The development status of IPv6 in Mexico and CLARA

Azael Fernández Alcántara

azael@ipv6.unam.mx

NETLab

IPv6 Forum, Mexico Chapter

IPv6 Working Groups in CUDI and CLARA

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Asia-Pacific Economic Cooperation

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 STATUS (before 2006)

- Many 6Bone nodes worked in Latin America until 2006.
- Different 6Bone phase-out dates.

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** APEC member
  - 6 in Colombia
  - 1 in Cuba
  - 3 in Dominican Republic
  - 16 in **Mexico** APEC member
  - 2 in **Peru** APEC member
  - 0 in Uruguay (1)

Asia-Pacific Economic Cooperation

IPv6 IN LATIN AMERICA (until 2006)

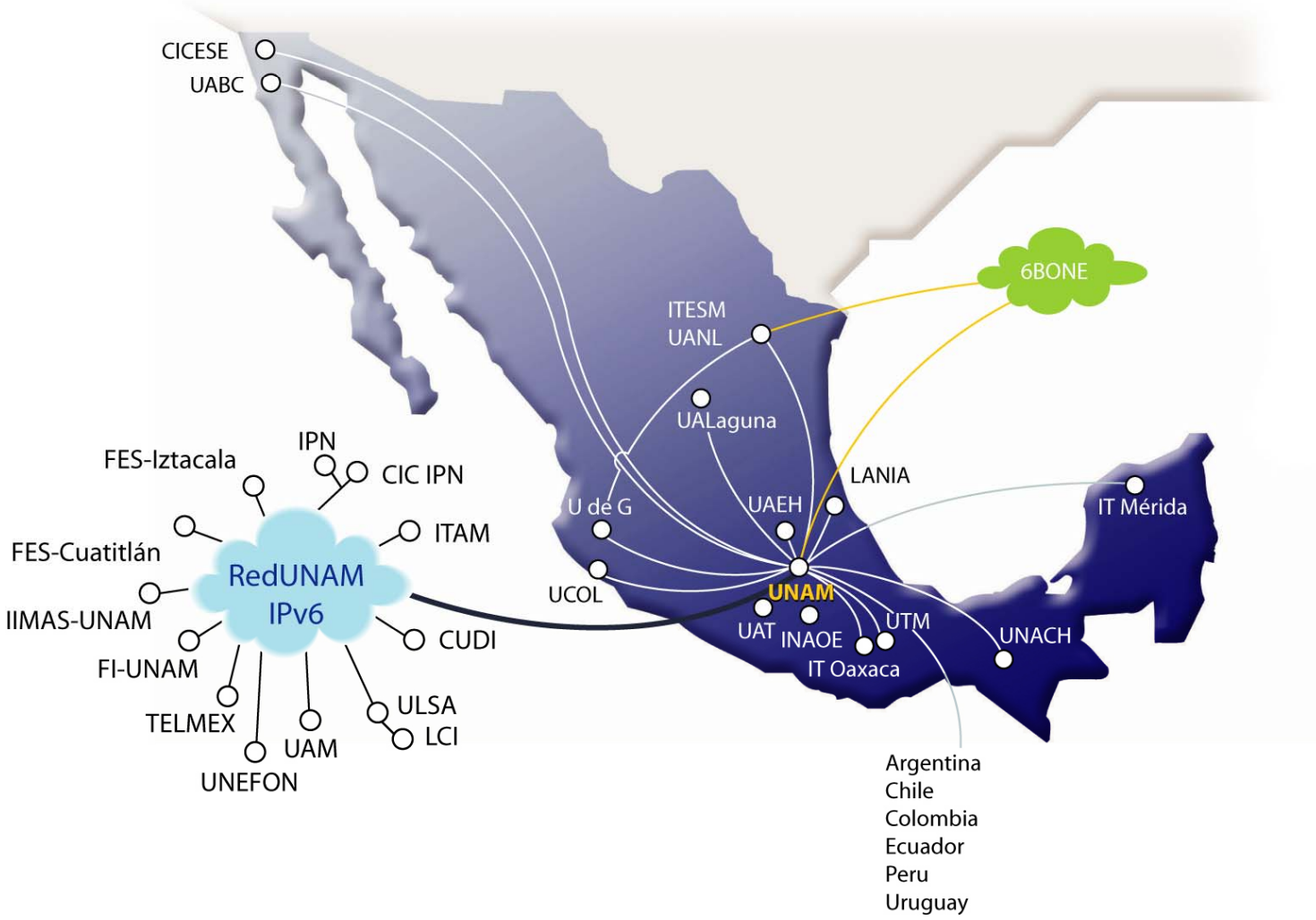
Test Prefixes (Within 6Bone Project)

- **8** pTLA (117 worldwide (26 Returned), i.e. 6.84%)
  - Rede Nacional de Pesquisa, RNP, Brazil
  - Fibertel, Argentina
  - UNAM, Mexico
  - ITESM, Mexico
  - Compendium, Argentina
  - UDG, Mexico
  - UACH, Chile
  - RETINA, Argentina

Countries with IPv6 nodes in 6Bone (until 2006)

Source: Web page of the UNAM's IPv6 Project

IPv6 in Mexico (in 6BONE until 2006)



First Chapters of the IPv6 Forum (OneWorld WG)

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

IPv6 current status in Latin America and the Caribbean

Latin American and Caribbean IPv6 Task Force

- LACIPv6TF
- Formed in 2004

Asia-Pacific Economic Cooperation

IPv6 in LATIN AMERICA

- Nowadays, there are no real IPv6 Promotion Councils in Latin American and Caribbean countries. However, the first steps have been taken with the integration of the Latin American and the Caribbean IPv6 Task Force (LACIPv6TF), in 2004, with an active participation from almost the 30 countries and territories.

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.

LACIPv6TF ACTIVITIES

- 7 Latin American events, called “IPv6 Forums” (FLIPs-6) from 2004-2009

- In 2005 the “IPv6 Tours” organized by LACNIC, took place in 10 countries.

- In 2008 seven “IPv6 Tours”.

- In 2009 eight “IPv6 Tours”.

Latin American IPv6 Task Forces

- Brazil
- Colombia
- Cuba
- **Mexico**
- Panama
- **Peru**

- Others in process

IPv6 in APEC Members

Production Networks (from 150 countries)

Position	Country	Visible	Allocated	Visible Percentage
1	United States	353	1004	9.30%
4	Japan	91	162	2.40%
10	Russia	36	79	0.95%
11	Canada	34	76	0.90%
16	Korea	10	57	0.26%
19	China	20	46	0.53%
20	New Zealand	19	44	0.50%
25	Indonesia	13	29	0.34%
27	Vietnam	3	27	0.08%
28	Malaysia	12	27	0.32%
30	Mexico	8	26	0.21%
31	Singapore	8	25	0.21%
35	Thailand	11	22	0.29%
42	Philippines	10	18	0.26%
48	Chile	5	14	0.13%
64	Peru	0	7	0.00%
94	Brunei	0	2	0.00%
107	New Guinea	0	2	0.00%

Source: SixXS Ghost Route Hunter

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	Equador	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%

