

## Workshop on Addressing the Barriers to IPv6 Deployment

### Spanish use case

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May 2018

## Agenda

### Agenda

- Initiatives for the IPv6 deployment
- IPv6 address space
- IPv6 addressing plan
- Barriers
- Conclusions

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## Background



- **Digital Agenda for Europe (2010-2020)**
  - Make eGovernment services fully interoperable, overcoming organisational, technical or semantic barriers and **supporting IPv6**.
- **EU eGovernment Action Plan (2011-2015)**
  - Administrations will need to take action to **upgrade IPv6**-relevant eGovernment infrastructure (portals, websites, applications, etc.) and online services of public interest, in view of the depletion of IPv4 addresses.



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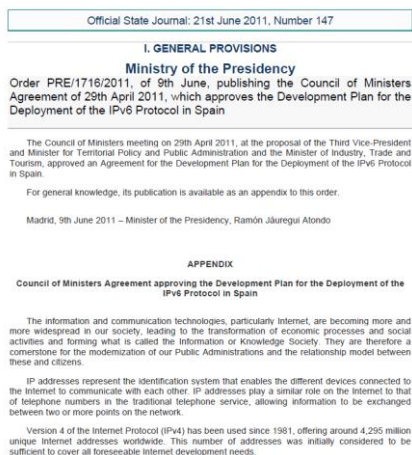
## Initiatives for the IPv6 deployment

### Plan to foster the deployment of IPv6

- **Agreement of Council of Ministers:**  
On 29th April 2011 the Council of Ministers approved the Spanish National Plan to foster the deployment of IPv6.
- **Plan Objective:**  
The Plan aims to foster the adoption of IPv6 in Spain, responding to the tremendous growth of Internet and, hence, promoting the development of the Information Society, the deployment of new services and furthering technological innovation in Spain.
- The Plan is driven by the **Ministry of Industry, Tourism and Trade**<sup>1</sup>, and in the aspects regarding the integration of IPv6 in Public Administration, by the **Ministry of Territorial Policy and Public Administration**<sup>2</sup>.

<sup>1</sup> Currently the Ministry of Energy, Tourism and the Digital Agenda

<sup>2</sup> Currently the Ministry of Finance and Civil Service



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## Plan to foster the deployment of IPv6

Main actions of the Plan:

### ➤ Pilots:

Pioneer IPv6 deployment in eGovernment services: adoption of IPv6 in the Online services belonging to the Ministry of Industry, Tourism and Trade and in portal 060 (eGovernment information portal)



### ➤ Diffusion:

**New Internet didactic portals on IPv6.**

- **IPv6 thematic portal** ([www.ipv6.es](http://www.ipv6.es)) deployed by the Ministry of Industry, Tourism and Trade.
- Further information on IPv6 adoption in the Public Administrations can be found on the **Electronic Administration Portal** ([www.administracionelectronica.gob.es](http://www.administracionelectronica.gob.es)).



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## Plan to foster the deployment of IPv6

Main actions of the Plan:

### ➤ Acquisitions:

“Promote the **incorporation of IPv6 as a requirement in the public acquisition** of information and communication technology products and services.”

### ➤ Deployment of IPv6 in the Public Administration:

**Promote the deployment of the IPv6 Protocol in the Public Administrations** through the associations responsible for eGovernment.

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## GEN6 - Governments enabled with IPv6

- **Goal:**
  - To promote the deployment of IPv6 in Europe
  - Pioneering experiences of transition to IPv6 in Public Administrations of different countries
- International consortium with entities from Germany, Luxembourg, the Netherlands, Slovenia, Czech Republic, Greece, Cyprus and Turkey
- In Spain implemented by:
  - Ministry of Finance and Public Administration
  - Ministry of Industry, Energy and Trade
  - Collaboration of the University of Murcia.
- **Knowledge transfer** between European partners:
  - Experiences from other Member States on the transition to IPv6 in Public Administrations

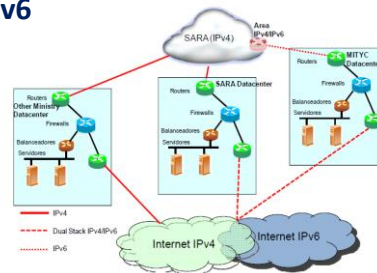


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## GEN6 - Governments enabled with IPv6

- **National pilot**
  - Provide a **platform for general access via IPv6** to electronic Administration services
  - Test **interoperability between administrative entities** using different protocols
- **International pilot**
  - Validation of the **provision of services between Administrations of Spain, Germany and Luxembourg** using IPv6 through the **sTESTA network**, adapting cross-border applications or services currently in operation



