



Twelve years of IPv6 in Mexico: Challenges, Experiences and Perspectives. Case UNAM.

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IPv6 Forum, Mexico Chapter

IPv6 Working Groups in CUDI and CLARA

National Autonomous University of Mexico, UNAM



2012 North American IPv6 Summit

April, 2012

Denver, Colorado, USA

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▶ UNAM Data

- 305,969 university students.
- 35,057 academics.
- Installations in more than 2 million 317 thousand constructed m², 2,901 buildings.
- Extension schools in 24 Mexican states, as well as in the US (California, Illinois and Texas), Canada and Spain.



▶ UNAM Data

- More than 50 thousand computers.
- More than 15 thousand telephone lines.



▶ IPv6 BACKGROUND

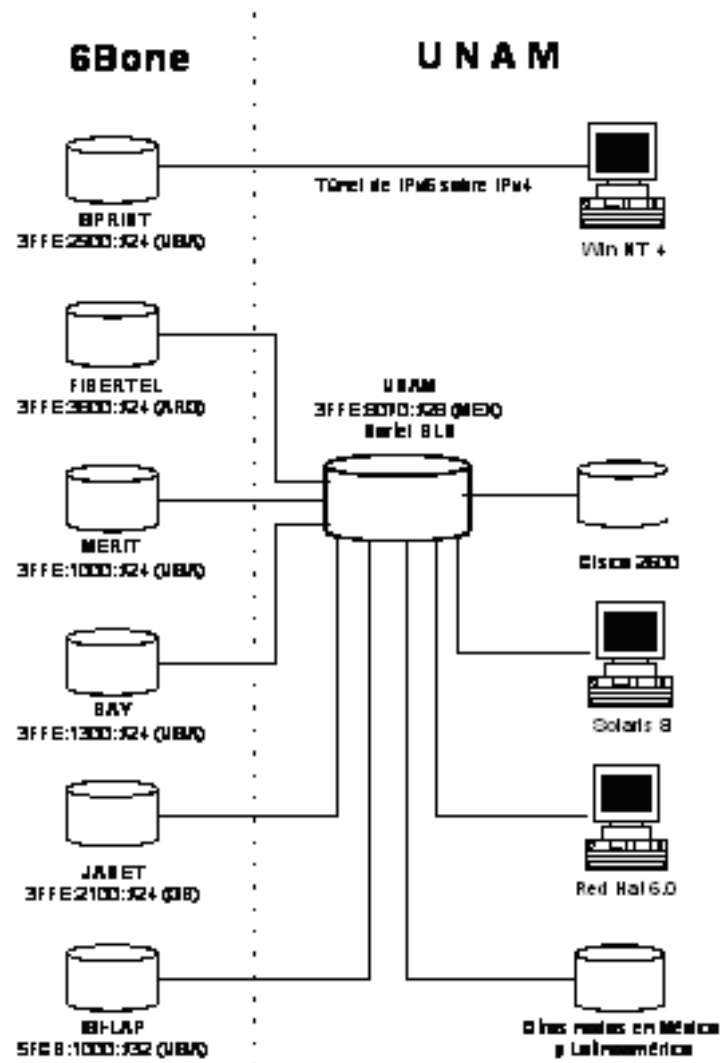
- During the last twelve years the IPv6 Project (Now IPv6 WG) of the National Autonomous University of Mexico (UNAM), has continued performing a series of tests with different IPv6 operating systems, equipments and applications.
- Offering the firsts IPv6 connections to some countries and institutions around the world mainly from Latin America and Mexico.



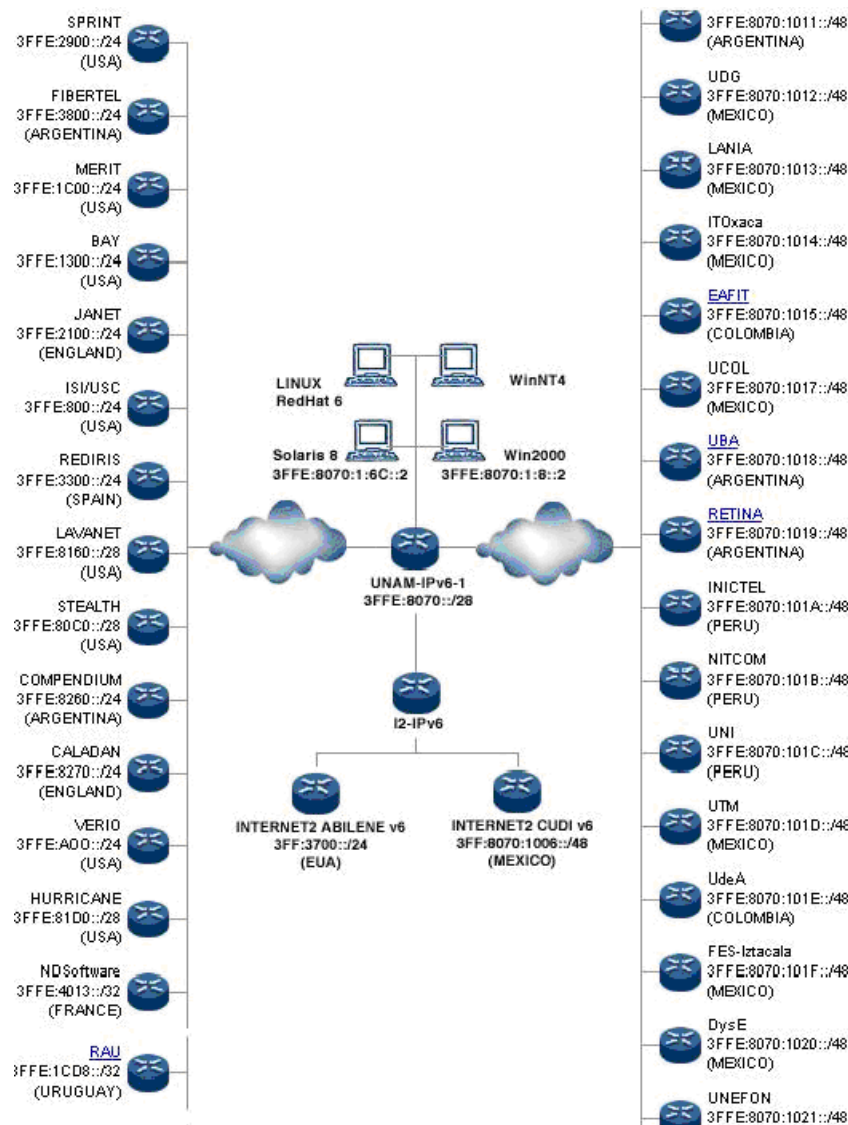
▶ IPv6 BACKGROUND

- To perform IPv6 tests it was constructed an IPv6 experimental network segment (RedUNAMv6), based on hosts using different operating systems, routers of some vendors and it reached almost 80 IPv6 connections with 6Bone participants.

