The Pan-European IPv6 IX Backbone
Towards deployment of IPv6 in Telcos / ISPs

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Perth, March 2006

Euro6IX: The Concept

- How to pronounce it: forget IX and read 6 (“SIX”)
- Build a large, scalable and native IPv6 Backbone of Traffic Exchanges, with connectivity across Europe and other IPv4/v6 Exchangers
- In order to promote and allow other players to trial v6 and port/develop key applications and services
- In order to break the chicken and egg issue !
- Gain REAL IPv6 experience, in a real world with not just research users, involving Telcos/ISPs/ASPs, among others: Allow new players into our trials
- Bring IPv6 into a production transit service

Euro6IX Goal

- Support the fast introduction of IPv6 in Europe.
- Main Steps:
  - Network design & deployment
  - Research on network advanced services
  - Development of applications validated by user groups & international trials
  - Active dissemination:
    - participation in events/conferences/papers
    - contributions to standards
    - project web site

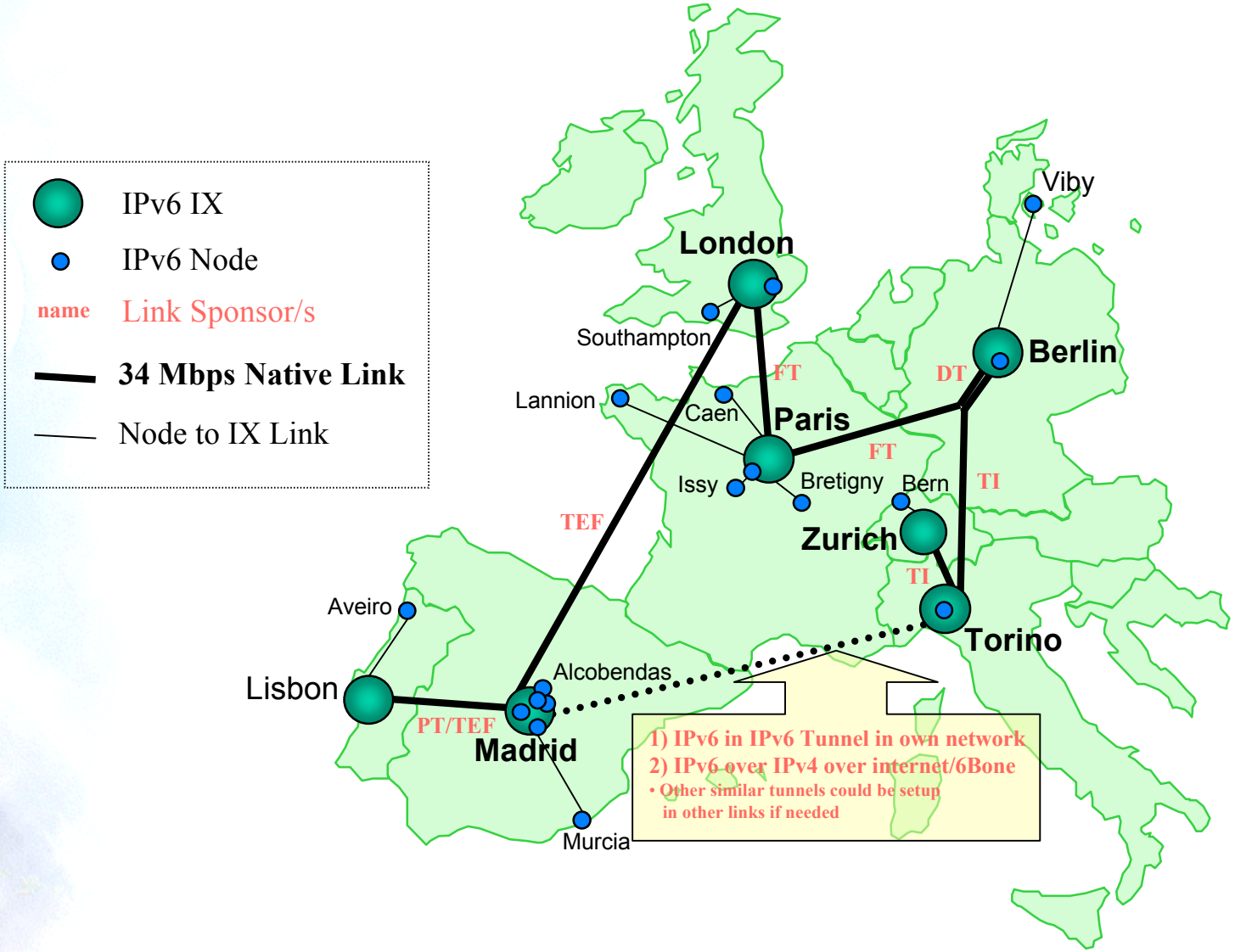
Objectives

1. Research an appropriate architecture, to design and deploy the first Pan-European non-commercial IPv6 Internet Exchange Network.
2. Use this infrastructure to research, test and validate IPv6-based applications & services.
3. Open the network to specific User Groups for its validation in trials.
4. Dissemination, liaison and coordination with clusters, fora, standards organizations (e.g. IETF, RIPE) and third parties.

