

France Telecom IPv6 strategy: an European case



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Tayeb Ben Meriem
Head of France Telecom R&D Division
IPv6 Skills Centre





Content

- S How France Telecom is organised regarding IPv6
- S France Telecom IPv6 background & Strategy
- S France Telecom IPv6 business cases



How we are organised regarding IPv6?

France Telecom R&D Division IPv6 Skills Centre: Mission and Tools

S **Missions**

- S The France Telecom IPv6 Skills Centre is a **Cross organizational** structure working on the IPv6 strategic domain. It is chartered to support the France Telecom Group and its Subsidiaries in the understanding of IPv6 stakes, and supporting the development and the deployment of IPv6 services.
- S Coordinate IPv6 activities throughout all France Telecom Group
- S Contribute to elaborating FT's IPv6 strategy and roadmap

S **Tools**

- S Provide coordination service for complex IPv6 projects
- S Promote and animate an IPv6 information sharing network
- S IPv6 seminars and IPv6 training sessions to Business Units
- S IPv6 web site
- S IPv6 Mailing list
- S IPv6 Skills Centre Newsletter

France Telecom R&D Division IPv6 Background:

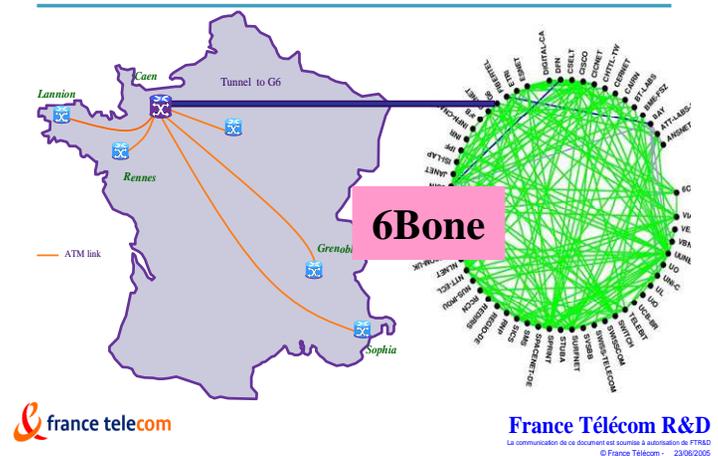


IPv6 an already old experience (10 years)

Key dates and achievements

- S Participation in IETF work since 1994 dnsop, rmonmib, v6opsWGs
- S Participation to G6 Bone – founding member of the G6 group (French IPv6 Organisation: Ministry of Research Initiative created in 1995)
- S Test of first IPv6 routers (Telebit) in 1996
- S Development of an IPv6 conformance test suite for IPv6 router assessment (IPv6, ICMPv6/Neighbor Discovery)
- S Deployment of an IPv6 native network internal to FT R&D Division (RIMBAUD) connected to the 6Bone in 1998
- S France Telecom got its sub-TLA on July 2000 (2001: 0688::/32)
- S Membership of IPv6 Forum (2000)
- S Contributor to IPv6 Task Force Europe 2001
- S Deployment of IPv6/WDM nationwide experimental Network in 2001 (VTHD network)
- S Deployment of an WLAN Mobile IPv6 Campus in collaboration with Strasbourg University on 2001
- S Deployment since 2002 of a native IPv6 international network “OpenTransitv6” (Asia, US, Europe)
- S Founding member of IPv6 Task Force France 2002

Rimbaud : FT R&D's native IPv6 Network

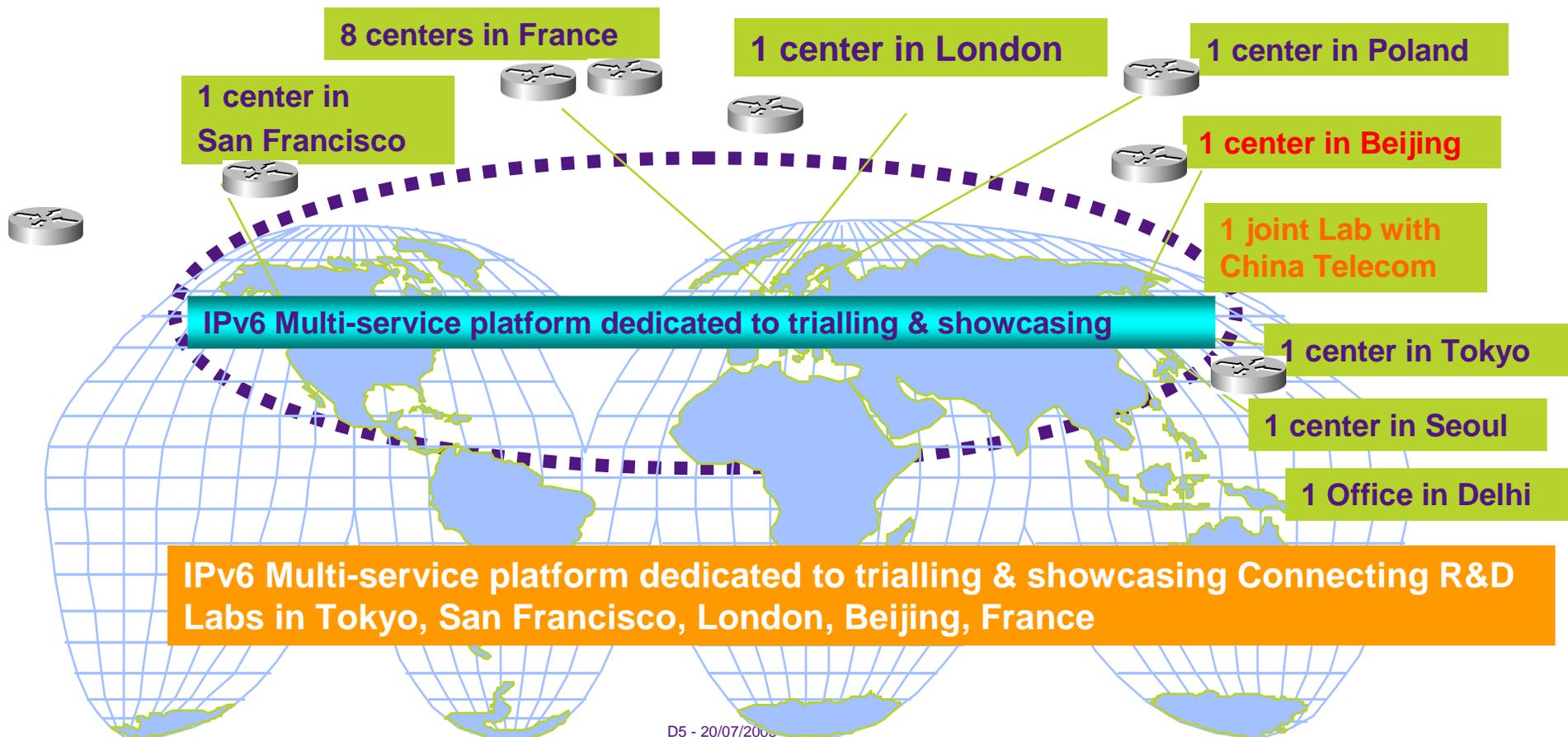


Deployed on 1998



R&D Division's International IPv6 Multi-Service Multi-Access Platform

- Promotion tool for BUs & Affiliates to demonstrate the potential and readiness of IPv6 (applications, services,..) to their top clients
- Showcasing complete IPv6-based applications tailored on the specific needs of each BU & Affiliate





IPv6 Cooperation Network: France Telecom participation in IPv6 Projects in China, Japan, Korea, US, Europe,..