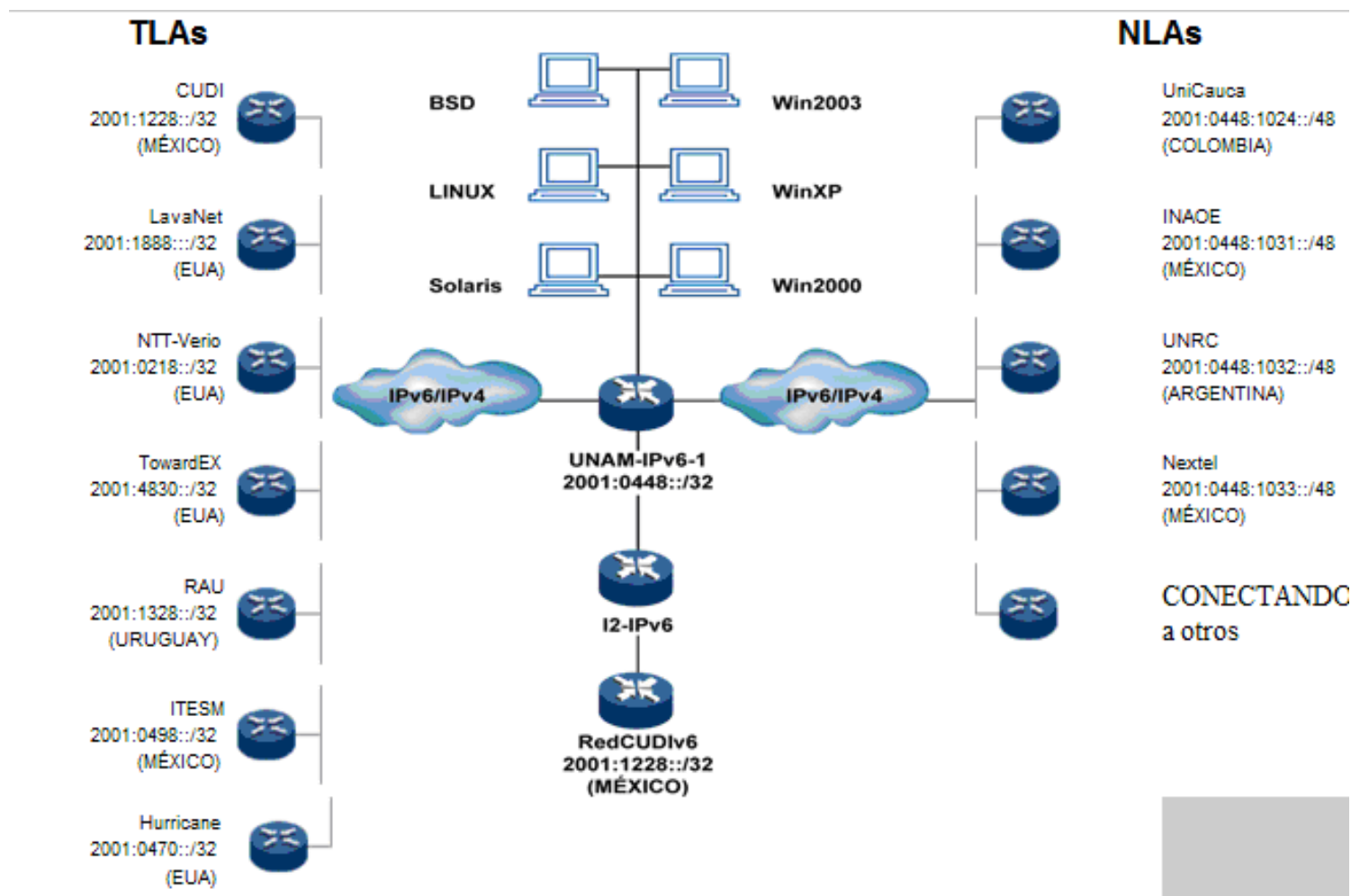
UNAM IPv6 Evolution (1)



UNAM IPv6 Evolution (2)



UNAM IPv6 Evolution (3)



