded and demonstrated on the MA V.

Once the application was installed, the visitors could receive the conference sessions through SDR and receive video and audio through VIC and RAT respectively.

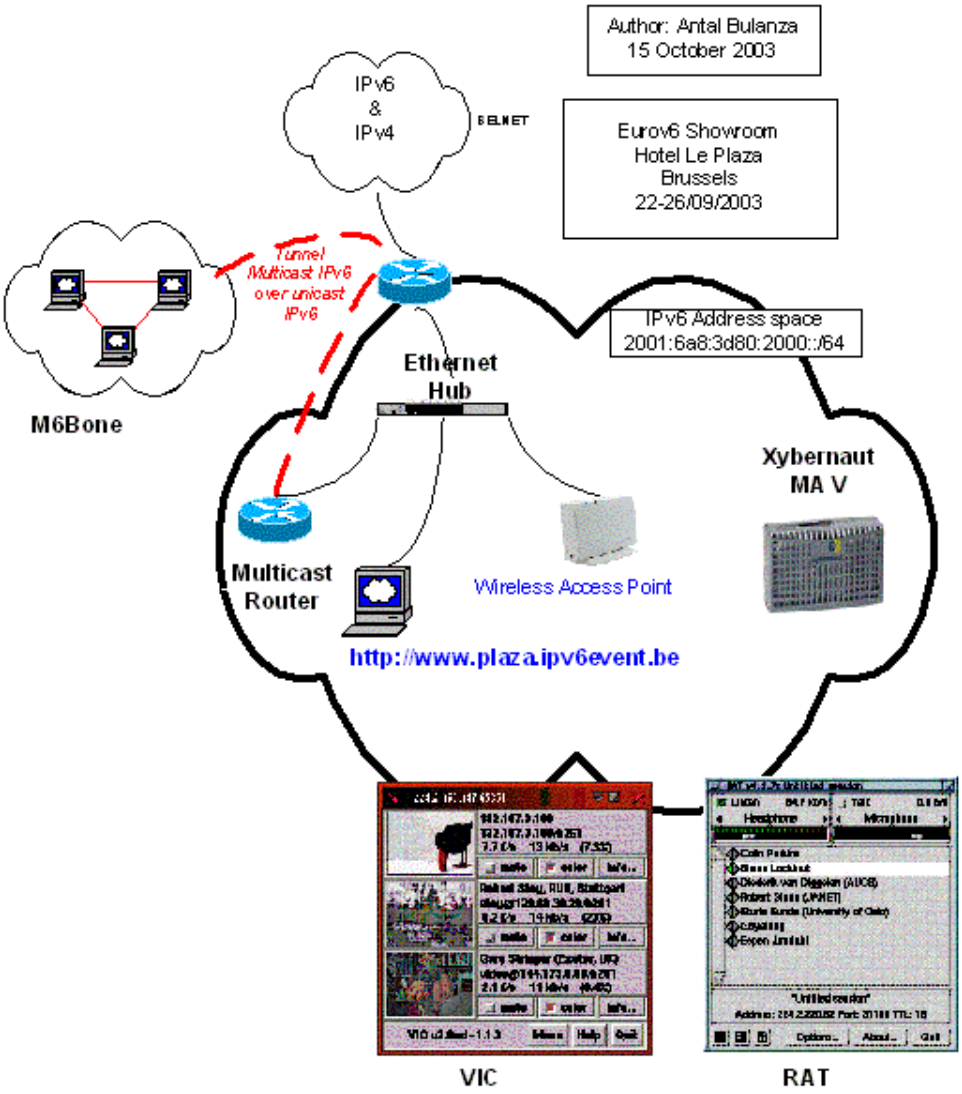

Figure 5-7: VIC-RAT on MA V over IPv6

5.1.4 IPv6 over GPRS

Ericsson and TeliaSonera demonstrated IPv6 services over a commercial GPRS network in an international roaming scenario. The demonstration showed that IPv6 services can be supported in a commercial mobile infrastructure, even when roaming, using automated IP tunneling. This can be seen as a stepping-stone toward native IPv6 networks and services including peer-to-peer applications.

An IPv6-enabled laptop with a Sony Ericsson GPRS PCMCIA was used to set up a connection through a commercial GPRS network in Belgium to the home network at TeliaSonera in Sweden. The laptop client automatically set up an IPv6-in-IPv4 tunnel using Intra-Site Automatic Tunnel Addressing Protocol (ISATAP) to TeliaSonera's IPv6 test mobile network, where IPv6 application servers are located and connectivity to the IPv6 Internet is provided.

5.1.4.1 Laptop Configuration

For the demonstration in Brussels two laptops running Windows XP with SonyEricsson GC75 GPRS PCMCIA cards were used. The PCs configuration is particularly easy, thus it is possible for a not particularly skilled user to access IPv6 services. Some of the IPv6 services include IPv6

Audio (music) streaming, IPv6 chatting and browsing on the public IPv6 Internet. Both the Chat server and the Media player server were based in the TeliaSonera IPv6 service network. Such services may be offered to any public user with a TeliaSonera GPRS subscription who has a PC running OS that supports IPv6 and ISATAP (such as Windows XP, Linux, FreeBSD).

The only configuration task for the PC used in the demonstration was to install the PCMCIA GPRS card to be able to access the GPRS service (a mobile used as modem would have obtained the same result) and install the IPv6 stack. Once an IPv4 address was obtained from the GPRS network (either public or private does not matter), Windows would have started the ISATAP automatic tunneling establishment procedure to assign an ISATAP IPv6 address to the laptop.

5.1.4.2 Applications

During the demonstrations the user could use Windows Internet Explorer for browsing the IPv6 Internet.

Windows Media Player 9 was used for streaming the songs from the TeliaSonera IPv6 streaming server while a freeware chat client was used to connect to IPv6 chat room into the TeliaSonera network.

In TeliaSonera network the service network had two PC, one running Windows 2003 for streaming songs at 20Kbit/sec and the other running Linux for the IPv6 chat server.

