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Abstract:

This deliverable presents a report of the case study of the IPv6 deployment for both internal and external internet-based services of the Spanish Ministry of Industry, Tourism and Trade.

Keywords:

IPv6, Public Administration, Support, Training, 6DEPLOY-2

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Executive Summary

One of the activities of the 6DEPLOY-2 project is to support the deployment of IPv6 within the public sector. This case study of IPv6 deployment within the Spanish Public Administration was performed as part of 6DEPLOY-2's support for Spain's National IPv6 Transition Plan, which includes several stages.

This case study briefly introduces how IPv6 was deployed in the Ministry of Industry Tourism and Trade (MITYC, Ministerio de Industria, Turismo y Comercio, http://www.mityc.es/) by Consulintel, representing 6DEPLOY-2.

The project also arranged a short training for the public employees of the organization as part of the deployment project.

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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 activities of the 6DEPLOY-2 project is the support of the IPv6 deployment, as achieved in this case study.

2.   THE MITYC & THE PROJECT

The Ministry of Industry, Tourism and Trade, is responsible for the Spanish Government's policy development and execution regarding Industry, Tourism and Trade, which includes aspects related to Telecommunications and the Information Society.

The Ministry offers more than 300 electronic procedures to the citizens (persons and organizations) by telematic means through the Internet.

In addition, the Ministry has over 4.000 internal users, situated in central offices in Madrid, other national offices and some international locations.

Initially, the Ministry was planning to deploy IPv6 around the end of 2013, however the opportunity of having support from the 6DEPLOY-2 partner in Spain (Consulintel), convinced the Ministry that the work should be done much earlier and that it was an achievable project.

The goal of the project was to acquire the knowledge in order to define how to deploy IPv6 in the data centre of the Ministry, including the necessary modifications in the network and systems that allow offering the contents of the Ministry to the citizens.

The project also included the creation of an informational portal about IPv6, targeted to the different impacted sectors, in order to ensure that basic, accurate and concise information was available for them in Spanish. This portal is hosted under the domain "ipv6.es"[1].

The project became an integral part of the Spanish Government's National Transition Plan, approved by the Council of Ministers on 29th April, 2011[2], and serves as a reference for the rest of the Public and Private sectors about how IPv6 can be deployed.

The technological solution for the deployment, included hosting the IPv6 Spanish portal on the Ministry premises with a dual stack (IPv4 and IPv6), in a parallel deployment. This avoided disrupting the existing services in the initial stage, including the required elements such as routing, perimeter security, load balancing, all of them with high-availability.

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[1] http://www.ipv6.es

[2] http://administracionelectronica.gob.es/recursos/pae_020000697.pdf

3. THE ADOPTED SOLUTION

The introduction of IPv6 in the MITYC services for the publication of contents and web applications was designed by the SGTIC (Subdirección General de Tecnologías de la Información y de las Comunicaciones), with the collaboration of 6DEPLOY-2.

The goals were to:

- Enable content to be presented in such way that the external users can access it with IPv4 and IPv6,

- Adapt the internal services in order to allow the internal users to access external IPv4 and IPv6 sites, and

- Allow the internal communications to run with both IPv4 and IPv6.

For the first step which is the most important stage, it was decided to create a parallel infrastructure, in order to ensure that there was no disruption to the existing services and allow some IPv6 testing and knowledge acquisition which would be new to the MITYC staff.

Once this parallel structure was tested with "ipv6.es", then the rest of the services were moved from the old infrastructure to the new one.

The parallel structure was feasible in this case because it was already forecasted to replace the required equipment in the same calendar year, so no new investment was needed.

3.1 Technical Details

The main elements of the deployment (all with high-availability) are:

- Internet Access: Multihomed access with a single transit provider (RedIRIS) and BGP allowing the balancing between two links, each one dual-stacked. The IPv4 addressing space is the prefix 193.146.1.0/24 and the IPv6 one is 2001:720:438::/64.

- Links: Two 100 Mbit/s fibre links are provided by Telefónica, from the Ministry data centre to the RedIRIS one. Active/Active configuration.