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## IPv6 Allocation Request

- A **common address space** for all Spanish Public Administrations
  - IPv6 Allocation large enough for current and future needs
- The General Secretariat for Digital Administration(SGAD) manages the **IPv6 allocation** for the public sector.
- Act as RIPE **LIR**

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## IPv6 Allocation Request

- Conversations with RIPE
  - Size larger than /29 ➡ Need justification
  - Assessment Criteria for IPv6 Allocations
    - Include organizational and territorial dimensions
      - More adjusted to the reality of government networks.
      - Extra bit for Hierarchical and Geographical criteria

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## IPv6 Allocation Request

- How to estimate the needs of all the Public Administrations?
  - Agreement with RIPE on the method of analysis to be used in the justification
    - Examples of entities (Regions and Ministries) of large, medium and small size extrapolated to the rest
 

|                    |                       |
|--------------------|-----------------------|
| ➤ 3 Large regions  | ➤ 5 Large ministries  |
| ➤ 8 Medium regions | ➤ 3 Medium ministries |
| ➤ 8 Small regions  | ➤ 5 Small ministries  |
- Collect data of the current size of ministries and regions

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## IPv6 Allocation Request

- Address space for the regions
  - Local entities included in the Regions allocation
    - Local administrations needs depend on their population
  - General and institutional administration
    - Including health and education services
- The size needed is determined by the structure of the local Administration and the health service.

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### Address space for the regions

- Local Administrations
  - Number of municipalities by population

| COMUNIDAD VALENCIANA                    |     | 730                   |
|---|-----|-----------------------|
| ALICANTE                                |     | /34 (/33 + extra bit) |
| DIPUTACIÓN                              |     | /42                   |
| MUNICIPALITIES > 20 000 INHABITANTS     | 26  | /35                   |
| REFERENCE MUNICIPALITY                  |     | /40                   |
| MUNICIPALITIES BETWEEN 5 001 AND 20 000 | 31  | /36                   |
| REFERENCE MUNICIPALITY                  |     | /41                   |
| MUNICIPALITIES BETWEEN 501 AND 5 000    | 53  | /36                   |
| REFERENCE MUNICIPALITY                  |     | /42                   |
| MUNICIPALITIES BETWEEN 101 AND 500      | 29  | /41                   |
| REFERENCE MUNICIPALITY                  |     | /46                   |
| MUNICIPALITIES < 100 INHABITANTS        | 2   | /46                   |
| REFERENCE MUNICIPALITY                  |     | /47                   |
| CASTELLÓN                               |     | /33 (/34 + extra bit) |
| DIPUTACIÓN                              |     | /42                   |
| MUNICIPALITIES > 20 000 INHABITANTS     | 8   | /37                   |
| REFERENCE MUNICIPALITY                  |     | /40                   |
| MUNICIPALITIES BETWEEN 5 001 AND 20 000 | 12  | /37                   |
| REFERENCE MUNICIPALITY                  |     | /41                   |
| MUNICIPALITIES BETWEEN 501 AND 5 000    | 51  | /36                   |
| REFERENCE MUNICIPALITY                  |     | /42                   |
| MUNICIPALITIES BETWEEN 101 AND 500      | 48  | /40                   |
| REFERENCE MUNICIPALITY                  |     | /46                   |
| MUNICIPALITIES < 100 INHABITANTS        | 16  | /43                   |
| REFERENCE MUNICIPALITY                  |     | /47                   |
| VALENCIA                                |     | /31 (/32 + extra bit) |
| DIPUTACIÓN                              |     | /42                   |
| MUNICIPALITIES > 20 000 INHABITANTS     | 31  | /35                   |
| REFERENCE MUNICIPALITY                  |     | /40                   |
| MUNICIPALITIES BETWEEN 5 001 AND 20 000 | 48  | /35                   |
| REFERENCE MUNICIPALITY                  |     | /41                   |
| MUNICIPALITIES BETWEEN 501 AND 5 000    | 140 | /34                   |
| REFERENCE MUNICIPALITY                  |     | /42                   |
| MUNICIPALITIES BETWEEN 101 AND 500      | 44  | /40                   |
| REFERENCE MUNICIPALITY                  |     | /46                   |
| MUNICIPALITIES < 100 INHABITANTS        | 3   | /45                   |
| REFERENCE MUNICIPALITY                  |     | /47                   |

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### Address space for the regions

