Success Cases in Green Initiatives

Sofrecom Know-how

September 16,2015

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Part of the Orange group

1 Energy transformation in telcos

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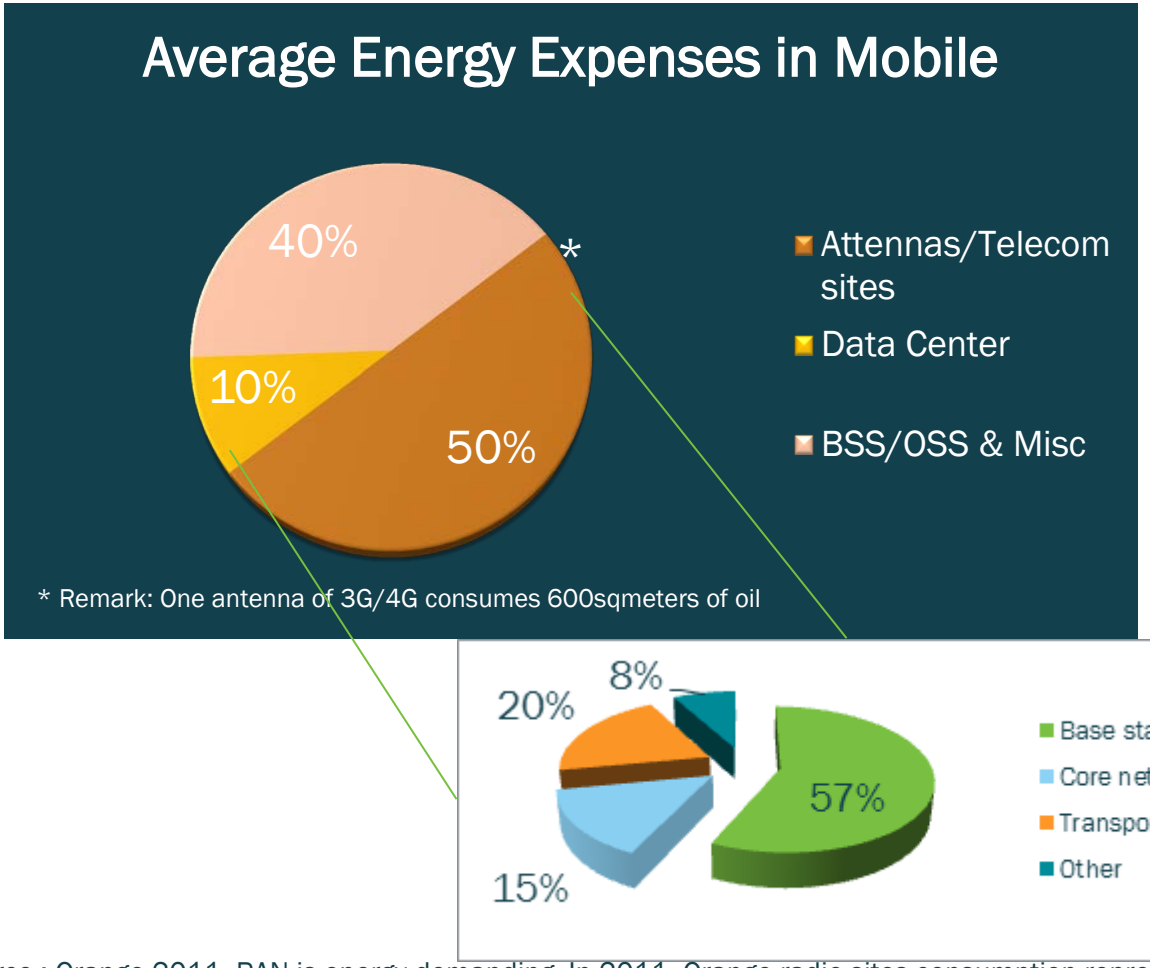
Pressure in energy consumption transformation

Orange Group stakes to reduce energy consumption and carbon footprint

From 2006 to 2012, within ITN perimeter of consolidated Orange countries, Orange Group has been facing a huge increase of energy consumption and spending, due to usage booming, growth of our customer base and energy costs rise (+6.2% electricity cost rise per year in average)

Average 50% of OPEX in telcos are from energy



Source : Orange 2011. RAN is energy demanding. In 2011, Orange radio sites consumption represented 57% of the overall energy consumption.

