# IPv6 International Efforts

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# "International" Regions



NORTH AMERICA

EUROPE

ASIA

AFRICA

SOUTH AMERICA

# IPv6 International Efforts

Where it all started – 6Bone

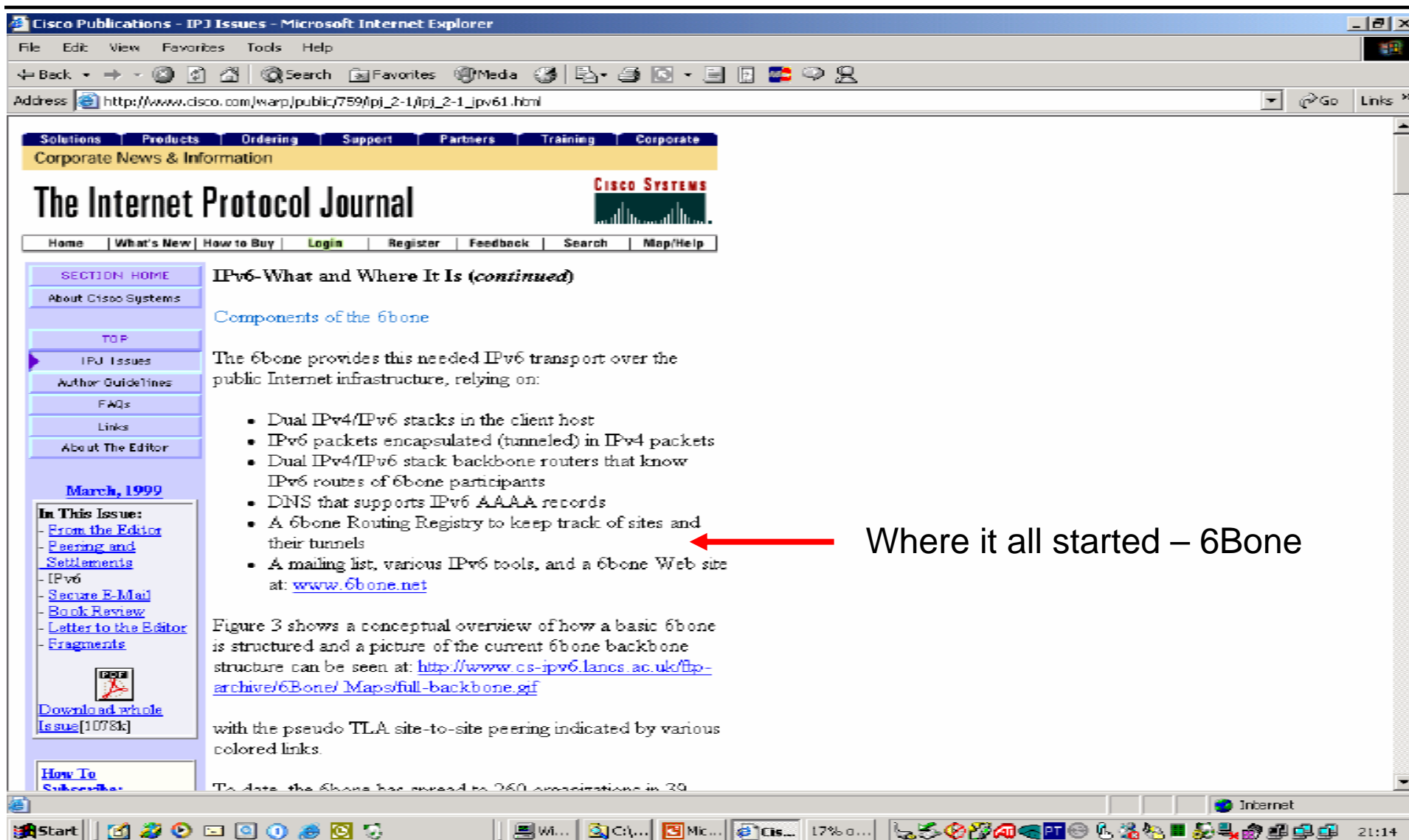# IPv6 International Efforts

**Router w/ Dual Stack**

With this 6bone architecture, once an IPv6-capable test site has an IPv6 over IPv4 "tunnel" to a 6bone backbone router, then any IPv6 packet directed to it will be delivered to the appropriate 6bone site

## 6bone History

Serious work to evolve and refine the IPv6 protocols sufficient to allow the start of various implementations of IPv6 began in 1994. By early 1996, it was obvious that a testing environment was needed, so in March 1996, several implementers and users met and agreed to start an international testbed called the 6bone.

By June 1996, two groups raced to provide the first IPv6 connectivity: the University of Lisbon (Portugal), the Naval Research Laboratory (U.S.), and Cisco Systems (U.S.); a Danish universities consortium (UNI-C), a French universities consortium (G6), and a Japanese universities consortium (WIDE).

# US-led Initiatives
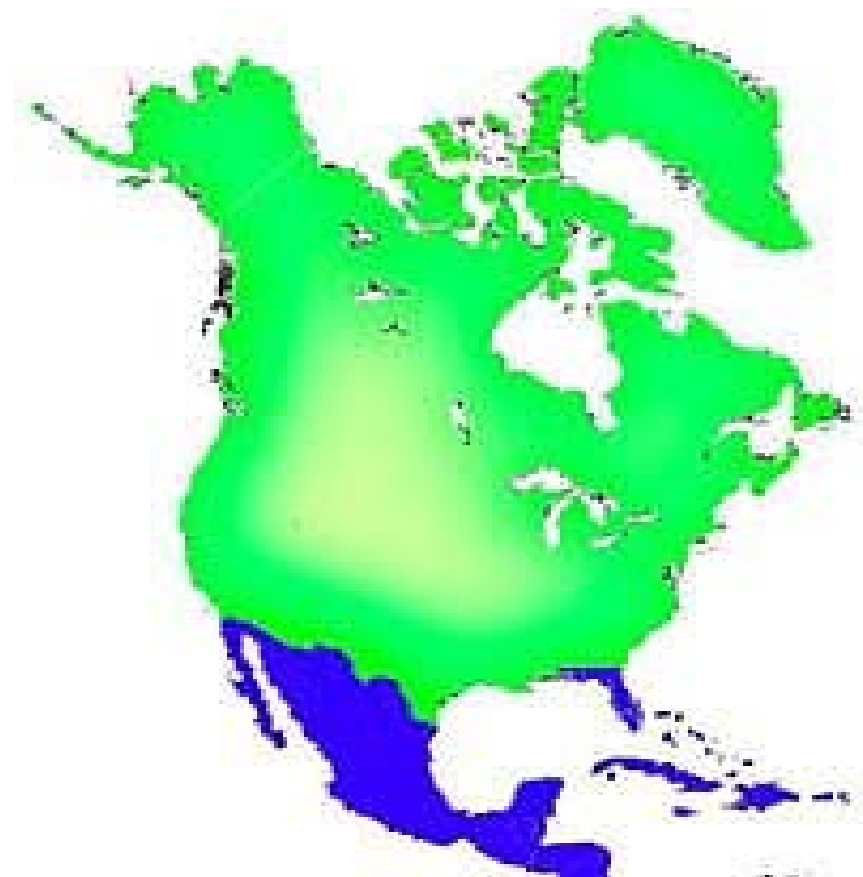
Moonv6

Metronet6

Occaid

# Moonv6 (2003 – 2008)

Joint collaboration between Joint Interoperability Test Command (JITC), DoD agencies, Internet-2, University of New Hampshire-Interoperability Lab, and the North-America IPv6 Task Force