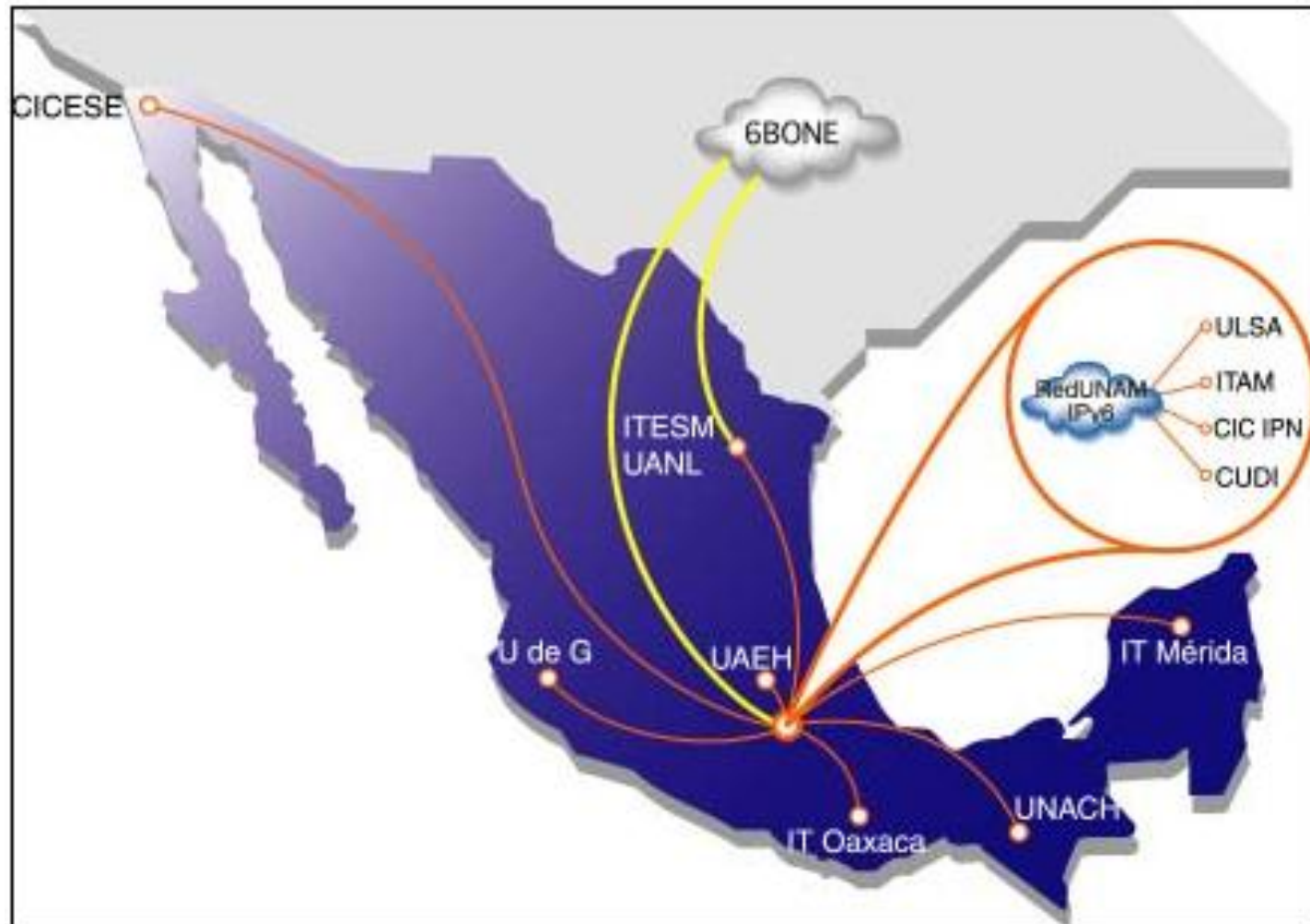


▶ Objectives: IPv6 PROJECT of the UNAM

- Research, test and implement IPv6 in the main campus of the university.
- Investigate, test, and implement IPv6 in the Integral Telecommunications Network of the UNAM.
- Participate in the development of national and international IPv6 projects.
- Participate in the fortification and promotion of IPv6 and its applications.
- Provide IPv6 services in Mexico and Latin America.

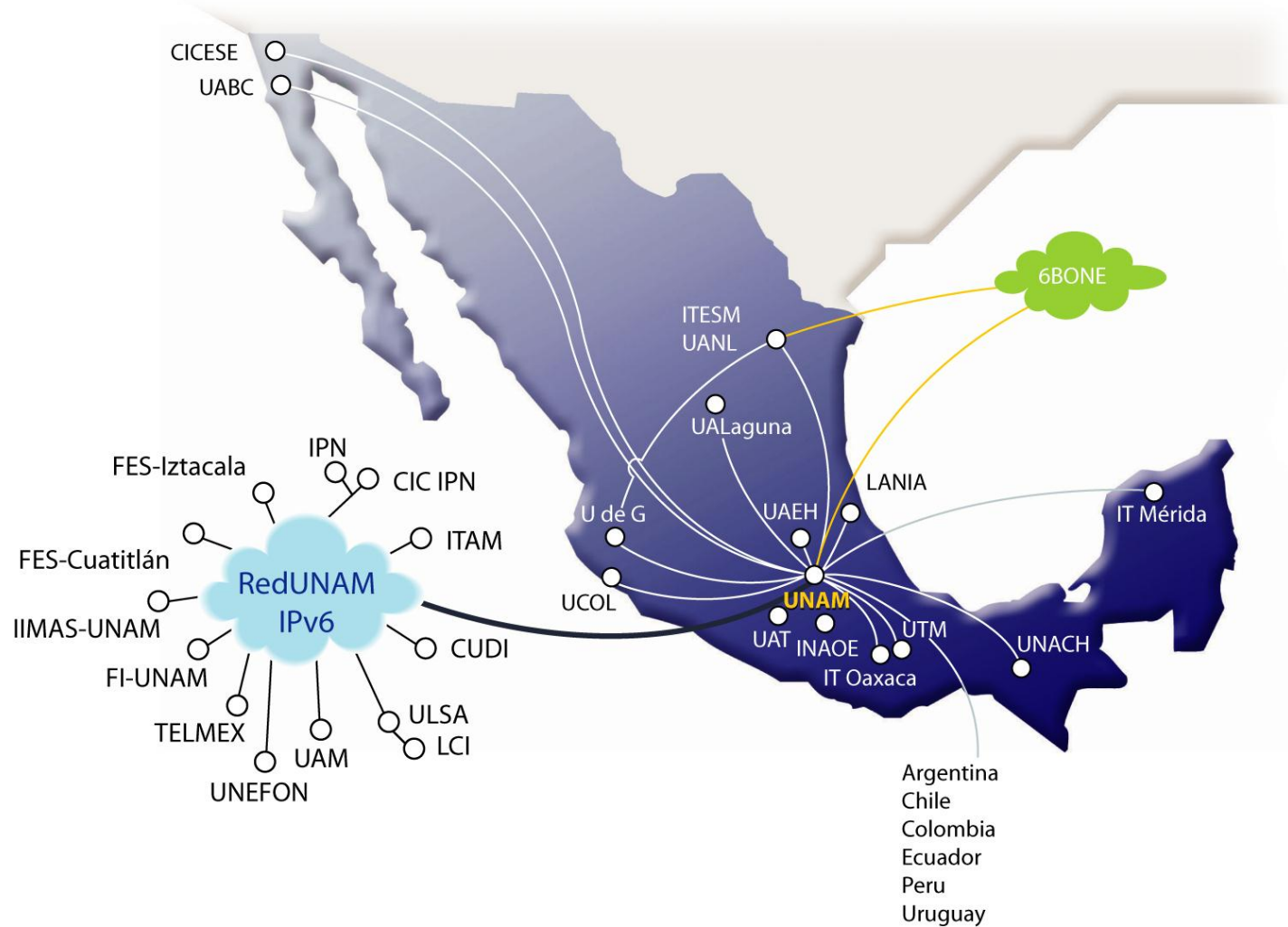


IPv6 in Mexico (in 6BONE before 2006)