Collaboration with IPv6 China Projects

- « **6TNet** » Project: France Telecom is a Member of the Steering Committee.
• « **CNGI** » initiative: R&D Division will participate in R&D item of this initiative

Collaboration with IPv6 Japan Projects

- « **WIDE** » Consortium: A MoU was signed with France Telecom. 2 topics: IPv6 mobility and Security in the framework of « **Nautilus** » project. France Telecom R&D is the leader of Security activity in France side

Collaboration with IPv6 Korea Projects

- « **STAR** » Project (**Science and Technology Amicale Research**) in the framework of France-Korea cooperation (2004). « IPv6 metrology ». Partners : ETRI, Korea Telecom, **SNU**, France Telecom

Collaboration with IPv6 US Projects

- « **Moonv6** » project: Collaboration with NAv6 Task Force (US IPv6 Task Force). Phase 1, 2, 3

Collaboration with European Commission

- « **European IPv6 Task Force** » France Telecom R&D member of this Task Force, and partner in the main IPv6 projects (IST IPv6 Projects: Euro6IX, SATIP6, 6QM, Diadalos, Ambient Network..)

Collaboration with Egypt IPv6 Task Force (Ministry of Communication & IT)

- « **Egypt IPv6 –TF** » project: Collaboration with Egypt IPv6 Task Force. Test of IPv6 Visioconf

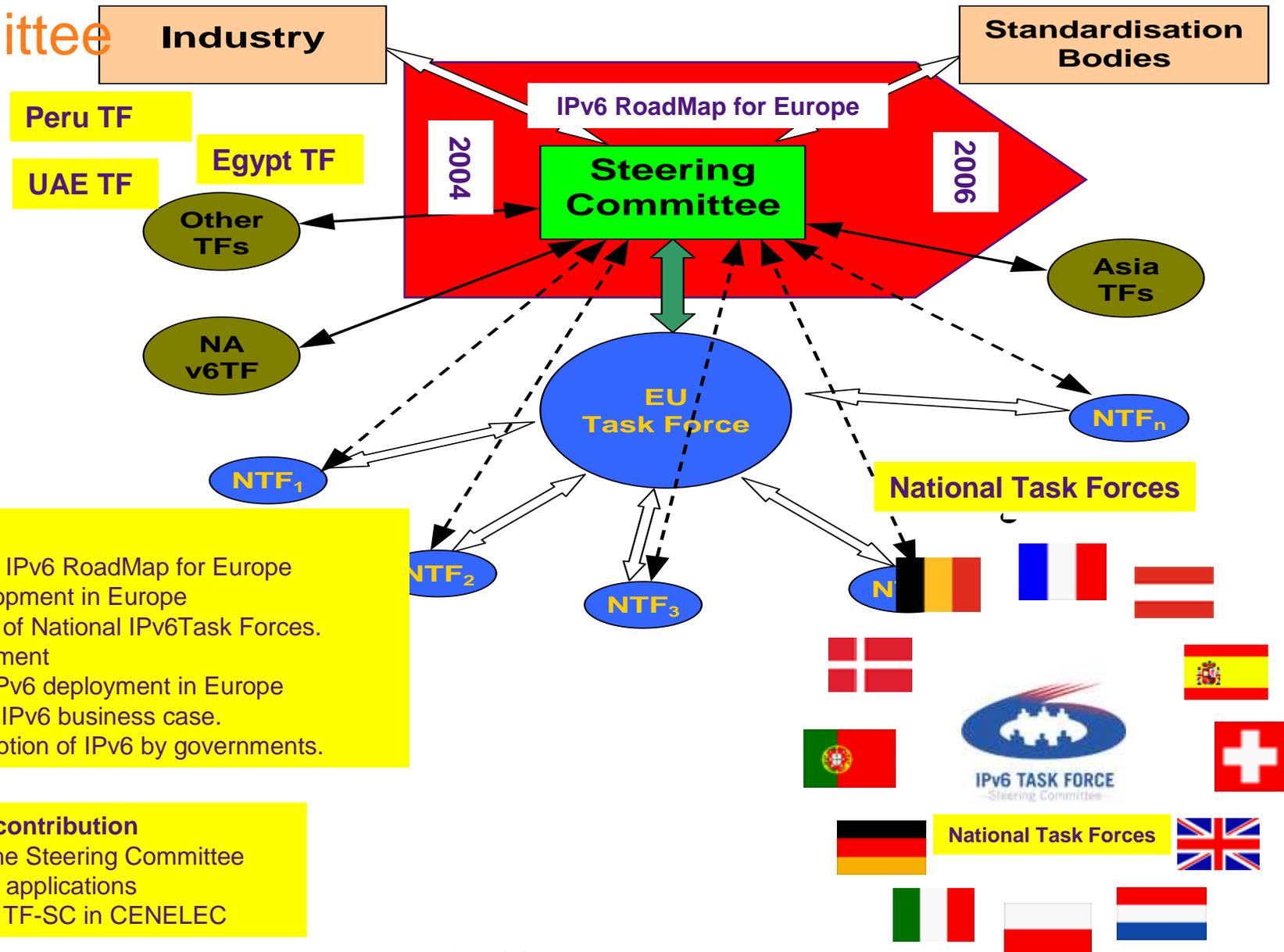


IPv6 Cooperation at National level: IPv6 Task Force France, which support from France Telecom

- S The IPv6 Task Force France is created in september **25th 2002** in «le Sénat » (French parliament)
- S France Telecom is a founding member of the IPv6 Task Force France and a member of its Steering Committee
- S **France Telecom's support**
 - Q France Telecom has provided expertise and contributed to the work of IPv6 Task Force France on recommendations, as well as deployment of services and rollout of applications at the national level.
 - Q *France Telecom is steering Operators/ISPs WG*
- S **The missions**
 - Q Share experiences
 - Q Identify applications, services, systems as the drivers of IPv6 deployment
 - Q Gather issues and solving them in ad'hoc groups of Task Force France
 - Q Communicate on the capabilities of the IPv6 technology and on the current deployments
 - Q Propose actions to the Government and public Authorities



European IPv6 Task Force-Steering Committee



Mission

- Consolidate the IPv6 RoadMap for Europe
- Push IPv6 development in Europe
- Guide the efforts of National IPv6 Task Forces.
- Focus on deployment
- Benchmark the IPv6 deployment in Europe
- Establish a clear IPv6 business case.
- Promote the adoption of IPv6 by governments.

France Telecom contribution

- is a member of the Steering Committee
- in charge of IPv6 applications
- representative of TF-SC in CENELEC

Euro6IX IST project : Pan-european IPv6 backbone & IXs



Deployed by European operators

S IST Programme

Q2002 to 2004

Q14 partners dont : BT-Exact, T-Systems, Telefonica I+D, TILAB, FT,...

S Objectives

QDeployment of a pan-european backbone and IPv6 Exchanges Points (IX)

QExperiment :

- Services of IPv6 (IX) Points
- Security (PKI & DNSSEC), Instant messaging, VoIP

S Status

QBackbone is operational.

QFrance Telecom contribution by its OpenTransitv6 (international network)