Real-life deployment to prepare the U.S. DoD for IPv6 integration



moonv6
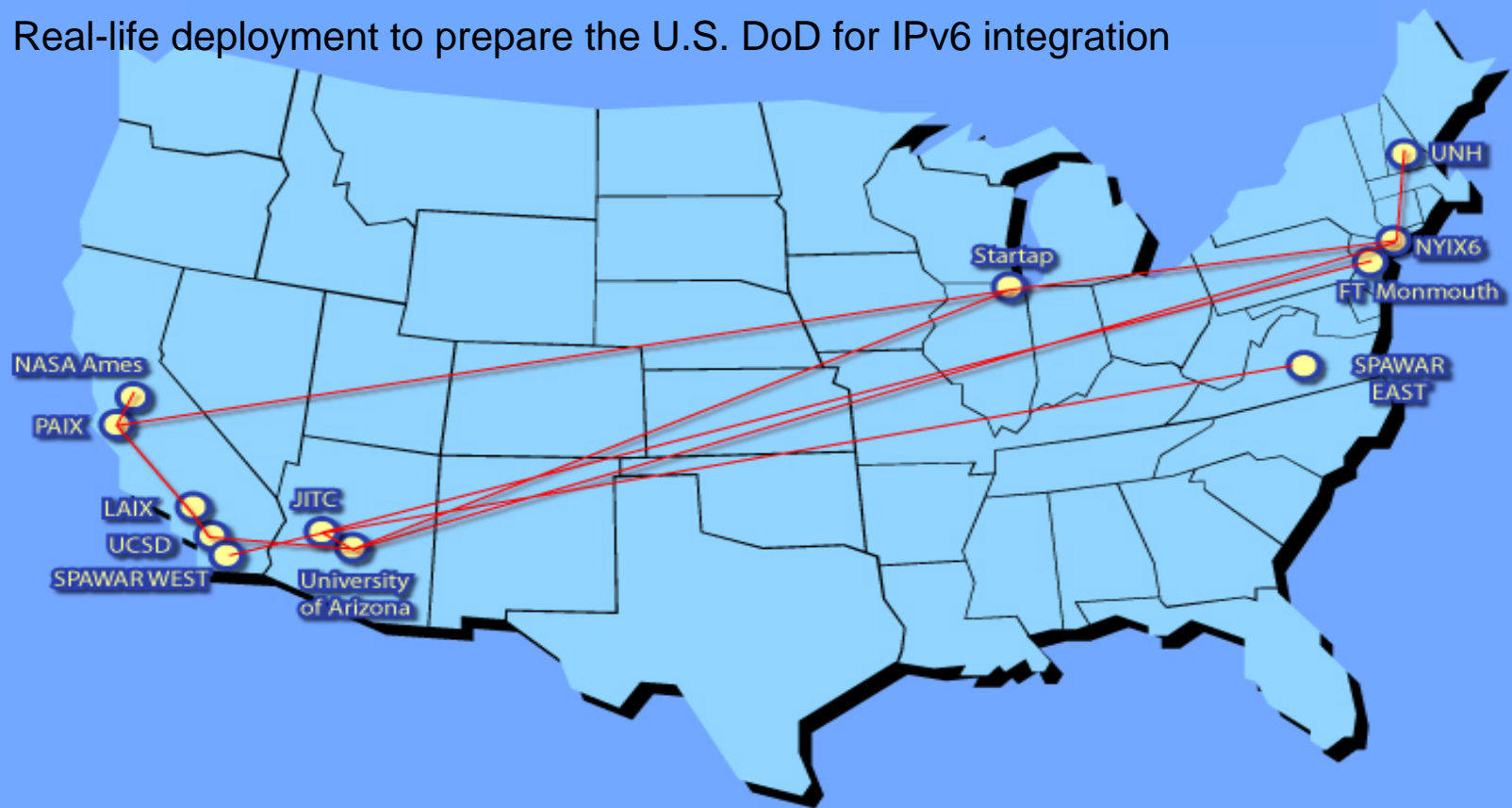
# Metronet6 (2006 – )

Communication between multiple first responder Independent networks



Access Network A

Provider Network A Infrastructure (Police)

Police
Wireless Link Media
First responder Mobile Ad-hoc network A

Access Network B

Provider Network B Infrastructure (Fire Department)

Fire Dept
Wireless Link Media
First responder Mobile Ad-hoc network B
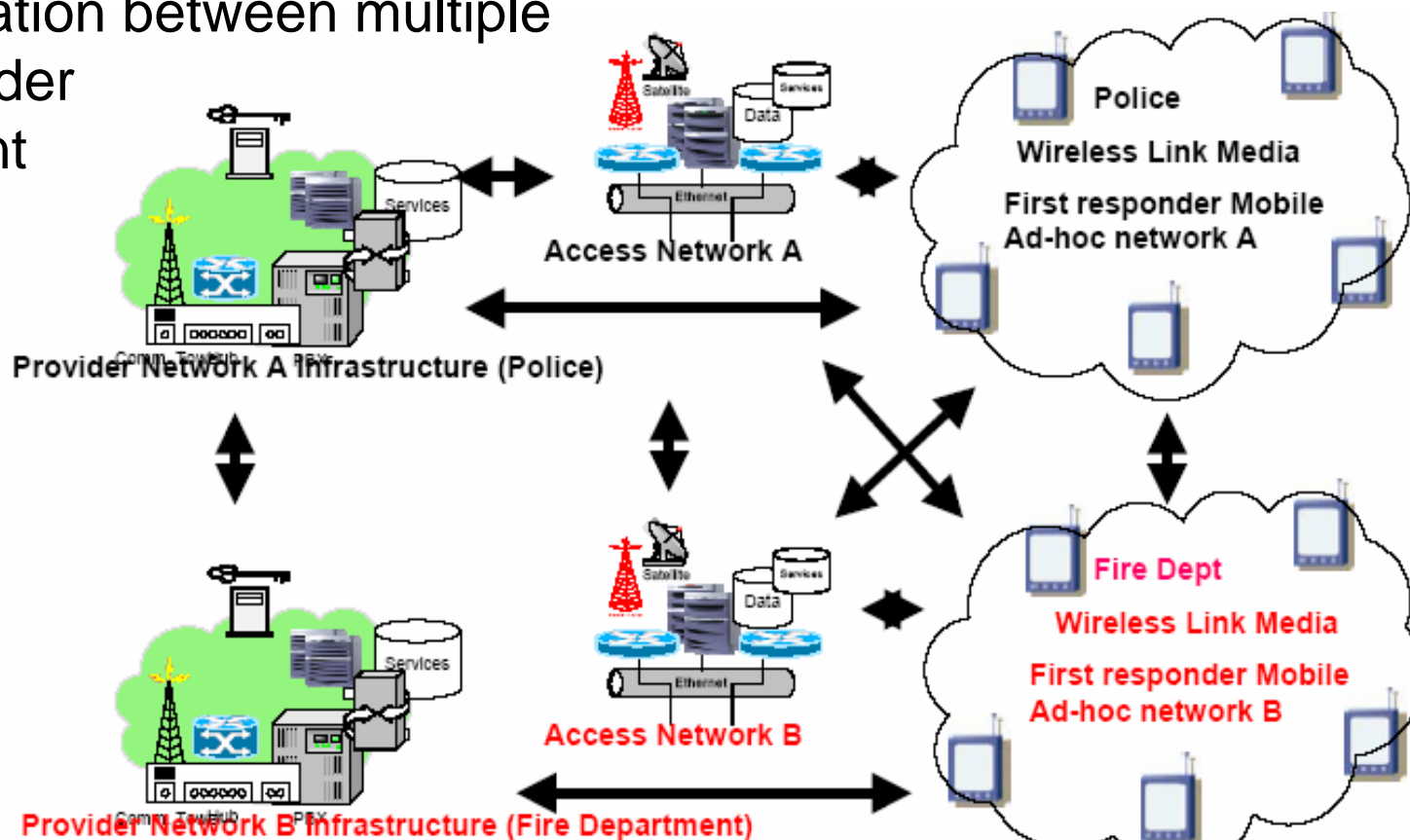
Note: Metropolitan EMN Internet Network does not exist in this use case example.

# Metronet6 (2006 – )

MetroNet6 supports the ability for a command center to be established in an Ad Hoc manner to communicate with the MetroNet6 Homeland Security Force and National Homeland Security Office using wireless or broadband communications.
MetroNet6 should be able to add additional Ad Hoc Sub-Networks as required such as the National Guard, Air Command, or other U.S. Agencies that must connect to the MetroNet6 during a disaster.

A Press Release was issued on 8th November 2006, concerning collaboration between Metronet6 and u-2010 (EU-IST project), the IPv6 task Force and the IPv6 Forum.