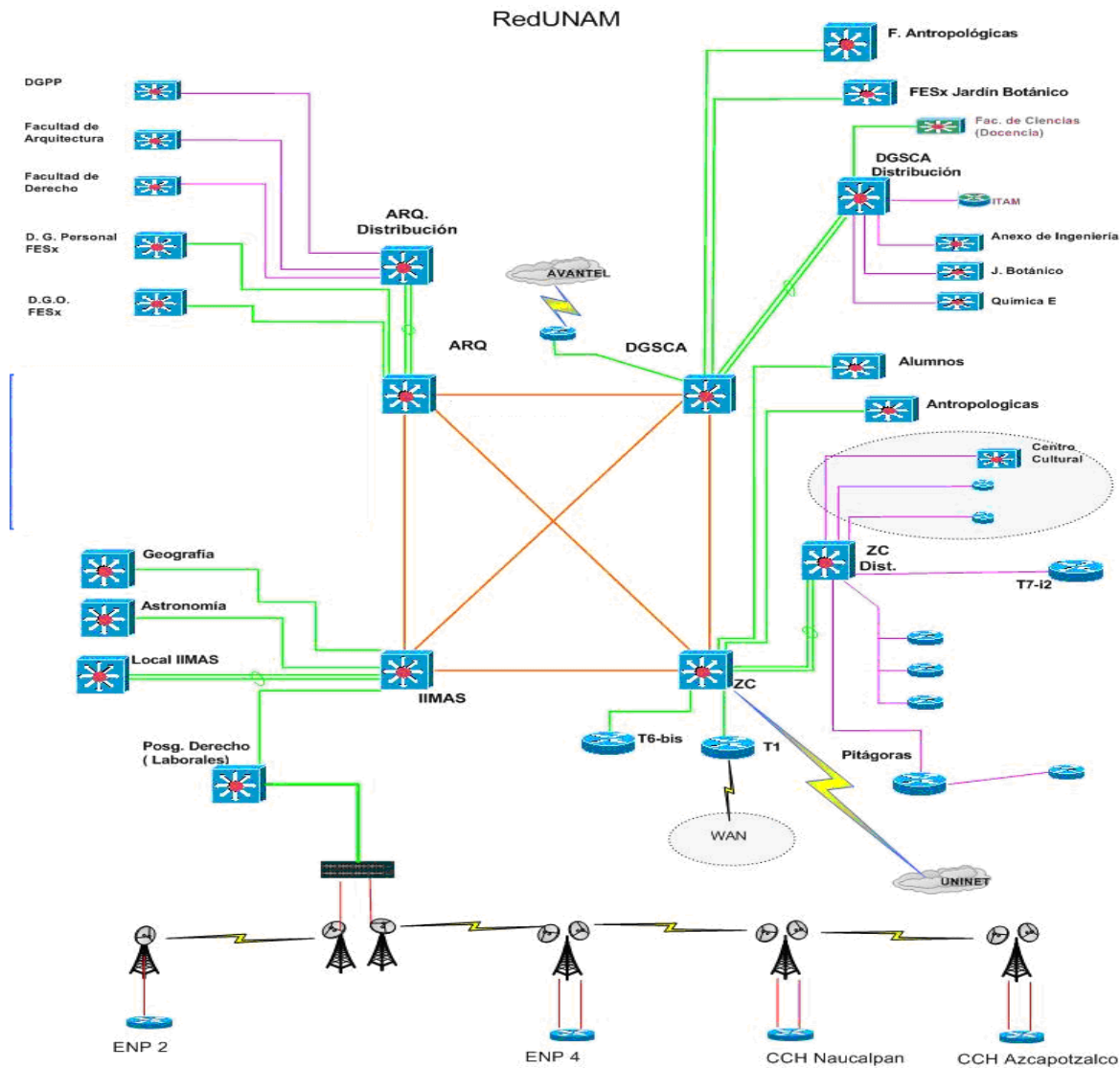




IPv6 in Mexico (in 6BONE until 2006)



UNAM Network (RedUNAM)





► Current IPv6 Status in the UNAM network

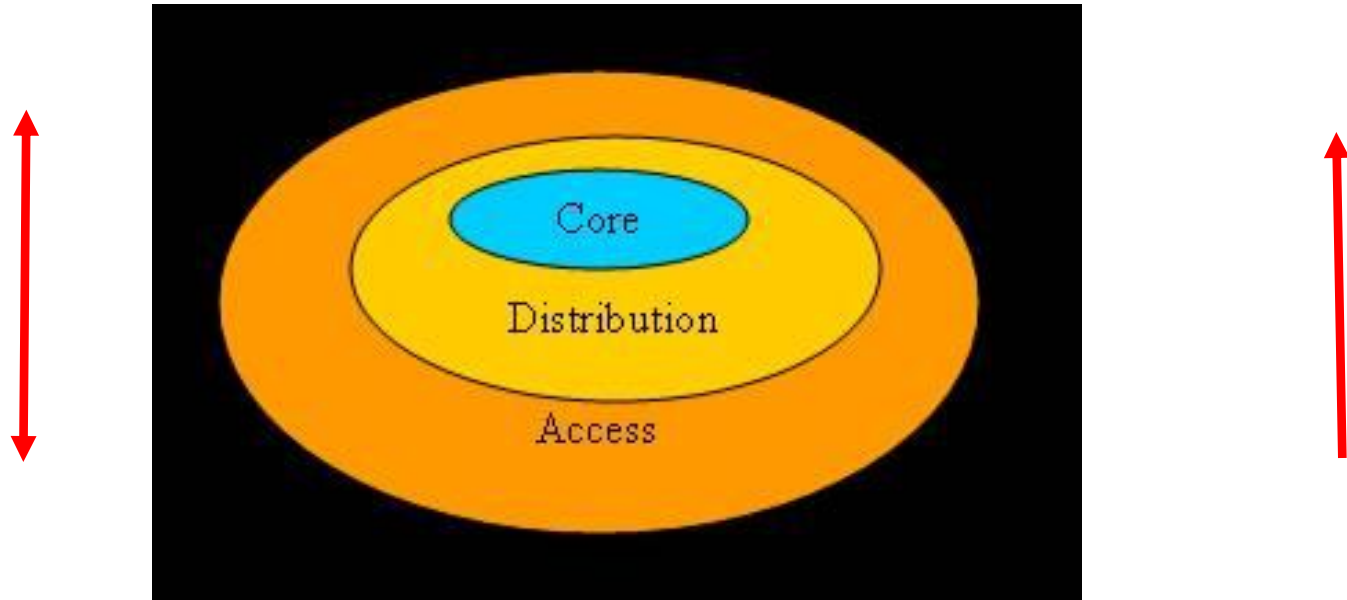
- This year native and almost complete IPv6 support in new Backbone equipments of the UNAM network (RedUNAM).
- First native IPv6 connection with an ISP.
- More recent IPv6 support in access and distribution equipments.
- Some new tests are currently planned in 2012.

