An IPv6 Experience

C. Jacquenet

christian.jacquenet@orange.com

Outline

- About us
- Context
- Strategy
- Life during transition
- Status
- Lessons and challenges

About Us

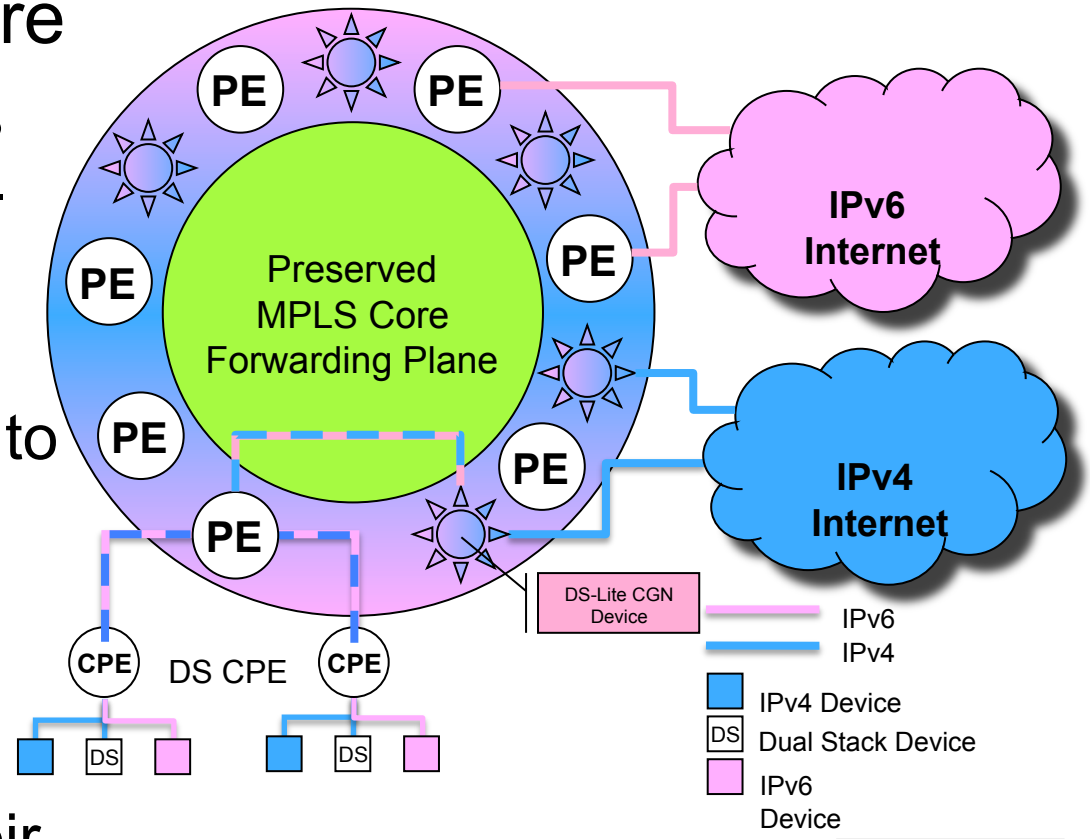
- 170,000 employees worldwide
  - 105,000 in France
- 227 Million customers worldwide
  - 169 Million mobile customers
  - 15 Million ADSL customers (worldwide)
- On Sept. 30, 2012 turnover is 32+ Billion Euros

0 Address, 1 Solution, 2 Problems

- IPv6 is the only perennial solution to global IPv4 address depletion
  - Cornerstone of business development (mobile data, M2M)
  - One-size-fits-all solution (enterprise, mobile, N-Play, wholesale)
- But IPv4 service continuity during forthcoming transition period is a MUST
  - Not addressed by IPv6 because migration cannot be done overnight

(Fixed) Networking Strategy

- Dual Stack architecture
  - CPE, network devices and platforms are DS-enabled
  - IPv6 prefixes are dynamically assigned to CPE by means of DHCPv6
  - Hosts connected to CPE devices automatically form their IPv6 addresses



Life During Transition

- Make sure access to IPv4 contents from IPv4 (and IPv6) terminals can be guaranteed during transition period
  - Although new customers will not be assigned a global IPv4 address anymore
- Hence the need to rationalize the global IPv4 address usage
  - Sometimes yielding the deployment of NAT capabilities in the network (*a.k.a*. Carrier-Grade NAT (CGN))
    - Depending on local IPv4 address depletion forecasts