Consortium Members (17)

- Telcos/ISPs (7):
  - Telecom Italia LAB (WP2 leader), Telefónica I+D (WP3 leader and project coordinator), Airtel-Vodafone, British Telecom Exact, T-Nova (Deutsche Telecom), France Telecom RD, Portugal Telecom Inovação
- Industrial (2):
  - 6WIND, Ericsson Telebit
- Universities (3):
  - Technical University of Madrid (WP4 leader), University of Southampton, University of Murcia
- Research, System Integrators and Consultancy (3):
  - Consulintel (WP1 leader and project coordinator), Telscom (WP5 leader), novaGnet systems
- Others (2):
  - Écija & Asociados Abogados, Eurocontrol

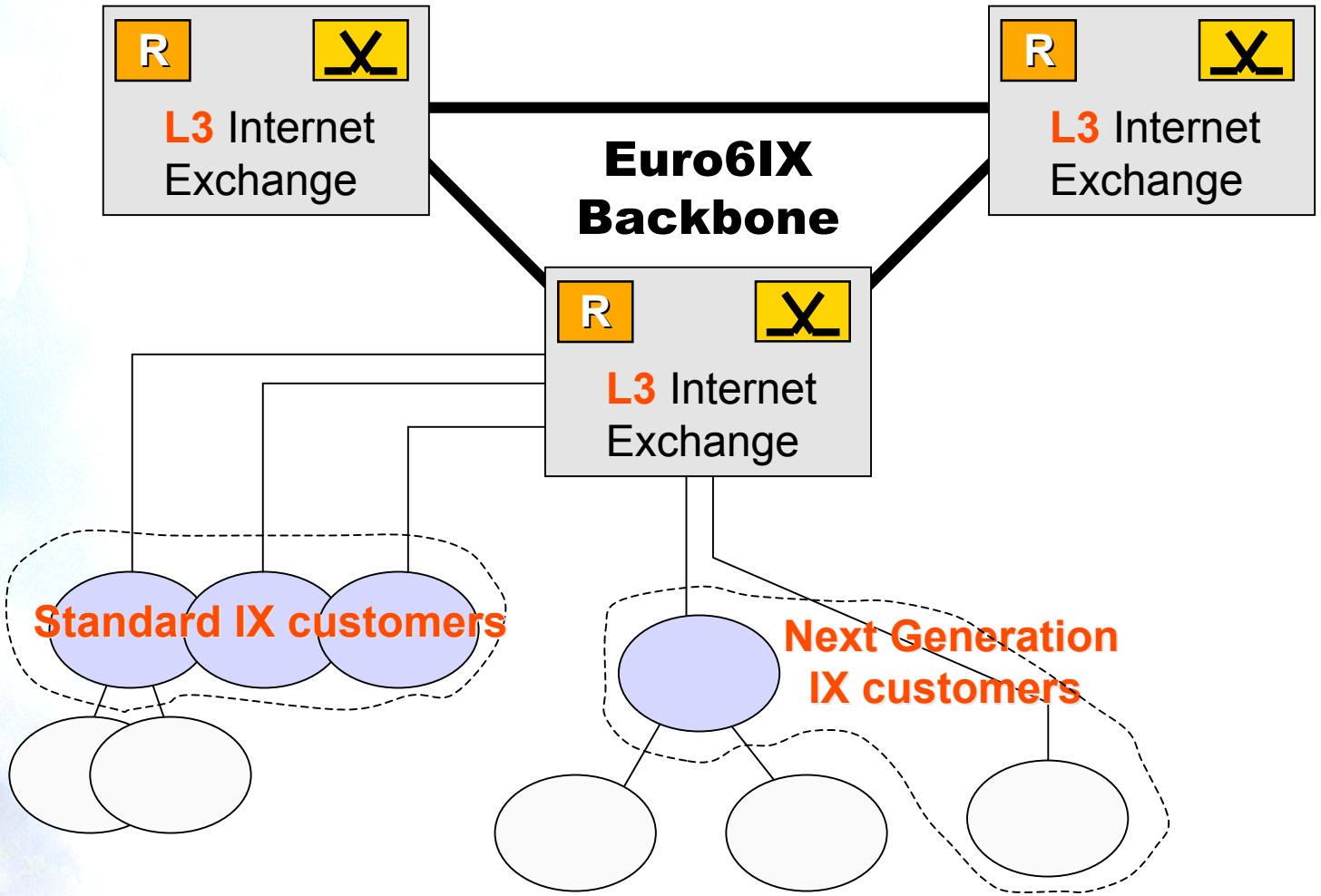
Updated Network Map



Layer 3 IX

