

# ITU-T Broadband forums

## Energy Efficiency and Future Data Centres

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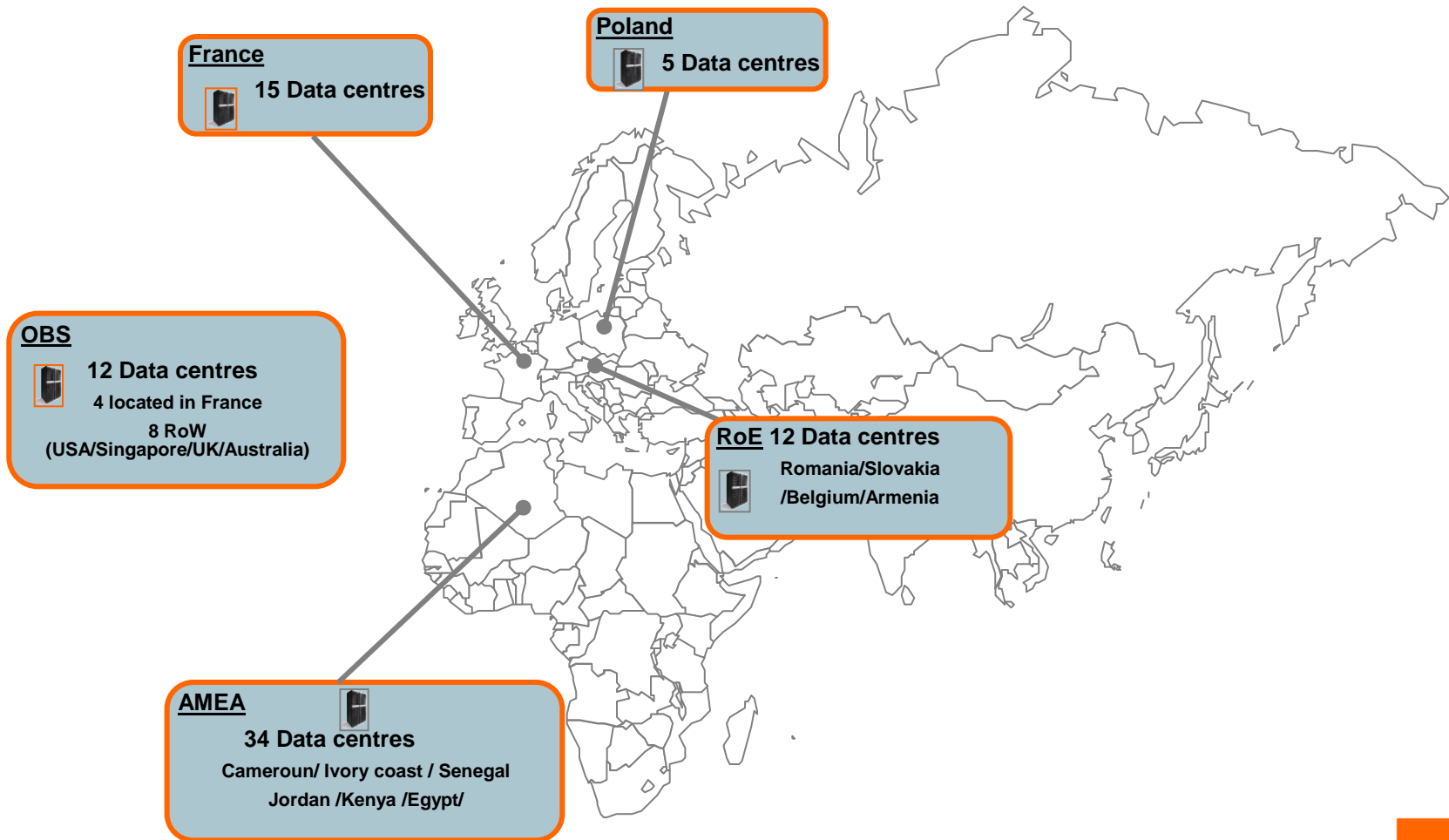


# Orange group: the DataCenter big picture

- No less than **78** DataCenters (including mixed telco/IT sites) scattered among **32** telco affiliates in countries and Orange Business Services.
- DataCenters consume around **500 GWh** from grid electricity in 2013, that is 10% of technical energy, itself 2/3 of total Group Energy consumption.
- Orange Group has committed to **sustainability objectives** since 2007
  - Reduce Group CO<sub>2</sub> footprint by 20% between 2006 and 2020<sup>1</sup>
  - Reduce Group energy consumption by 15% between 2006 and 2020<sup>1</sup>
  - 25% of AMEA energy coming from solar energy in 2015
- Orange is an endorser of the **European Code of Conduct for Datacenters**, with 3 datacenters signed in: Nice, Normandie & Poland.
- DataCenter consolidation program started in 2009.