IPv6 Deployment Options



Current IPv6 Plan

Original IPv6 Plan

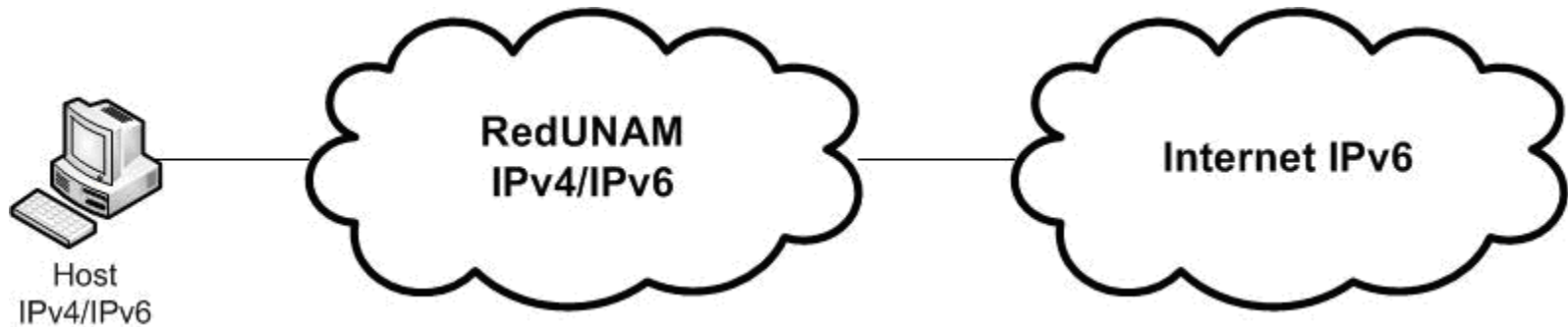




► Current IPv6 Services in the UNAM campus

- Local servers and services:
 - Manual IPv6 tunnel connections.
 - Automatic 6to4 tunnel connections.
 - IPv6 over PPP support.
 - Teredo Server.
 - Tunnel Broker.
 - Some common services: Web, DNS, VC, others.
 - Helpful scripts (network staff)
 - Transparent connections to common users.

Transition options in RedUNAM





UNAM IPv6 Web pages

IPv6 Enabled Program

-----New Service



Application Information

Organization: UNAM
 Application URL: www.ipv6.unam.mx
 Application Tags: Education Site
 Application Location: MX

Test Summary

Test Case Name	Primary Test Result	Maintenance Test Result for Last Week
IPv6 DNS Resolving Ability in Primary Test	pass	----
IPv6 Http Accessing Ability in Primary Test	pass	----
IPv6 DNS Resolving Ability in Maintenance Test	----	pass
IPv6 Http Accessing Ability in Maintenance Test	----	pass

Test Detail

IPv6 DNS Resolving Ability in Primary Test Primary test for the web site IPv6 domain name resolving ability by five different DNS servers and each server for five times.

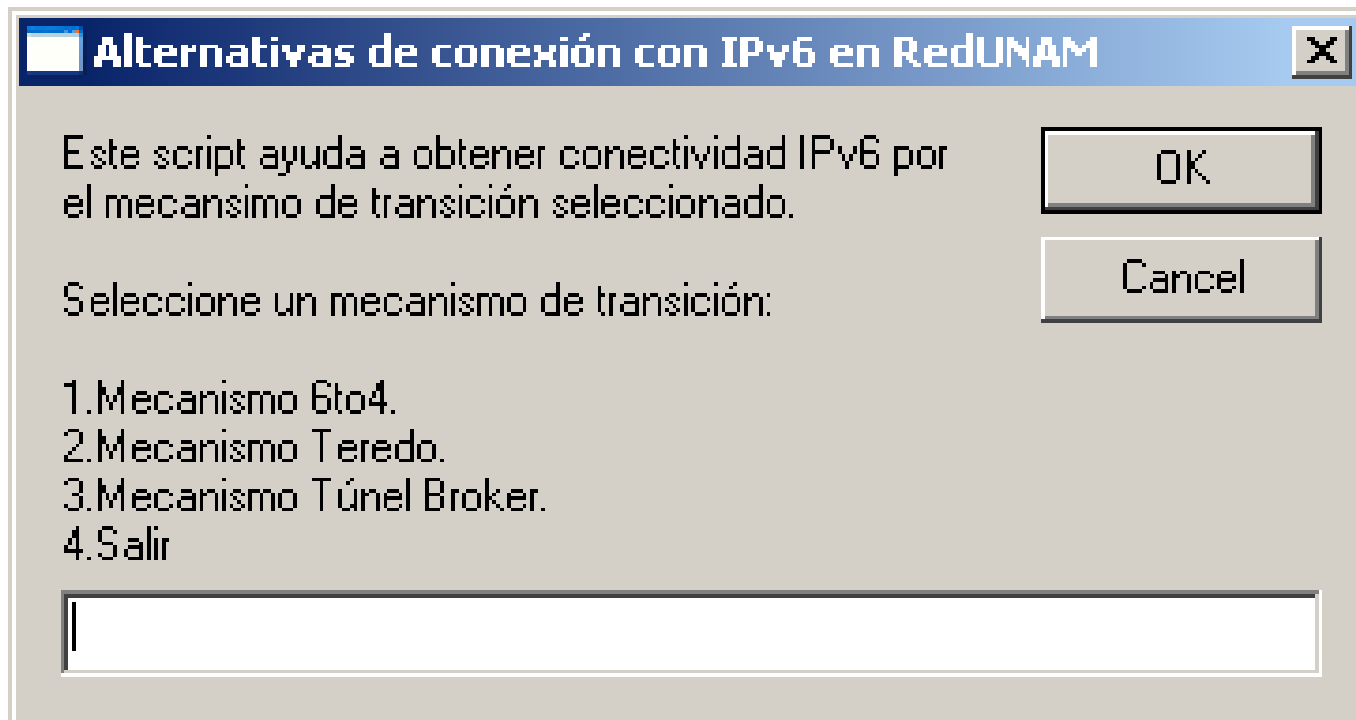
IPv6 Http Accessing Ability in Primary Test Primary test for web site IPv6 Http accessing ability.

IPv6 DNS Resolving Ability in Maintenance Test Maintenance test for the web site IPv6 domain name resolving ability by five different DNS servers and each server for five times.