On CGN Technology

- *Any* CGN technology is lesser evil rather than a perennial solution
  - Because of well-known address sharing issues (see RFC 6269)
- DS-Lite technique has attractive pros:
  - Only one level of NAT
  - Assumes IPv6-enabled (access) infrastructures, hence encouraging IPv6 deployment and usage
- But CGNs do NOT address all issues, *e.g.*,:
  - User-Generated Contents (UGC)
  - Implicit user authentication
  - Access to multicast-based services
- CGN technology does NOT question IPv6 deployment

Mobile Services

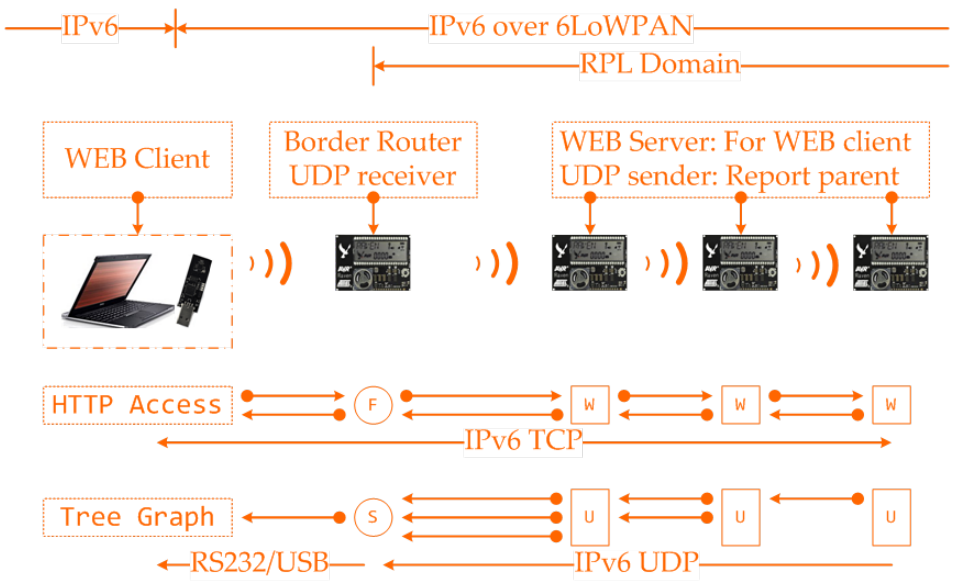
- First allocate IPv6 prefixes *and* IPv4 addresses to mobile terminals
  - Dual or single PDP context is constrained by current and forthcoming 3GPP/LTE designs and specs.
  - Privilege a single PDP context whenever possible for the sake of bandwidth optimization
- Then assign only IPv6 prefixes
  - Access to IPv4 contents relies upon NAT64 capabilities
- Applications should be Address Family-independent
- Use IPv6 as M2M service catalyst