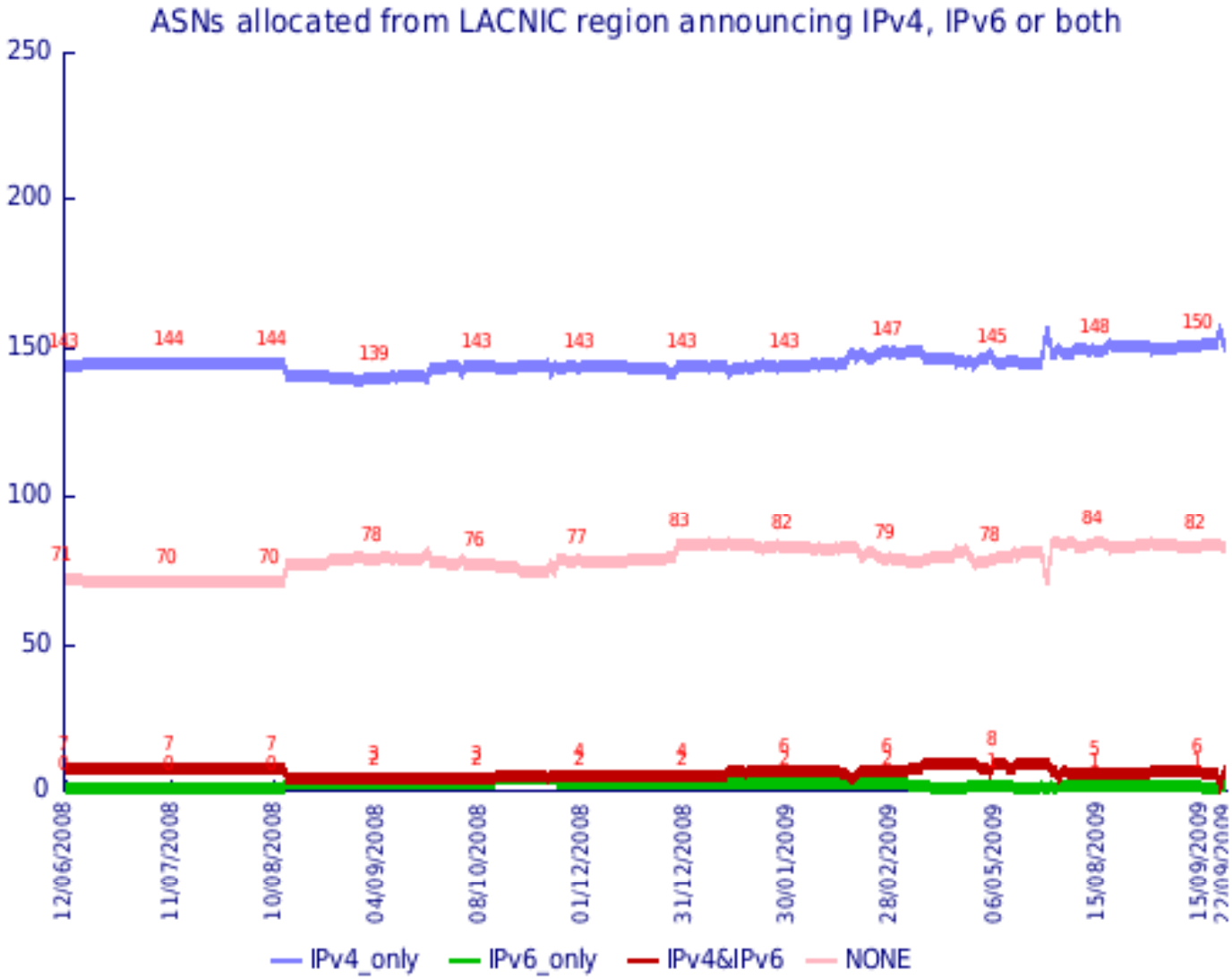
Source: SixXS Ghost Route Hunter

IPv6 IN LATIN AMERICA
Production Prefixes

- **212-(7** pTLA's) (22 countries, 150 worldwide, i.e. 14.67%)
  - UNAM, Mexico
  - AVANTEL, Mexico
  - ITESM, Mexico
  - AXTEL, Mexico
  - MAXCOM, Mexico
  - Alestra, Mexico
  - BANCO DE MEXICO, Mexico
  - PROTEL, Mexico (Returned)
  - UNINET, Mexico (Returned)
  - Brazil / Dominican R. / Uruguay / Paraguay / Venezuela / etc.)
  - Chile (14 prefixes)
  - Peru (Telmex, Comsat, Optical IP, Telefonica del Peru, Americatel)

IPv6 in MEXICO

Autonomous Numbers (ASNs) in routing table



IPv6 in CLARA

CLARA

- CLARA organization (Latin American Cooperation of Advanced Networks) – is responsible for the implementation and management of the network infrastructure that interconnects the National Academic Networks (NRENs) of 14 Latin American countries, from the original 18.
- It has been possible by the ALICE Project.

ALICE Project

- "América Latina Interconectada con Europa"
- Started – June 2003
- Coordinator – DANTE
- Partners – FCCN, RedIris, Renater, GARR and 18 LA-NRENs
- Total budget – 12.5 M Euros (20% LA, 80% EU)

CLARA Network

- First packets crossed the Atlantic on August, 31 2004
- 14 LA-NRENs
- Big interest in IPv6

CLARA Network

BACKGROUND

- Preliminary addressing plan by the NEG.
- The IPv6 Working Group started in April 2005.
- Allocation of the IPv6 prefix.
- Some addressing and routing plans discussions.