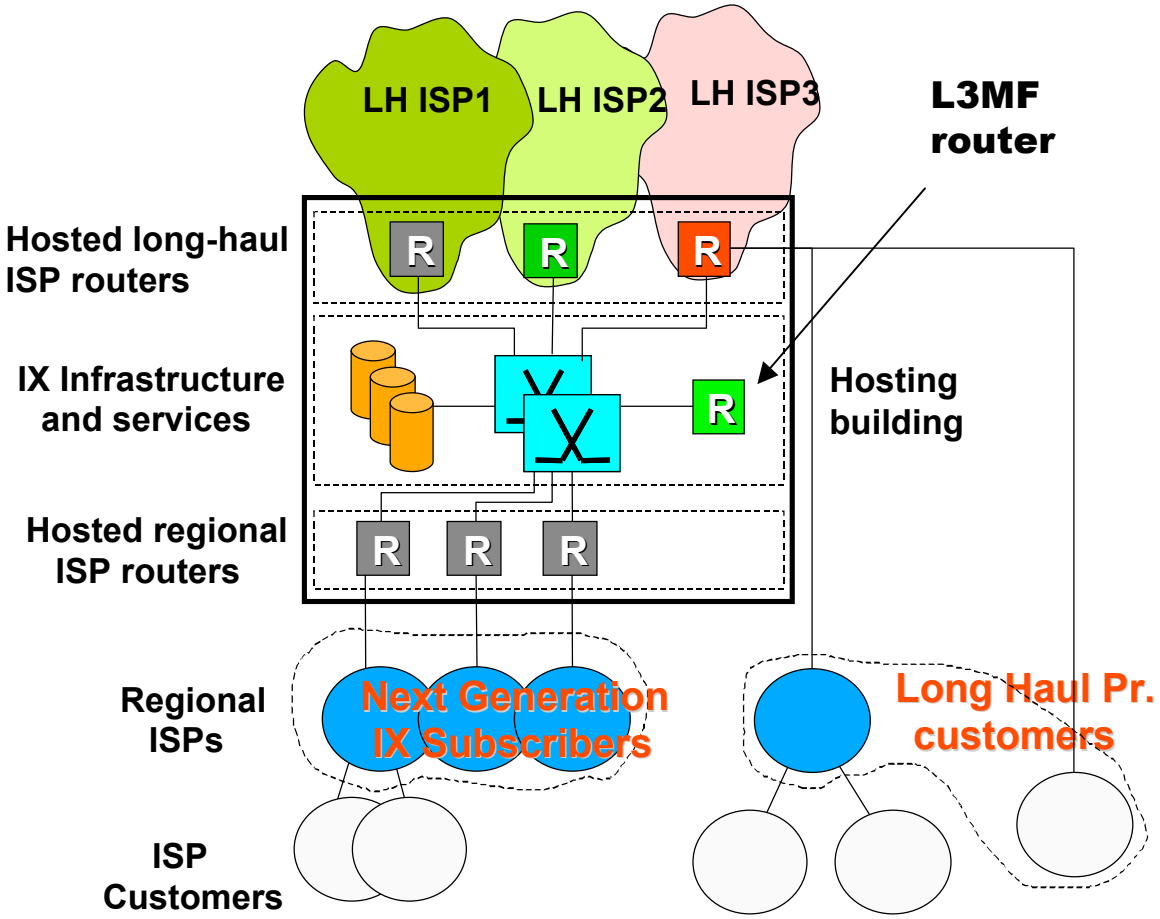
- Infrastructure providing both layer 2 and layer 3 interconnection service.
- Several IXs can make direct peering offering also Wide Area Layer 3 transport as an Internet Service Provider. Every IXs will use an assigned xTLA prefix (x=p or s) to assign NLA prefixes to ISPs or customers connecting to the IX.
- Project partners will use their xTLA prefix to assign NAL to customers and regional ISP connecting to IX.

Layer 3 IXs Network Architecture



IX Model C

- L2 infrastructure (fully redundant) where the IX services are placed
- Routers infrastructure (long-haul providers and customers)
- Layer 3 mediation function router (L3MF) is the real new element of this model