5.1.4.3 IPv6 Communication and Network Setup

The figure below describes the network set up for the demonstrations. The laptop is in this case in the local mobile network (Brussels). The GPRS service that gets established uses the Radio Base Station and the SGSN of the visited local mobile operator. The connection of the laptop to the home GGSN and to the home service network goes through the GRX, which is responsible to allow establishment of a tunnel between the visited SGSN and home GGSN.

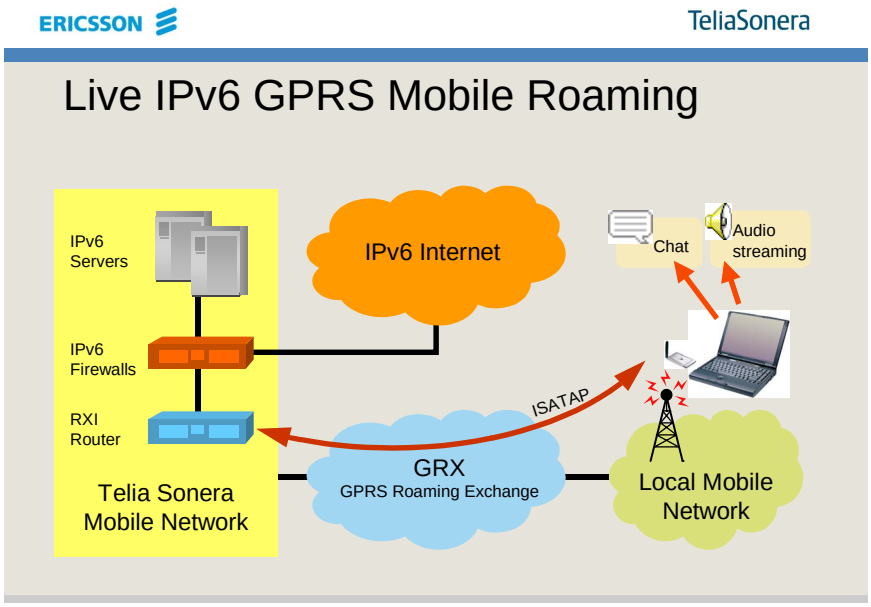

Figure 5-8: IPv6 GPRS Network Setup

In order to allow for the establishment of the IPv6 connectivity in this scenario, only one router and a firewall where added as a plug-in into the TeliaSonera network. The router supports the ISATAP server functionality and allows for the automatic tunnel establishment. The Firewall supports IPv6 and allows protecting IPv6 traffic from possible intrusions or attacks. The two PCs' service network is attached to the firewall.

5.2 IST2003 Event

During the IST2003 event, 2nd-3rd October 2003 in Milan, Consulintel and other Eurov6 partners showed applications as ISABEL videoconference system, Peer-to-peer application (3 Degrees), Radio streams (Windows Media Player and Freeamp), News (news6), Video streams with QoS (Windows Media Player) and so on using PLC connectivity in some devices. Also IPv6 over GPRS from Ericsson and IPv6 cameras from Panasonic were presented.

5.2.1 Peer-to-Peer Applications with 3 Degrees

3º is a peer-to-peer application for sharing multimedia files among several users belonging to a user group. The working is simple: when a user in Milan wants to share a file, for example an mp3 file, with other partners everywhere, the user must log-in in the .NET area, then he/she selects the folk for sharing the file and he/she starts to play the file. The same file sound in the remote PC of the selected folks.

5.2.2 Radio Streams

A PC running Windows Media Player and FreeAmp provides access to Radio streams over IPv6. For this demonstration was used the BT's UK6x IPv6 radio MP3 server and an IPv6 connection from IST2003 to UK6x trough 6Bone/Euro6IX.

- For BT's UK6x IPv6 radio MP3 service quite a lot of clients under different Operating Systems are supported.
- There are different ways to connect to the radio, the syntax depends of the client you are using.
    - The server is at http://radio.ipv6.btexact.com:8000.
    - A Winamp playlist is at radio.m3u.
    - A Microsoft Media (v9) link is at radio.asx.

Figure 5-9: FreeAmp and Windows Media Player Tuning IPv6 Radio Stations

5.2.3 News over IPv6

A PC running news6 software allows access to News news6.ngnet.it server over IPv6.

News6 is used for relay the connection between localhost and news6.ngnet.it on 119 port using IPv6. For this demonstration the PC client needs:

- IPv6 stack enabled.
- News6.exe software.
- Normal (IPv4) news read program (like Outlook, Netscape news, etc).
- A connection from IST2003 to news6ngnet.it server trough 6Bone/Euro6IX.