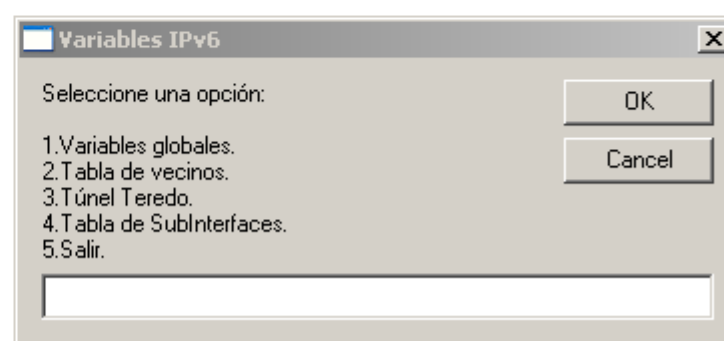
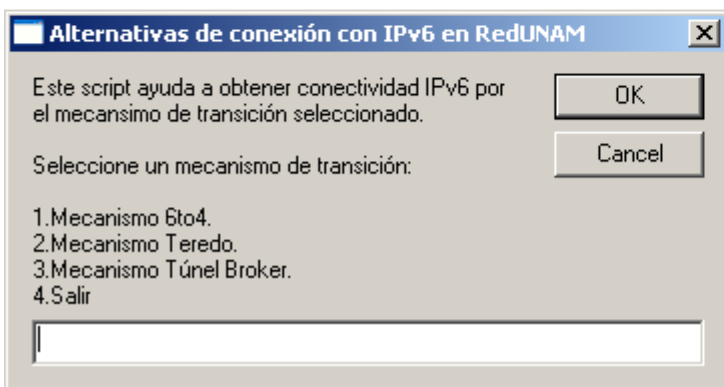
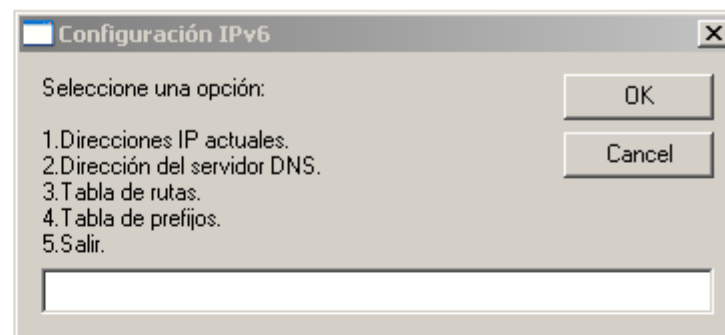
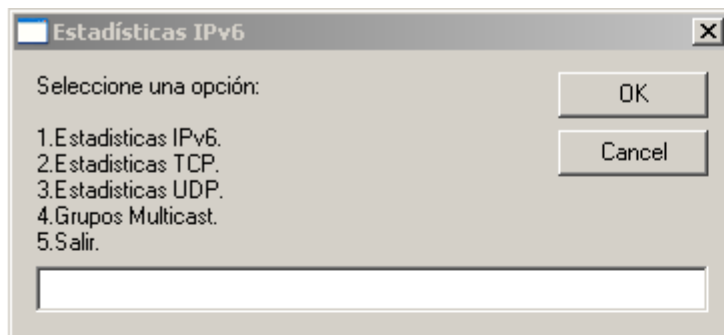
IPv6 Http Accessing Ability in Maintenance Test Maintenance test for web site IPv6 Http accessing ability.

Powered By © IPv6 Forum 2009

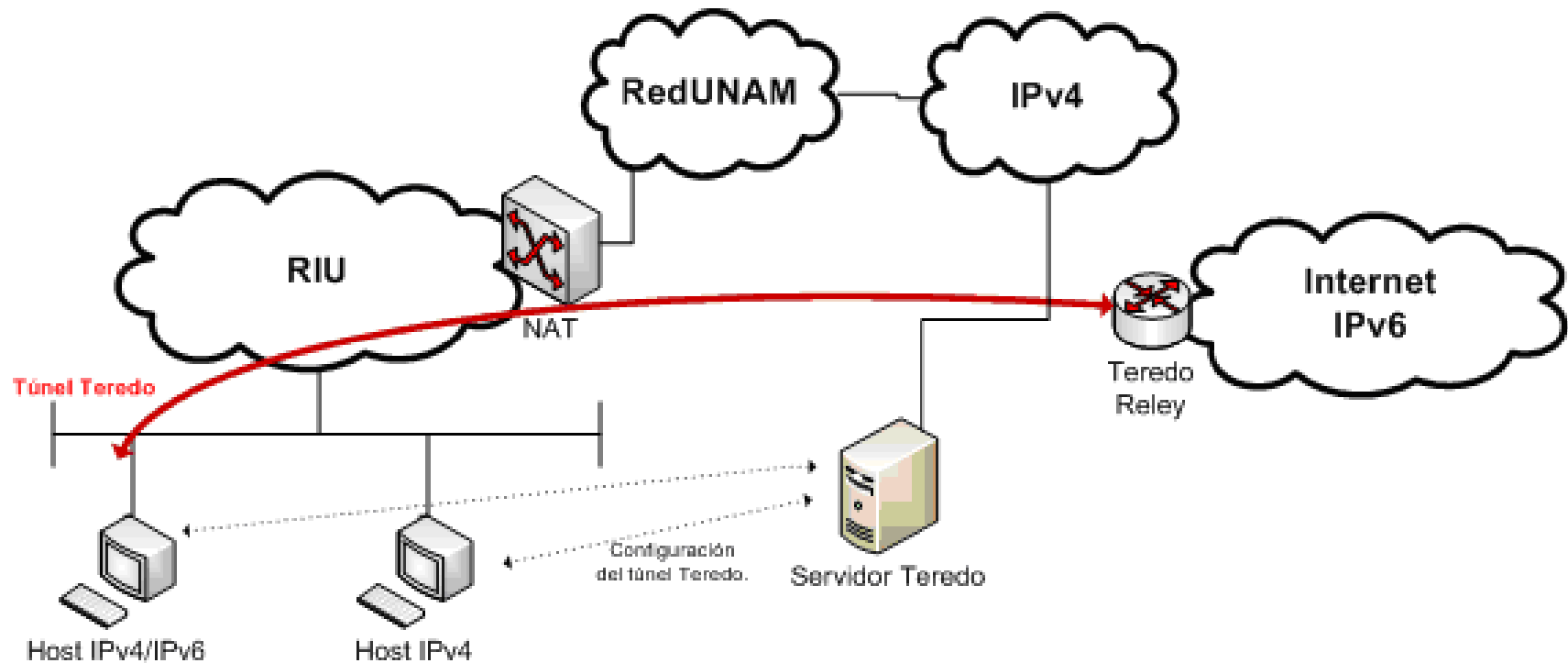
IPv6 connection's options script



More scripts examples



Local Teredo Service



Tunnel Broker Server



A screenshot of the Tunnel Broker Server web interface. The page has a light blue header with the RedUNAM logo and navigation links. A blue banner reads 'Servidor de Túnel Broker'. The main content area welcomes users and explains the service. On the right, there is a login section with input fields for 'Usuario' and 'Contraseña', and a 'Iniciar Sesión' button. Below the login section are logos for 'Red 6' and 'IPv6'. The footer contains copyright information and a disclaimer.