Orange's Green ITN 2020 transformation program

Green ITN 2020: what has been achieved so far?

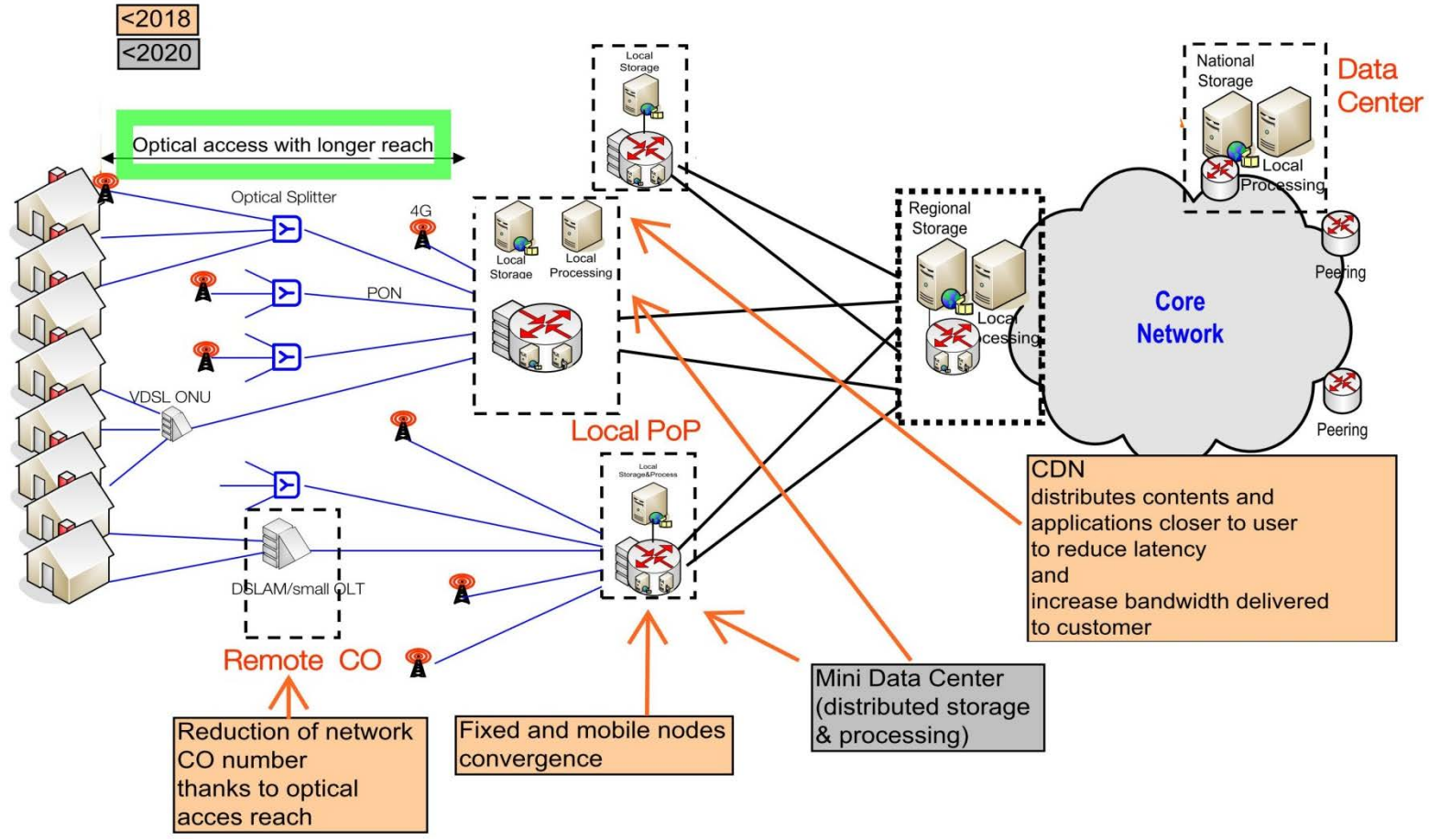
A set of technical recommendations, including site reconfiguration, cooling strategy, as well as space/consumption optimization have been initiated and executed and going on for several years. Some ITN Consumption parameters have been improved constantly.