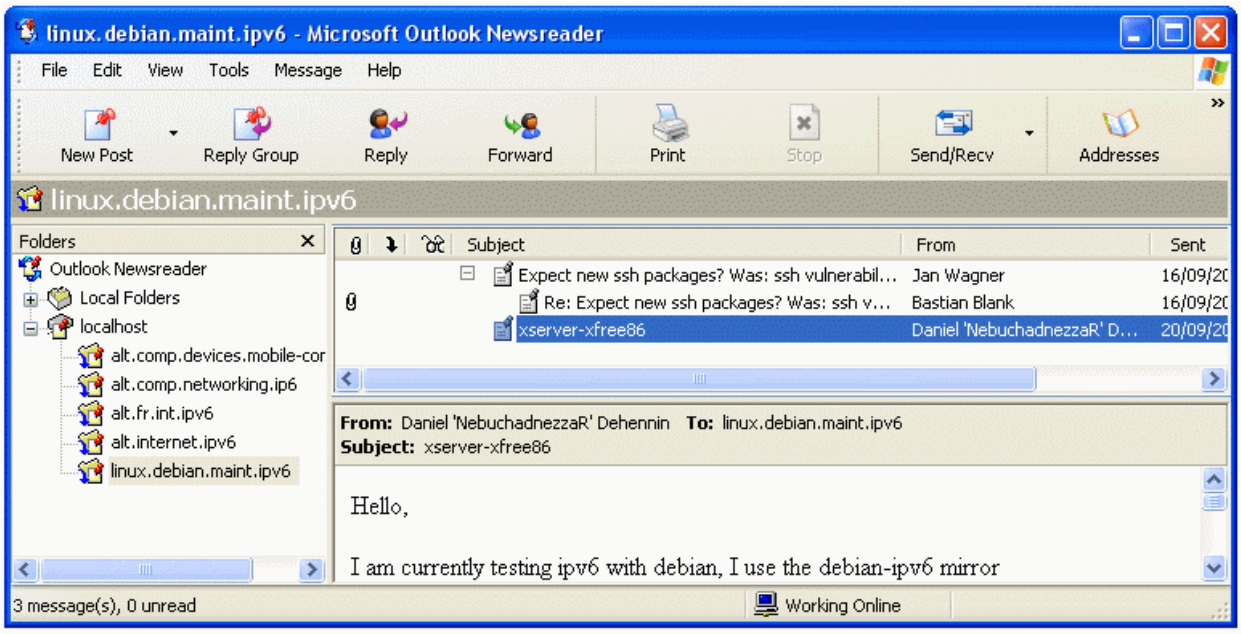

Figure 5-10: News Service over IPv6

5.2.4 Video Streams with QoS

The main objectives of this demonstration were:

- To show the working of the audio and video streams over IPv6 networks, particularly:
  - High Quality Audio/Video streaming.
  - QoS streaming marking.
  - QoS streaming with differentiated qualities.
  - Live streaming of the images captured by one web cam connected the streaming server.
- In addition of this, another goal is to show a preliminary use of IPv6 QoS functionalities for this kind of streaming services.

In a multihomed Video Streaming server, the clients can access to streams by two separate paths. In the first path, trough Euro6IX, the client can find a video with Best effort treatment, getting a high quality video. In the second path, trough 6Bone, the client can find a video with bandwidth limitation, getting a low quality video.

At the same time, the IPv6 Traffic Class field of the streams is marked for future uses exploiting DiffServ DSCP functions.

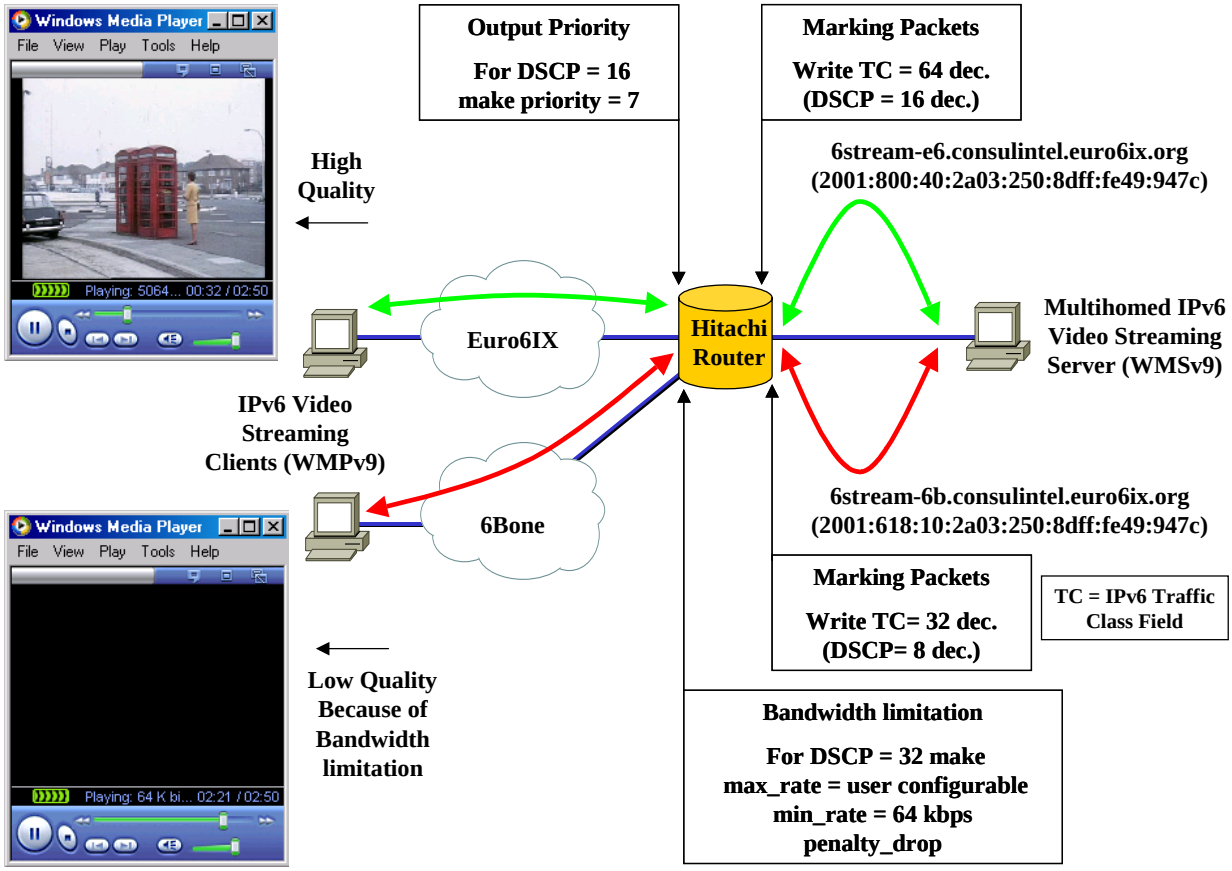

Figure 5-11: Topology for Remote Audio/Video Streaming with QoS

5.2.5 Panasonic Demonstration

The objectives for this demonstration included:

- To show the usage of the IPv4/IPv6 dual stack Network Camera, which can be used for perform remote monitoring.
- To show the IPv6 Web Server implemented in the Network Camera, so without any special software or equipments, the camera image can be accessed through Web browser of PC, PDA or mobile phone and not only monitoring camera image but also controlling the camera angle (Pan, Tilt or Zoom) can be performed simply.
- Also, to show FTP and SMTP services that the network camera supports, so by using external sensor trigger or preset timer, the camera image can be transmitted to preset FTP sever by FTP and/or the preset e-mail address as attached file.
- To show peer-to-peer connections that can be simply realized by using IPv6 address (Global address).
- To show the easy Plug & Play set-up realized by supporting RA (Router Advertisement).