# OCCAID

OCCAID :     Open Contributors Corporation for
                    Advanced Internet Development

It is a collaboration between research communities and ISPs, working to develop and deploy Next Generation Network technologies for the enrichment of commercial and advanced Internet applications
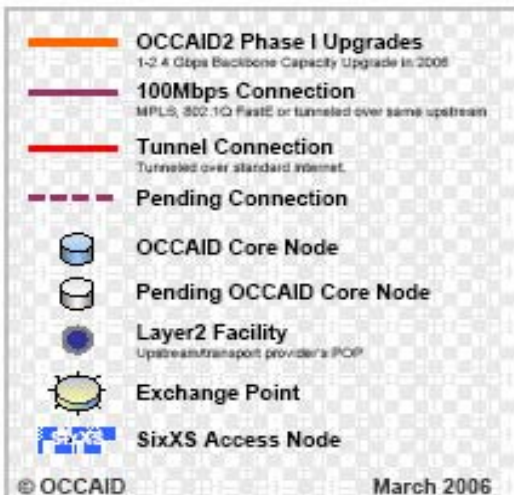
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# South America-led Initiatives
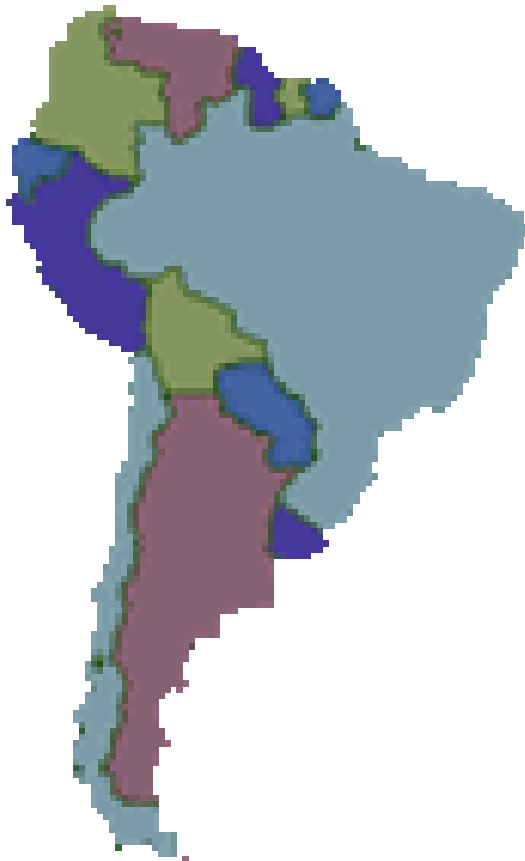
ALICE

RedCLARA

Map courtesy of Theodora.com

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# ALICE (2003 – 2006)

ALICE: America Latina Interconectada Con Europa

€12.5M from the EC represents 80% of constructing
and operating the RedCLARA network
(the other 20% comes from the LA partners)

The goal was to develop an IP research network
infrastructure within the Latin American region and
towards Europe.

# RedCLARA Network

(April 2006)



Backbone Topology April 2006

# Asia-led Initiatives

U-Japan

Live-e!

Nautilus6

CNGI

# U-Japan

http://www.soumu.go.jp/menu_02/ict/u-japan_en/index2.html

## u-Japan Policy
### Working Toward Realizing the Ubiquitous Network Society by 2010

**u-Japan Policy Overview**

A detailed overview of the Ministry of Internal Affairs and Communication's u-Japan Policy and concrete issues.

**Examples of ICT usage in u-Japan society**

→ Contributing to Future Deployment of e-Japan Strategies

→ The Potential of ICT to Resolve Social Problems

→ The u-Japan Concept

→ Structure of the "u-Japan Policy Package"

# Basic u-Japan Concept

## u－Japan is the next generation ICT society from 2010

### u－Japan （Ubiquitous Japan）

#### Ubiquitous
**Connects everyone and everything**

○An easy-to-use network anytime, anywhere, with anything and for anyone.
· ICT will be everywhere in daily life for a user-friendly society
○Person2Person plus Person2Goods, and Goods2Goods
· In every aspect, communication will take the more important role in society

#### Universal
**User-friendly**

○Gentle with people
· Can be used by anyone without thinking of the equipment or network
· The aged and disabled will be able to participate in society with ICT
○Interaction
· A heart to heart interaction overcoming barriers between generations and localities to create togethemess

#### User-oriented
**From the user's point of view**

○Close to the user
· For a society that is user-orientated than a society where objects are given by the supplier
· Developing technologies and services that are connected to our needs

#### Unique
**Be something special**

○Create individual energy
· A new society where your dreams come true
○Vitalize the society
· Create new social systems and business services
· Get out from the norm and realize local revitalization with creativity
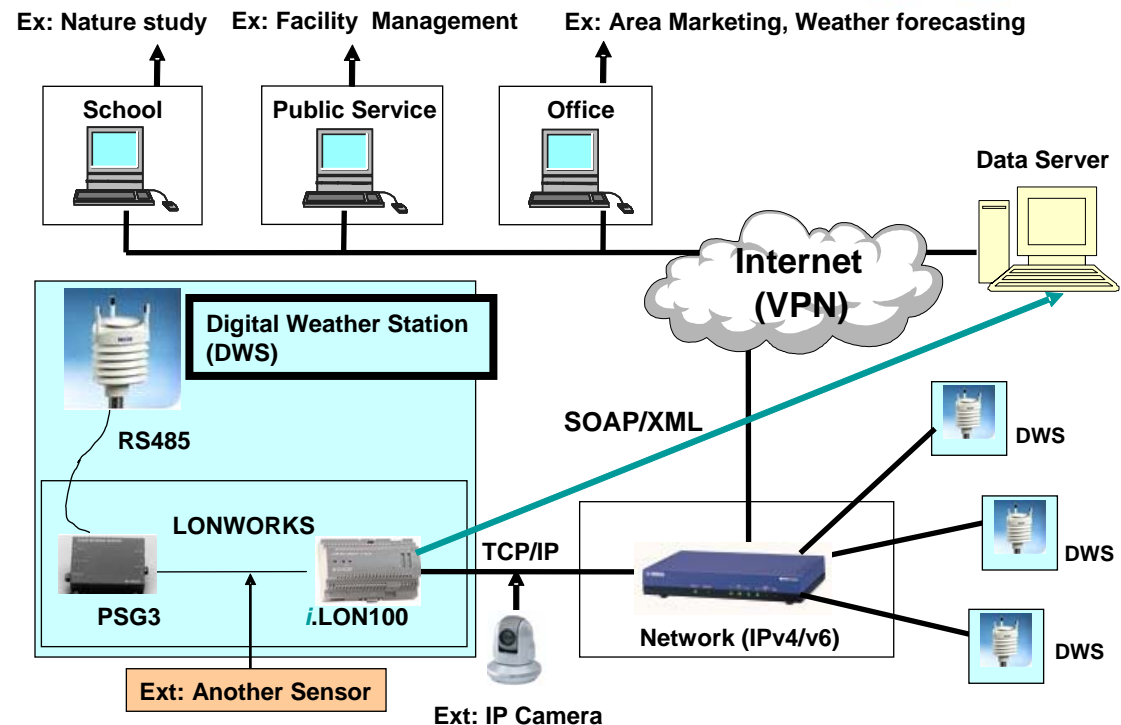
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# Live-e! (2006 – )

- The goal is to gather, process, and share "Environmental Information", worldwide

- "Environmental Information" is collected by "Digital Weather Station", IP cameras, etc. that are set up by individuals and organizations voluntarily.

- Simple "Digital Weather Stations" acquire weather information with low cost and send the information to a data server via the Internet and JGN2 (Japan Gigabit Network).

    JGN2: http://www.jgn.nict.go.jp

- Targeted at education, public service and businesses.