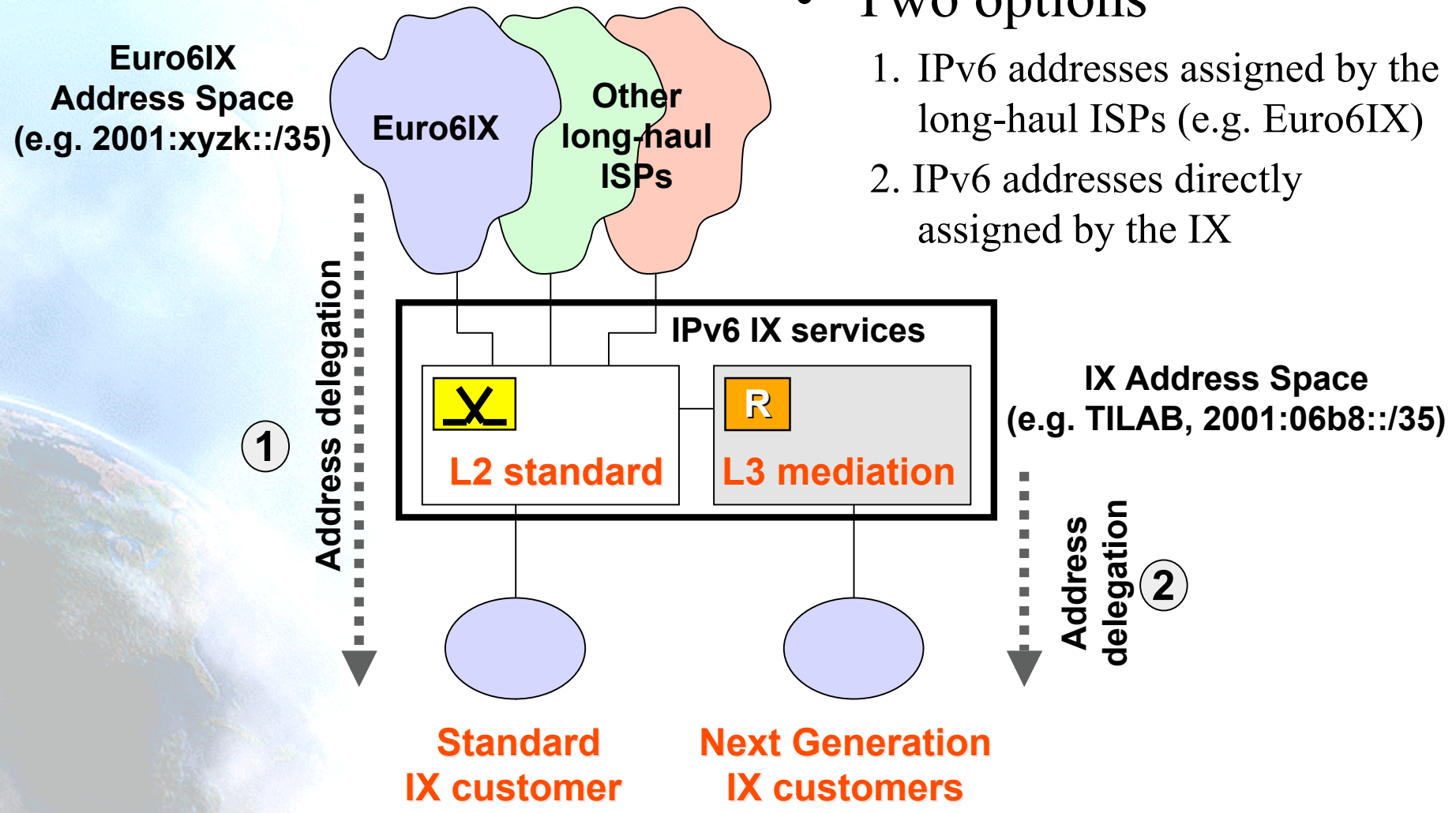


RFC2374 Benefits

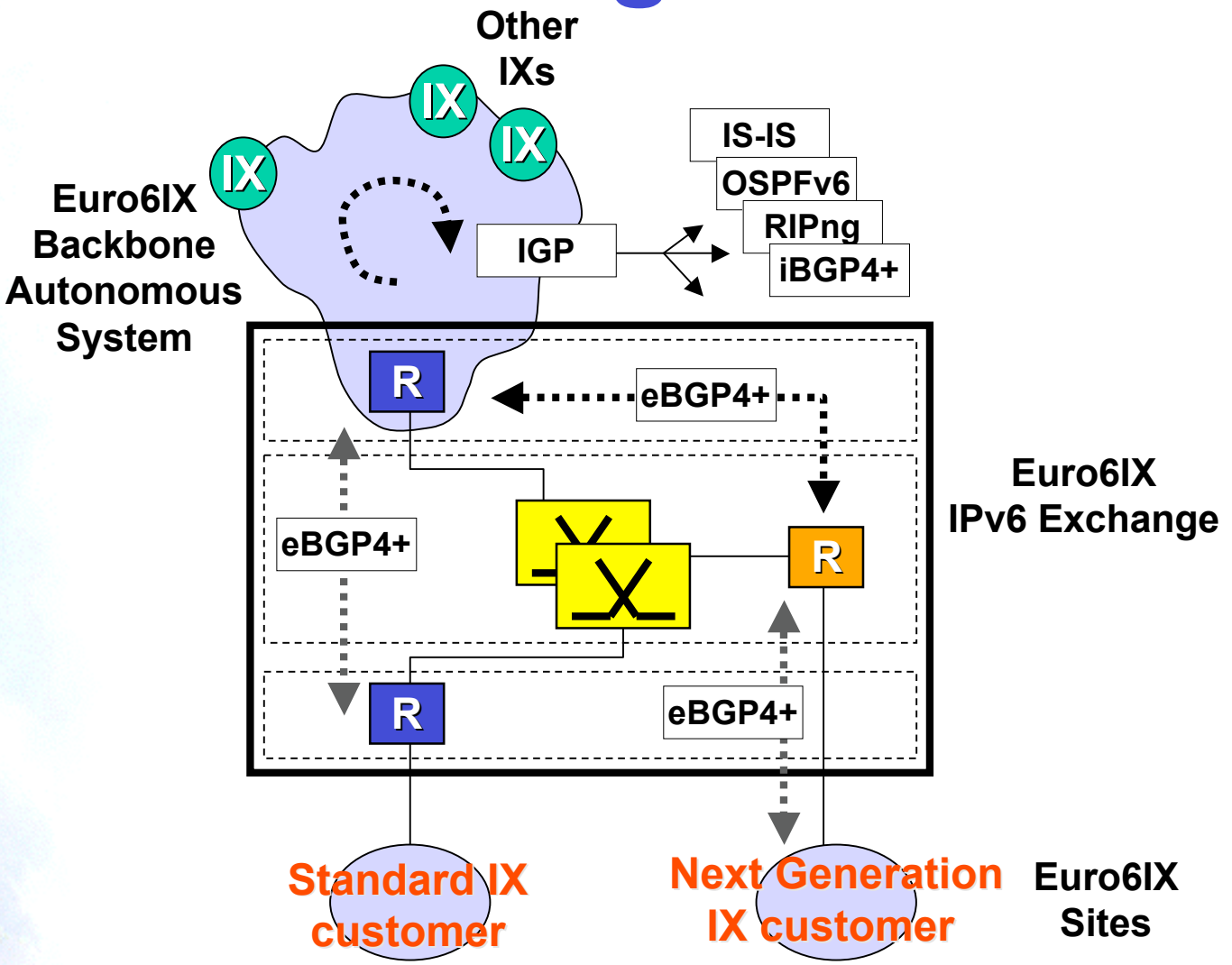
- This model is based on the RFC 2374 to verify that:
  - a customer could change its service provider without changing its addressing space
  - the renumbering functionality could be realized more easily (no renumbering in the better case)
  - the multihoming functionality could be realized more easily
- IX plays an intermediation role between the ISP and the customers (Layer 3 mediation function router)
- Routing:
  - iBGP+IGP: inside the Long Haul Provider
  - Euro6IX is the collection of the routers inside the IX emulating the LHP (single AS)
  - eBGP4+: between the customers and the IX
  - eBGP4+: between the IX and the LHPs