IPv6 in CLARA

- **August 2005.**

Native IPv6 implemented in the backbone

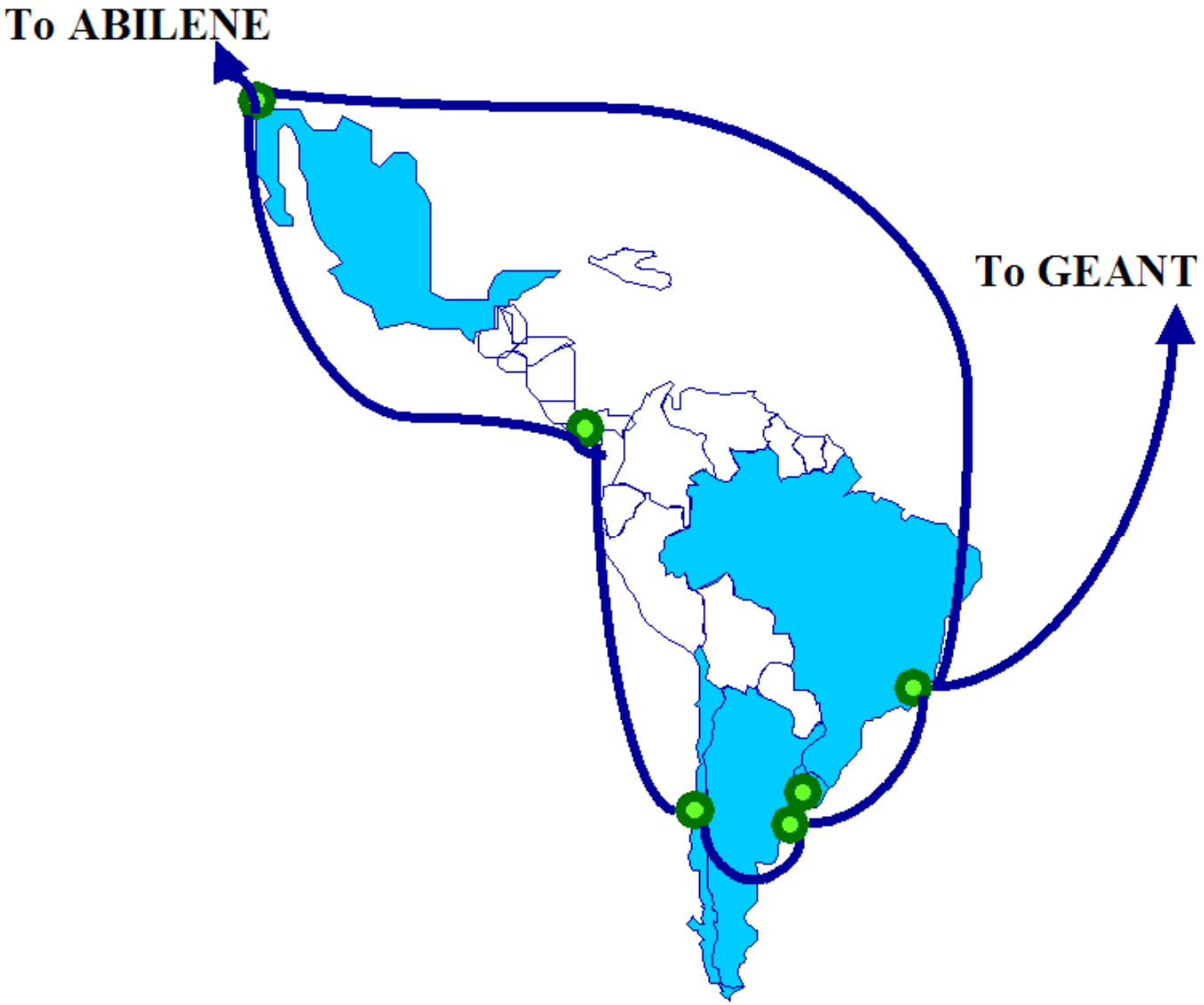
- **November 2005.**

Multicast IPv6 implemented in the backbone

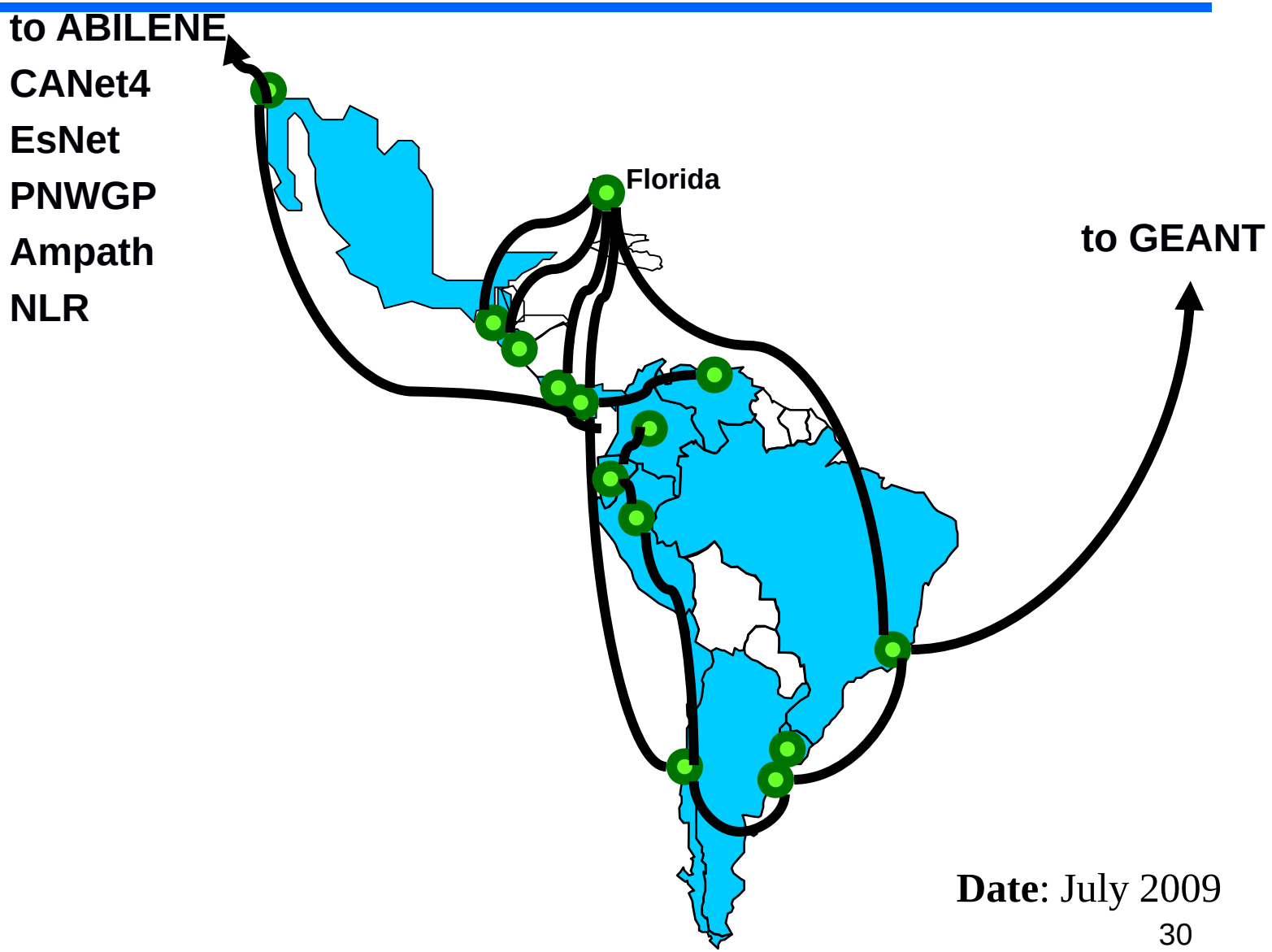
NRENs connected with IPv6

Source: IPv6 Web page of the UNAM

Initial IPv6 Deployment in CLARA



IPv6 Support in CLARA



Date: July 2009

First NRENs connected with IPv6 (5 from 14)

- RETINA (Argentina)
- RNP (Brazil)
- REUNA (**Chile -** APEC member)
- CUDI (**Mexico -** APEC member)
- RAU (Uruguay)

Next NRENs connected with IPv6

- RENIA (Nicaragua)
- REACCIUN (Venezuela)
- CEDIA (Ecuador)
- RAGIE (Guatemala)
- RedCyT (Panama)
- RAICES (El Salvador)
- RAAP (**Peru -** APEC member)
- RENATA (Colombia)
- CR2net (Costa Rica)

CLARA Network version 2

- It is been possible by the ALICE2 Project.
- Budget to be provided by the EC, thru EuropeAid
- Co funding to be provided by the LA NRENs
- December 2008 until August 2012
- Emphasis on:
  - An upgraded long lasting infrastructure,
  - Sustainability,
  - MDG Oriented applications
  - Inclusion

Source: Presentation of Florencio I. Utreras Executive Director of CLARA

IPv6 in CUDI

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.

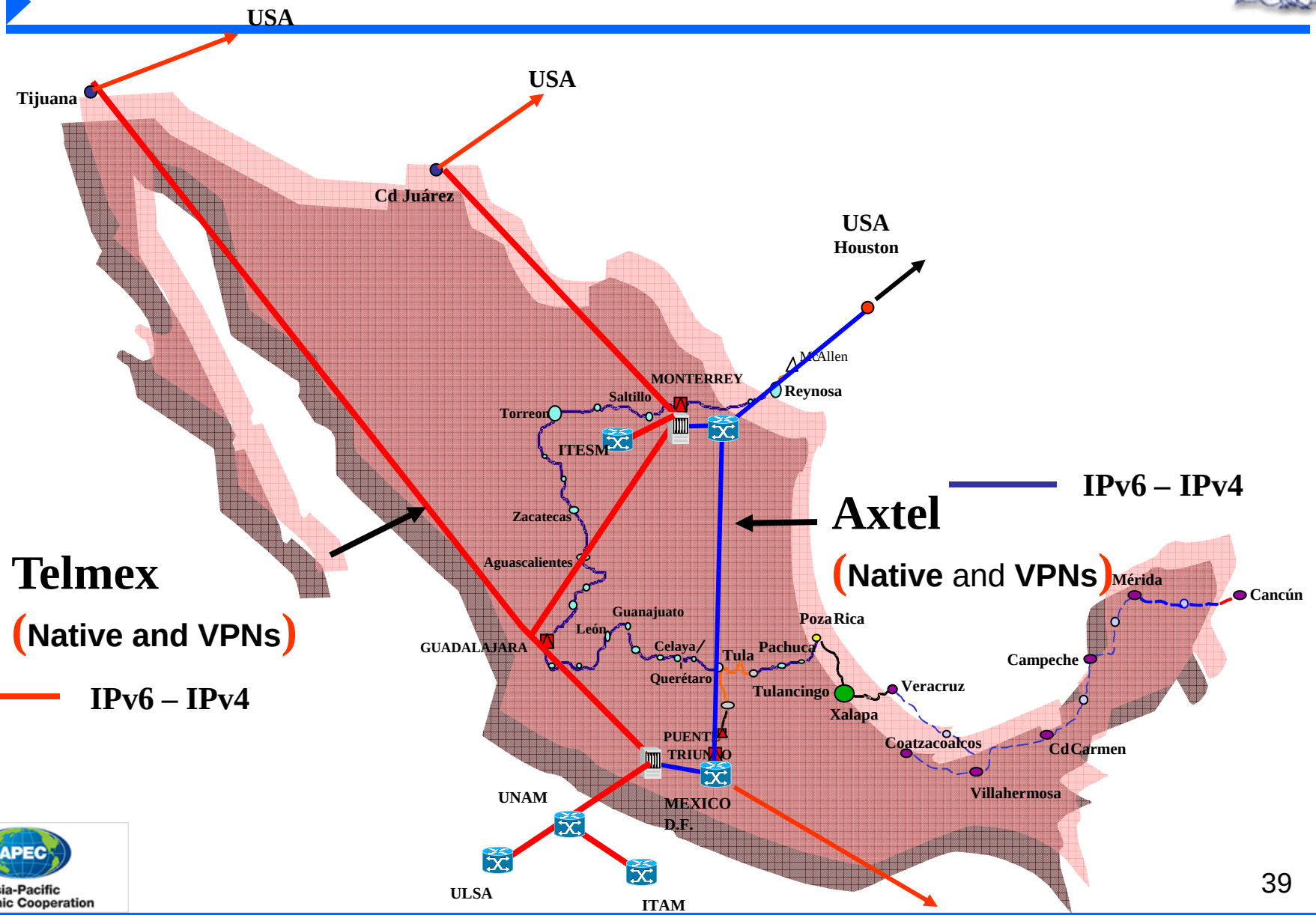
History of IPv6 in CUDI

- **April 2003.**
- Bigger IPv6 prefix.