- Routers: Two Cisco Catalyst 6509 routers with dual 720 supervisory cards, donated by Cisco as part of the 6DEPLOY-2 cooperation, provide the layer 3 functionalities. Each one is equipped with 24 fibre ports and 48 copper ports.

- Firewalls: Two Palo Alto PA-5050 units were installed, with independent IPv4 and IPv6 systems and the corresponding security policies.

- DMZ: Two layer-2 switches create this area where dual-stacked DNS servers have been placed.

- Load-balancers: Since all the internal servers only have IPv4 with private addresses, the easier way to deploy IPv6 using the same structure was to configure virtual servers through the load-balancers, which are dual-stacked on the external side, in the DMZ, but have only IPv4 on the internal side. The load-balancers are models F5 3900.

- Web services platform: The SGTIC will continue using the existing platform and infrastructure, which remains IPv4-only at this stage, using MOSS technology.

3.2 Network Concept before the IPv6 Deployment

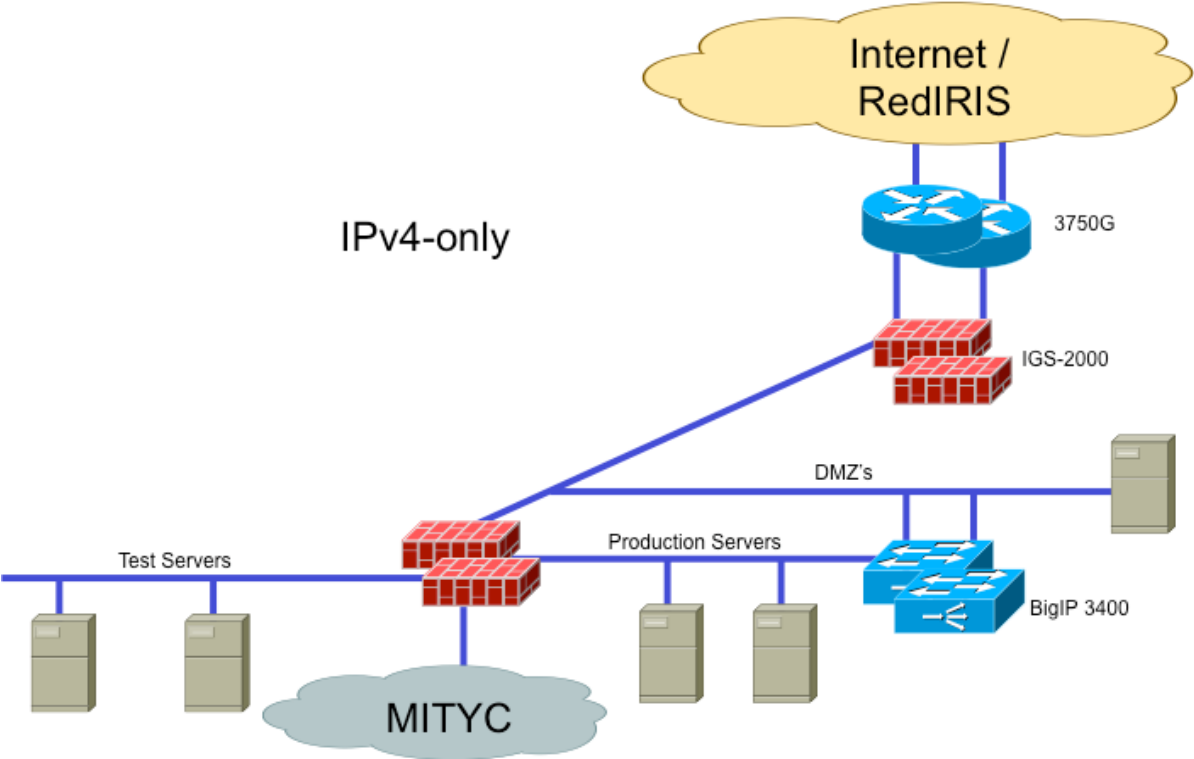The following picture shows the conceptual view of the network before the IPv6 deployment.