- 1 Exchange Point (IX) in Paris
- 2 IPv6 links: Paris - Londres, Paris- Berlin

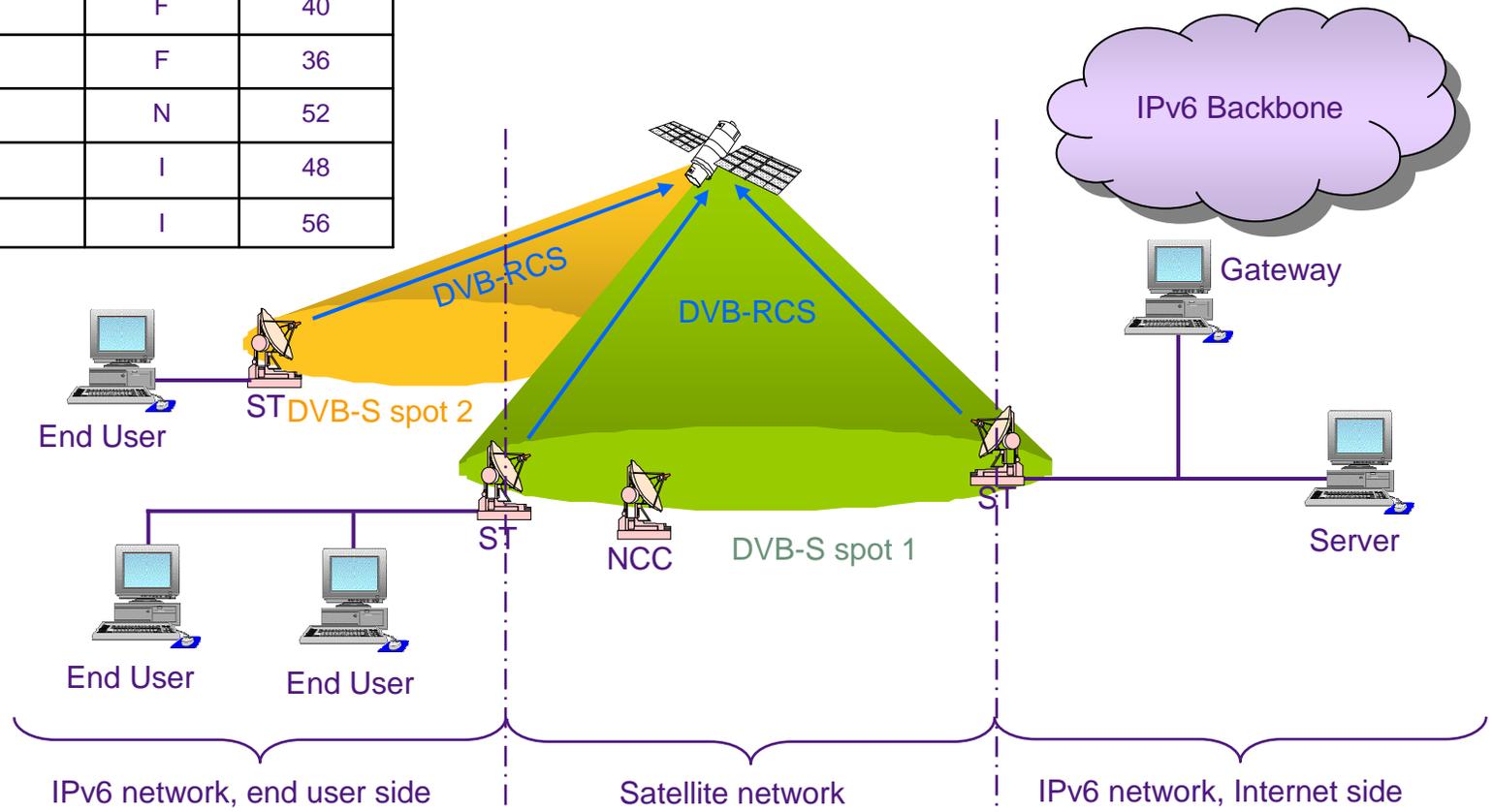


SATIP6 meshed architecture (IST project 2002 – 2004)



FT Leader of WP1 : Satellite/IPv6 Network Integration Requirements

Partners	Country	# m.m.
Alcatel Space (ASP)	F	94
AQL	F	36
France Télécom (FTRD)	F	40
LAAS/CNRS	F	36
SINTEF (STI)	N	52
Telecom Italia Lab (TILAB)	I	48
University of Rome (UoR)	I	56





SATIP6 (Summary)

S Main goals

- Q Demonstrate the feasibility and the relevancy of an OBP satellite based VPN to carry IPv6 network and applications
- Q Provide inputs for standardisation bodies

S Work done

- Q Technological development, architecture and scenarios study, technical requirements, specifications development, simulation, platform implementation

S Tests

- Q End-to-end aware and unaware QoS based on NGN principles
- Q Specific security protocol over satellite network, optimized for multicast
- Q TCP Proxying Enhancement Protocol mechanism
- Q Mobile IPv6
- Q Static multicast
- Q Web browsing, FTP transfers
- Q Video and audio streaming, bidirectional visio-conferencing



OpenTransitv6: FT's International IPv6 backbone

- It's FT's IPv6 commercial offering (since 2002)
- 50 POPs worldwide are Dual Stack since June 2005



S Cost effective solution

Q Propose IPv6 at same price as regular internet (same bill)

S Plug and play

Q IPv6 and regular internet in the same pipe

S Premium connectivity

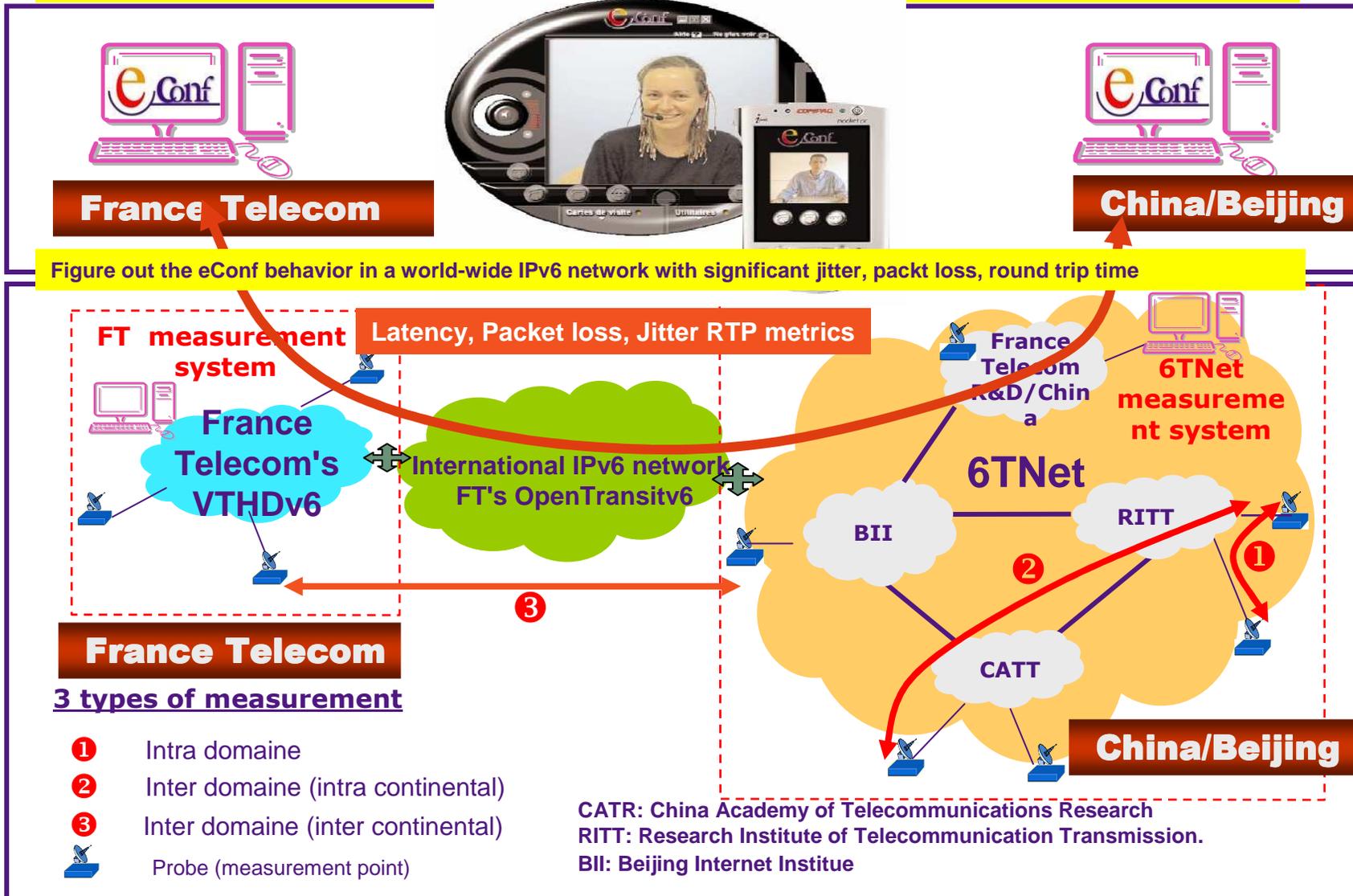
Q FT provides IPv6 to some customers (Renater, Belnet, FTR&D, Euro6IX,)