**Ex: Nature study   Ex: Facility  Management       Ex: Area Marketing, Weather forecasting**

School

Public Service

Office

Data Server

**Internet (VPN)**

Digital Weather Station (DWS)

RS485

SOAP/XML

DWS

LONWORKS

TCP/IP

DWS

PSG3       *i*.LON100

Network (IPv4/v6)

DWS

Ext: Another Sensor

Ext: IP Camera

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# Nautilus6 (2003-

**www.nautilus6.org**

- focus on mobility aspects
- a WG in the WIDE project: www.wide.ad.jp

The WIDE Project ("technology bringing society together")

- Launched in 1988
- They aim to provide global connection between computers and all other equipment, to bring to the fore the relative issues and problems
- They claim the world's first undertaking of IPv6

# CNGI (2004 – )

- Led by China Government
- National IPv6 backbone built independently by the participants and interconnected by at least 2 IPv6 IXs
- Total funding from government and the carriers will be 170M$
- Includes 5 major carriers + NREN
  - China Telecom, China Unicom, China Netcom/CSTNET, China Mobile, China RailCom and CERNET
- Aiming for, by the end of 2006:
  - 39 GigaPOPs
  - >300 CPNs
  - Nationwide coverage

# Other Asian URLs

- IPv6 Promotion Council: www.v6pc.jp

- KAME Project: www.kame.net
  - a free stack of IPv6, IPsec, and Mobile IPv6 for BSD variants

- TAHI Project: www.tahi.org
  - IPv6 validation, since 1988

- USAGI (UniverSAI playGround for Ipv6) Project: http://www.linux-ipv6.org/
  - linux IPv6 development …. led by Jun Murai

- DVTS Consortium:  www.dvts.jp   (in Japanese)

- Internet ITS Consortium: www.internetits.org
  - Internet for cars

- AI3 : www.ai3.net
  - operates a satellite based testbed network in SE Asia

- JPNIC : www.nic.ad.jp
  - National Internet registry for Japan

# Africa-led Initiatives

AfriNIC/AfNOG
IPv6 training
across Africa

# AfriNIC/AFNOG

AfriNIC is the Regional Internet Registry for Africa

AfriNIC's mission is:

- to provide the professional and efficient distribution of Internet number resources to the African Internet community

- to support Internet technology usage and development across the continent

- to strengthen self Internet governance in Africa by encouraging a participative policy development

# AfriNIC/AFNOG

The Africa Network Operators Group (AfNOG) is a forum for the exchange of technical information

It aims to promote discussion of implementation issues that require community cooperation through coordination and cooperation among network service providers to ensure the stability of service to end users

The goal of AfNOG is to share experience of technical challenges in setting up, building and running IP networks on the African continent

AfriNIC and AfNOG are runnning a series of IPv6 training courses throughout Africa, supported by Jordi Palet and 6DISS

# European-led Initiatives

IPv6 Task Forces

IPv6 Forum

6bone, M6bone

6NET, Euro6IX

GÉANT

U-2010

Occasion

6DISS

Map courtesy of Theodora.com

# IPv6 Task Forces

Europe: http://www.ipv6-taskforce.org/#

- Belgium, France, Germany, Italy, Spain, Swiss, UK, …

North-America: http://www.nav6tf.org/

Japan (IPv6 Promotion Council):
http://www.v6pc.jp/en/index.html

China, Korea, India, Taiwan,…

# IPv6 Forum

IPv6 Forum : www.ipv6forum.com

42 IPv6 Forum chapters worldwide:

| | | |
|---|---|---|
| Australia | Austria | Belgium |
| Brazil | Bretagne | California |
| China | Columbia | Cuba |
| Denmark | Egypt | Finland |
| India | Ireland | Israel |
| Italy | Japan | Korea |
| Latin America | Luxembourg | Malaysia |
| Malta | Mexico | Mid Atlantic IPv6 TF |
| Morocco | Netherlands | North America |
| Pacific Islands | Pakistan | Peru |
| Poland | Portugal | Russia |
| Senegal | Spain | Switzerland |
| Taiwan | Thailand | Tunisia |
| United Kingdom | United Arab Emirates | |

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# IPv6 Forum

## The „IPv6 Ready" programme

The logo is a certification of compliance and interoperability

| Country | Phase I | Phase II |
|---------|---------|----------|
| JP | 116 | 25 |
| US | 35 | 14 |
| TW | 35 | 9 |
| CN | 15 | 6 |
| KR | 29 | 4 |
| IN | 4 | 4 |
| CA | 2 | 2 |
| DK | 2 | 1 |
| FR | 1 | 1 |
| NZ | 8 | 0 |
| IL | 1 | 0 |
| SE | 2 | 0 |
| DE | 2 | 0 |
| AT | 1 | 0 |
| PH | 1 | 0 |
| **Total** | **254** | **66** |

| Continent | Phase I | Phase II | Total |
|-----------|---------|----------|-------|
| Asia | 200 | 48 | **248** |
| America | 37 | 16 | **53** |
| Europe | 9 | 2 | **11** |
| Oceania | 8 | 0 | **8** |

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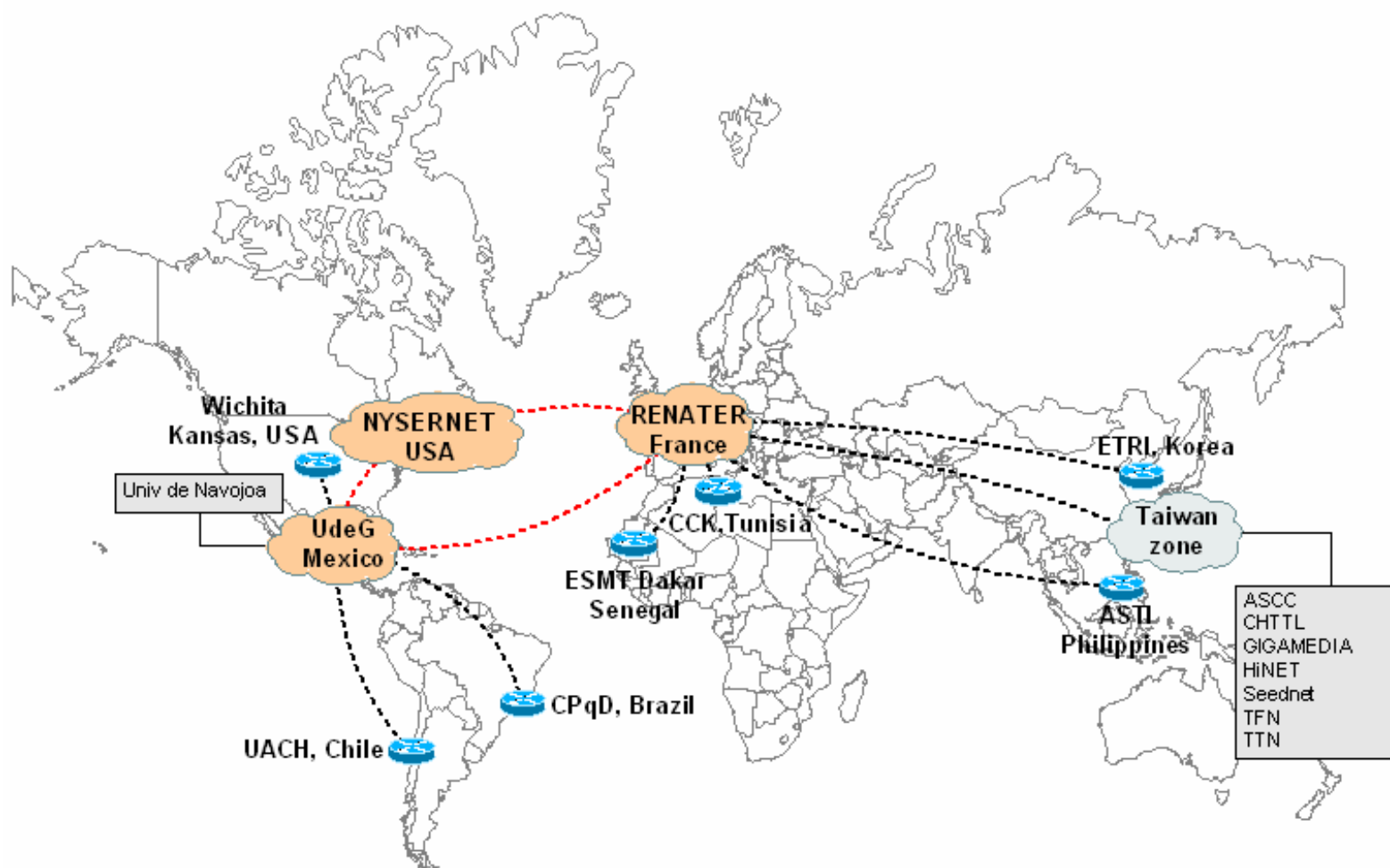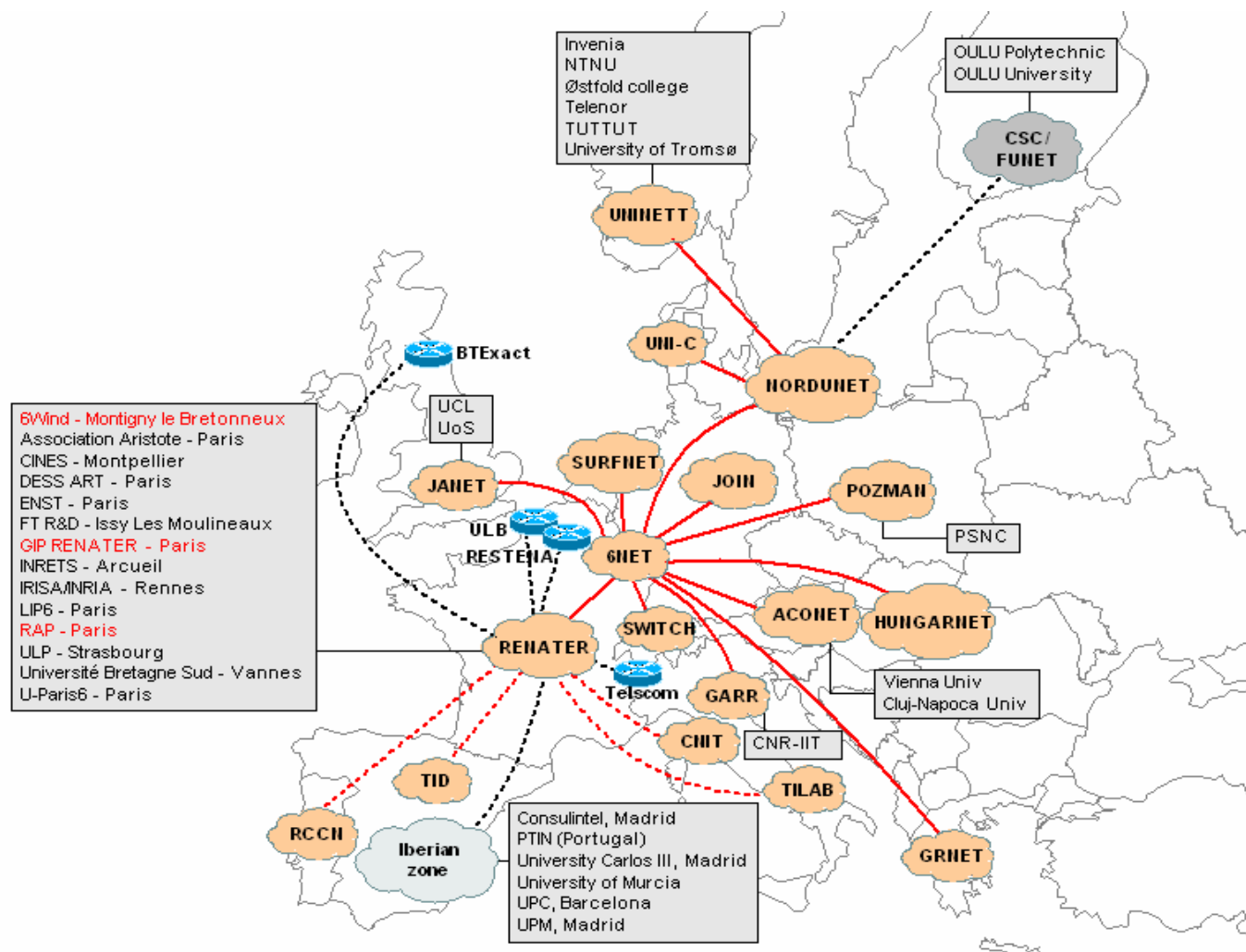
# 6bone (1996 – 2006)