Tunnel Broker Server visual results



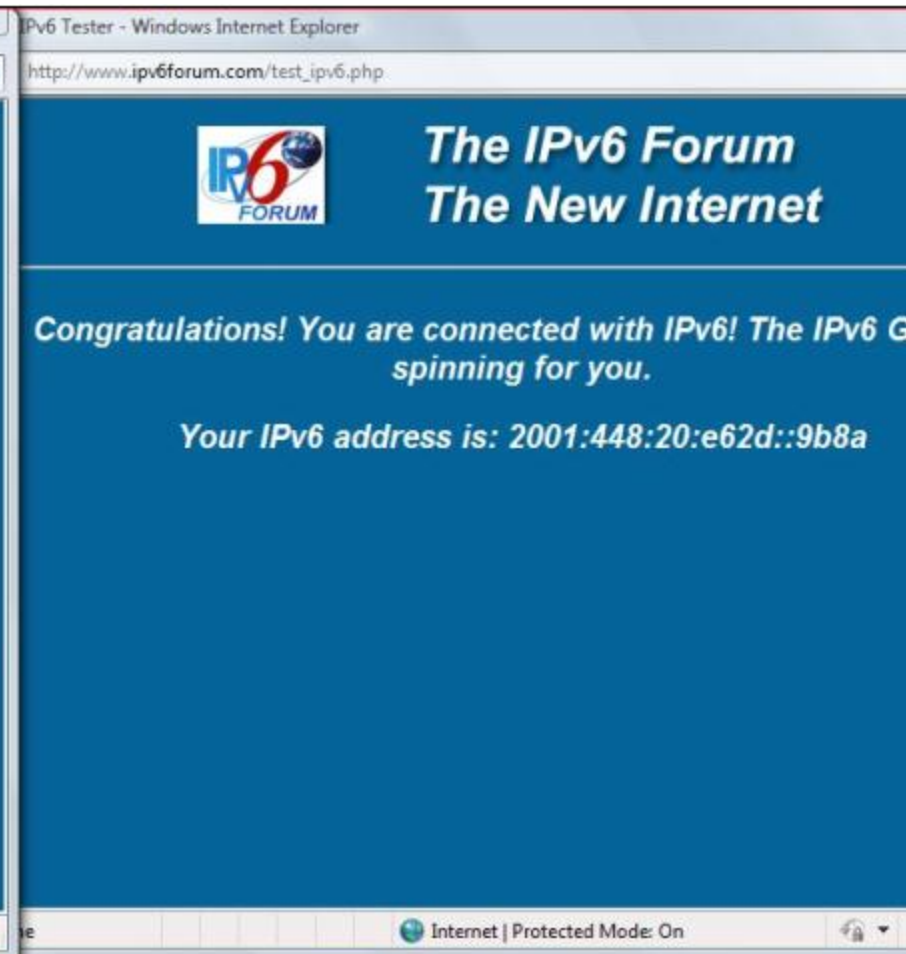
Tunnel Broker Server visual results



Initial IPv4 Connection



Successful IPv6 Connection





▶ Next IPv6 Services in the UNAM campus

- More local servers and services with IPv6-IPv4 support:
 - Main production servers.
 - DSL connections.
 - VPNs.
 - Native IPv6 wireless and mobile connections.
 - UNAM's Radio and TV station.
 - IPv6 / WDM links.
 - IPv6 in Grids.
 - Environmental monitoring (volcanic).
 - VoIPv6 or SIP with IPv6.
 - And many others.



IPv6 current status in Latin America and the Caribbean



▶ BACKGROUND

- Since 1998, academic institutions of Brazil (RNP) and Mexico (UNAM) began research and first tests with IPv6.



▶ BACKGROUND

- Since 2000 academic institutions, and later the first ISPs got their own production prefixes from ARIN.
- Later on, with the creation of LACNIC in 2002, the number of allocations has grown, in 2005 it duplicated.

IPv6 in LATIN AMERICA (until 2006)



Test bed Networks (Within 6Bone Project)

- **56** Nodes (1485 worldwide, i.e. **3.77%**).
 - 11 in Argentina (14)
 - 13 in Brazil
 - 3 in Chile
 - 6 in Colombia
 - 1 in Cuba
 - 3 in Dominican Republic
 - 16 in **Mexico**
 - 2 in Peru
 - 0 in Uruguay (1)



► Countries with IPv6 nodes in 6Bone (until 2006)



Source: Web page of the UNAM's IPv6 Project

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First Chapters of the IPv6 Forum

(OneWorld WG)

- Australia.
- Korea.
- Spain.
- India.
- **Mexico.** (Since 2000)
- Russia.
- Singapore.
- Taiwan.





▶ IPv6 in LATIN AMERICA

- Only in some countries like Cuba exists a strong IPv6 Promotion Policy. In two of them Brazil and **Mexico**, the pioneers of IPv6 research in the region, exist an IPv6 Forum Chapter. In others, such as Argentina, Brazil, Colombia, Cuba, Panama and Peru, IPv6 Task Forces operate following the objectives of LACIPv6TF.

IPv6 in LATIN AMERICA



Production Networks (22 countries)

Position	Country	Visible	Allocated	Visible Percentage
1	Brazil	17	68	8.02%
2	Mexico	8	23	3.77%
3	Argentina	8	20	3.77%
4	Venezuela	6	14	2.83%
5	Chile	5	13	2.36%
6	Uruguay	7	11	3.30%
7	Colombia	2	9	0.94%
8	Peru	0	7	0.00%
9	Ecuador	3	7	1.42%
10	Nether Antillen	2	5	0.94%
11	Cuba	3	5	1.42%
12	Panama	1	4	0.47%
13	Bolivia	0	4	0.00%
14	Costa Rica	2	4	0.94%
15	Dominican Rep	1	4	0.47%
16	Guatemala	2	4	0.94%
17	Nicaragua	0	2	0.00%
18	Trinidad & Tobag	1	2	0.47%
19	Paraguay	0	2	0.00%
20	Haiti	1	2	0.47%
21	Honduras	0	1	0.00%
22	El Salvador	1	1	0.47%

Source: SixXS Ghost Route Hunter



IPv6 in CUDI



- CUDI (University Corporation for the Development of Internet) – is the NREN of Mexico, it has IPv6 support since 2001.

IPv6 Working Group



- The IPv6 Working Group started in April 2000.
- It is coordinated by the UNAM.

Grupo de trabajo de IPv6 en **cudi** 



► History of IPv6 in CUDI

- **April 2000.**

IPv6 Working Group was created.

- **April 2001.**

First IPv6 over IPv4 tunnel by Internet2 between CUDI in Mexico and Abilene in the USA.