France Telecom in China: Chinese IPv6 6TNet trial



2 applications developed by France Télécom and deployed in 6TNet network

- a) eConfv6: Visioconference (+30 patents on MPEG2, MPEG4, G723),
- b) IPv6 QoS measurement system





IPv6 Business Cases

***Some France Telecom's R&D Division
IPv6 Business Cases***



Some IPv6 business cases developed by France Telecom R&D Division



- S IPv6 video conferencing
- S Video Streaming over IPv6 in a Very High Bandwidth IPv6 Network: VTHDv6
- S IPv6 for residential customers (Homenetworking v6 services)
- S IPv6 Multimedia Broadband services Over Satellite (DEMOS, MCAST)
- S IPv6 Adhoc meshed network + access network
- S Streaming Over Mobile IPv6 WLAN
- S xDSLv6 : IPv6 in the Access Network
- S IPv6 Push service Over GPRS/WLAN
- S WLAN Mobile IPv6 in a Campus in collaboration with Strasbourg University
- S E-learningv6
- S Interactive multicast videoconference using M6Bone network
- S M2M Over IPv6 (RFID Over IPv6)

VTHDv6: France Telecom R&D Division IPv6 experimental

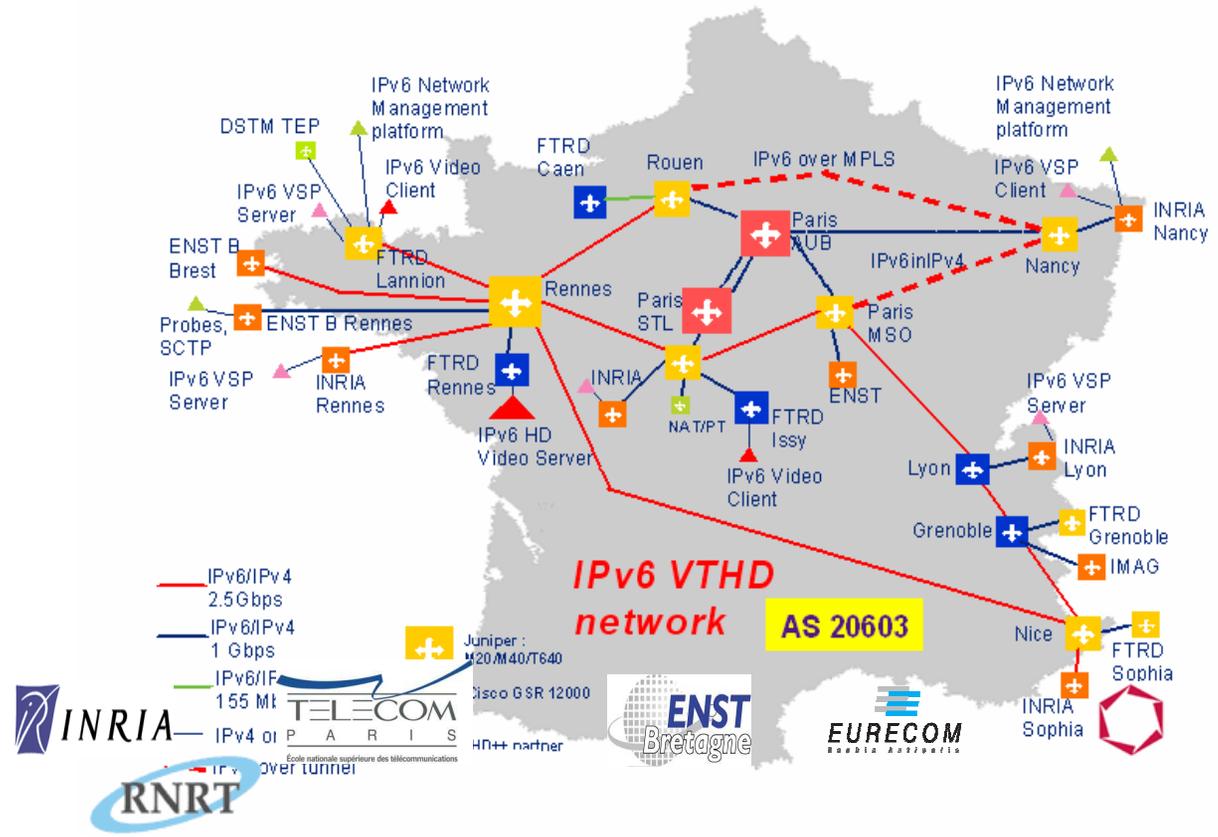


Partially French government funded project (initiative for research on networking technologies) :
 RNRT (Réseau National de la Recherche en Télécommunications).
 a multivendor gigabit network (Avici TSR, Cisco GSR 12012, Juniper M40, M160, T640)

- QPhase 1 (June 2001): **Tunneling**: Additionnal IPv6 routers at the edge
- QPhase 2 (December 2001-September 2002): **Dual Stack** router in the core of VTHD
- QPhase 3 (October 2002 – December 2004): Generalization of Dual Stack + **6PE** (IPv6 over MPLS based on L3 VPN)

- 10 backbone routers
- 27 aggregation routers

Addressing plan: VTHD Uses a /42 from France Telecom Sub-TLA (2001:0688:1f80::/42)
 This /42 prefix is divided in $n^*/48$
 ° 1/48 VTHD Backbone
 ° 1/48 France Telecom R&D site
 ° 1/48 per RNRT Partner