**IETF: v6ops   ngtrans**

The 6bone was established in 1996 by the IETF as an IPv6 Testbed network to enable various IPv6 testing as well as to assist in the transitioning of IPv6 into the Internet.
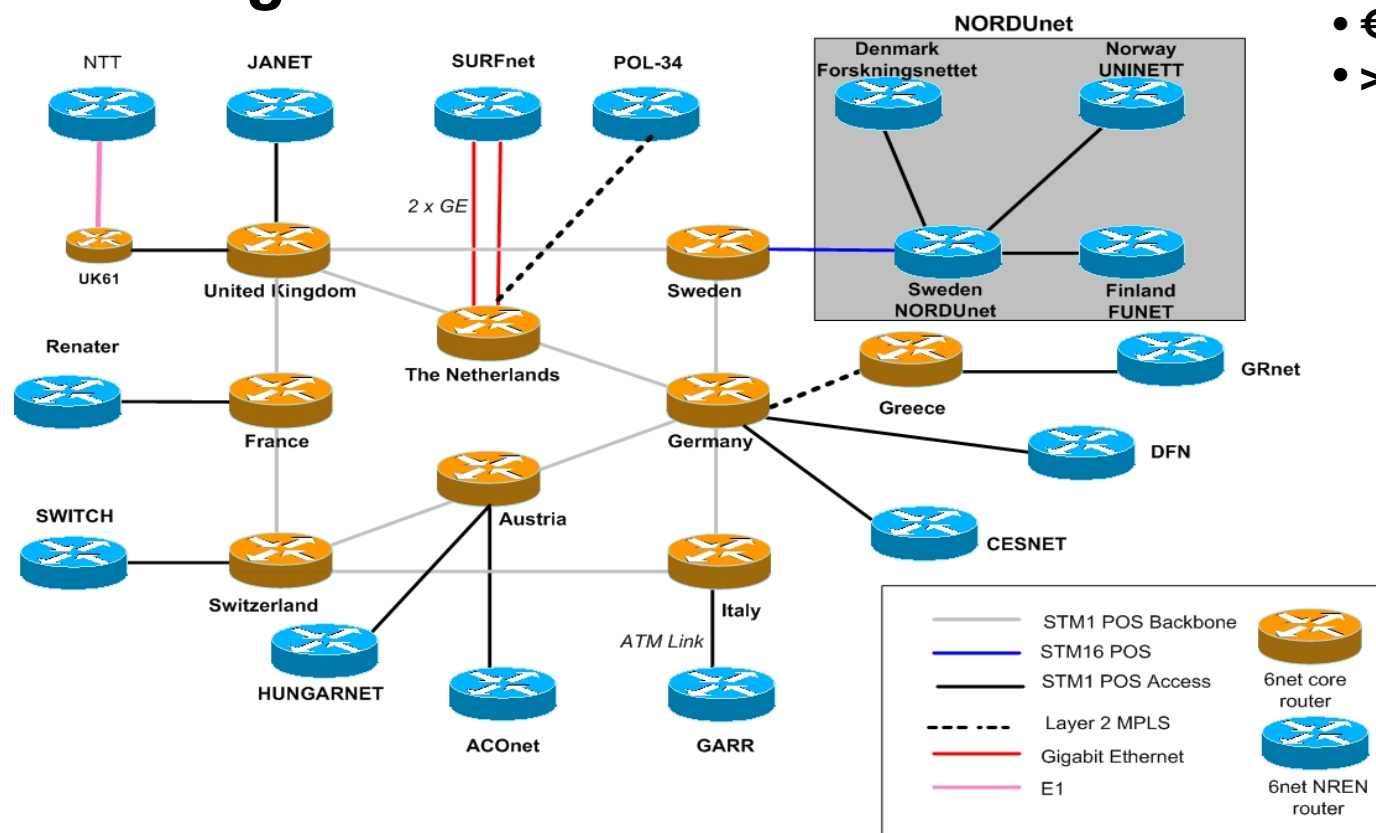
Officially phased out in June 2006