Address Assignment

- Two options
  1. IPv6 addresses assigned by the long-haul ISPs (e.g. Euro6IX)
  2. IPv6 addresses directly assigned by the IX



Routing


Other
IXs
IX
IX
IX
Euro6IX
Backbone
Autonomous
System
IS-IS
OSPFv6
RIPng
iBGP4+
IGP
R
eBGP4+
eBGP4+
R
R
eBGP4+
Euro6IX
IPv6 Exchange
Standard IX
customer
Next Generation
IX customer
Euro6IX
Sites

IX Based Services

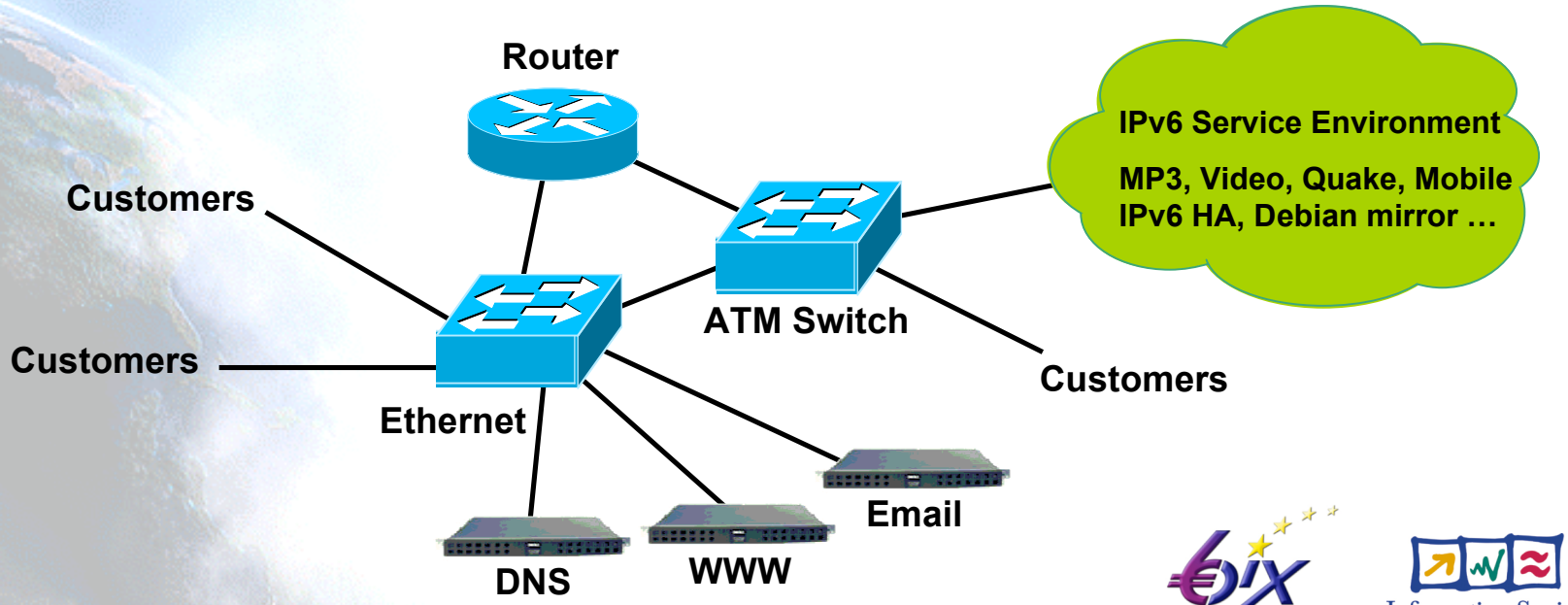
- IX becomes a place where new services are offered to the users.
- IX is an aggregation point, so it can provide those services who can benefit by this “user aggregation” (e.g. in a based multicast network, the RP could be located inside the IX, because a lot of users connect to it).
  - Network Services
    - Multicast, AAA, QoS, DNSSec
    - Mobility
    - Transition Mechanisms: NAT-PT, Tunnel Broker, 6to4, Teredo
    - Route Server mechanism
  - Application Services
    - HTTP, FTP, SMTP
    - VideoConference/e-learning services
    - P2P applications
  - Monitoring Services
    - Routing/Traffic/Reachability Monitoring (Magalia, AS-Path tree, Looking Glass)

The UK6x (LON6IX)