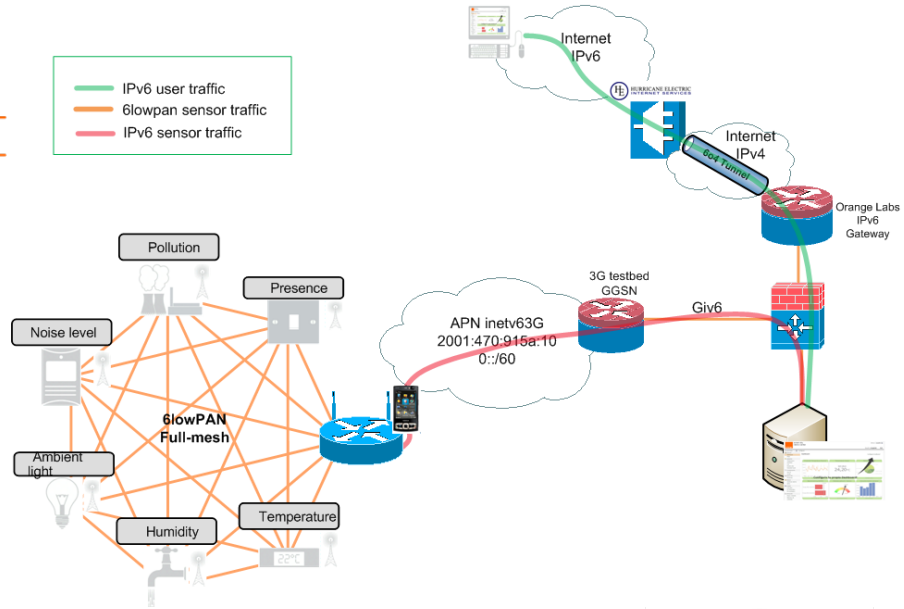
IPv6 as a True M2M Business Catalyst

- Because of the addressing capacity
  - M2M-inferred environments assume tens (*e.g.,* home services) to thousands (*e.g*., urban services) of connected devices
- Because of self-configuration capabilities
  - Devices automatically form their IPv6 addresses, discover their neighbors and are up and running as per a plug'n play approach

Early Achievements

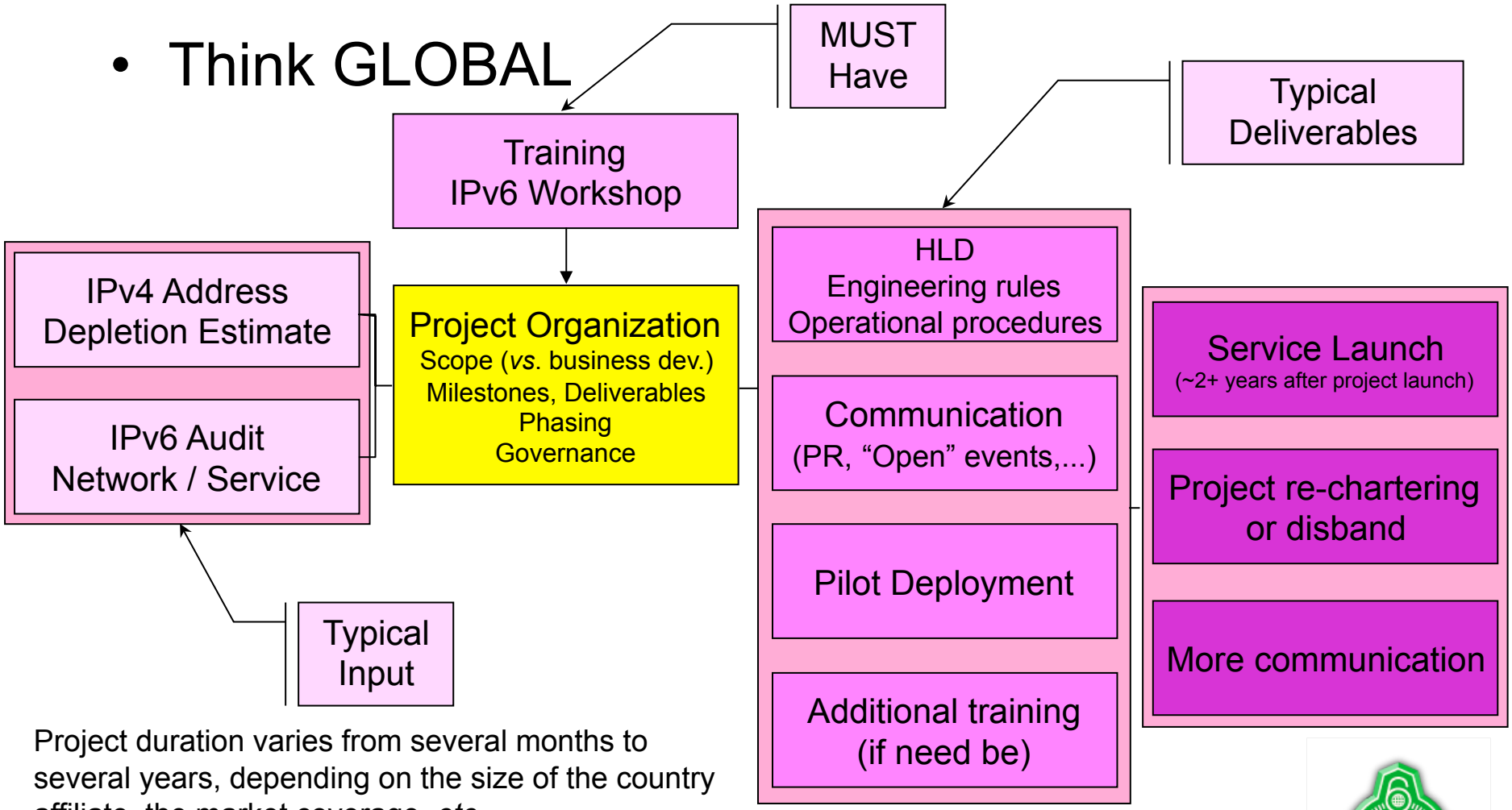
- Beijing labs operate a temperature-metering RPL-enabled WSN for more than a year
  - Validation of management framework in progress
- Spanish labs demoed a sensor-networked city
  - Sensor-collected data retrieved through the IPv6 APN