# M6bone



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# M6bone

# 6NET (2002 – 2005)

**www.6net.org**

- 3.5-year project
- €9.5M from EC
- >40 partners



**Cisco 12400 and 7200 series routers**

Inter-continental connectivity to Internet-2, WIDE, KOREN

# Euro6IX (2002 – 2005)

***www.euro6ix.org***

- 3+ year project
- €7.7M from EC
- 17 partners



- Targetted at Telcos, ISPs, ASPs
  - Network design
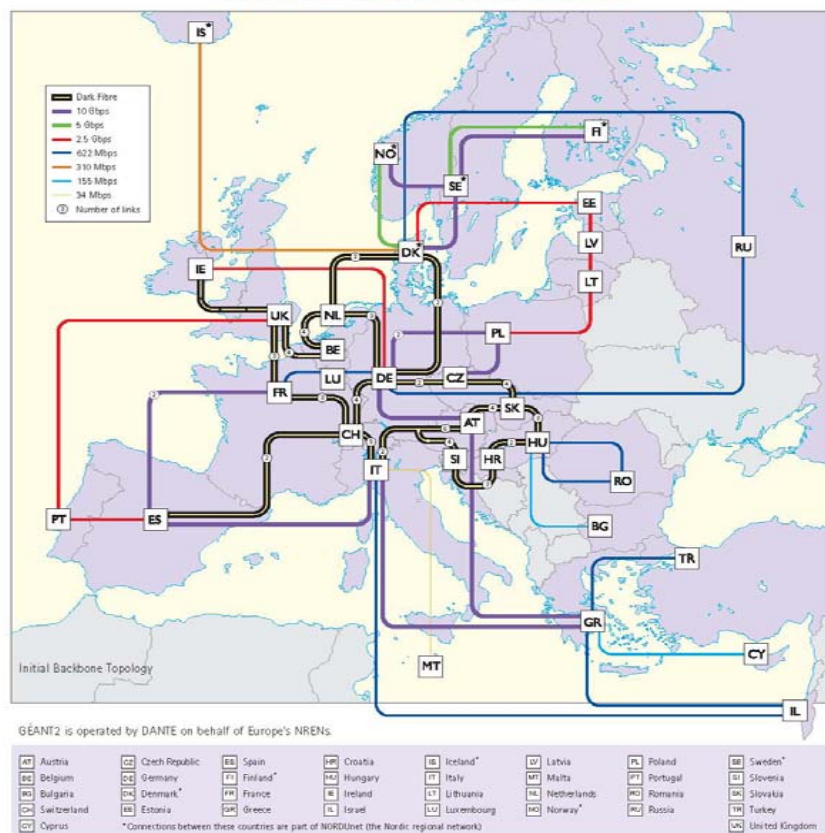  - Applications
  - Standards
  - Dissemination

Pan-European IPv6 Backbone:

- London, Paris, Berlin, Madrid, Lisbon, Zurich, Turin

Intercontinental link to Japan, via NTT
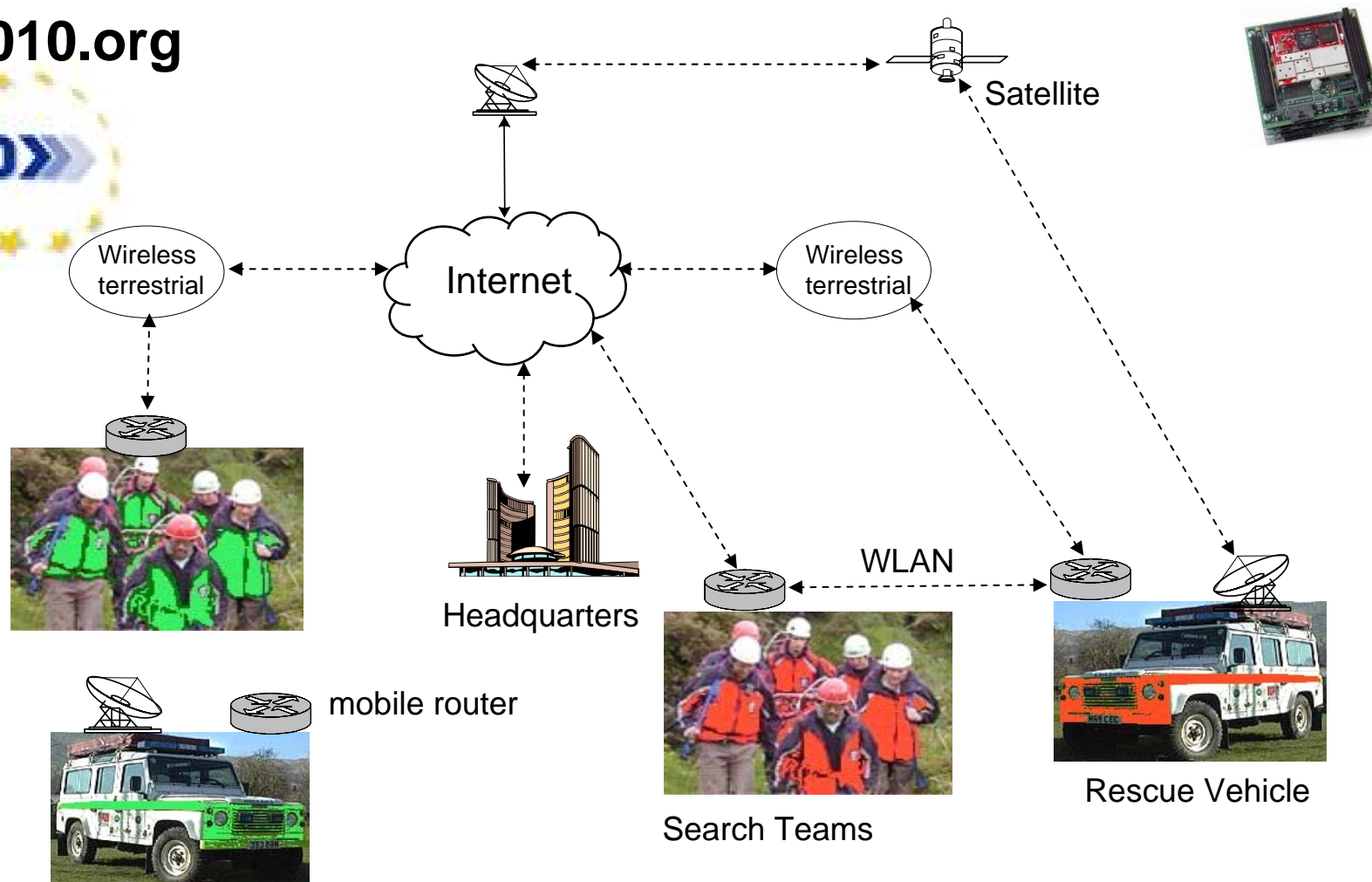
# GÉANT2

## 2004 - 2008



The GÉANT2 network will connect 34 countries through 30 NRENs, using multiple 10Gbps wavelengths