Figure 5-12: Panasonic IPv6 Camera

5.2.6 IPv6 over GPRS

Ericsson and TeliaSonera demonstrated again the IPv6 services over a commercial GPRS network in an international roaming scenario as during Brussels IPv6 event they did.

The demonstration showed that IPv6 services can be supported in a commercial mobile infrastructure, even when roaming, using automated IP tunneling. This can be seen as a stepping-stone toward native IPv6 networks and services including peer-to-peer applications.

An IPv6-enabled laptop with a Sony Ericsson GPRS PCMCIA was used to set up a connection through a commercial GPRS network in Milan to the home network at TeliaSonera in Sweden. The laptop client automatically set up an IPv6-in-IPv4 tunnel using Intra-Site Automatic Tunnel Addressing Protocol (ISATAP) to TeliaSonera's IPv6 test mobile network, where IPv6 application servers are located and connectivity to the IPv6 Internet is provided.

5.3 Eurov6 at Global IPv6 Service Launch Event

Eurov6 successfully participated on the Global IPv6 Service Launch Event, http://www.global-ipv6.org, on 15th-16th January 2004 in Brussels.

Eurov6 was the responsible of the organization and setup of the network and demonstrations, and Consulintel was appointed as responsible within Eurov6.

The demonstrations presented are depicted in the following sections.

5.3.1 IPv6@Home

This is a live and very realistic scenario. The demo, leaded by Consulintel, showed an automation system being able to watch the house with cameras, to open/close the blinders, to switch on/off lights/heater/etc. in a room, to detect presence of stranger persons at home, to remotely manage the alarm system, to remote manage cameras (and see the video signal), take care of pets (provide them water/food), etc. Some of the needed devices used native IPv6 (with via Ethernet, WLAN, PLC and Bluetooth) and the other ones was X.10, so an Interface system (OSGi) IPv6-X.10 was used. The system is located in a REAL home, near Madrid, connected with a commercial IPv4 ADSL with a NAT box, using proto-41 to forward the IPv6 traffic, out of the demo room. The way to show was with the PC located into the demo room in Brussels. All this can't be done with IPv4, so IPv6 facilitates all the service availability. Real pets (2 cats and 3 dogs) are already there, and could be feed from Brussels, with IP cameras to show them. All is real, the blinders, the alarm system, the water supply for the pets, etc.