➢ Orange has been ambitious and active in research and planning green initiatives with many success cases in energy Transformation

➢ Orange is one of the top-3 most recognizable global operators with best-practices in green initiatives and programs.

- The 22 countries involved in the Orange Energy Action Plan allowed us to save 313 GWh electricity in 2013, representing 8.6% of our 2012 ITN consumption, 33 m€ of Opex and around 110 000 tons of CO 2 .
- In addition, thanks to over 2300 solar sites, 20 countries, mostly in AMEA, produced, about 15 GWh of solar energy in 2012, avoiding the consumption of 28 million litres of fuel: together with maintenance savings, this represents an additional 36 m€ Opex savings and 76 000 tons of CO 2 spared.
- Actions taken in 2012 allowed to limit the rise of our Group ITN energy consumption to 3.8% and our ITN CO 2 emissions to 6.3%. However, in spite of significant achievements so far, we have not yet been able to reverse the growing trend of energy consumption, which is mandatory to keep our energy Opex under control

Soon transformation of telecom buildings



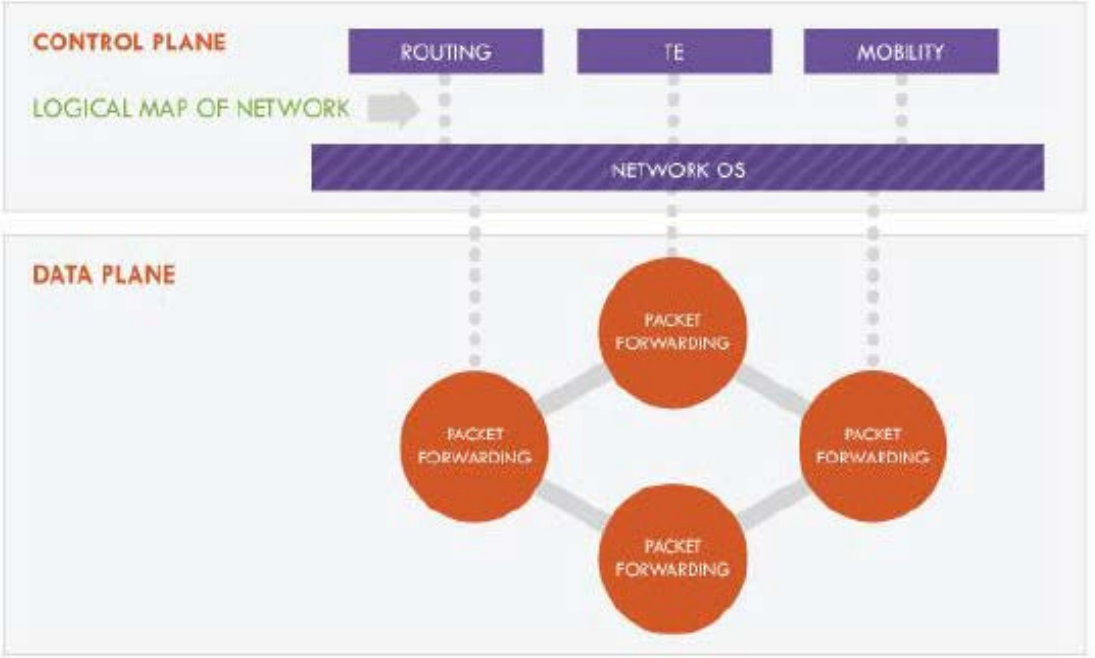
Using SDN to help maximize efficiency

Concept for a new form of network architecture

- Technic based on the separation of the control plane and the data plane
- Architecture around the controller (key to centralize control plan)