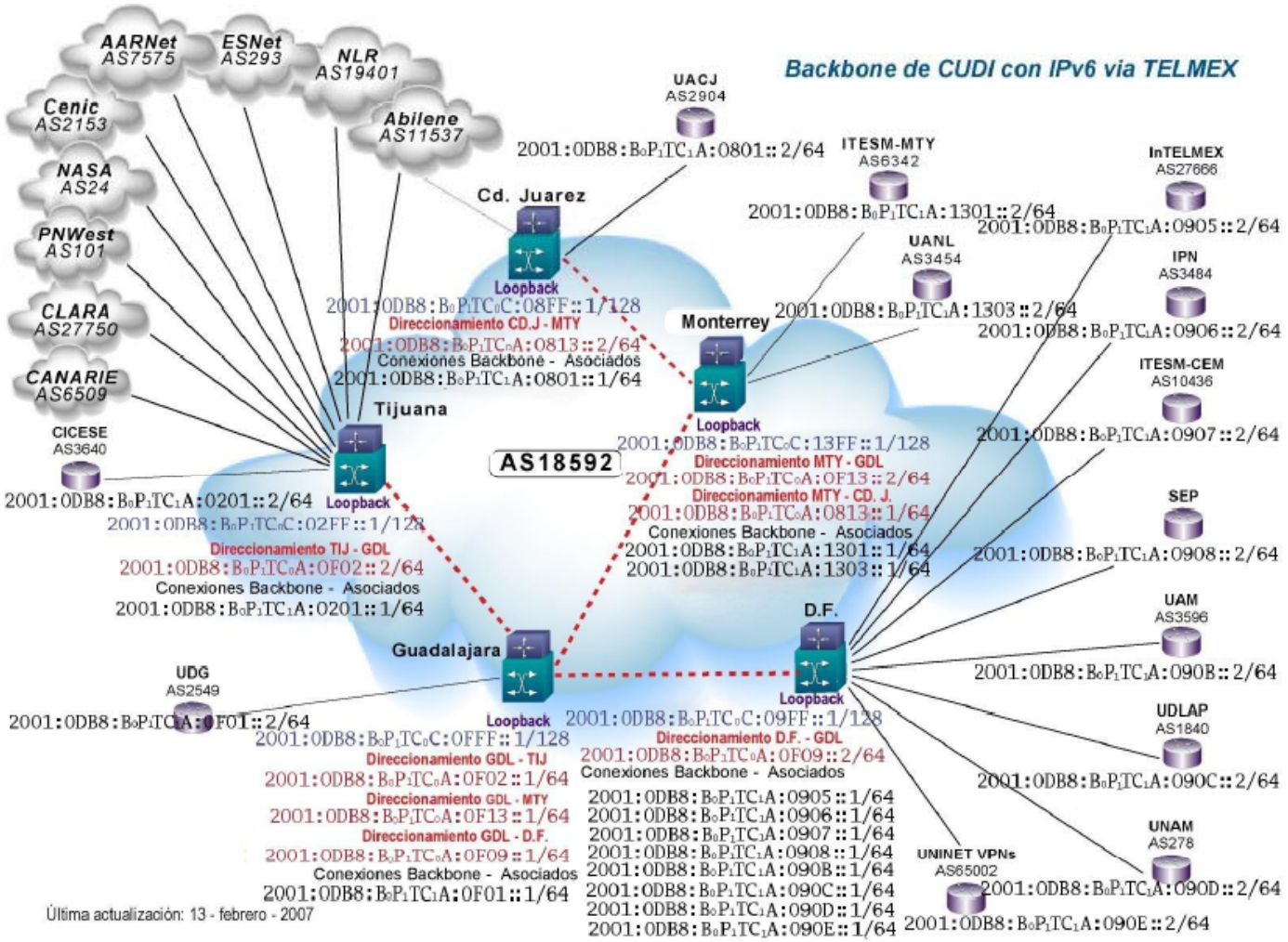
- **February 2004**
  IPv6 Virtual Day.

and many more activities …

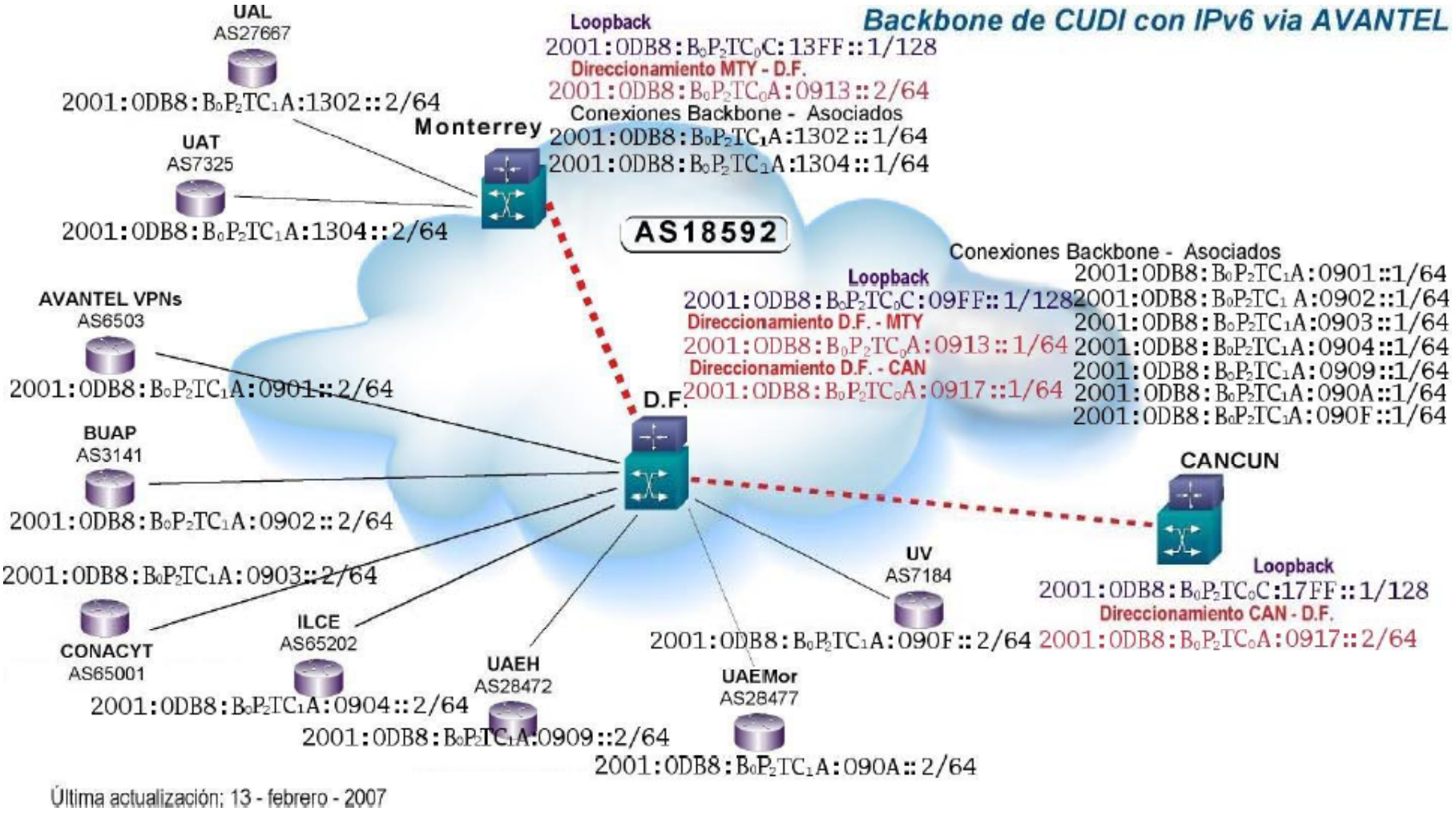
IPv6 in CUDI


USA
Tijuana
USA
Cd Juárez
USA
Houston
McAllen
Reynosa
MONTERREY
Saltillo
Torreon
ITESM
Zacatecas
Aguascalientes
Guanajuato
León
GUADALAJARA
Celaya
Querétaro
Tula
Pachuca
Poza Rica
Tulancingo
Veracruz
Xalapa
Mérida
Cancún
Campeche
Coatzacoalcos
Cd Carmen
Villahermosa
PUENTE TRIUNFO
MEXICO D.F.
UNAM
ULSA
ITAM
Telmex
(Native and VPNs)
IPv6 – IPv4
Axtel
(Native and VPNs)
IPv6 – IPv4