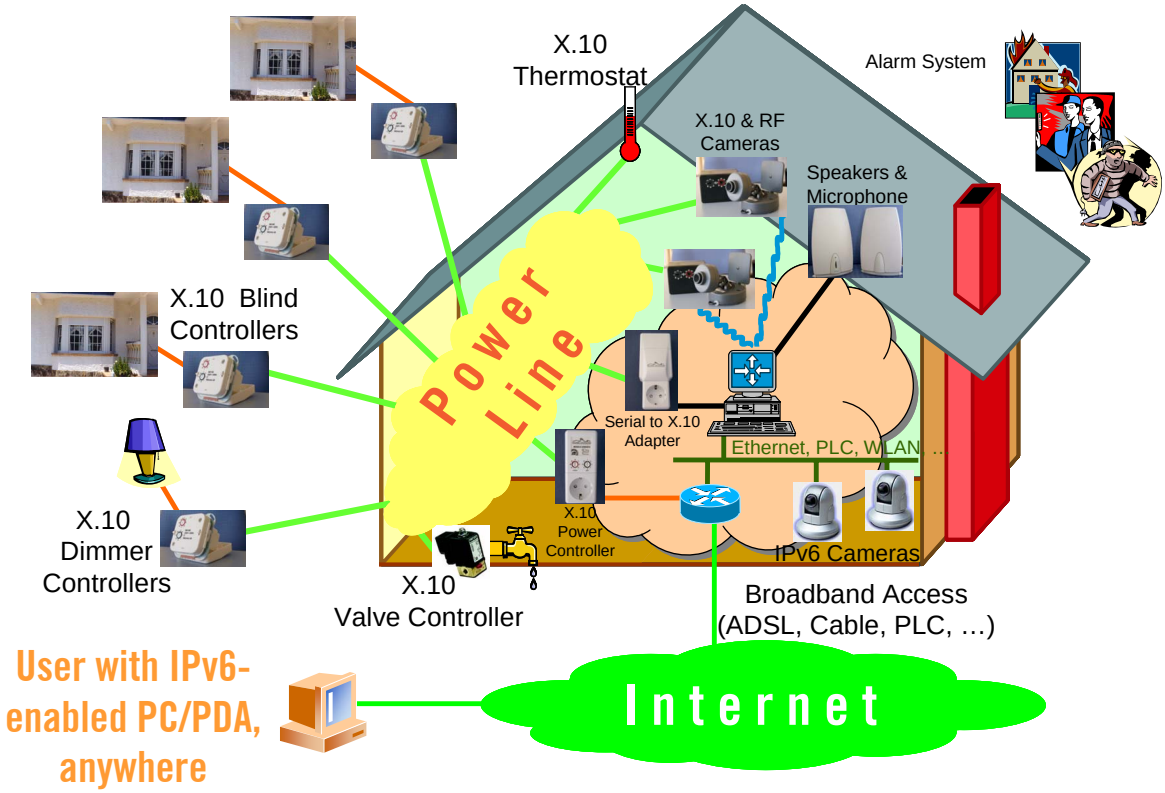

Figure 5-13: IPv6@Home Elements

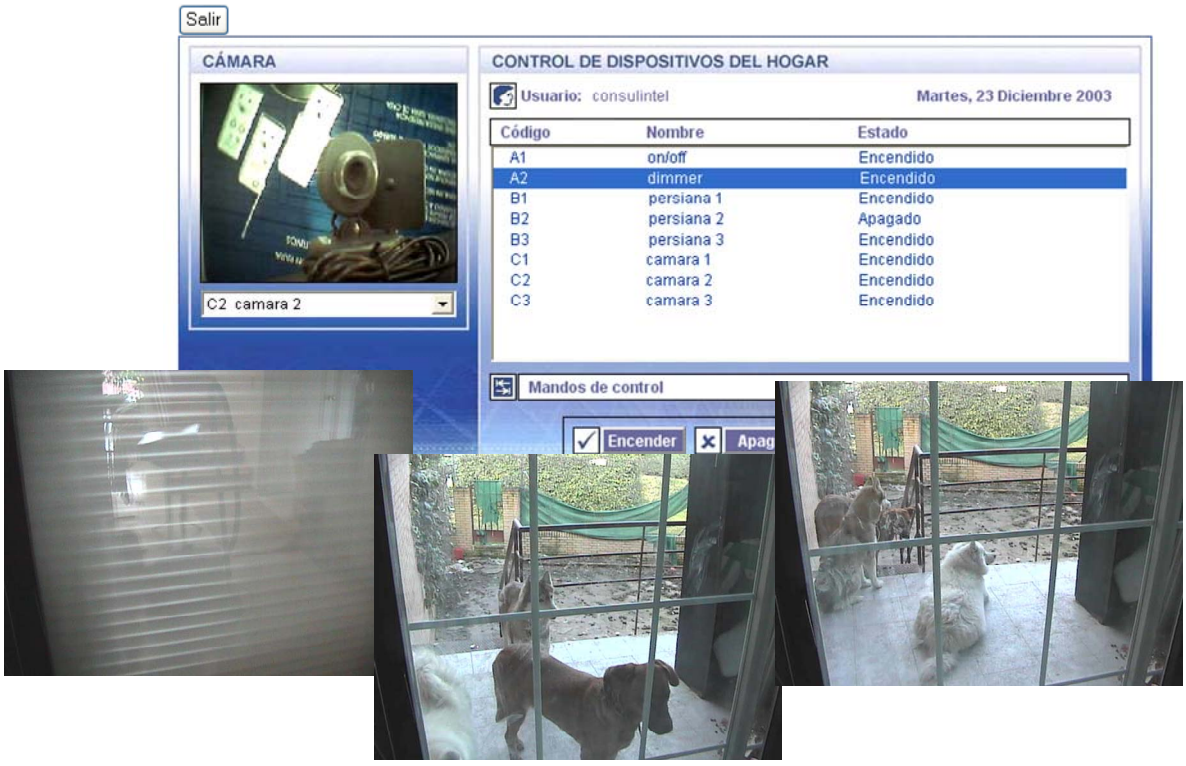

Figure 5-14: IPv6@Home Application Snapshot

5.3.2 i2CAT IPv6 Broadband Resources

Sponsored by UPC/i2CAT this demonstration included:

- Digital Video Server. Video in DV format (about 25Mbps) was used from a server at i2CAT MediaCAT in Barcelona. Video server, transmission and video client running on native IPv6.
- MPEG2 video streaming over IPv6. Video server, transmission and video client running on native IPv6.
- Live TV streaming on IPv6. The local TV station in Catalonia is feeding i2CAT network using multicast IPv4 and unicast IPv6.
- Dexvio Portal. http://www.dexvio.org (It is in Catalan at this moment). Dexvio is an ongoing project for the design and construction of the i2CAT broadband portal. A veritable community of developers, from a range of companies and institutions, designed the broadband interface. Dexvio has the following functions:
    - Internet television, using on-demand streaming or video of digital, TV-quality content (750 Kbps) and featuring advanced search options and automatic personalization by means of metadata or descriptive information on audiovisual content.
    - Shared visualization spaces. These spaces combine different tools for collaborating on a network, which enables communities of users to share audiovisual material. The spaces may be public (i.e. accessible to all the portal's users), or private (i.e. shared by a limited group of users, such as families, friends, etc.).

5.3.3 Advanced IPv6 services over broadband PLC

6POWER project presented this demonstration showing some applications for the Next Generation Internet, making use of normal power wires as a broadband transmission medium. The IPv6 protocol allows high quality end-to-end services to be deployed over PLC (Power Line Communications), like the ones showed in this demo.

- High quality video and audio services. Bandwidth in PLC allows to take full advantage of Quality of Service techniques in IPv6, making it possible to archive high quality VoD (Video-on-Demand) applications, and real-time adaptive video conferencing.
- Security services. The usage of a PKIv6 to offer a wide range of services, like Windows access control and web authentication based on smart cards.

5.3.4 Remote Instrumentation – Digital Video over IPv6

GEANT and Internet2 sponsored this demonstration showing two applications streaming live data from an intermediate-voltage electron microscope (EM) and a high speed laser scanning multi-photon light microscope (LM).

High resolution digital video was streamed from the national Center for Microscopy and Imaging Research (NCMIR) at the University of California, San Diego (UCSD) enabling viewers to monitor and/or control the instruments in real time. The two live data streams depict biological samples at two different scales of magnification. The first shows a sample at the scale of light microscopy (sub-micron) and the second at the scale of electron microscopy (angstrom).

This demonstration showed a system that is fully compliant with IPv6 and features the effective use of Digital Video over this protocol. The streaming video over native IPv6 networks is delivered to the conference over the Internet2, GÉANT, and BELNET research networks in collaboration with UCSD. The use of IPv6 in applications of this nature facilitates the remote access of key scientific instruments. Mobile IP, using IPv6, extend the usage model for remote microscopy.

5.3.5 Internet on the Move - Mobile video services and IPv6 over GPRS

Euro6IX sponsored this demo. Using the video-on-demand and streaming media services of the LON6IX, in combination with its Mobile IPv6 infrastructure this demo showed the power of IPv6 to provide mobile video services over both fixed and wireless network infrastructures.

- Mobile Video Services. Streaming video was delivered from the LON6IX IPv6 Internet Exchange point to mobile nodes at the Global IPv6 Service Launch Event.
- IPv6 over GPRS. Using the IPv6-capable GPRS bearer of the LON6IX was demonstrated the use of IPv6 technology over a 2.5G network including the use of International GPRS roaming.