Opportunities with SDN

- Automation Of network configurations to avoid duplication of interventions on various equipment
- Centralization Management and control of network elements
- Optimization Resources
- Setting Service on demand
- Understanding and Analysis of traffic transiting the network



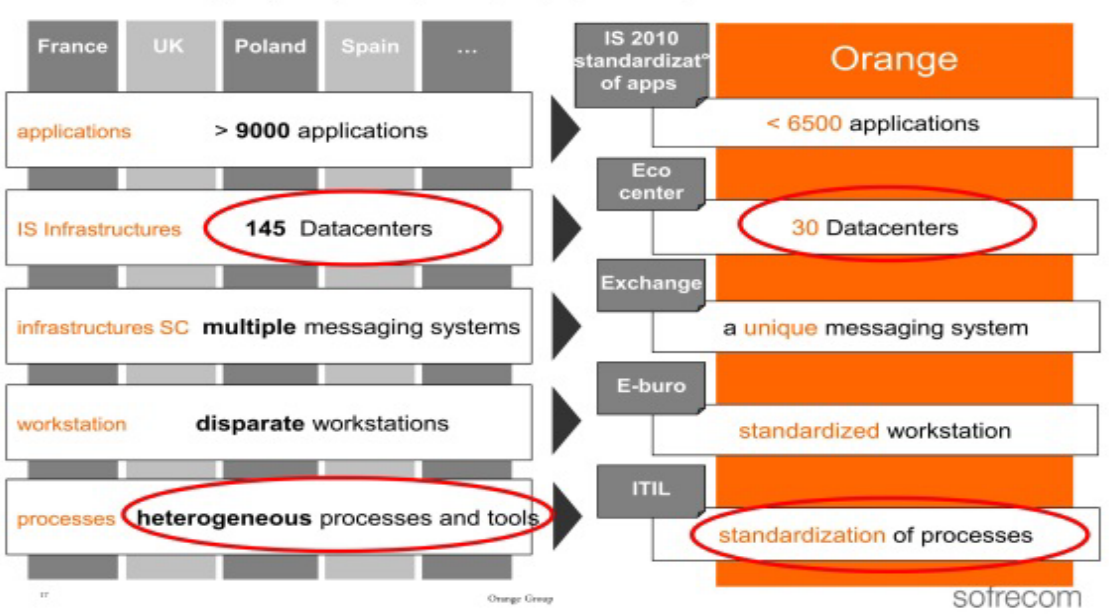
Orange Group engaged a transformation program since 2008

A common ambition : becoming a new generation integrated operator under the orange banner.

IS & network was one of 5 transformation domain.

- IS & network
- Support functions (HR, accounting, finance…)
- Marketing & Orange brand
- Customer relationship
- Constantly innovating (3000 staff members dedicated to R&D)

- **2 lead indicators on IS & network.**
  - Reducing OPEX by 2 points in relation to revenue ratio
  - Maintaining Capex level at 10% of overall revenue.
  - Reducing data Processing - PUE (power usage efficiency
- **Consolidation program involving several Orange subsidiaries : UK, Spain, Poland, Romania, Slovakia, Belgium, Switzerland, France**



Sample parameters of eco-datacenter:

- Setting 1 PUE Kpi per data center
- Adjusting 4 racks per one cooling system with localized surge
- Using "in-row cooling" concept, i.e. hi-density rack will be contained to cool the room – one row of racks, one cooling rack.

Orange Group's key areas of program execution

Some example of programs

Sample Programs

-Electra solution:

Focus on small sites by tracking/monitoring electricity consumption in every 5 min, how much energy come into site and temperature

-Joulex :

Focus on big sites to measure and optimize consumption via utilizing backup battery balancing with fuel.