- **December 2001.**

Native IPv6 implemented in the Backbone in four of the five existing POPs: Mexico City, Guadalajara, Monterrey and Tijuana.

- **June 2002.**

First IPv6 native connection between the academic networks of Mexico and the USA.



► History of IPv6 in CUDI

- **April 2003.**
Bigger IPv6 prefix.
- **February 2004**
IPv6 Virtual Day.
- **2010**
Challenge CUDI IPv6.
- **2011**
World IPv6 Day.



▶ PROJECTS and TESTS

- IPv6 Applications development.
- VoIPv6 or SIP with IPv6.
- Videoconference with IPv6
- Remote control of devices.
- Multicast IPv6 (Opera Oberta):
(Gran Teatre del Liceu de BarcelonaGran Barcelona)
 - High Definition
 - IPSec+ IPv6 Multicast
- M6Bone
- Open Student Television Network (OSTN)

Summary of IPv6 Activities in Mexico



- First National IPv6 seminars in 1999 and 2000 organized by the Mexican Chapter of the IPv6 Forum.
- Each year since 2002, ISOC Mexico has organized IPv6 roundtables, in its annual meetings.



- 2005: IPv6 Tour organized by LACNIC, NIC-Mexico.
- 2006: First formal IPv6 presentation in SCT office.
- 2009:
 - IPv6 Workshop in ICANN 34 Meeting, in March.
 - IPv6 Observatory Web page launched. (e-Mexico)



Summary of IPv6 Activities in Mexico



- 2011:
 - World IPv6 Day.



- 2012:
 - World IPv6 Launch





▶ Current IPv6 STATUS in Mexico

- Almost ready ISPs with native IPv6 offer.
- Not yet native IPv6 DNS queries (sooner than later)



References



REFERENCES

- www.6bone.net
- www.ipv6.unam.mx
- www.ipv6.unam.mx/Internet2/
- www.ipv6forum.com.mx
- www.ipv6forum.com/ipv6_enabled/



▶ REFERENCES

- www.cudi.edu.mx
- www.redclara.net



English Version

Esta página puede ser visualizada con IPv4 y con [IPv6](#)

[Esta usando IPv6 desde \(2001:1218:1:6:b90e:7994:d597:1c1f\).](#)

La "Internet Engineering Task Force" ([IETF](#)) creó el proyecto IPng: **Internet Protocol for Next Generation**, también llamado **IPv6**.

Esta versión del Protocolo de Internet (IP) ya está conviviendo y sustituyendo en algunos casos progresivamente a IPv4, ya que brinda mejores características entre las que destacan: espacio de direcciones prácticamente infinito; posibilidad de autoconfiguración de varios dispositivos con puertos de red (computadoras, ruteadores, agendas electrónicas, teléfonos inteligentes, etc.); mejor soporte para seguridad, computación móvil, calidad de servicio; un mejor diseño para el transporte de tráfico multimedia en tiempo real, aplicaciones para anycast y multicast; así como diversos mecanismos de transición gradual de IPv4 a IPv6 y de comunicación entre equipos de ambas versiones.

Eventos

Listo de correo

SOLICITUD de Direcciones

NUEVO IPv6 Ya!



Pasado miércoles 8 de Junio !!!

NOTICIAS

Se publica entrevista "[Internet para Todos IPv6](#)." en el suplemento de los martes "[UNAMirada a la Ciencia](#)", en el periódico [la Prensa](#).

México, 13 de septiembre de 2011

Se participa en el programa de radio "Hoy por Hoy en la Ciencia" de la Dirección General de Divulgación de la Ciencia de la UNAM, en W Radio, con el tema de IPv6.

México, 30 de julio de 2011

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Última actualización:
Octubre de 2011





El Nuevo Internet: Internet para Todos Calidad, Movilidad y Seguridad

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Twitter: @foroipv6

Agotamiento IPv4

▼ situación actual (RIR)

RIR	Plazo y número de bloques (Reserva de)
AfriNIC	31.10.2014 2.06
APNIC	15.04.2011 0.94
ARIN	01.08.2013 4.01
LACNIC	31.01.2014 2.25
RIPE NCC	31.07.2012 2.57

NetCore via IPv4

Twitter: foroipv6mx



Bienvenido al Capítulo Mexicano del Foro IPv6

Miércoles 7 de Marzo del 2012

El Grupo de Trabajo Mexicano de IPv6 es un esfuerzo conjunto para impulsar el conocimiento de esta tecnología, identificar oportunidades de la misma, promover su despliegue, así como construir una comunidad de instituciones y personas activas en el campo de IPv6 en México.

Eventos



[Lanzamiento Mundial de IPv6](#)



[Cumbre China de IPv6 2012](#)



[Cumbre Norteamericana de IPv6 2012](#)

[Eventos Próximos y pasados](#)
[Presentaciones y Documentos](#)

Foro "Internet hasta en la SOPA"

Noticias y Artículos IPv6

[Artículos y Documentos:](#)
[IPv6 Forum Roadmap & Vision 2010](#)

[Noticias Nacionales y de medios nacionales:](#)



[Se participa durante la Semana Regional de IPv6 \(13/febrero/2012\)](#)

[Internet para Todos IPv6 \(13/septiembre/2011\)](#) Fuente: "UNAMirada a la Ciencia". periódico la Prensa



www.netlab.unam.mx

Octubre 4, 2011



GRUPOS DE INVESTIGACIÓN

El Laboratorio de Tecnologías Emergentes de Redes en Telecomunicaciones de la UNAM, cuenta con diversos grupos de investigación sobre las tecnologías que permiten el desarrollo tecnológico de la RedUNAM.

- IPv6
- VoIP
- MPLS
- QoS
- H.323
- Multicast

[Obten Flash Player](#)

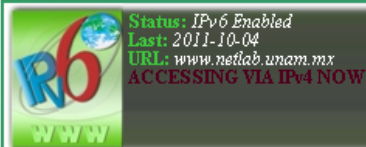
| [IPv6](#) | [PLC](#) | [VoIP](#) | [WDM](#) | [MetroEthernet](#) | [IP Móvil](#) |

EVENTOS

- [LACNIC XVII / LACNOG 2011](#)
Octubre 04-07, 2011
Buenos Aires, Argentina.
- [Congreso de Internet 2011](#)
(Organizado por ISOC México)
Octubre 05-06, 2011

NOTICIAS

Se inicia nueva
Convocatoria para los
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► <http://wiki-gtipv6.reuna.cl/wiki/index.php>



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Portada

Bienvenido a la página Wiki del Grupo de Trabajo IPv6

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Thanks for your attention !

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Gracias !

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