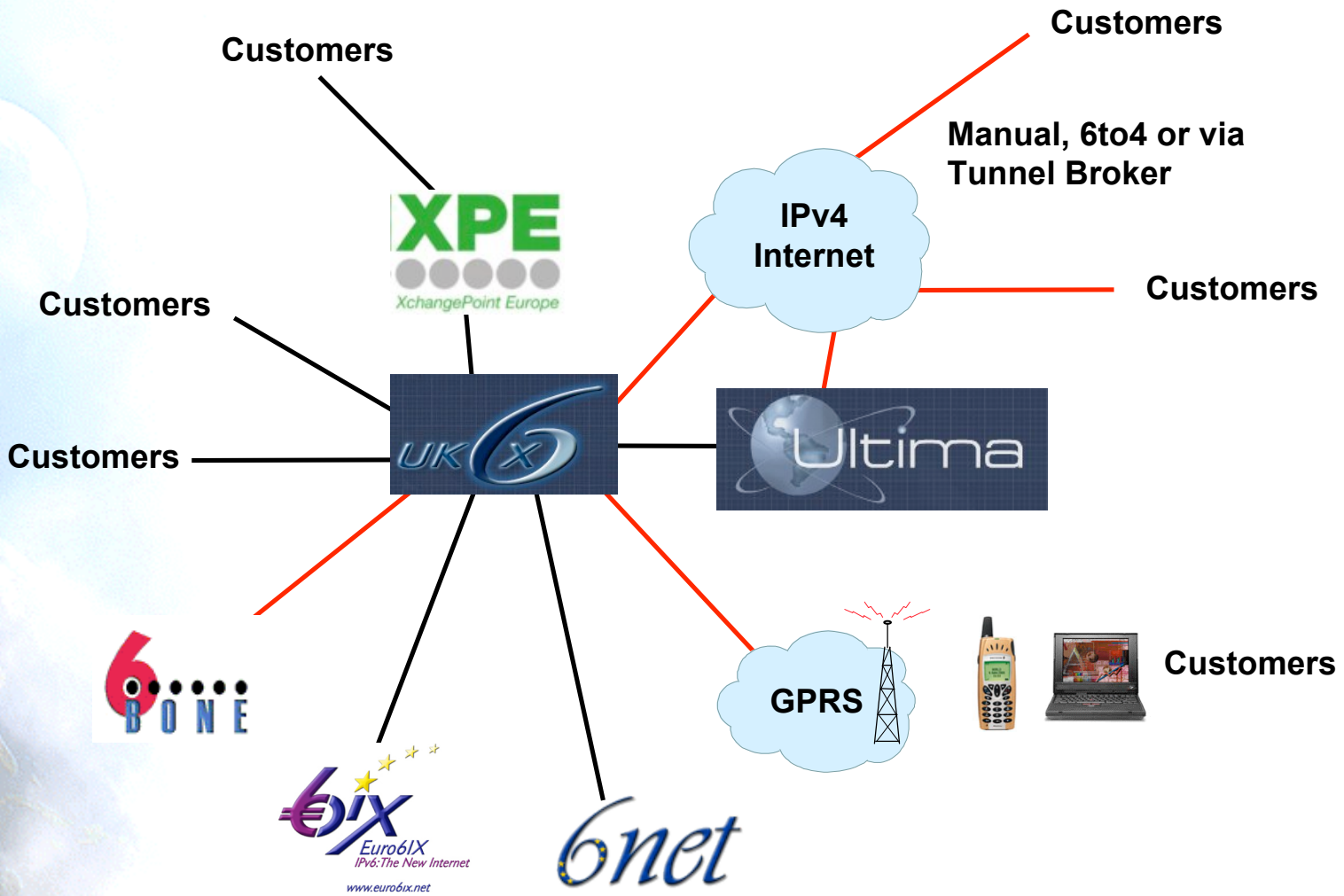
- Layer 2 & 3 IPv6 Internet exchange
- First in the UK
- Uses commercial IPv6 addresses
- Located at the heart of the UK Internet – Telehouse
- Open to all
- Primary aims are:
  - to stimulate the IPv6 environment in the UK, Europe and the World
  - to further the understanding of IPv6

UK6x Core Architecture

- Ethernet switch for Layer 2 peering
- ATM switch for additional customer access mechanisms
- Router for Layer 3 functionality
- 2001:618::/32 used for address allocation
- 2001:7F8:2::/48 used for infrastructure
- Maintenance via Looking Glass, ASpath-tree etc.