Intercontinental connectivity to
- North America
- Latin America
- Asia-Pacific (India just added)
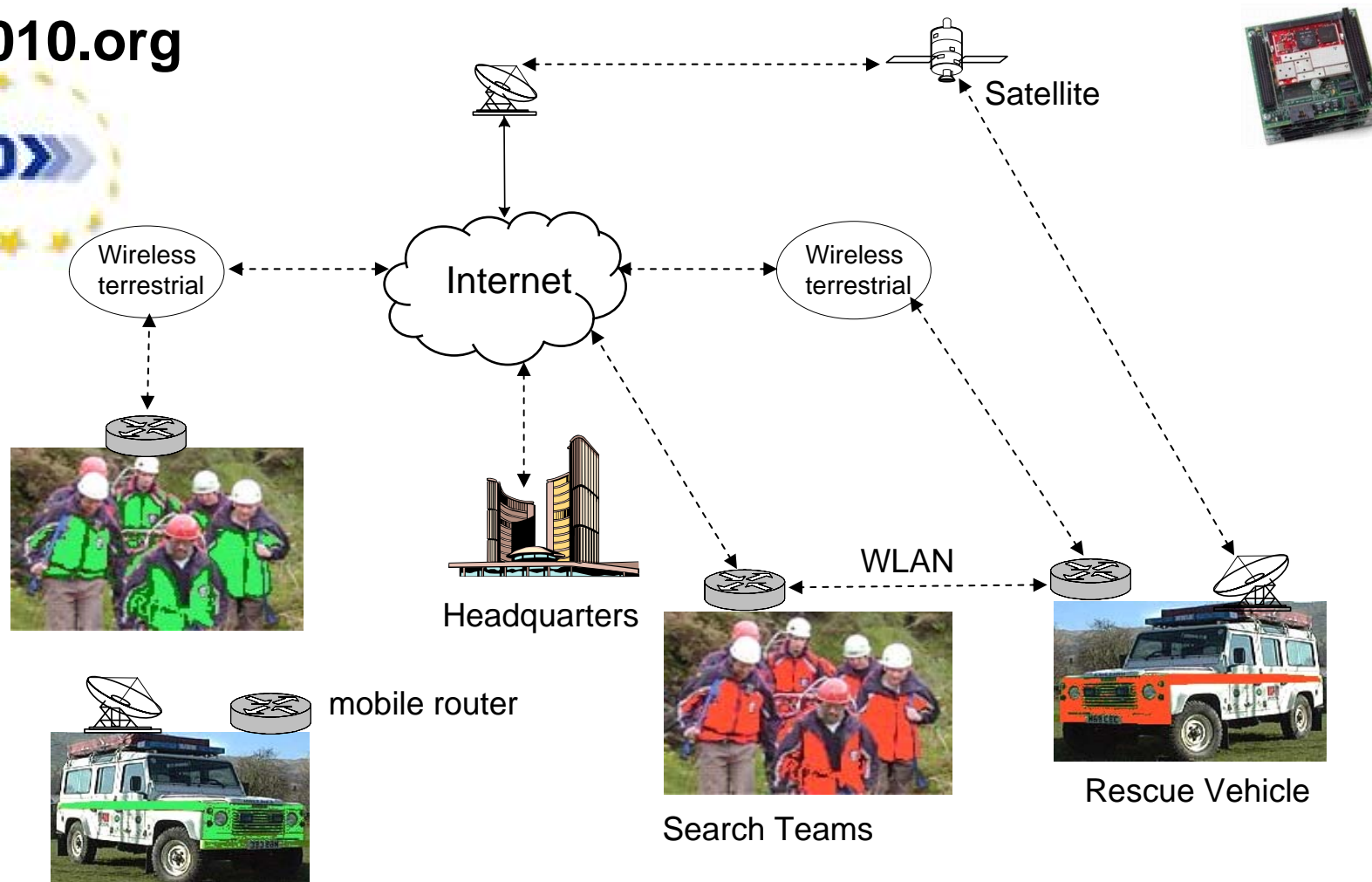- North Africa
- South Africa
- Middle East

# U-2010 (2006 – 2008)

**www.u2010.org**



Satellite

Wireless terrestrial

Internet

Wireless terrestrial

Headquarters

mobile router

WLAN

Search Teams

Rescue Vehicle

# Occasion (2005 – 2007)

**www.u2010.org**



Satellite

Wireless terrestrial

Internet

Wireless terrestrial

Headquarters

mobile router

WLAN

Search Teams

Rescue Vehicle
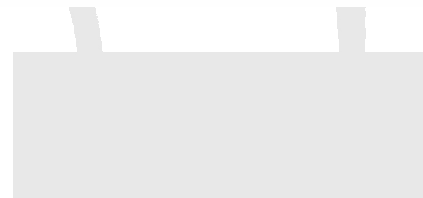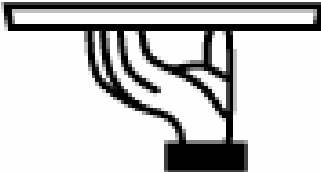
# 6DISS (2005-2007)

**www.6diss.org**

IPv6DISSemination and Exploitation

# 6DISS Objectives

1. To transfer our knowledge on IPv6 deployment to NRENs, Universities, commercial organisations, ISPs, governments and regulators in:
   - Africa (Southern, sub-Saharan and Mediterranean)
   - Asia Pacific Region
   - South and Central America
   - SE Europe
   - Newly-Independent States
   - The Caribbean

2. To help integrate organisations from the visited regions into subsequent European projects
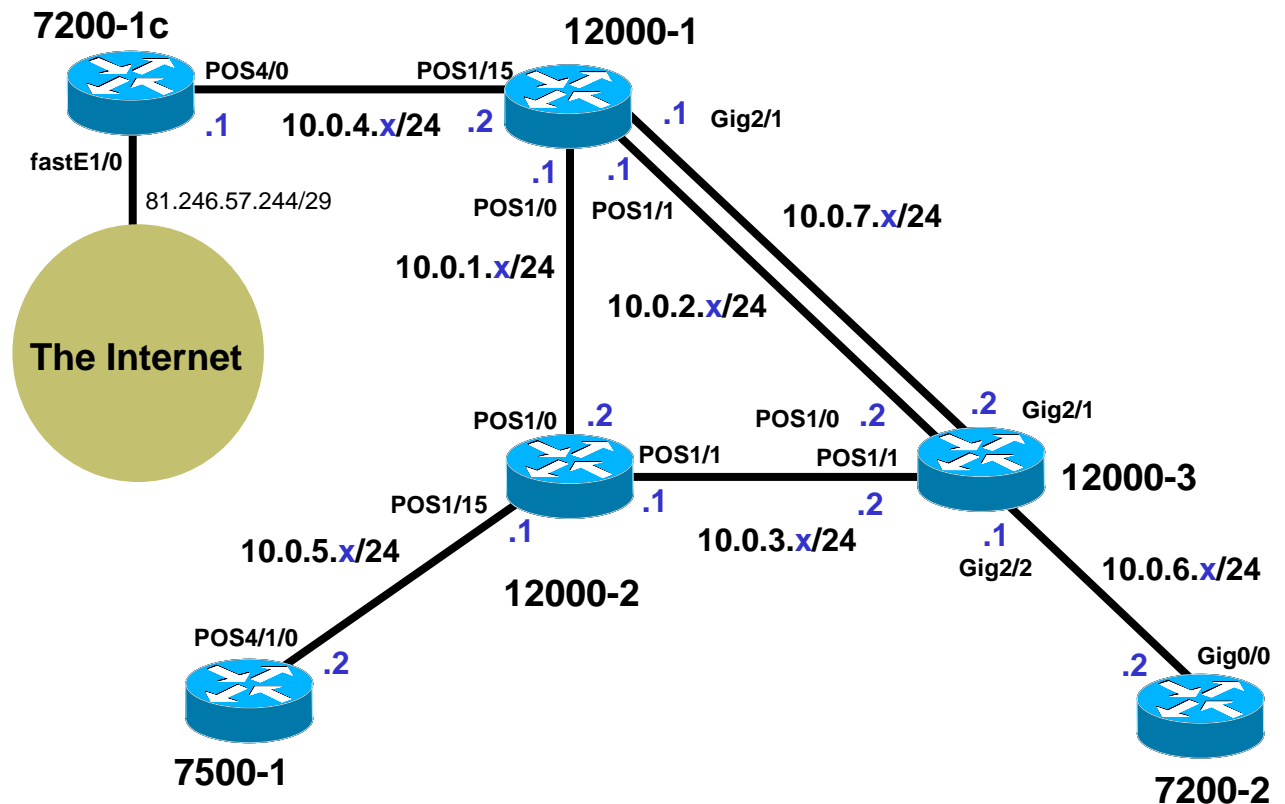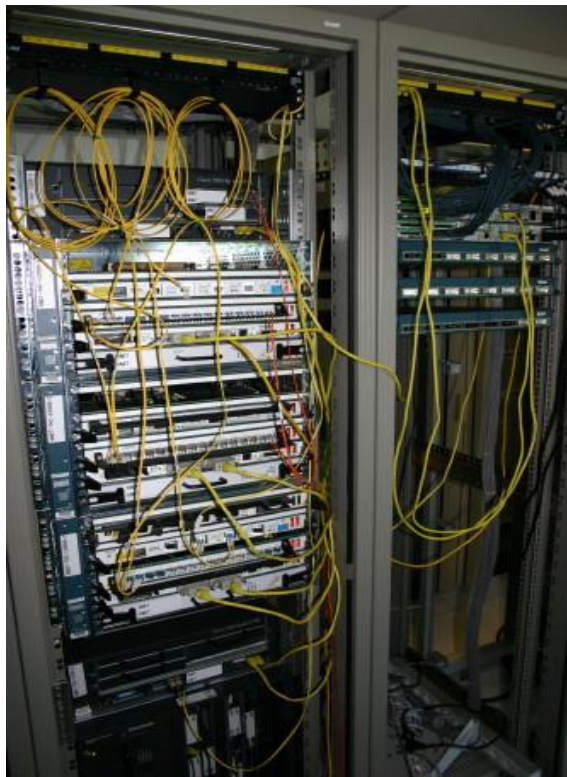
# 6DISS Toolkit