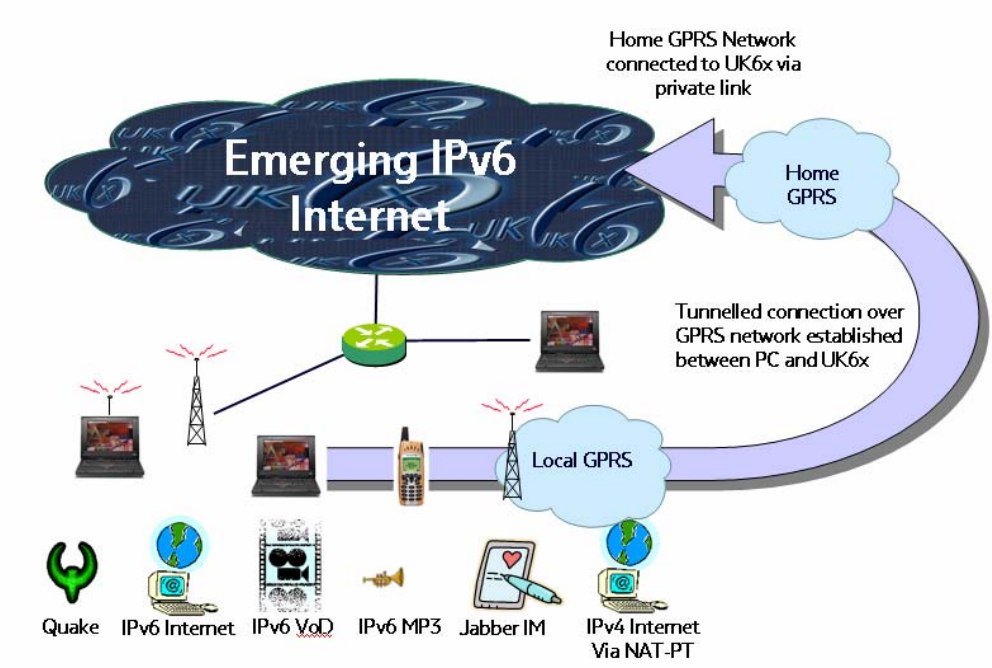

Figure 5-15: Euro6IX LON6IX Services and Connectivity

5.3.6 IPv6 HDTV Streaming with Guaranteed Quality of Service

6NET presented this demo. In this demonstration was showed an inter-domain IPv6 HDTV streaming service with guaranteed Quality of Service in a DiffServ Network and IPv6 live video streaming service over TEIN (TransEurasia Information Network).

- IPv6 HDTV Streaming Service with guaranteed QoS. The HDTV streaming was delivered over SURFnet and 6NET backbone, guaranteeing the streaming bandwidth for preserved HDTV stream in advance using Diffserv mechanism.
- IPv6 Live Video Streaming Service over TEIN. The live video streaming covered the two different sites to include between the 6NET booth in venue, Belgium and ETRI-v6Lab, Korea over TEIN IPv6 network during the Global IPv6 Service Launch Event.

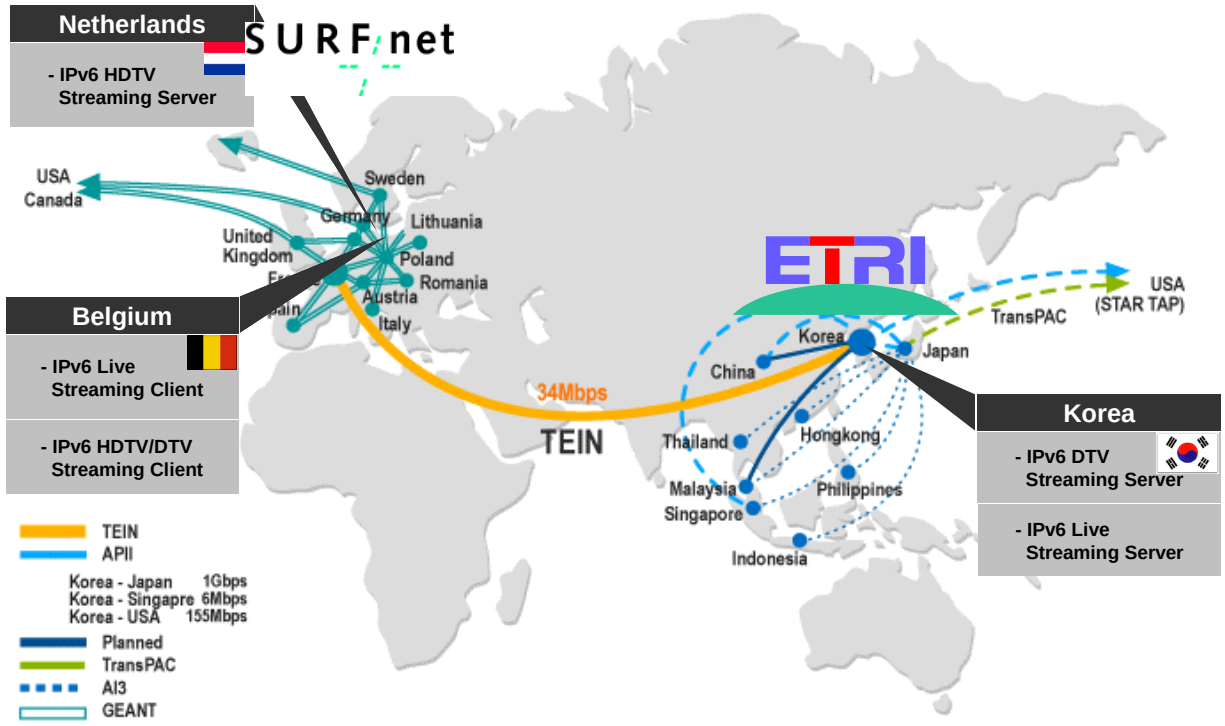

Figure 5-16: Global IPv6 Streaming Service over TEIN

5.3.7 Native IPv6 over Satellite using DVB-S/MPEG-2

European Space Agency presented this demo. ESA has initiated a number of projects that will support the role of satellite communications in emerging IPv6 networks. This demonstration used the prototype equipment from ESA projects that implement an Internet Draft proposing a method to transport IPv6 and other protocols more efficiently over satellite links. In this demonstration Ultra Light Encapsulation (ULE) was used, as defined in the emerging IETF IP over MPEG-2/DVB (ipdvb) Working Group.