<sup>1</sup> Figures include technical energy as well as all buildings and vehicles

# Orange group today... around 78 Data centres ...



# Axes for energy reduction in data centres & IT

- Orange launched early 2009 the green data centre strategy program in order to reduce energy consumption of its data centres. This program was based on a layered approach.
  - Less energy for hosting
  - More processing power to the watt
  - Better use of processing
  - Fewer needs for processing power
- A similar program was launched for Network

# DataCenter and IT consolidations

- Group:
  - Use of centralized cloud for all telco affiliates & OBS.
    - Currently based on two European hubs
- France: Reduction from 18 DataCenters to 6.
  - 1 new DataCenter, **Normandie**, Orange flagship DataCenter
  - Phase 1: 5 existing DataCenters remain
  - Phase next: Another Normandie will be built and some other data centres will be decommissioned.
- Africa: Two countries host centralized applications
- All new Data Centres have energy efficiency goals and replace a number of older non-efficient ones.

# A few words about Normandie DataCenter

- Room for 4 buildings, each able to host 10 MW,
  - 1 half building in operations, other half commissioned end of year 2014.
  - Target yearly PUE: 1,3
    - 85% total free cooling; 10% mixed recycling; 5% total recycling
  - Recycles heat for office heating, 50KW heat pump, plant wall
  - No ROI for solar panels (room still available on roofs)



# Assessment of energy management efficiency

- Orange has decided to use the emerging  $DC_{EM}$  global indicator instead of PUE for assessment of energy management performance in its data centres.
  - This indicator was defined by TC/ATTM ETSI following the mandate M/462 of European Community. It is now an ETSI standard and shall be promoted to European Standard in 2015.
  - It is a label based upon a global efficiency indicator that combines the old PUE with sustainable aspects of energy management: energy reuse & use of energy coming from local renewable power sources
  - References:
    - $DC_{EM}$  KPI for performance of energy management in DC
    - ETSI ES 205 200-2-1 (Energy Management Global KPI for Data Centres),
- Orange considers switching to  $DC_{EM}$  for the rest of its ICT sites.



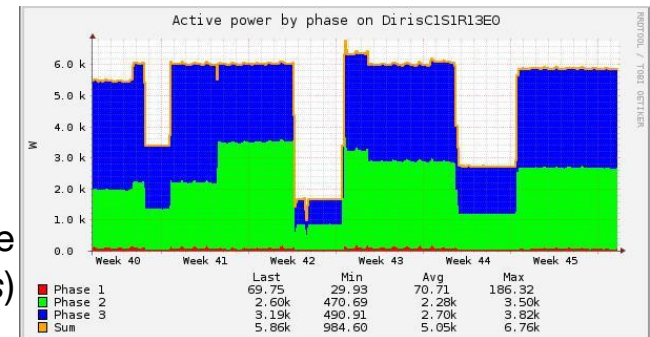
# Anticipation : Submersion cooling

- A prototype lent by *Green Revolution Cooling Company* was aimed at studying implementation conditions and performance of a cooling solution where servers were immersed in an oil loop.



- The experiment has been run in the Orange data centre near Nice. Servers were stripped off their fans and dipped into oil. Deep analyses of the technology behaviour were run and operability was controlled.

- Observed performances were quite remarkable  
(Phase 1 : Cooling ; Phases 2&3 : Servers)



- **Benefits:** smaller primary power installations less depending on the yearly climate changes.
- **Caveats:** Does not apply to all kinds of IT components.
- **Next steps:** written support of the technology by IT component vendors.
- validation of working conditions where the oil temperature can reach 50°C.
- **Still ongoing:** Studies on long term impact of the use of oil.



# Anticipation : Low power modes

- The next major step in energy reduction is decrease of the need for power by IT. We wish an unused equipment consumes nothing.
- Approaches:
  - **By equipment itself** : current servers have power needs varying from 1 to 4 from idle to full use, this gap is increasing. **We do believe this is the future.**
  - **By IT Tools** to shut & restart IT equipment (Cisco, VMware...)
    - Mostly only servers today
    - Management of other kind of data centre equipment is less usual.
- Expected savings: 10% of IT energy consumption when applied to servers
  - Assuming 60% of traditional IS applications can sleep 40% of the time
  - Assuming only 20% of service platforms (1/6 of applications) can sleep 40% of the time
  - Assuming servers are 50% of data centre hosted consumption
  - Note: Same savings may be expected from other kinds of IT equipment (fewer solutions available today)
- Expected impacts:
  - Energy consumption by IT load will become more and more variable
    - **Technical equipment will have to adapt to variable charges.**

# Future target and sustained activities

- Less energy for hosting
  - Current: Free cooling for new DataCenters and some refitted
  - Anticipation: **Submersion cooling**, 400 VDC
- More power to the watt
  - Current: Removal of unused & obsolete equipment
  - Anticipation: 400 VDC
  - Research: Expected new techniques for IT equipment
- Better use of processing power
  - Current: Virtualization & cloud
  - Anticipation: **Sleep modes**
- Fewer needs for IT processing power
  - Current: prune useless functions & consolidate scarcely used functions
  - Anticipation: Eco-Design

# Summary: expectations from vendors

- On Information Technology equipment:
  - Support 400VDC
  - Support 20°C ambient as well as 35°C with no consumption increase
  - Do nothing, consumes nothing
  - Support submersion cooling
- On Technical Environment equipment
  - Support 400 VDC
  - Support varying power needs without significant performance degradation (on-demand power and cooling)
- On OS developments
  - Support of deepest sleep modes
- On application development
  - Eco-Design together with energy ratings of applications
  - Active/Active multi sites design for the most critical applications
  - Rationalize functionalities across applications.

Thank you,  
Questions ?