- Vendors' equipment optimization

Orange has been working with vendors to adopt equipment every site to wider range of temperature , from 35 degree and after 2010 to 40+ degree

Program	Objectives
interconnection	improve the profitability of the outgoing minutes of traffic vs. incoming
acquisition and commissioning	manage profitability and sustainability of gross ads to avoid « washing machine effect »
bad debt	improve our credit collection process
device, SIM and scratch cards procurement	improve our procurement and supply chain
international connectivity	improve our capacity management
network energy	improve our energy consumption and our energy costs

Program	Objectives
IT infrastructure	optimize our IT infrastructure usage
A&P	improve impact of our campaigns and our communication
property	improve the management of our properties
spectrum	improve the usage of our spectrum
general expense	optimize our general expense. currently group ratio is 3,5%, AMEA is 4,3%
shared services	Long-term goals

Orange Group (France): Building of a new generation Data Center

A new data center to take a step ahead on the rapidly-expanding cloud market

Sofrecom has contributed to this major transformation project aiming at:

- ✓ Optimizing Orange's Information System infrastructures
- ✓ Catering for internal Group IT and customer-oriented service platforms
- ✓ Improving pooling, flexibility, quality of service and security
- ✓ Ensuring alignment of Orange's infrastructure with our group's environmental goals

5000m²
(first building)

10 MW
Power

Tier 4
Data Center

Cloud ready

Green & sustainable
Data centre for Orange's **critical IT applications**

1 Stakes

- Time to market
- QoS improvement
- Meet and anticipate IT requirements driven by the business needs
- Reduce operational cost, complexity and improve efficiency
- Improve Power Usage Effectiveness (PUE) – transition to a Green data center
- Have a simplified and more agile management

2 Methodology

- Greenfield program for new data center construction – Greenwich
- Just-in-time approach for construction plan
- End-to-end program management
- Program management based on Orange's proven methodology for data center projects

3 Benefits

- Best in class Data Center, compliant to data center best practices (free cooling, raised floor, aisle isolation, ...)
- New infrastructure based on modern and flexible technologies – Cloud ready
- Data Center consolidation program: an opportunity for cost savings by reducing the number of data centers in Orange Group
- New data center supports Orange Group Green IT program & attitude
- Highly available Tier IV Data Center for mission critical applications

http://www.orange.com/sirius/datacenter/indexen.html

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Pulse program in Ivory Coast (Africa) part of the Green ITN 2020 transformation program.

Securing and optimizing strategic sites including Data center + telecom sites

The PULSE program was validated by Investment Committee in April 2014 for a budget of 14.3 m€ over the next 3 years. PULSE is the program aiming at securing and optimizing

Technical Environment of the 21 strategic sites of Orange Ivory Coast in order to meet AMEA target in terms of QoS improvement, Opex reduction and technical enablers of Orange services.

Sofrecom provides the Project manager since the beginning.

14.3 m€ investment over 3 years

21 strategic sites

Sofrecom consultants to drive the project

1 Stakes

- Main issue to tackle is that electrical grid in Ivory Coast is quite unstable and network QoS is strongly impacted by power cuts. In 2013, 2 incidents per month were caused by power failures within the 21 strategic sites.
- Additionally, the 21 strategic sites which are hosting the most critical network platforms (2G, 3G, National transmission....) require a high level of reliability in terms of Technical Environment.
- It was then vital to improve power supply availability on these sites:
  - Outdated energy sources (transformers > 16 years of operation)
  - Critical load rate due
  - Strong growth in electricity consumption (more than 10% /yr)
  - Lack of redundancy in power supply design (all sites)

2 Methodology

- The Pulse program has been set up, through many regular and fruitful remote and on-site work sessions. The dossier prepared by Orange Ivory Coast and Sofrecom consultants was presented to AMEA Investment Committee in 2014.
- Short term improvement were also implemented in parallel waiting for long term investment.