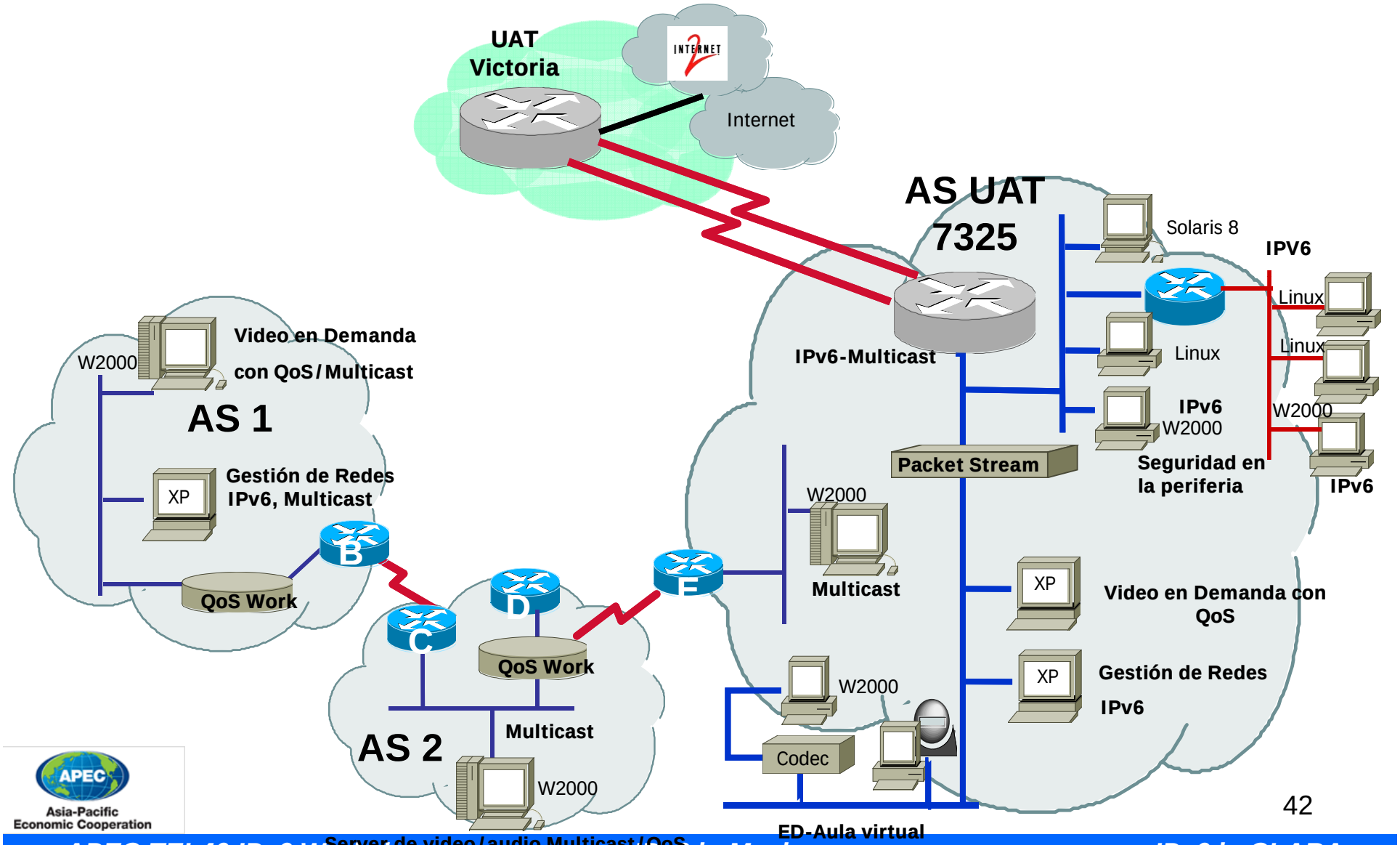
IPv6 BACKBONE in CUDI



IPv6 BACKBONE in CUDI



IPv6 Interoperability Test bed

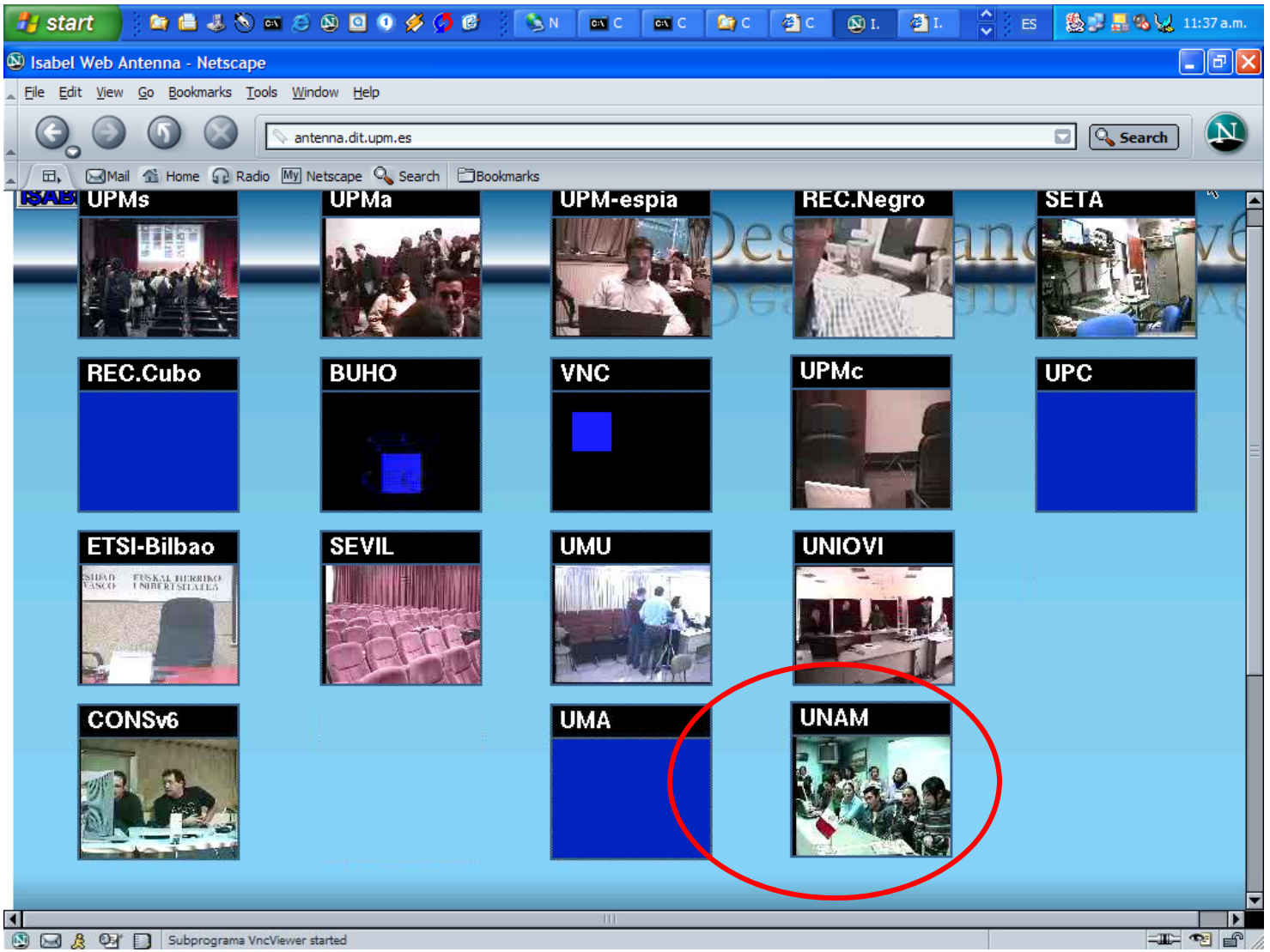


PROJECTS and TESTS

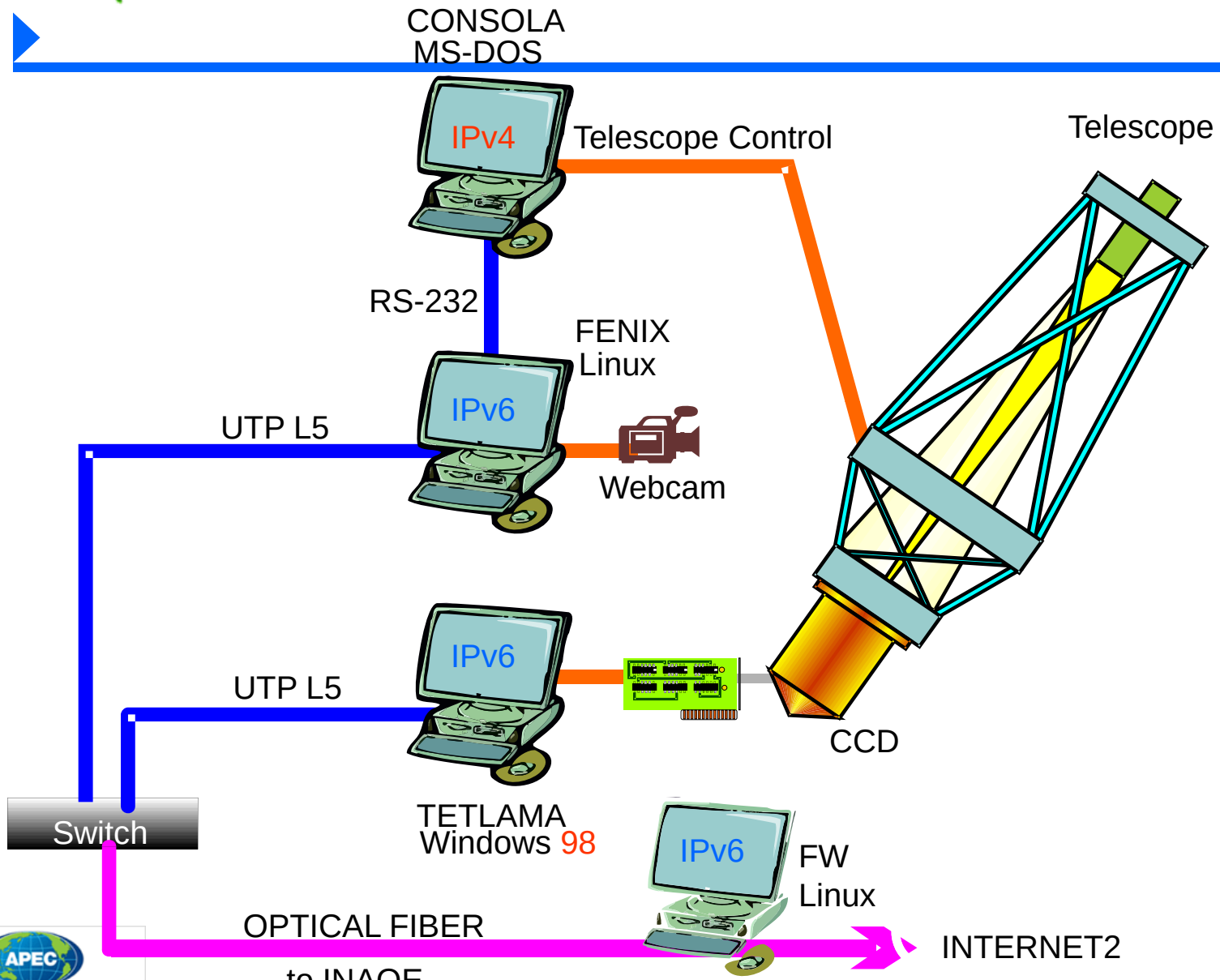
- IPv6 Applications development.
- VoIPv6 or SIP with IPv6.
- Videoconference with IPv6
- Remote control of devices.
- Multicast IPv6 (Opera Oberta):