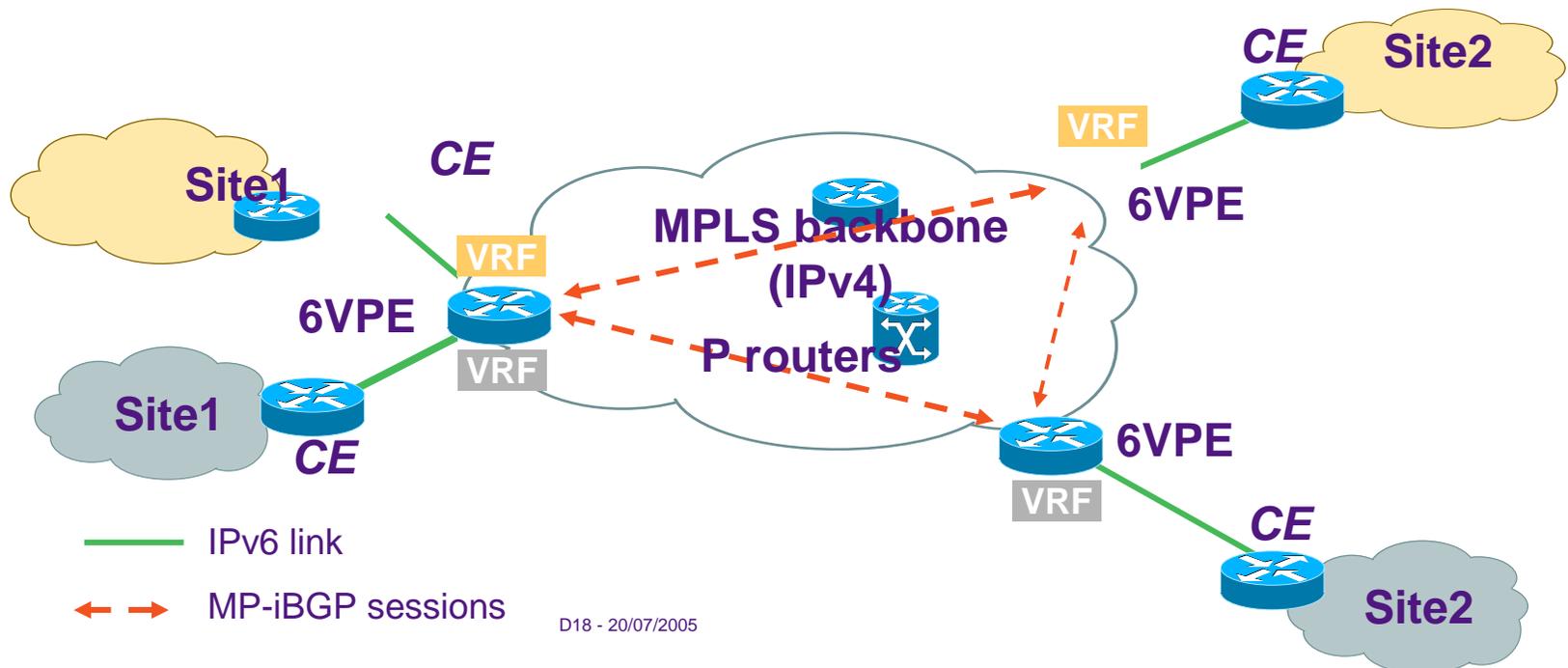


IPv6 VPN Business Case: Goals & Global architecture of the trial



S Goals

- Q Placing IPv6 VPN at the same level as IPv4 VPN
- Q Combining network and services initiatives
- Q Convergence between IPv6 and IPv4 on MPLS VPN (RFC 2547bis)
- Q Resolving technical limitations of IPsec-based solutions
- Q Based on a proven technology (MPLS), largely implemented in France Telecom's networks
- Q Permitting an easy and backward compatible IPv6 deployment
- Q Vendors solutions available

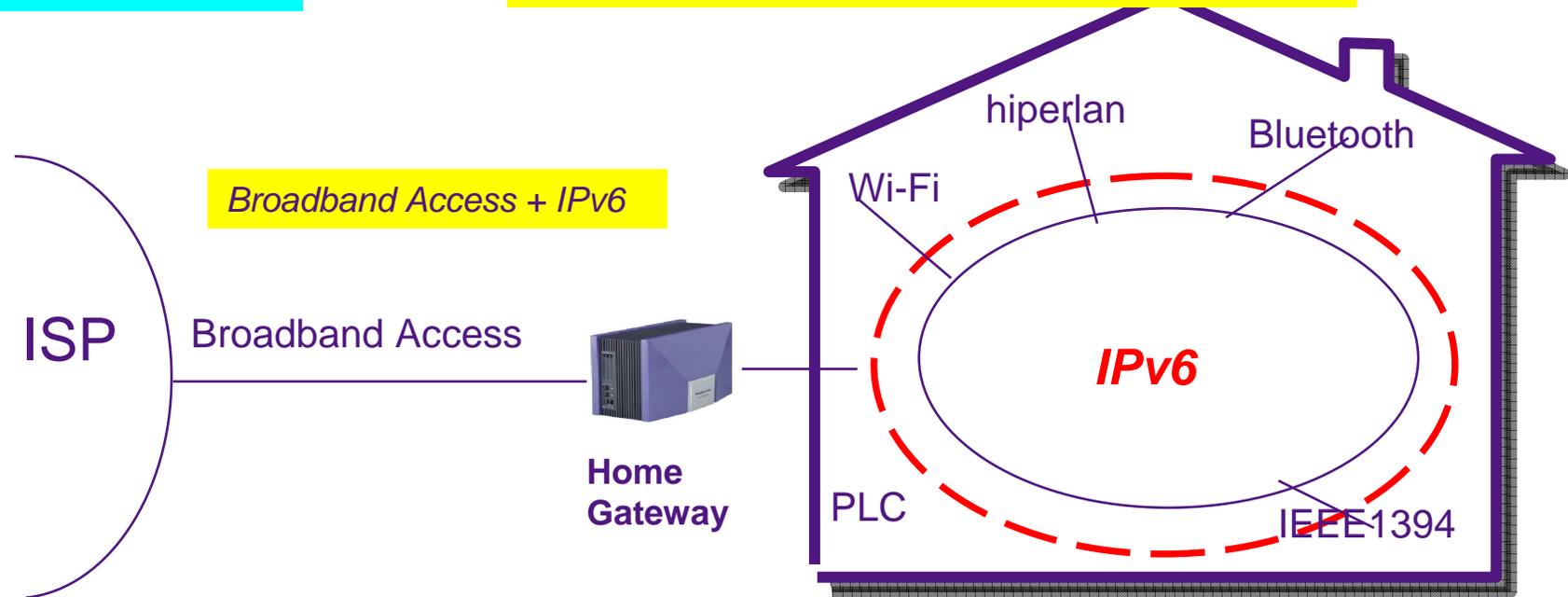


IPv6 Homenetworking Business case



Home Gateway Initiative (HGI)
Led by France Telecom

Homenetworking is a major driver of IPv6



- * How to allow users to connect and communicate regardless of device type, manufacturer, or network technology ?
- * How to do name resolution in the absence of DNS
- * How to autoconfigure services
- * How to bridge between different network technologies (e.g. Bluetooth, 802.11b,)

WLAN MIPv6 Campus deployment



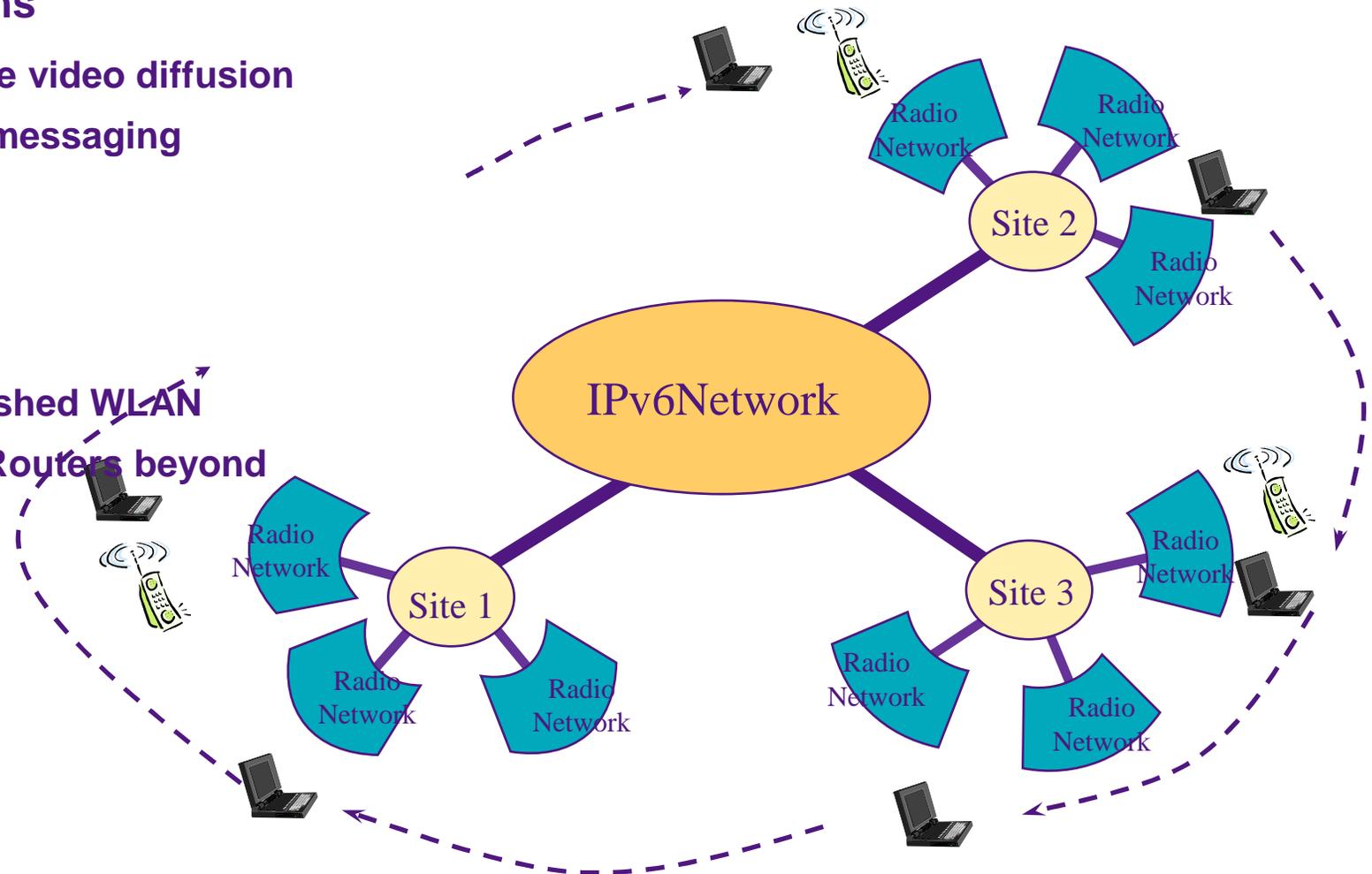
This project launched in 2001 is a collaboration between FTR&D and Starsbourg University. It was the first deployment in Europe of a WLAN MIPv6 Campus.