3 Benefits

- The quality of the work and deliverables produced led the Orange Group Investment Committee to validate this program for a cost of 14.3 m€ over 3 next years.

Mobile operator in Middle East (2014): Opex reduction based on unused equipment.

DC inventory and identification of unused, under utilized equipment for CapEx and OpEx reduction

Removal of Telecom equipment step by step approach

Detailed plan for the removal of all equipment for all sites

Equipment packing techniques and removal from the sites

Identification and provision of suggestions for the assets that will be recycled, refurbished

Result: $ Million saving

significant OPEX reduction

technical sites

network and IT equipment inventoried

1 Stakes

- Free white space and Power utilisation from the environment and achieve CAPEX and OPEX savings through the elimination of obsolete /unutilized equipment's

2 Methodology

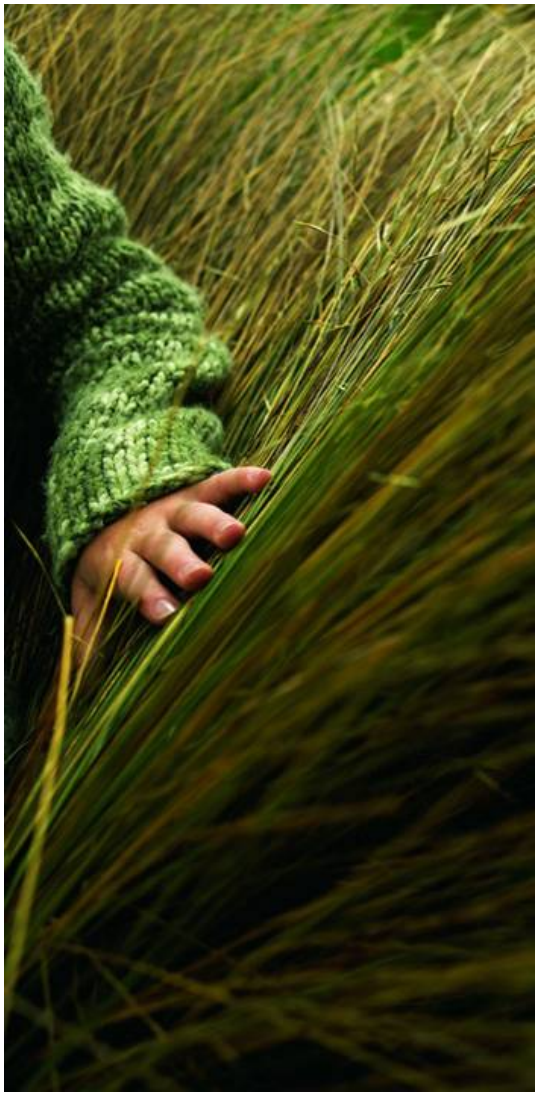
- Detailed discovery methodology including new tools integration to collect the data and inventory phase
- Proposal of obsolescence criteria to analyze and asset removal strategy definition
- Inventory of Telecom, IT and supporting facilities equipment (Electricity, Heating, Ventilation and Air conditioning, …)
- Shortlist of all equipment eligible to removal
- Recommendations on refurbishment and recycling equipment, interim warehouse to store