  (Gran Teatre del Liceu de BarcelonaGran Barcelona)
  - High Definition
  - IPSec+ IPv6 Multicast
- M6Bone
- Open Student Television Network (OSTN)

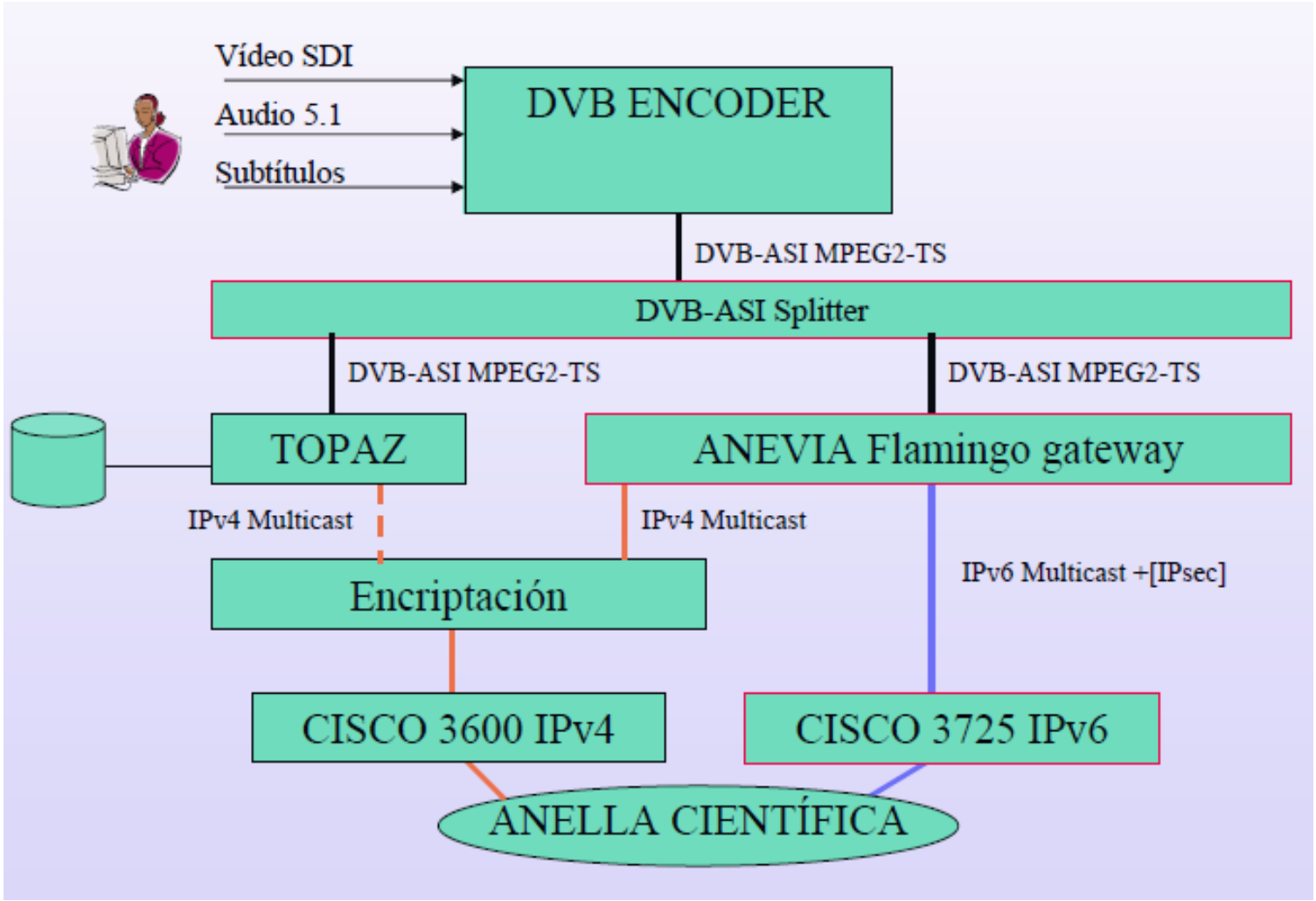
Participation using ISABEL



REMOTE CONTROL of TELESCOPES

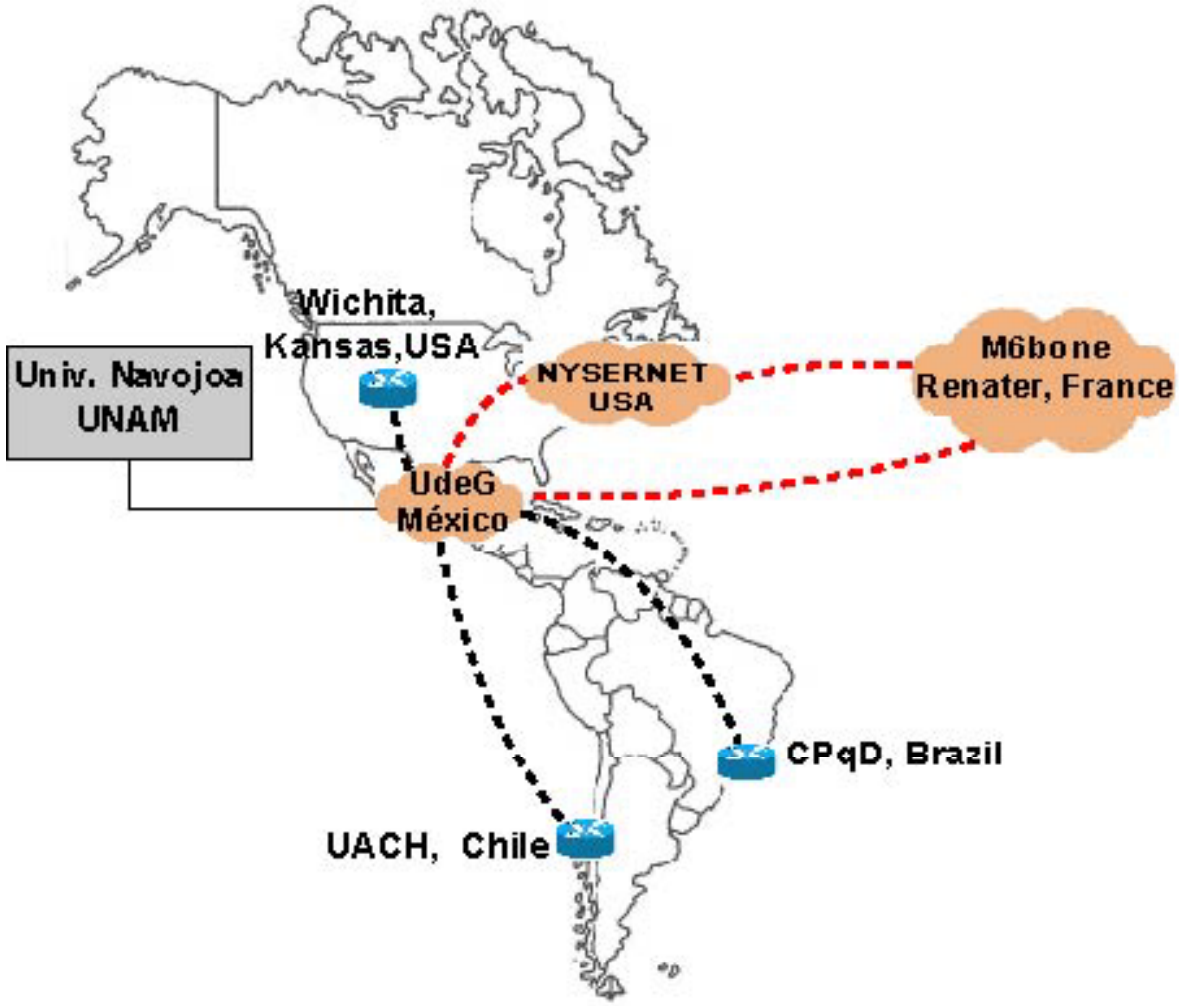