S Applications

- Q High-rate video diffusion
- Q Instant messaging
- Q Web
- Q Mail...

S What next

- Q IPv6 Meshed WLAN
- Q Mobile Routers beyond MIPv6



IPv6 Push Service Business case on GPRS & WLAN

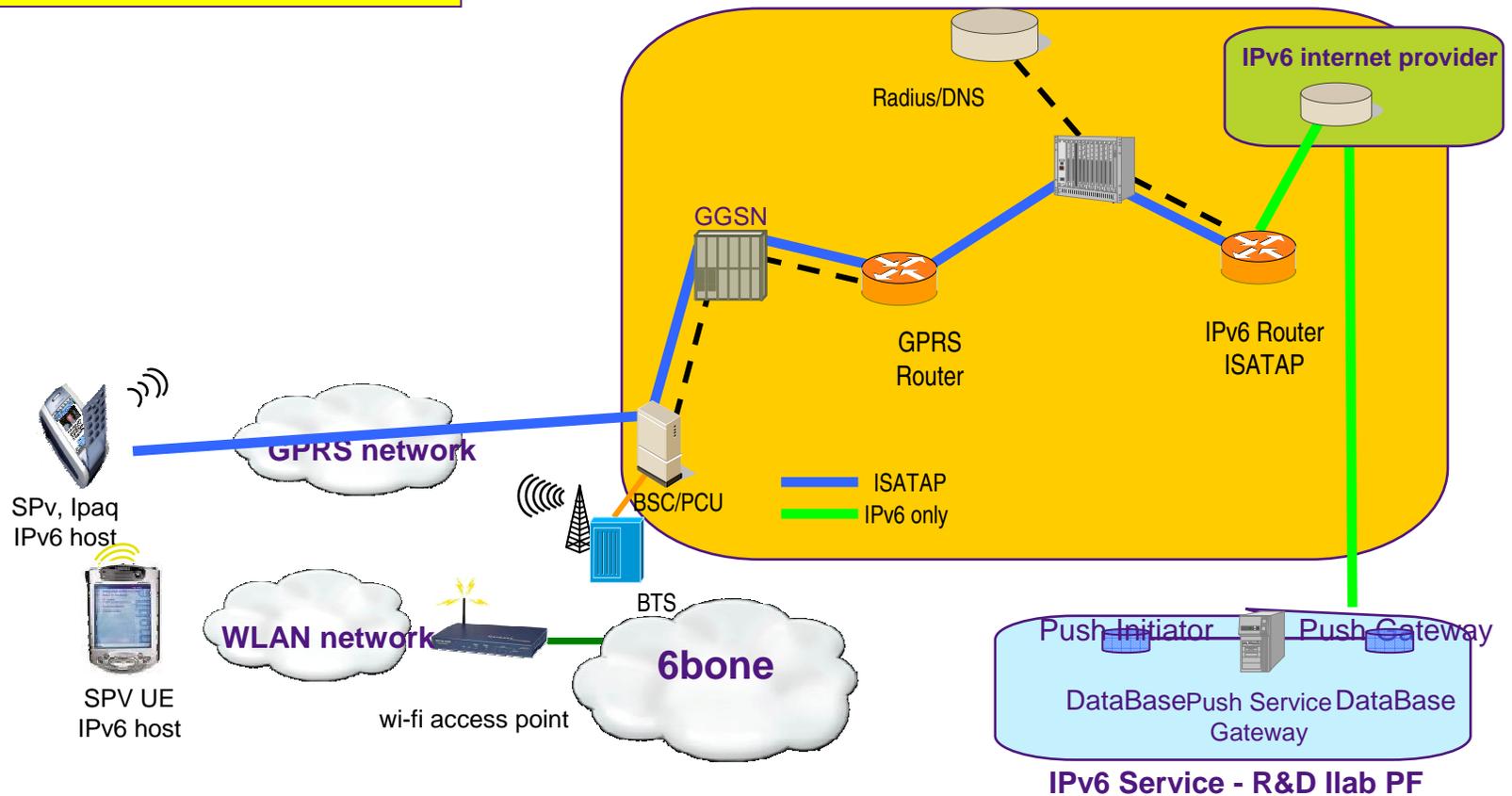


u Provider assets

- More than one IP address achievable on the Internet at home...
- No more NAT/PAT (translation) facilitate deployment for domestic services
- Richness of services (end to end communications, presence, IP phone, ...)

u Client assets

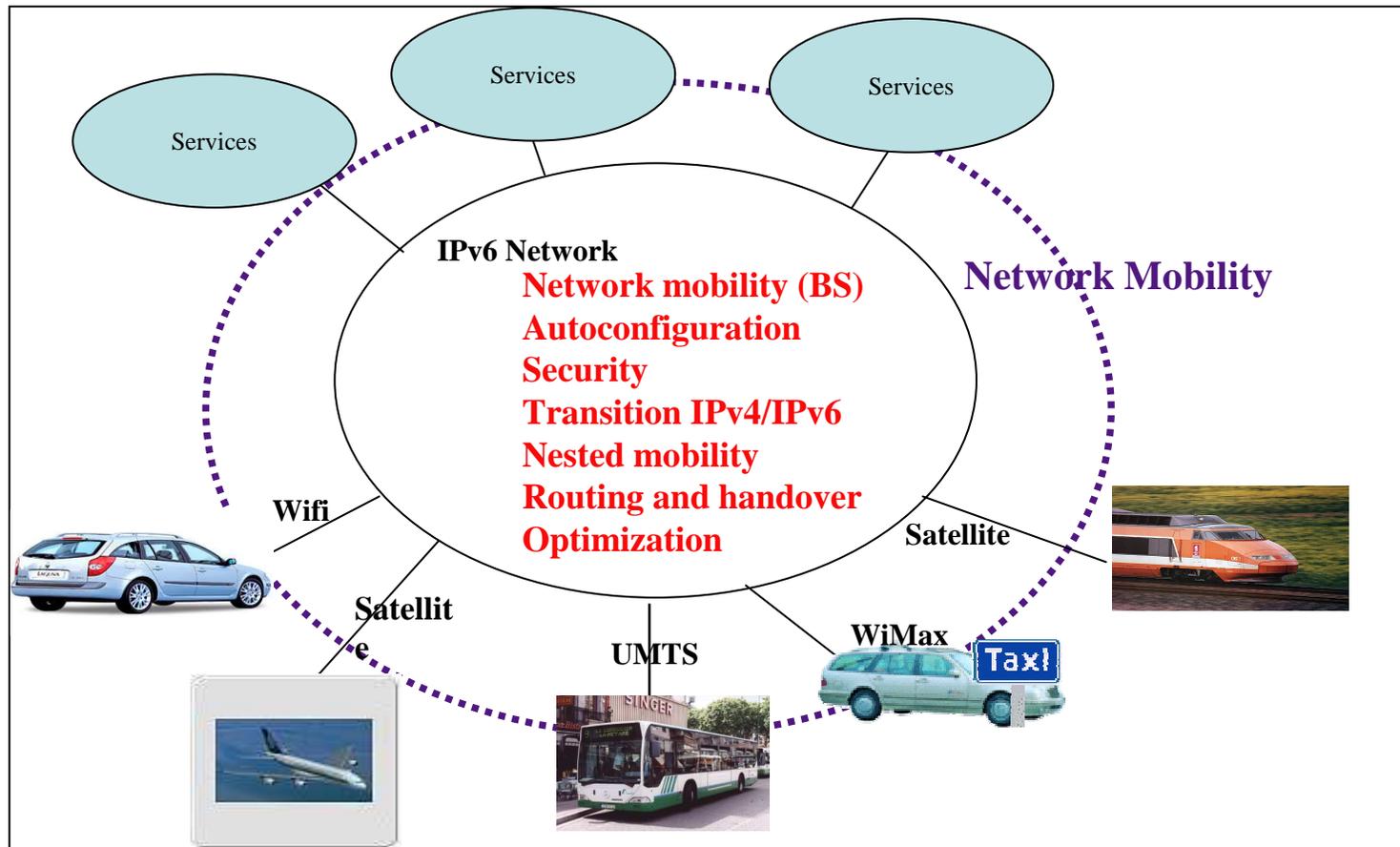
- Simplicity to set-up and use a domestic network (auto-configuration, stateless, no more translation...)
- Richness of services (end to end communications, peer to peer, multicast,)
- Scalability and robustness of services
- Unique IP address aware in different network access