3 Benefits

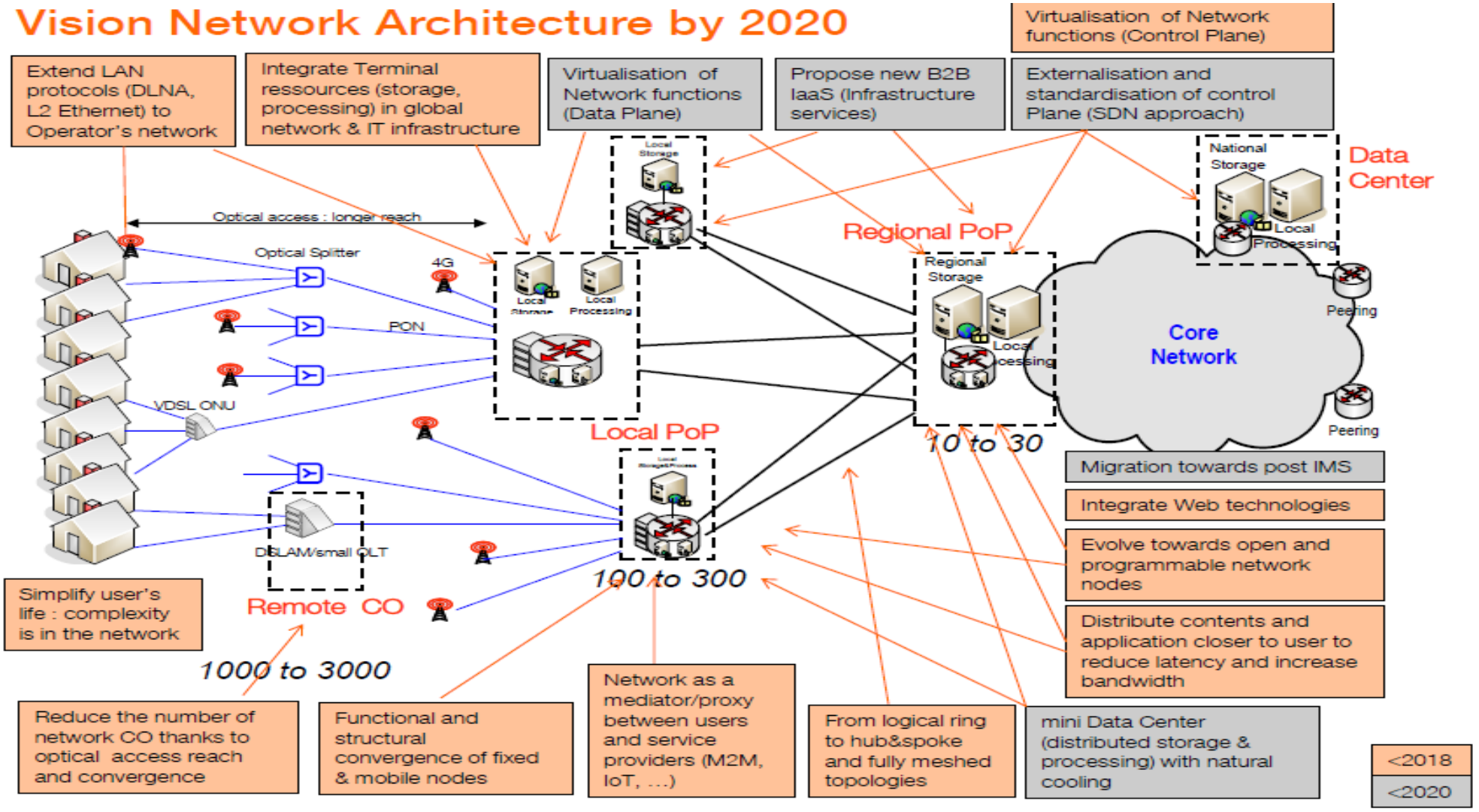
- space saving based on unused equipment and free space in cabinets
- Comprehensive strategy and methodology for asset removal, including detailed milestones for each phase in order to
- CAPEX and OPEX savings thanks to the avoidance of construction of new data centers

Other references

- Orange Slovakia: **8 Technical sites** consolidation
- Orange Poland: **230 server rooms** consolidation
- Ivory Coast : **securing & optimizing power supply** design on 21 strategic sites
- Orange Jordan:
  3 Data Center consolidation/ **civil defense and security**
- AMEA: 7 **feasibility studies and roll-out** for Submarine cable landing Stations
- Orange Group program to reduce energy consumption and carbon footprint
- Orange France: Building of a new generation Data Center
- Mobile operator in Middle East: **technical building** optimization



Orange's 2020 mission



Thank you

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