IPv6 Multicast in Opera Oberta

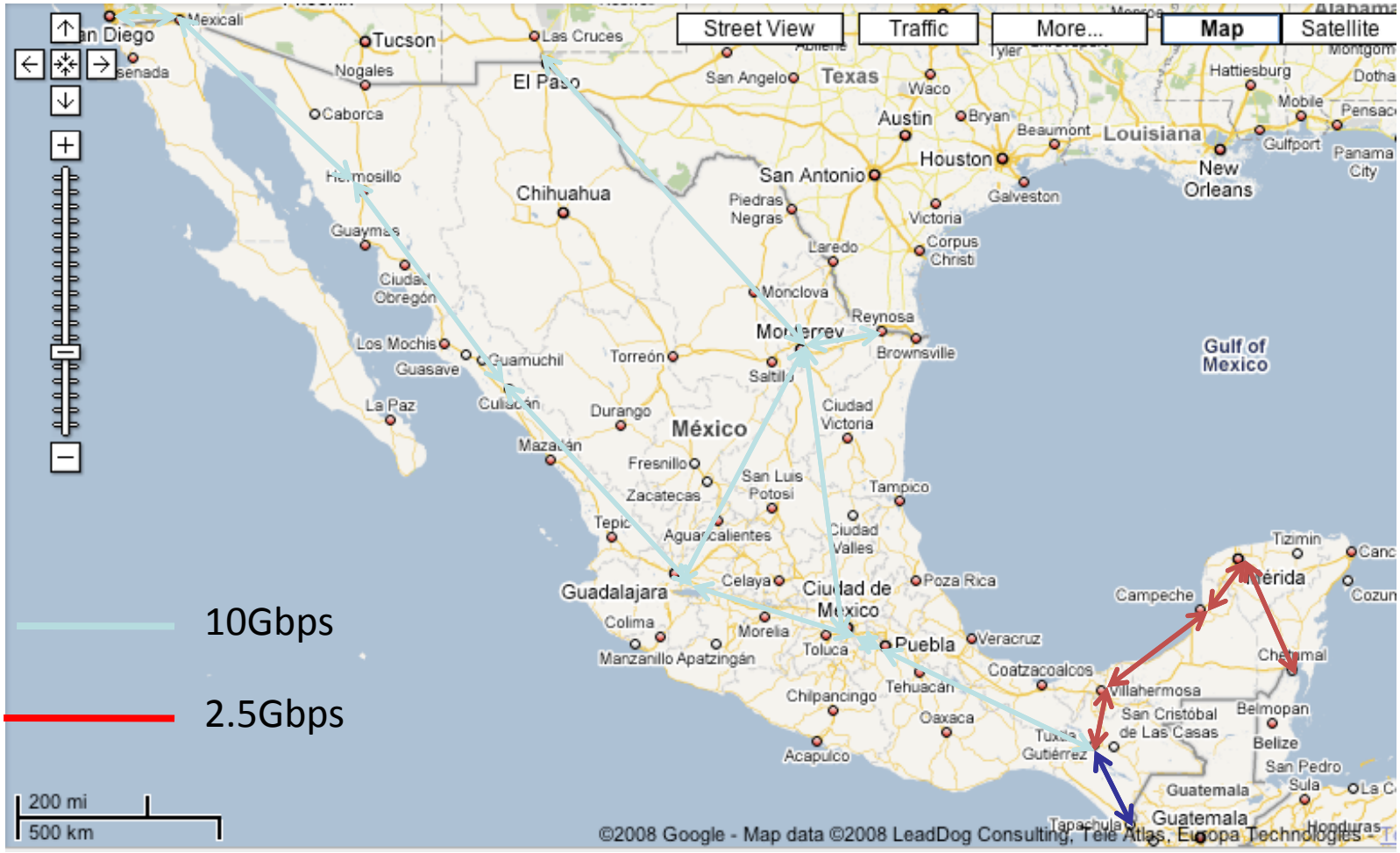


Source: Presentation of Ángel Fernández - Teatre del Liceu

M6Bone in Latin America



CUDI Network version 2 (2009-2010)



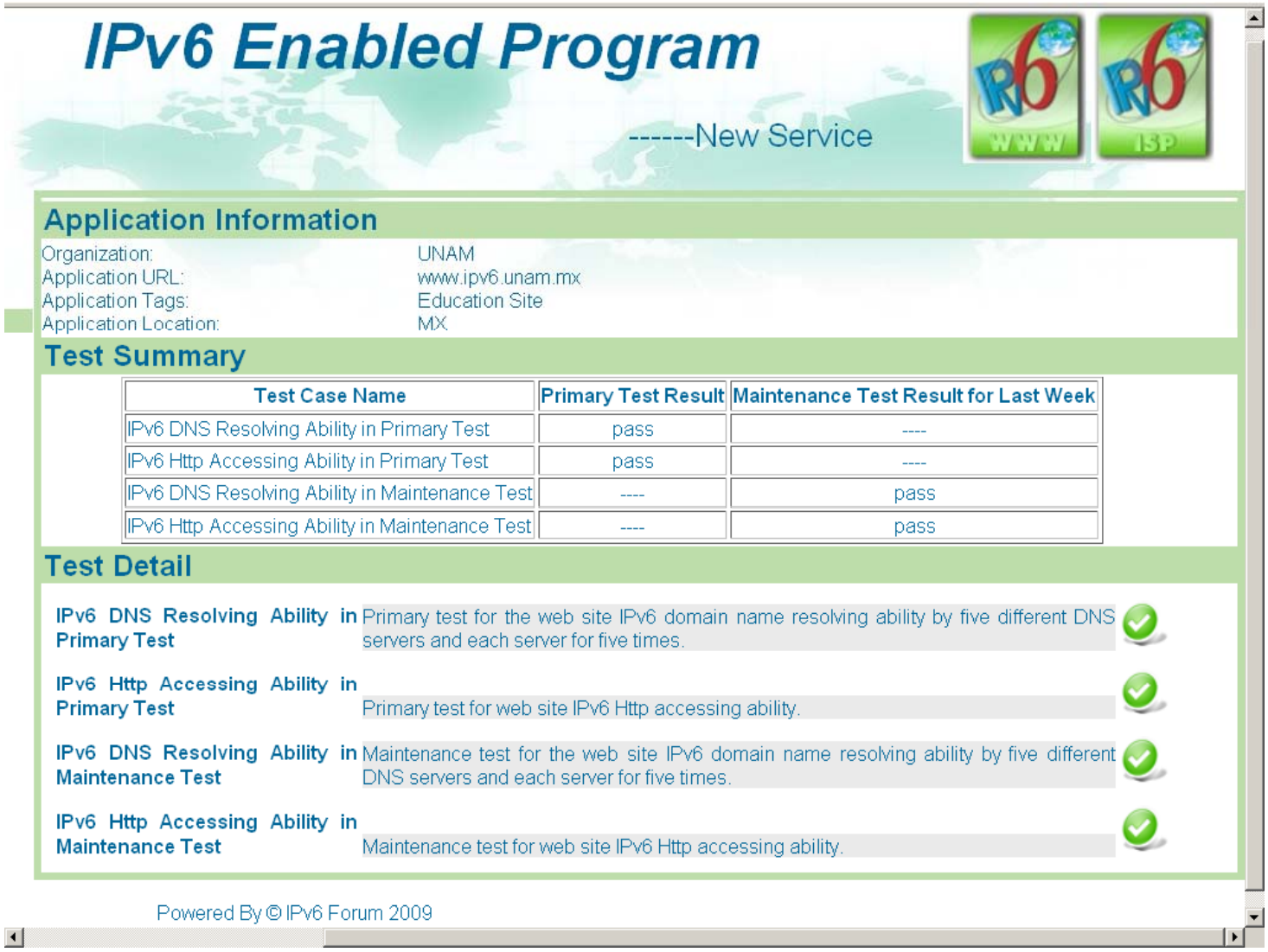
Source: Presentation of Fernando Muro. CUDI Coordinator