- Health service

| Level 1                | Level 2 | Level 3 | Level 4 | Level 5 | Type of element | Number of elements | Prefix L5 | Prefix L4 | Extra bit L4 | Prefix L3 | Extra bit L3 | Prefix L2 | Extra bit L2 | Prefix L1 |
|------------------------|---------|---------|---------|---------|-----------------|--------------------|-----------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| <b>Healthcare</b>      |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| <b>Primary care</b>    |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Province 1             |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| City 1                 |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Health centres         |         |         |         |         |                 | 1                  | 48        |           |              | 44        |              | 43        |              | 39        |
| Consulting             |         |         |         |         |                 | 3                  | 46        |           |              |           |              |           |              | 38        |
| Auxiliary Clinics      |         |         |         |         |                 | 4                  | 46        |           |              |           |              |           |              |           |
| City 2                 |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Health centres         |         |         |         |         |                 | 1                  | 48        |           |              | 43        |              | 42        |              |           |
| Consulting             |         |         |         |         |                 | 3                  | 46        |           |              |           |              |           |              |           |
| Auxiliary Clinics      |         |         |         |         |                 | 11                 | 44        |           |              |           |              |           |              |           |
| City 3                 |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Health centres         |         |         |         |         |                 | 1                  | 48        |           |              | 44        |              | 43        |              |           |
| Consulting             |         |         |         |         |                 | 3                  | 46        |           |              |           |              |           |              |           |
| Auxiliary Clinics      |         |         |         |         |                 | 4                  | 46        |           |              |           |              |           |              |           |
| more province 1 cities |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Province 2             |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| City 1                 |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Health centres         |         |         |         |         |                 | 1                  | 48        |           |              | 46        |              | 45        |              | 38        |
| Consulting             |         |         |         |         |                 | 1                  | 48        |           |              |           |              |           |              | 37        |
| Auxiliary Clinics      |         |         |         |         |                 | 1                  | 48        |           |              |           |              |           |              |           |
| City 2                 |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Health centres         |         |         |         |         |                 | 1                  | 48        |           |              | 48        |              | 47        |              |           |
| Consulting             |         |         |         |         |                 | 0                  | 0         |           |              |           |              |           |              |           |
| Auxiliary Clinics      |         |         |         |         |                 | 0                  | 0         |           |              |           |              |           |              |           |
| City 3                 |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Health centres         |         |         |         |         |                 | 1                  | 48        |           |              | 46        |              | 45        |              |           |
| Consulting             |         |         |         |         |                 | 1                  | 48        |           |              |           |              |           |              |           |
| Auxiliary Clinics      |         |         |         |         |                 | 2                  | 47        |           |              |           |              |           |              |           |
| more province 2 cities |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| Further provinces      |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| <b>Hospital Care</b>   |         |         |         |         |                 |                    |           |           |              |           |              |           |              |           |
| General Hospitals      |         |         |         |         |                 | 3                  |           |           |              | 46        |              | 45        |              | 44        |

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## IPv6 address space

### IPv6 Allocation Request

- Address space for the ministries
  - Hierarchical criteria:
    - Secretaries of State, General Directorates, ...
  - Geographical criteria:
    - Distribution by provinces