IPv6 and Transport: Network mobility architecture

Deploy solutions to enable the permanent connection of IP terminals in a moving network (Trains, Cars, Buses)
- Propose added value services such as Internet connection, VoD service, VoIP service to customers travelling



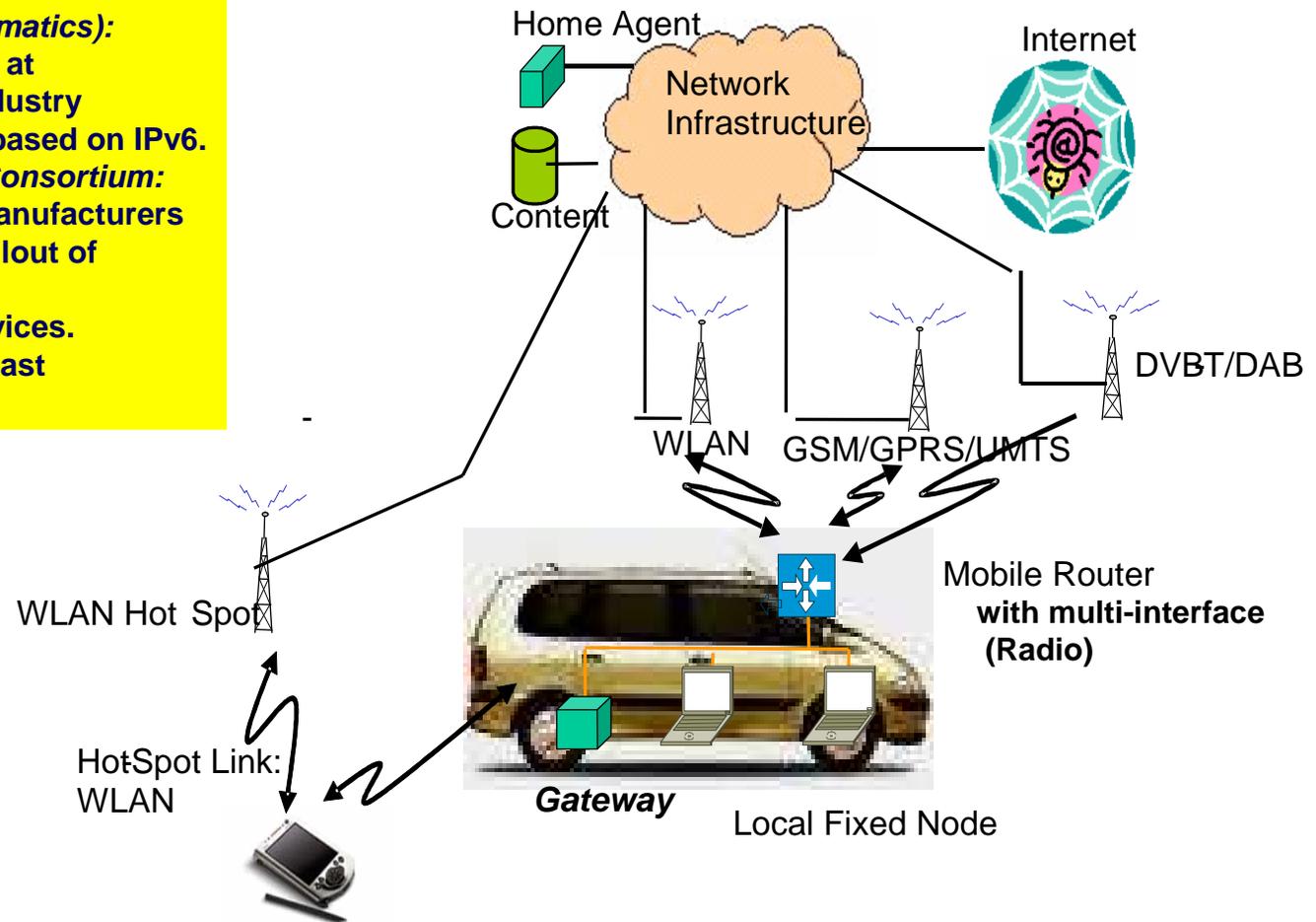
IPv6 for Transparent Access to Vehicles Lan (Mobile Router)



As in the residential market, the notion of **Transport Gateway** can be used. It will have to make the permanent connection for all the IP devices inside the transport mean but also will have to provide additional features tight to auto configuration, authentication for example.

* **GTS (Global System for Telematics):** an European project that aims at converging the automobile industry and telematic standards. It is based on IPv6.

- **Car-to-Car Communication Consortium:** an association of European manufacturers for the standardisation and rollout of C2C (Car-to-Car) and C2I (Car-to-Infrastructure) services. The protocol used for the unicast spect is IPv6.

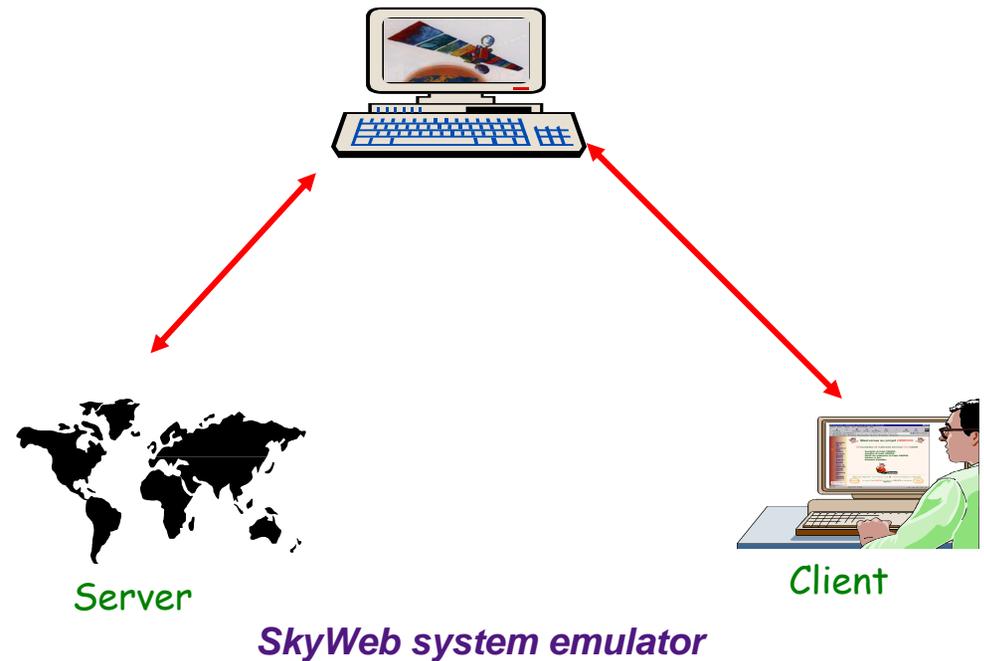


- * Continuity of services between an external access and an intra-vehicule access
- * Cooperation between telcos/diffusion networks and managemnt of handovers