CLARA and CUDI IPv6 Challenge

Source:
www.mrp.net/IPv6_Survey.html

Organisation (domain)	Web	Mail	DNS	NTP	XMPP
AAIREP (Australia) (aarnet.edu.au)	SUCCESS	FAIL	0/0/4		FAIL
ANF (Korea) (anf.ne.kr)	FAIL	FAIL	0/0/2		
APAN (Korea) (kr.apan.net)	FAIL	FAIL	0/1/2		
ARNES (Slovenia) (arnes.si)	FAIL	FAIL	0/2/4		
BELNET (Belgium) (belnet.be)	FAIL	FAIL	1/1/3	FAIL	
C-DAC (India) (cdac.in)	FAIL	FAIL	0/0/4		
CANARIE, Inc. (Canada) (canarie.ca)	FAIL	FAIL	0/0/2		
CARNET (Croatia) (carnet.hr)	SUCCESS	FAIL	0/0/2	FAIL	FAIL
CEDIA (Ecuador) (cedia.org.ec)	FAIL	FAIL	0/0/1		
CERNET (China) (cernet.edu.cn)	FAIL	FAIL	0/0/2		
CESNET (Czech Republic) (ces.net)	SUCCESS	FAIL	1/3/3		
CLARA (Uruguay) (redclara.net)	FAIL	FAIL	0/0/1		
CNTI (Venezuela) (cnti.ve)	FAIL	FAIL	0/0/2		
CR2NET (Costa Rica) (crnet.cr)	FAIL	FAIL			
CSTNET (China) (cstnet.cn)	FAIL	FAIL	0/0/1		
CUDI (Mexico) (cudi.edu.mx)	FAIL	FAIL	0/0/5		
DFN-Verein (Germany) (dfn.de)	FAIL	FAIL	0/0/5		FAIL
ERNET (India) (ernet.in)	FAIL	FAIL	0/0/5		
Etisalat University College (UAE) (ece.ac.ae)	FAIL	FAIL	0/0/3		
EUN (Egypt) (eun.eg)	FAIL	FAIL	0/1/2		
FAPESP (Brazil) (fapesp.br)	FAIL	FAIL	0/0/2		
FCCN (Portugal) (fccn.pt)	SUCCESS	FAIL	2/2/2		
GARR (Italy) (garr.net)	FAIL	FAIL	0/0/2		
GEANT/DANTE (England) (geant.net)	SUCCESS	FAIL	0/1/4		
GIP RENATER (France) (renater.fr)	SUCCESS	SUCCESS	1/2/2		
GRNET (Greece) (grnet.gr)	SUCCESS	PARTIAL	0/1/5	FAIL	

UNAM IPv6 Web page



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.

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Asia-Pacific Economic Cooperation

Summary of IPv6 Activities in Mexico

- First National IPv6 seminaries 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.

@ congreso Internet.2002

Internet Society Internet 2009
Año decisivo para la Sociedad de la información en México

- Two Global IPv6 Summits in Mexico.
- 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)

e México

APEC Asia-Pacific Economic Cooperation

NECESSARY IPv6 PROMOTION in:

- Governmental IPv6 support. (Promotion Council)
- IPv6 Traffic Exchange Points
- ISPs with public IPv6 services
- Native IPv6 networks.
- Demo services.
- More Research and Develop Projects.
- Creation of different WGs.
- Spanish documentation.
- More Training and educative Programs.

Uses of IPv6

- Military.
- Projects:
  - National and international Grids.
  - Environmental monitoring (volcanic, etc).
  - Mobile IPv6

DRIVERS of IPv6

Users of many addresses and the always-on services:

- Wireless networks (MIPv6, 3G/4G, WiMax, etc.)
- ADSLv6, PLC, etc.
- Research and home networks.
- Online games, etc.

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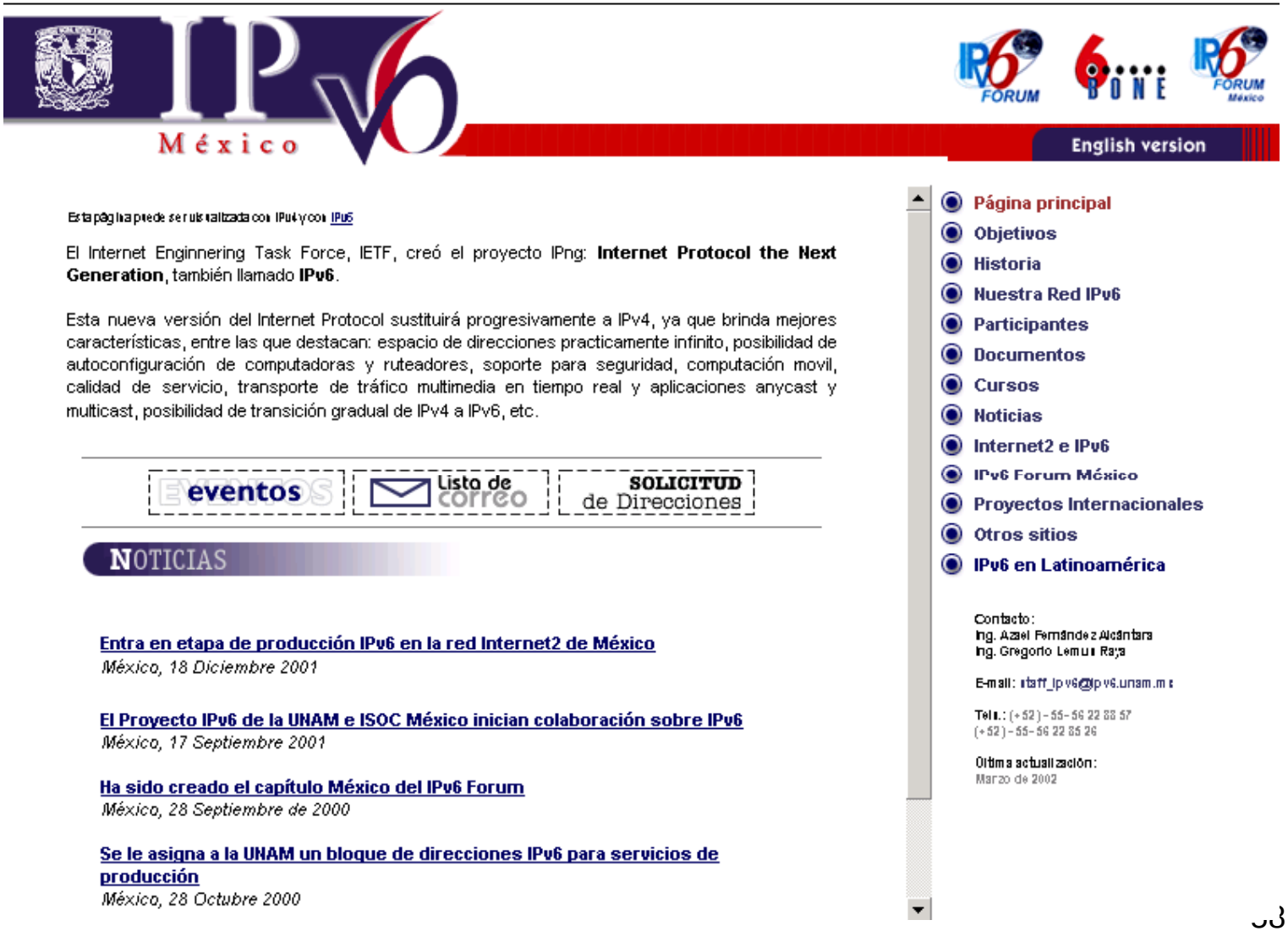
- www.redclara.net/index.php?option=com_content&task=view&id=77&Itemid=284&lang=en
- www.mrp.net/IPv6_Survey.html

www.ipv6.unam.mx



www.ipv6forum.com.mx

Inicio
Acerca de IPv6
Grupo de Trabajo
Noticias
Eventos
Documentos
Suscripción
Otros Sitios
Solo Miembros

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

Bienvenido al Capítulo Mexicano del Foro IPv6 Lunes 7 de Abril del

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

Eventos

Congreso Internet 2007

Cumbre IPv6

Cumbre de IPv6 en China

Eventos Próximos y pasados
Presentacioness y Documentos

Noticias y Artículos IPv6

Artículos y Documentos:

IPv6 Forum Roadmap &Vision 2010

IPv6 WG WIKI

http://wiki-gtipv6.reuna.cl/wiki/index.php

Thanks for your attention !

azael@ipv6.unam.mx

Asia-Pacific Economic Cooperation

Gracias !

azael@ipv6.unam.mx