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## IPv6 address space

### Address space for the ministries

| Nivel 0 | Nivel 1   | Nivel 2            | Nivel 3 | Nivel 4 | Nivel 5 | Sedes | Prefijos N2 fijos N1                 | Total |
|---------|---|--------------------|---------|---------|---------|-------|--------------------------------------|-------|
|         | Ministerio de Justicia  |                    |         |         |         |       | /32 (/33 + extra bit)                |       |
|         | División de Tecnologías de la Información y Comunicaciones y Centro de Estudios Jurídicos (CEJ) |                    |         |         |         |       | /43 (/44 + 1 extra bit)              |       |
|         | Centralised Services network:   |                    |         |         |         |       | /47                                  |       |
|         |   | CPD OC157          |         |         |         | 1     | /48                                  |       |
|         |   | CPD LC09           |         |         |         | 1     | /48                                  |       |
|         | User network:   |                    |         |         |         |       | /45                                  |       |
|         |   | SB4E               |         |         |         | 1     | /48                                  |       |
|         |   | SB#2               |         |         |         | 1     | /48                                  |       |
|         |   | CEJ                |         |         |         | 1     | /48                                  |       |
|         | Management network:   |                    |         |         |         |       | /48                                  |       |
|         |   | Management network |         |         |         | 1     | /48                                  |       |
|         | SGNT, Abogacía del estado y MUGEJU  |                    |         |         |         |       | /34 (/35 + 1 extra bit)              |       |
|         | Data processing centers network:  |                    |         |         |         |       | /47                                  |       |
|         |   | Ocaña              |         |         |         | 1     | /48                                  |       |
|         |   | Luis Cabrera       |         |         |         | 1     | /48                                  |       |
|         | User network:   |                    |         |         |         |       | /36                                  |       |
|         | Andalucía   |                    |         |         |         |       | /41 (/42 + 1 extra bit per region)   |       |
|         | Almería   |                    |         |         |         |       | /45 (/47 + 1 extra bit per province) |       |
|         |   | SGNTJ              |         |         |         | 0     | /48                                  |       |
|         |   | Abogacía           |         |         |         | 1     | /48                                  |       |
|         |   | MUGEJU             |         |         |         | 1     | /48                                  |       |
|         | Cádiz   |                    |         |         |         |       | /45 (/47 + 1 extra bit per province) |       |
|         |   | SGNTJ              |         |         |         | 0     | /48                                  |       |
|         |   | Abogacía           |         |         |         | 1     | /48                                  |       |
|         |   | MUGEJU             |         |         |         | 1     | /48                                  |       |
|         | Córdoba   |                    |         |         |         |       | /45 (/47 + 1 extra bit per province) |       |

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## IPv6 Allocation Request

- Validate the estimations with Regions and Ministries
- Request the allocation to RIPE
- A **/24 IPv6 allocation** for our LIR

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## Addressing plan

- **Law 40 / 2015: Legal Regime of the public Sector**

**Article 155.** Transmissions of data between Public Administrations.

3. *The General State administration, regional administrations and local authorities, shall take the necessary measures and incorporate precise technologies to enable **the interconnection of their networks** in order to create a communications network that interconnect the information systems of public administrations and enable the exchange of information and services between them in their respective fields as well as the interconnection with the networks of the institutions of the European Union and other Member States.*
- **Royal Decree 4/2010: National Interoperability Framework**

**Article 14. Addressing plan of the Administration.**

*Public Administrations will apply the **Addressing and Networking Interconnection Plan of the Administration**, approved by the Higher Council of eGovernment, for its interconnection through the Communication Networks of Public Administrations.*

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## Addressing plan

- Currently for private IPv4 address ranges
- Content
  - Table of ranges allocated to entities and organizations
  - Rules for the assignment of addresses in IP networks
    - Initial distribution of ranges in a centralized way
    - Assignment to networks and equipment by each entity from the assigned range - Development of the specific address plan for each entity
    - Recommendations for the allocation



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## Next step

- Update the addressing plan IPv4 to IPv6
  - Issues to consider:
    - Coexistence between IPv4 and IPv6 addressing in Public Administrations
    - Rules for allocating addresses and managing the ranges
    - Coexistence of IPv6 addressing of the Spanish Administrations with the addressing of other Administrations (sTESTA)
    - Internal Addressing (SARA network) vs. external (Internet)
    - Addresses allocated by SARA network vs. addresses allocated by Internet access providers
    - Appropriate size of blocks of addresses reserved for Public Administrations

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## Next step

- **Scope of the IPv6 addressing plan:**
  - The addressing offered to entities is global and unique
  - Entities can adopt it for their internal networks and to access the Internet
  - The use of these ranges outside the connection to the SARA Network is not required by the Addressing plan of the Public Administrations
  - The use of a single range is highly recommended, greatly favoring interoperability

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## Next step

- **IPv6 routing guide**
  - Document elaborated for entities that are connected to SARA Network
  - Design of the deployment strategy
  - Need a revision and update
- **Goal:** to minimize or eliminate potential routing problems that may occur.



**GUÍA DE ENRUTAMIENTO  
IPv6 PARA ENTIDADES  
CONECTADAS**

Diseño del Plan / Estrategia de  
Implantación



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## Barriers

- An early phase of IPv6 deployment:
  - Not yet detected many barriers in deployment
- Coordination between all the administrations
  - Central, Region and local administrations
  - How to manage the ranges?
    - A distributed management by each region is expected
  - IPv6 routing guide for entities that are connected to SARA Network
    - Pilot for testing the alternatives of connection

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## Conclusions

- Necessary to promote the deployment of IPv6
- Early phase of IPv6 deployment:
  - /24 allocation
  - Need to update the IPv6 addressing plan and the deployment strategy
- Face the challenges of barriers

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Thank you!