UK6x Connectivity

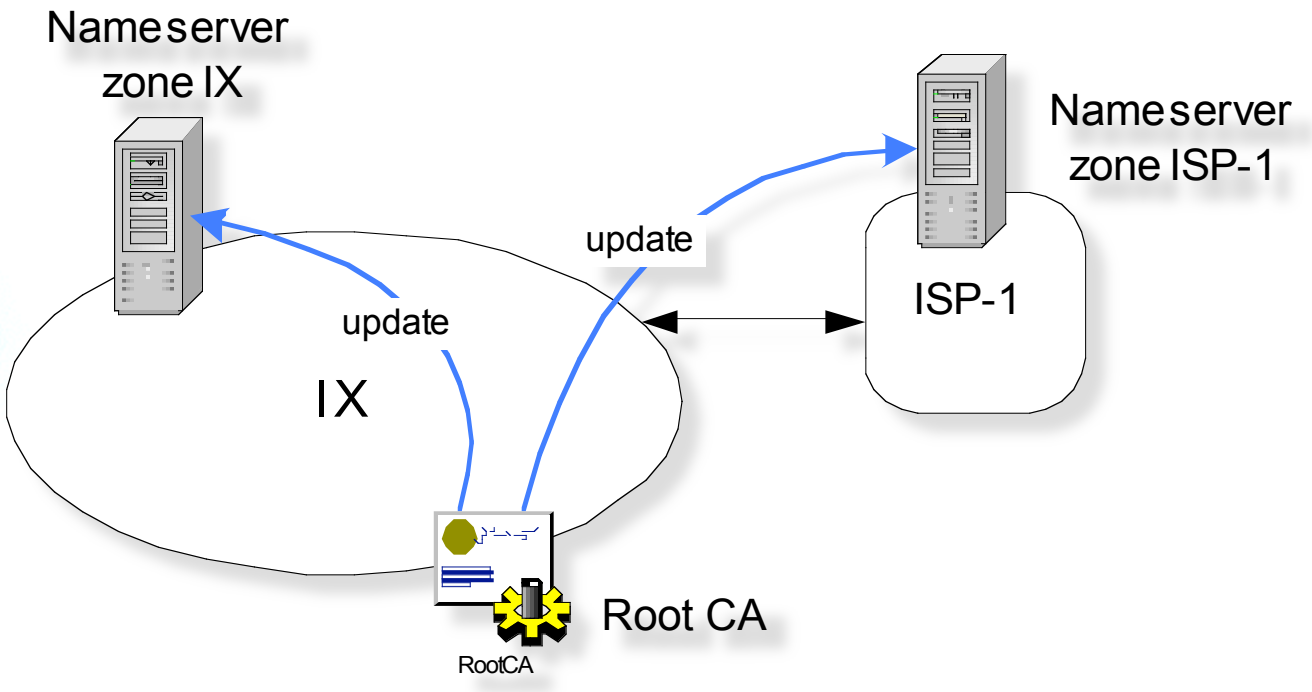


DNSsec Services

- UPM is completing the DNS emulation environment
- Developing a complete set of DNSSEC example configurations using the emulation environment
- DNSSEC pilot work on setting-up and maintaining experiment between UMU, Consulintel and UPM
- Publishing certificates using DNSsec
  - Models analyzed to publish certificates:
    - TSIG Model: symmetric keys.
    - SIG Model: asymmetric keys.
  - Support in PKIv6:
    - PKIv6 supports TSIG Model
      - BIND 9.2.0 or newer for TSIG
    - PKIv6 will support SIG Model
      - BIND 9.3.0 (snapshot) for SIG(0)

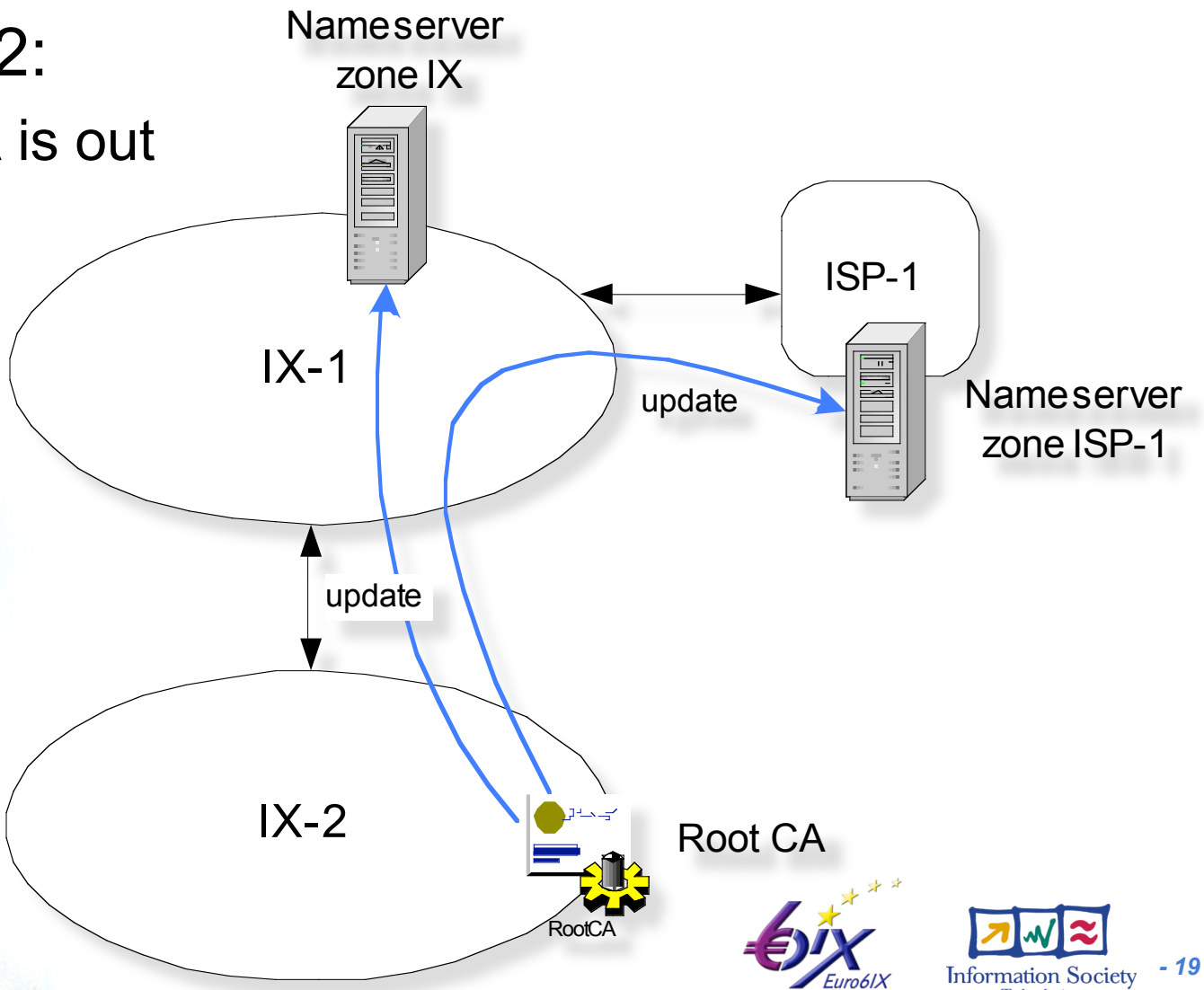
IX service PKIv6 to publish certificates using DNSSEC