Organizing an IPv6 Project

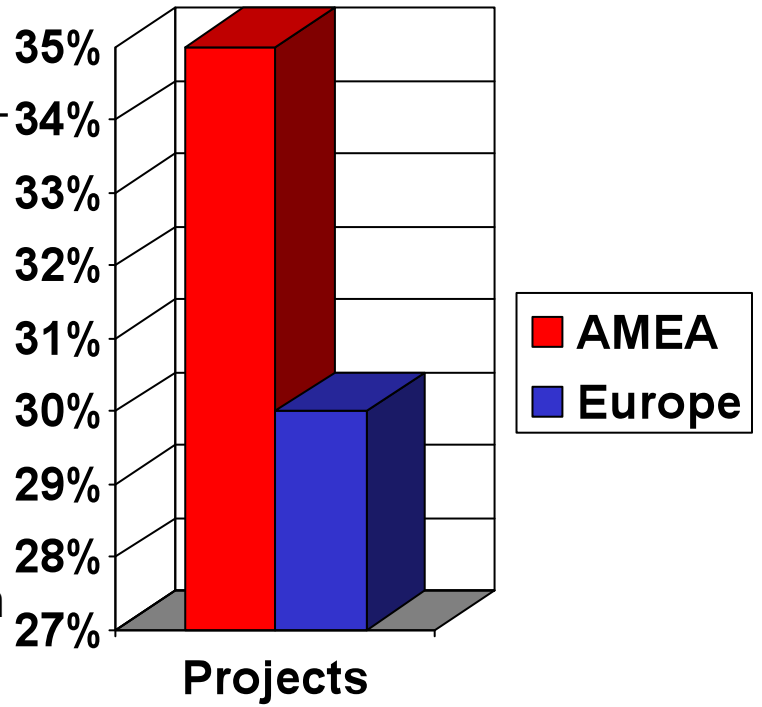
- Think GLOBAL



Project duration varies from several months to several years, depending on the size of the country affiliate, the market coverage, *etc*.

AMEA and Europe

- AMEA
  - Jordan, Kenya, Mauritius, Morocco, Senegal, and Uganda are currently the most active, *e.g.*,:
    - Meditel presented detailed roadmap to ANRT
    - Mauritius Telecom provide IPv6 connectivity service to AfriNIC
    - Orange Uganda's website is IPv6-reachable
  - Early pilot deployments assume off-the-shelf CPEs
- Europe
  - Romania already provides IPv6 transit service
  - Moldova and Poland to open IPv6 service in 2013
  - French backbone is iPv6-ready but grand opening is not foreseen before 2014
  - Slovakia to ignite project in 2013



Status

- IPv6 transit offering available since 2002
- 20 countries ignited IPv6 activities/projects since 2008
  - Several pilot deployments started in 2010 (France, Moldova, Senegal) and 2011 (Poland)
  - Additional affiliates to join in 2013
    - Poland (fixed/mobile) to launch IPv6 connectivity service in April 2013
- IPv6 VPN service available since 2009
  - Including an IPv6 consulting service for corporate customers
- 1,000+ colleagues trained to IPv6 group-wise

Lessons and Challenges

- **The need for IPv4 service continuity raises the trickiest issues**
  - Consolidate CGN-based design and assess scalability and performances
- Some vendors are not IPv6-minded **yet**
  - *E.g*. STB and mobile terminals markets, but progress is dramatic
- Applications should be Address Family independent
  - Must be used over IPv4 or IPv6 indifferently
- Both pilot deployments and communication are **key**
  - Acquire operational experience (Moldova, Poland, Senegal are typical examples)
  - Think IPv6 as a business **opportunity** not a constraint

Thank You!