



Eco-sustainability: an imperative for networks

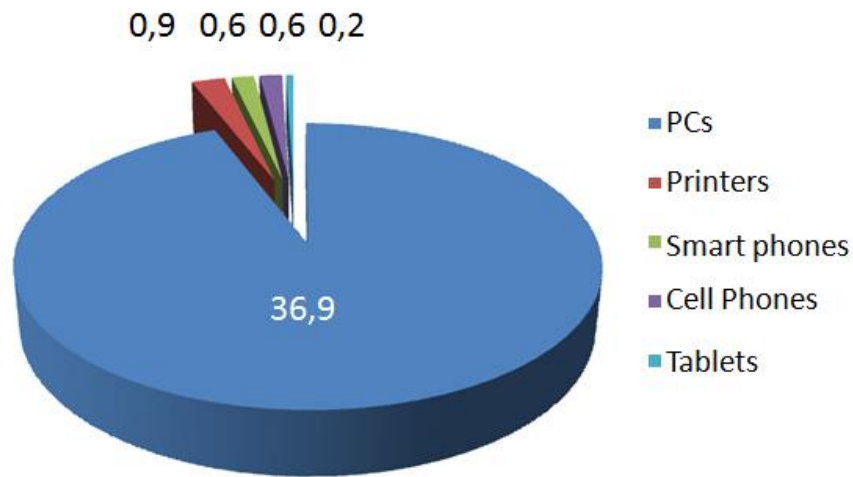
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GWATT: interactive application for network energy challenges and solutions

How is energy consumed in the Internet: snapshot on terminals

- Likely not to increase thanks to users switching from PCs to tablets

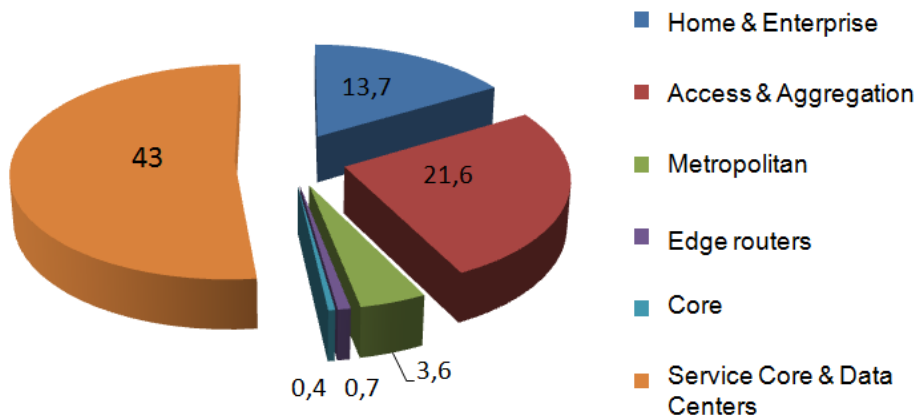


Average Power consumed by the Terminals in 2013 (GW)

GWATT: interactive application for network energy challenges and solutions

How is energy consumed in the Internet: The Network Infrastructure

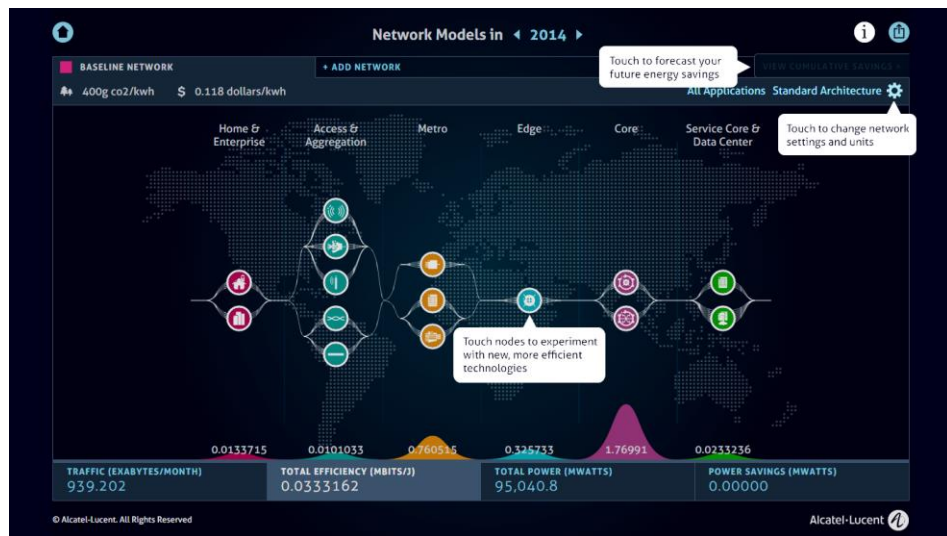
- two big hot spots: access and data centers