- Scenario 1:
  - Root CA and Name Server are together in the IX

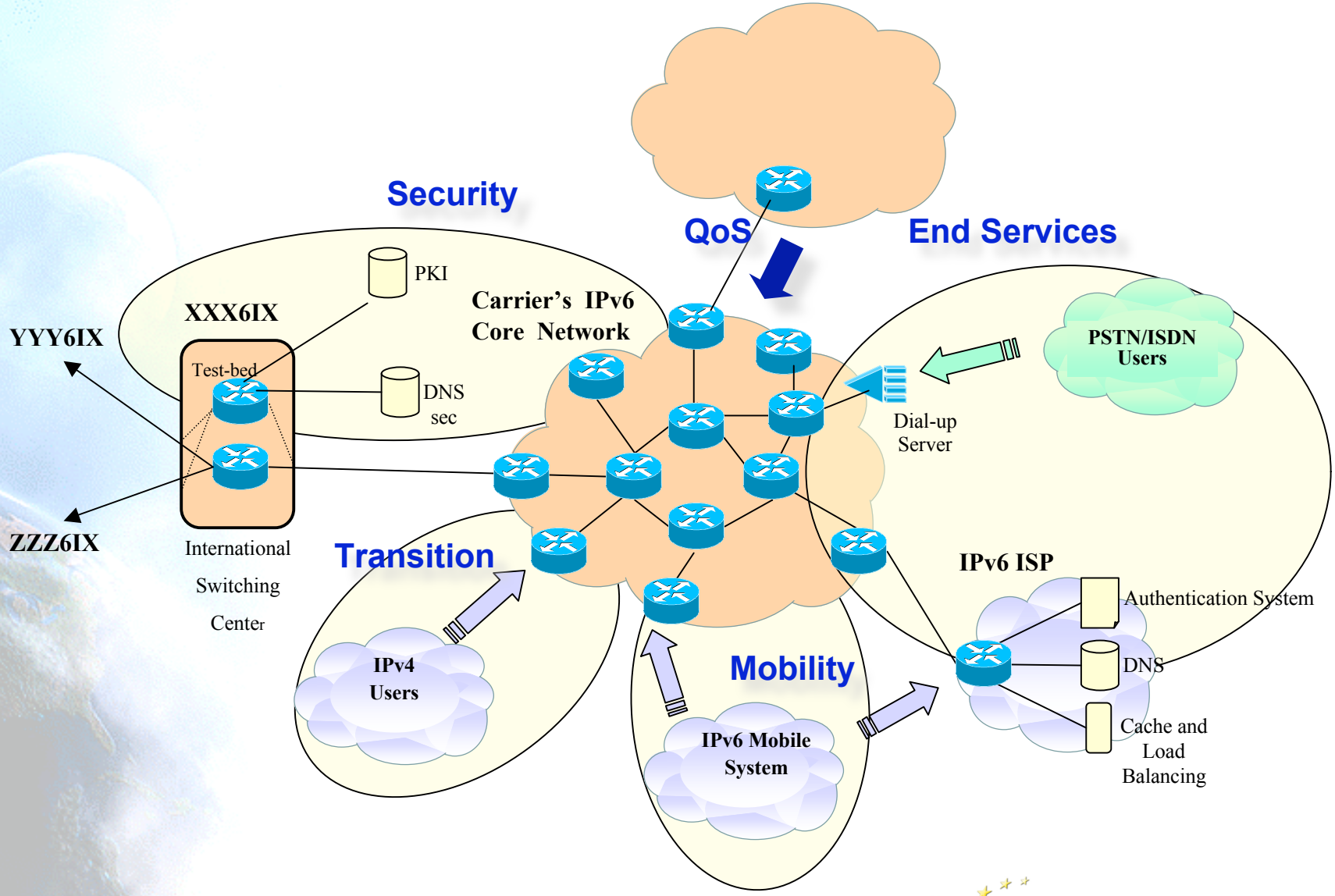


IX service PKIv6 to publish certificates using DNSSEC

- Scenario 2:
  - Root CA is out



Advanced Services Vision



Thanks !

Contact:

- Jordi Palet (Consulintel): jordi.palet@consulintel.es

- Madrid 2005 IPv6 Summit, slides available at:
  http://www.ipv6-es.com

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