- Workshops (slideware + access to remote labs)

- E-learning package

- Training the Trainers manual

- IPv6 Technical Training course

- Tiger Team (helpdesk@6diss.org)
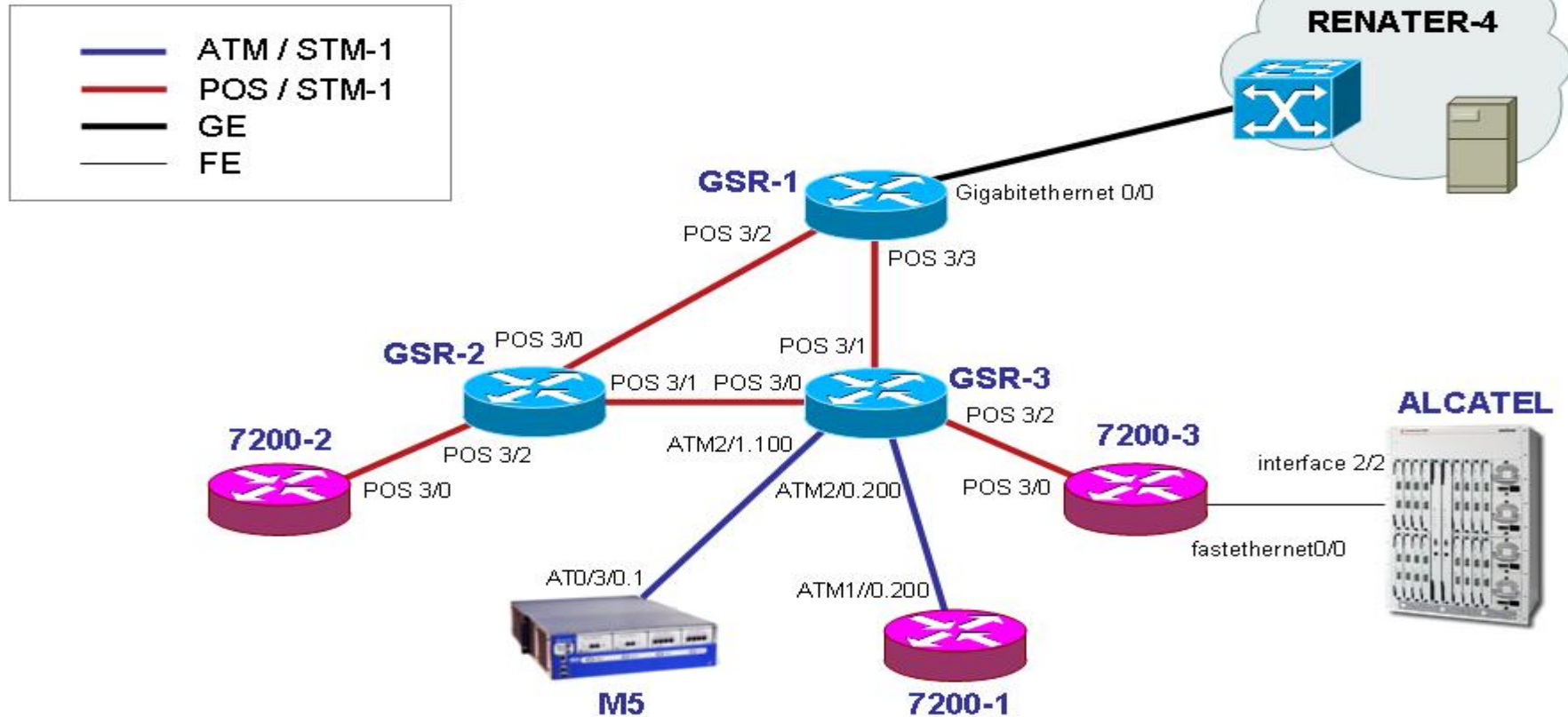
- Website

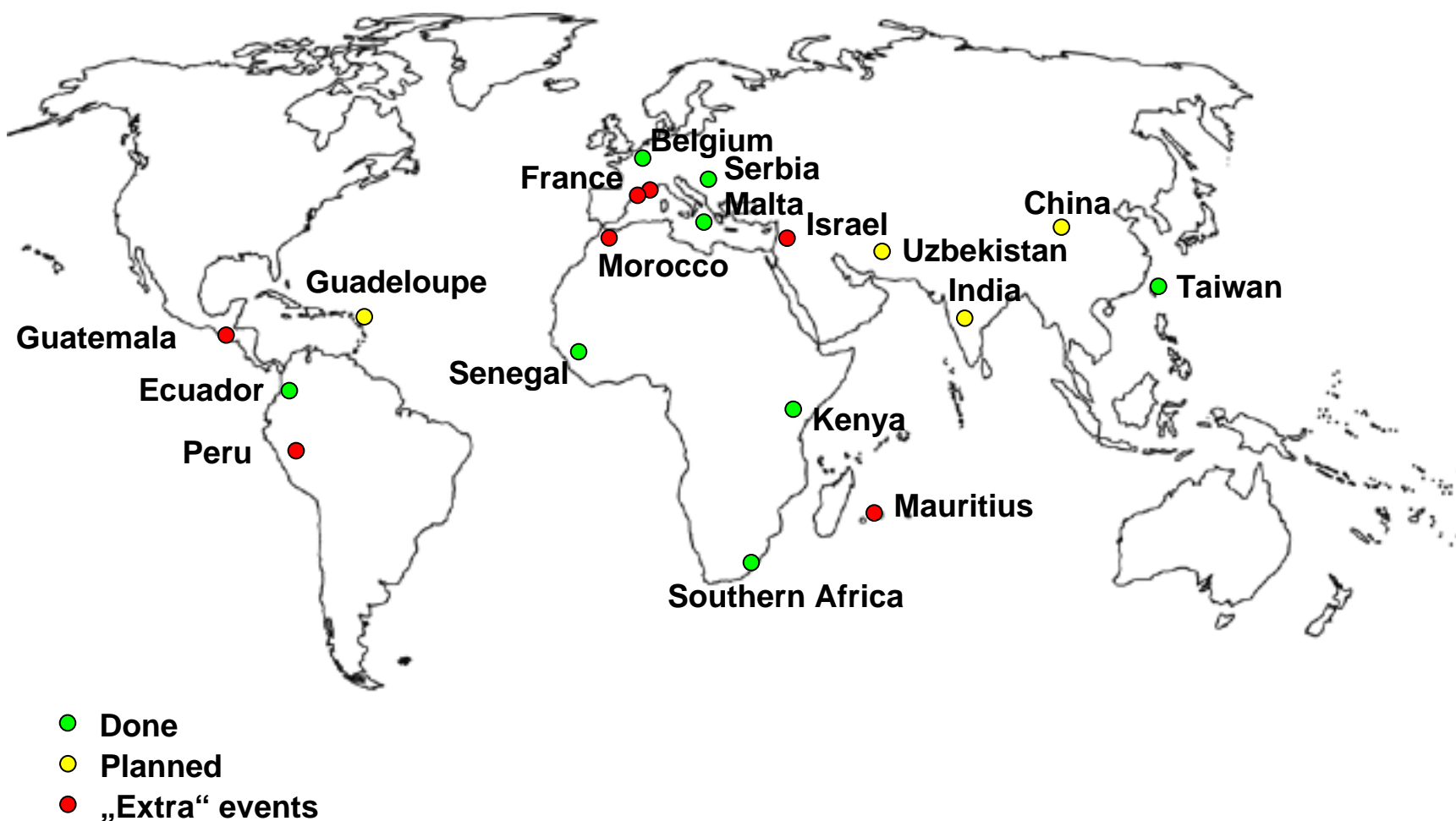# 6DISS Toolkit – Access to remote labs

Brussels lab

# 6DISS Toolkit – Access to remote labs

Paris lab

# Training Schedule



Done · Green
Planned · Yellow
„Extra" events · Red

Map labels: Belgium, France, Serbia, Malta, Israel, Morocco, China, Uzbekistan, India, Taiwan, Guadeloupe, Guatemala, Senegal, Ecuador, Kenya, Peru, Mauritius, Southern Africa

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# Thank you for your attention