Streaming video over IPv6 was uplinked from ESTEC (European Space Research and Technology Centre) in Noordwijk and was received at the Global IPv6 Services Launch Event venue. Using commercially available DVB-S receivers with modified drivers, native IPv6 could be received in the whole of the footprint of the satellite.

The efficient support of IPv6 allows seamless integration of satellite communication into a range of applications including: IPv6 multicast overlay networks, mobile networks, integration with Set Top Boxes and Home networks, IPv6 Internet trunking and direct Internet access via satellite.

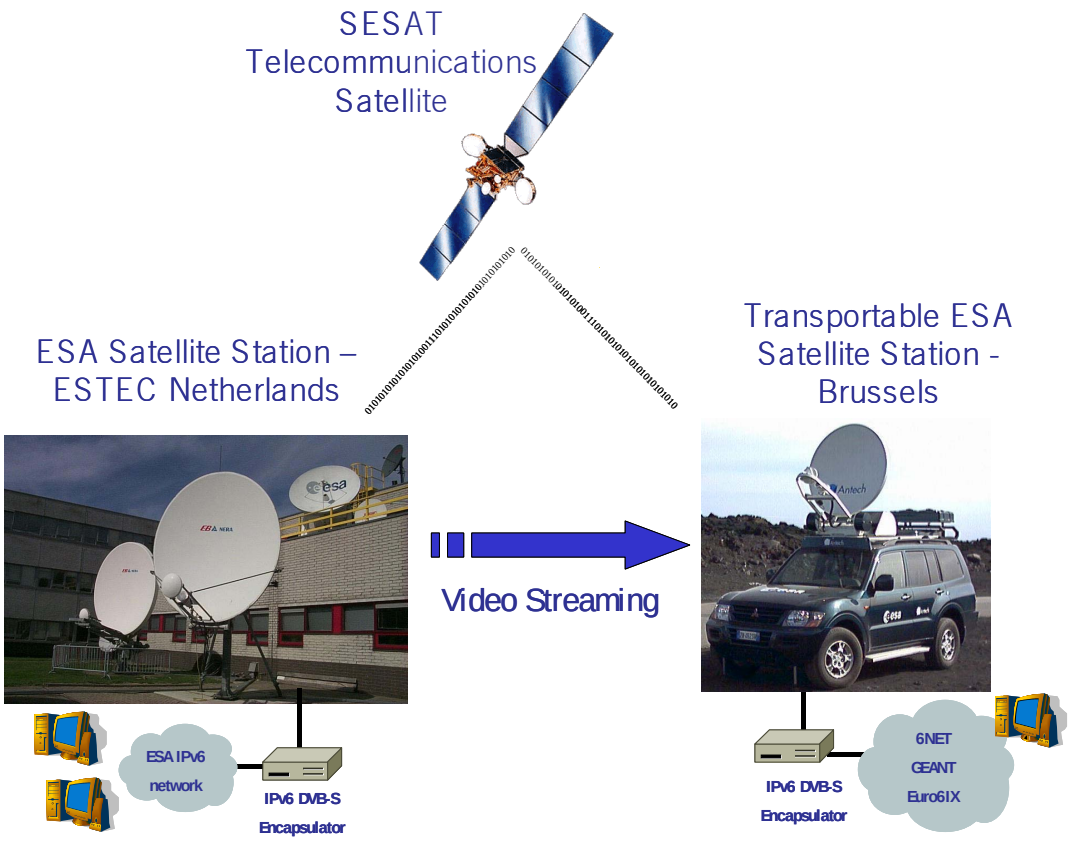

Figure 5-17: Video Streaming via Native IPv6 over DVB-S/MPEG-2

5.3.8 Mobile IPv6 Car

Renault sponsored this demo. The demonstration showed a Car using Mobile IPv6 to support WiFi to GPRS handover. The car equipped with an embedded micro router providing both IPv4 and IPv6 connectivity inside the car (Bluetooth and WiFi), and enabling connection to IPv4 or IPv6 infrastructure. The items showed here included:

- Mobile IPv6. A Mobile IPv6 “home agent” router located on the internet provide a seamless continuity between several access networks. The handover is ensured between GPRS and WiFi thanks to the embedded micro router, supporting physical interfaces switching.
- Mobile Network. The embedded micro-router enables “mobile networking”. Several equipments inside the car benefit from the IPv6 mobility: The whole network in the car is mobile. The main telematic control unit (providing navigation system), a tablet PC and a PDA are “IP connected” inside the car.
- Ready for Transition: The car can be connected to IPv4 and IPv6 networks. Both IPv4 and IPv6 applications are supported inside the car. Using the best of IPv6 on top of IPv4 existing infrastructure, this IPv6 car is ready for the new generation Internet.