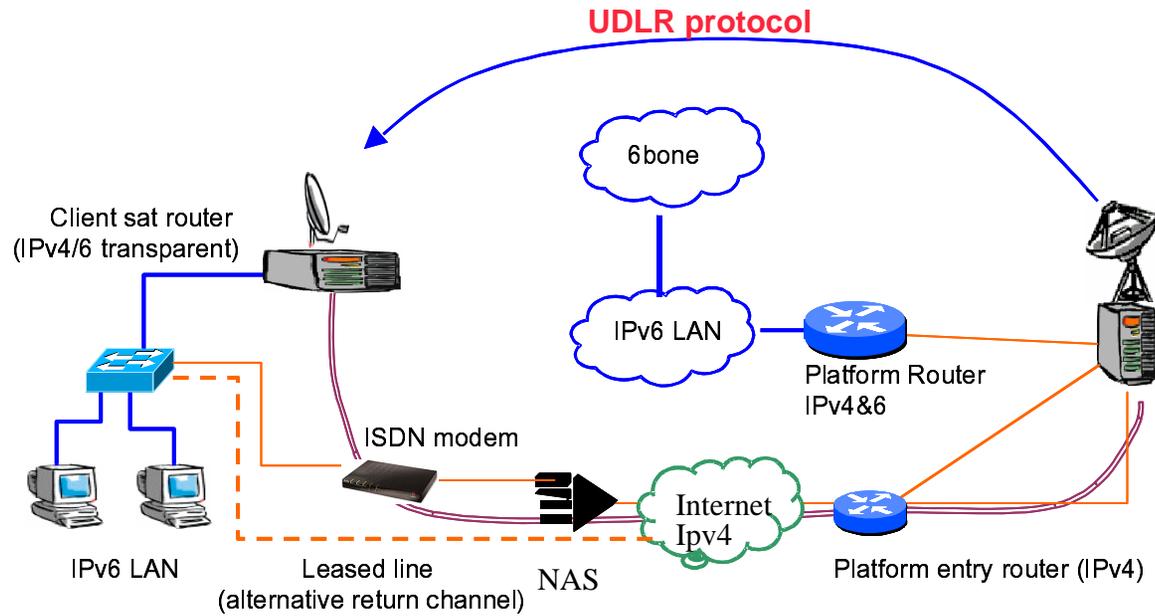
France Telecom's Demos project (2000)



- S **Demos** (Demonstrator of multimedia services on satellite) platform.
- S The objective was to allow France Telecom to evaluate the performance of future interactive satellite communications systems before they are launched
- S This evaluation has been done in two ways :
 - Q **Radio air-interface resource allocation mechanisms** were studied via non real time simulations using these simulations use IP traffic models to simulate forward and return link resource allocation algorithms
 - Q **A real-time platform** was developed which added the real traffic of one further real user to the simulated traffic of the above N users.



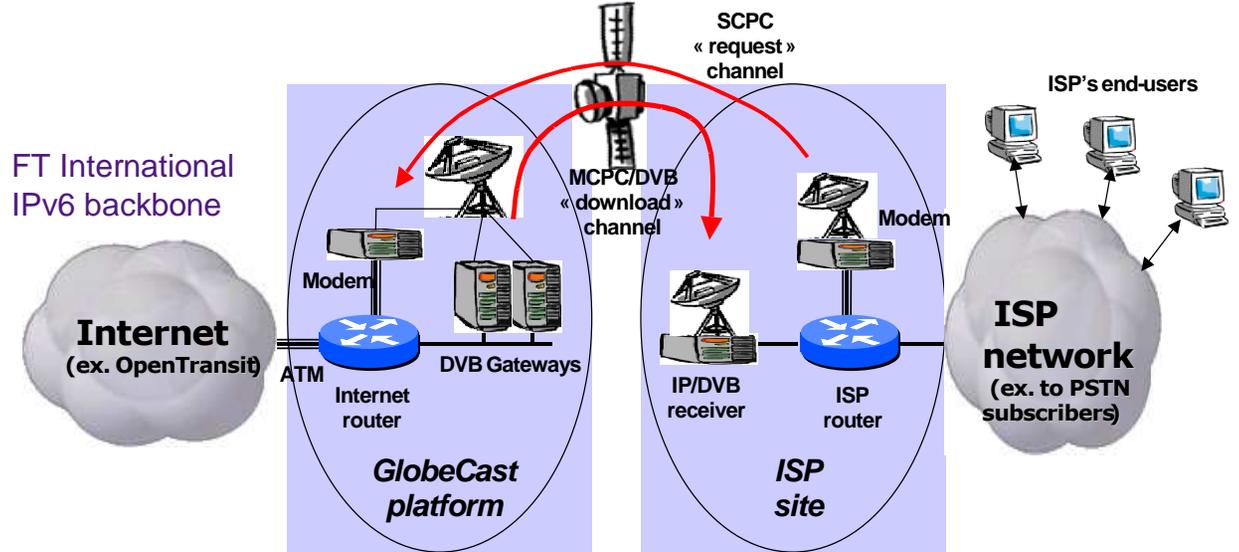
FT R&D IPv6 satellite experimental networks



— IPv6
— IPv4
— IPv4 (GRE-encapsulated IPv6)

MCASTConnect Architecture
 is a solution for delivering broadband Internet access via satellite directly to businesses and residential subscribers. The use of the satellite offers better download throughput even used in conjunction with poor terrestrial links, which in this case are used only to ensure the feedback channel..

MCAST Direct Architecture
 Service enables ISPs and Corporate Users to expand their connectivity to the International backbone. Broadband satellite bypasses poor terrestrial infrastructures to deliver content directly to the ISP. .



RFID and IPv6 business case



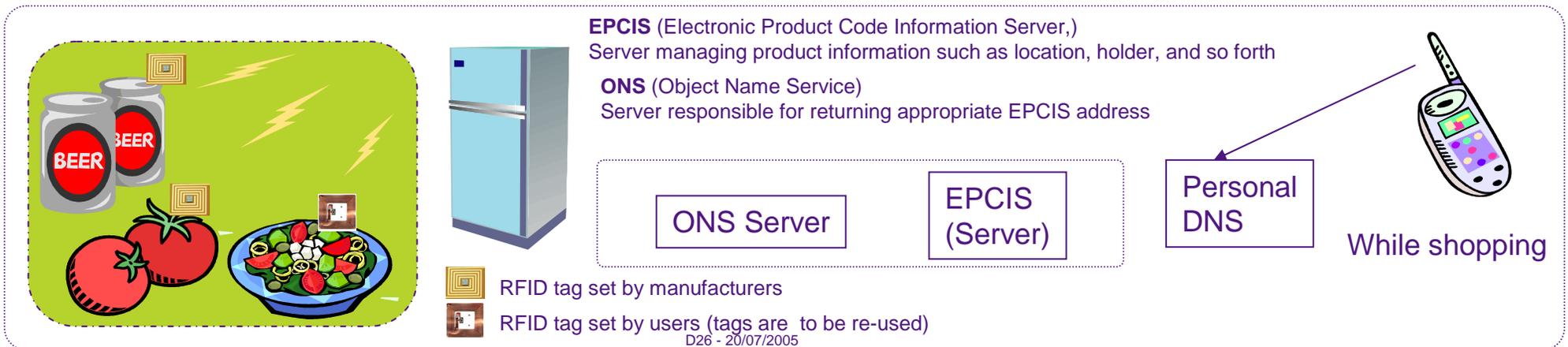
Objectives

- Investigation of RFID technologies and IPv6 technologies integration
- Realization of M2M (machine-to-machine communication)
- Implementation of applications that utilizes M2M communication

Basic approach

- Most of the existing RFID solutions are focused on retailer-side and distributor-side. (e.g. traceability system). The user-side benefit is generally less focused.
- By integrating IPv6 technologies that provide end-to-end connection and 128bit address space, we believe that it is possible to design RFID solutions that are beneficial to users.

Proof of the concept by Fridge business case





Thank you