Figure 3-1: Network Concept before the IPv6 Deployment

3.3 Network Concept after the IPv6 Deployment

The following picture shows the conceptual view of the network after the IPv6 deployment.
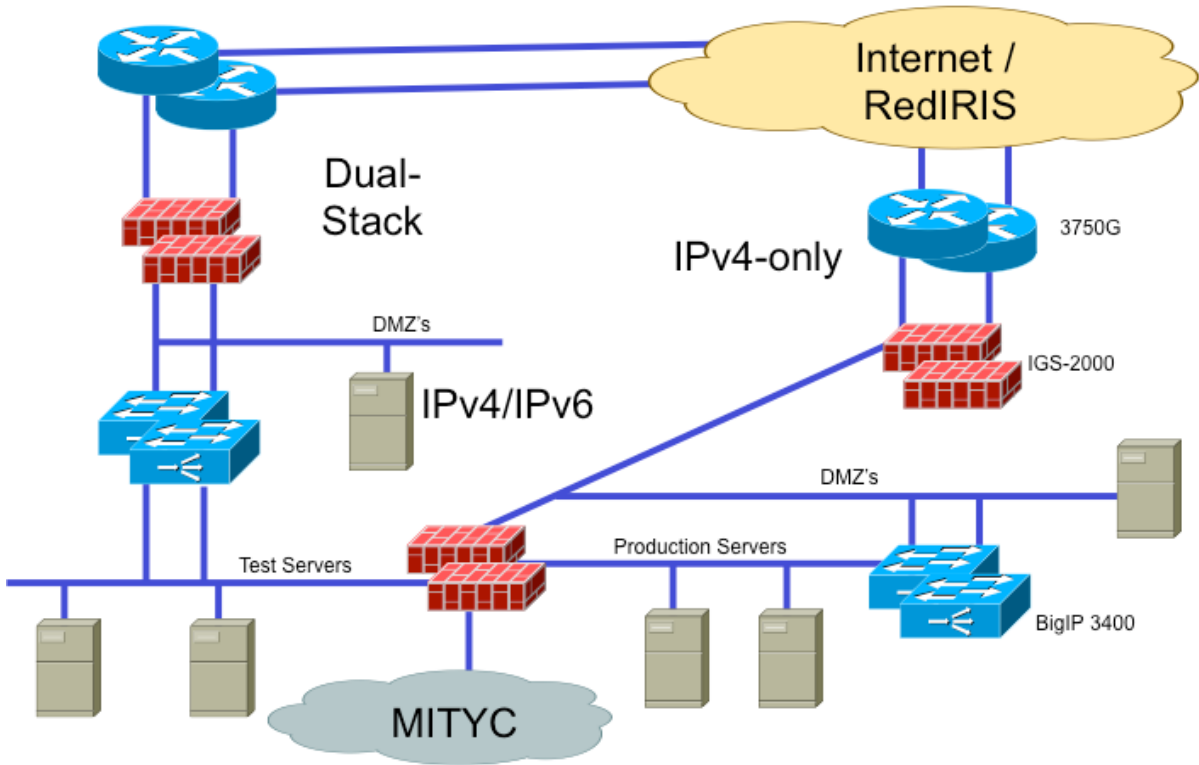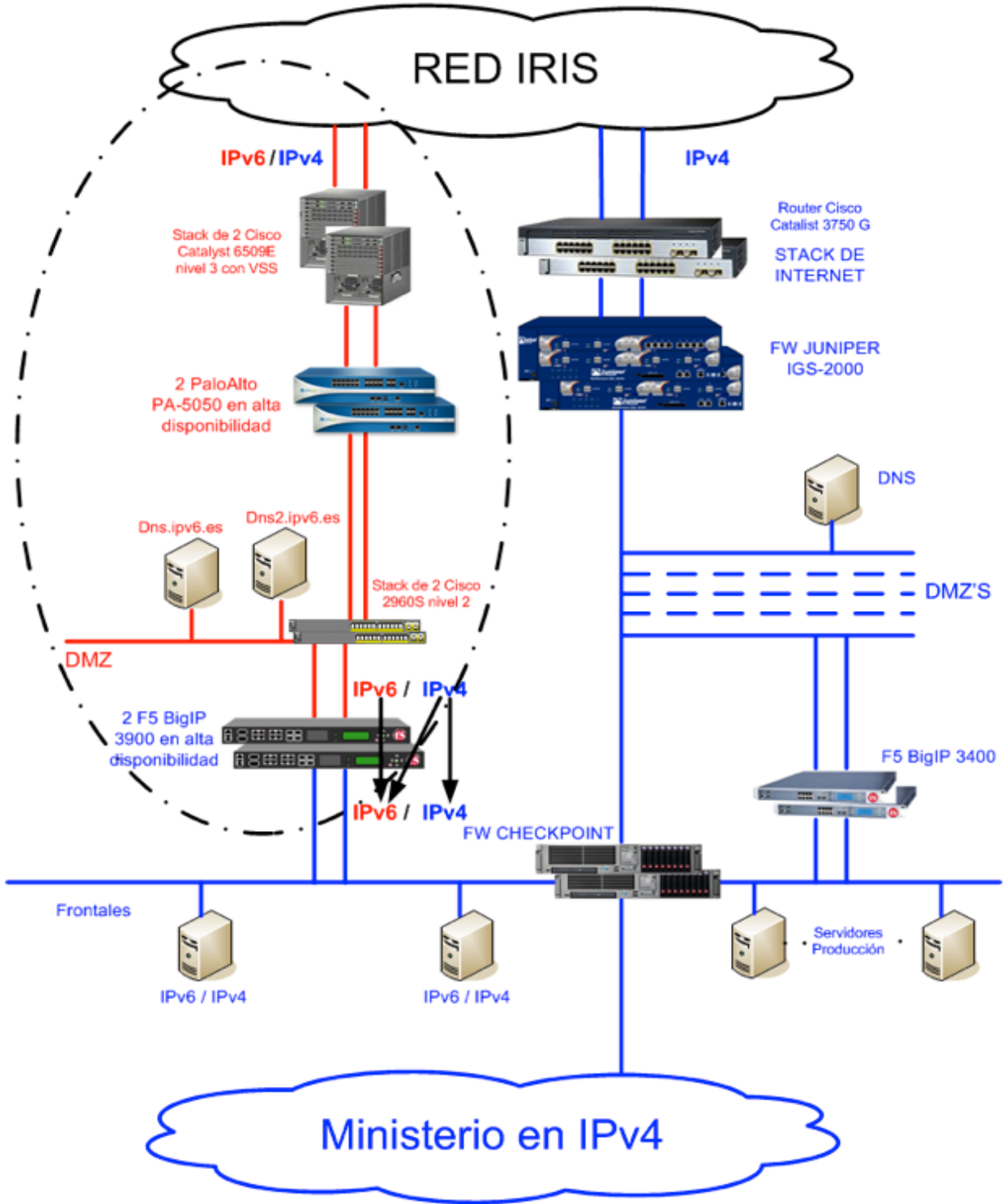

Figure 3-2: Network Concept after the IPv6 Deployment

3.4 Final Production Network with IPv6 Support

The following picture shows the final/actual production network already with the IPv6 support.

Figure 3-3: Final Network with IPv6 Support

4. STEP-BY-STEP APPROACH

The project to deploy IPv6 in the Spanish Ministry of Industry, Tourism and Trade (MITYC) followed a step-by-step approach with all the involved parties (6DEPLOY-2/Consulintel, MITYC, RedIRIS, vendor/equipment providers and the existing contractors responsible for the maintenance of the different equipment).

Various meetings were hold between different parties for the project definition and the progress follow-up.

A description of those steps is available at the "ipv6.es" site[3], in order to allow a more detailed view of the project phases.

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[3] http://www.ipv6.es/es-ES/transicion/casos/Paginas/evolucion.aspx

5. CONCLUSIONS

This IPv6 deployment project shows that, without additional investment, it is feasible, with the adequate level of knowledge and expertise, to deploy IPv6 for existing internal and external internet-based services of a public authority.

This example is very useful, not only for other public administrations, but also for similar cases of content providers in the private sectors.