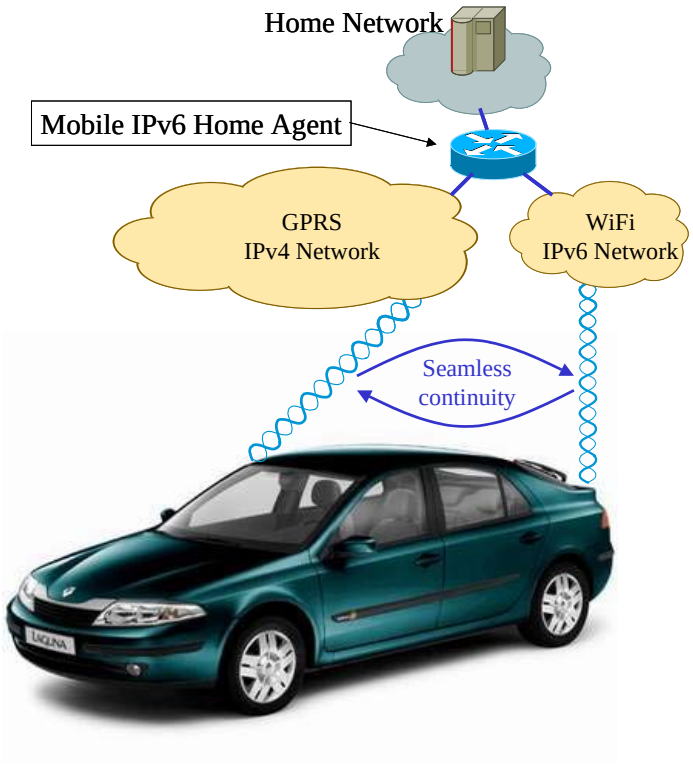

Figure 5-18: GPRS - WiFi Handover in IPv6 Car

Other important demonstrations presented during the Global IPv6 Service Launch Event included.

- IPv6 Multicast/M6Bone (6NET).
- Isabel collaborative environment (Euro6IX).
- IPv6 Digital Home (Euro6IX).
- IPv6 Global Networks Monitoring: Magalia (Euro6IX).
- Digital v6TV: EuroNews (Euro6IX).

Finally, it is important remark that a Worldwide IPv6 network was interconnected for the appropriate set up and show of the demonstrations. In this way, key IPv6 networks in Europe, Asia and US were used by the different demonstrations, see the following figure.

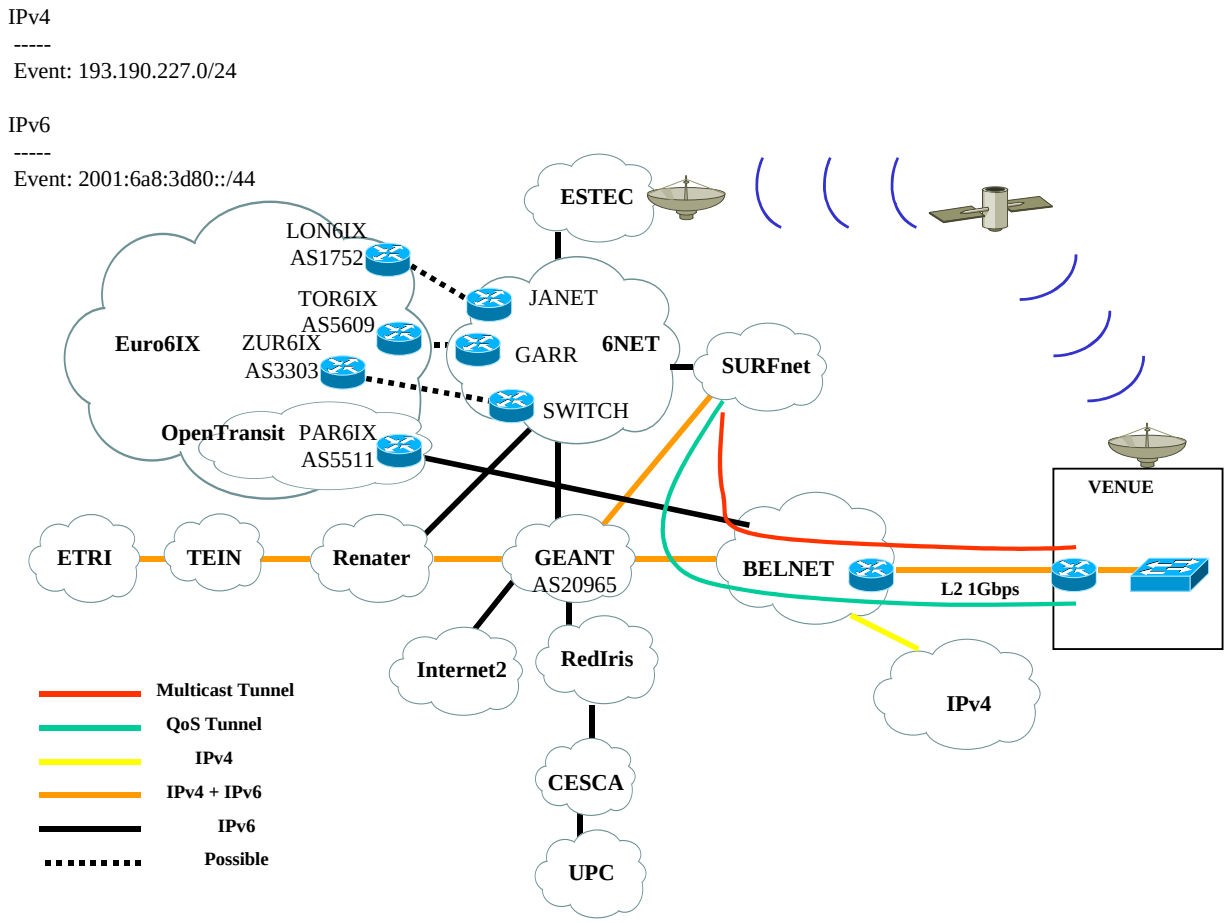

Figure 5-19: Global IPv6 Service Launch Event WAN Network

6. SUMMARY AND CONCLUSIONS

This document describes the final improved scenarios with all network components and applications acquired from the sponsors, projects and bought from commercial off the shelves components and services.

The improved scenarios for the second year include enhancements on devices, multimedia and peer-to-peer applications, Home Portals, IPv6 on Cars, GPRS, AAA, DHCPv6, RAS, IPv6@Home, etc.

These scenarios are been available for IPv6 demonstration for both Fixed and Nomadic Showroom during the second year of the project.

Several Nomadic Showrooms were successfully held during Brussels IPv6 Event, IST2003 Conference and Global IPv6 Service Launch Event, showing amazing IPv6 devices, applications and services from key IPv6 players, of industry and academic areas, mainly from Europe but also from Asia and US.