Average Power consumed by the Network Infrastructure in 2013 (GW)

GWATT: interactive application for network energy challenges and solutions

- An interactive Bell Labs application to model ICT network energy consumption, cost and carbon footprint.
- To date, accessed by over 18,000 users.
- Increase awareness of the network energy challenge among ICT stakeholders.
- Identify network hotspots and validate impact of targeted improvements in energy efficiency.
- Users can visualize new technology impact and relative benefits on network energy consumption.
- Forecast trends in energy cost, consumption and carbon footprint and impact of technology evolutions.



alcatel-lucent.com/bell-labs/GWATT

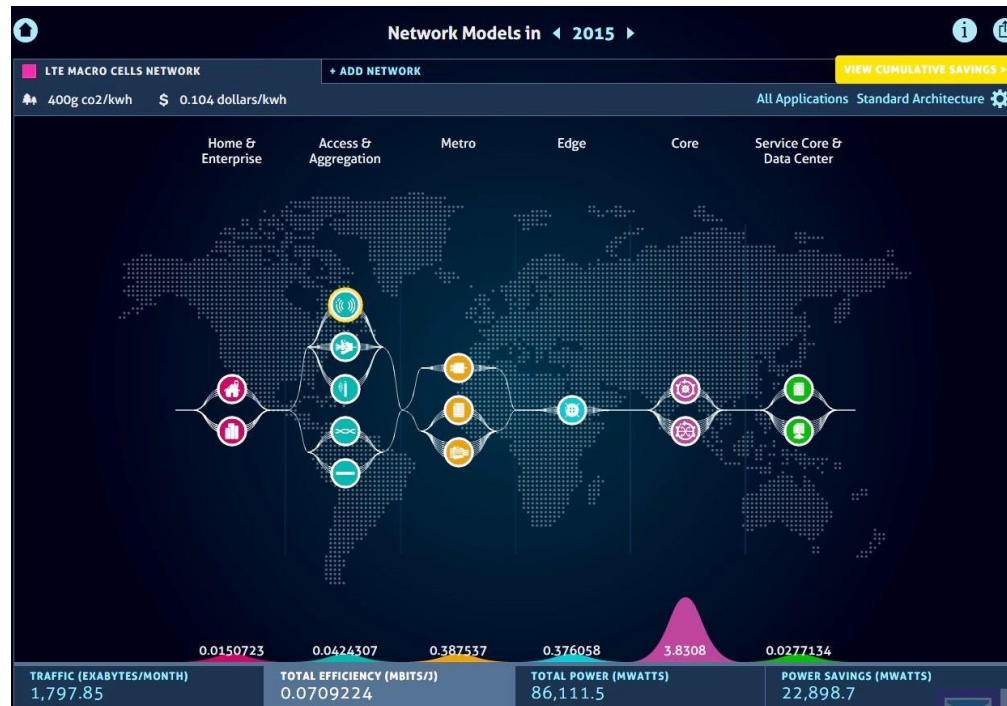
Launching GWATT to Increase Awareness of Network Energy Challenges and Opportunities

GWATT: interactive application for network energy challenges and solutions

Impact of the deployment of new technologies: LTE use case

Thanks to GWATT, one can easily understand how the deployment of the LTE technology reduces the overall network consumption

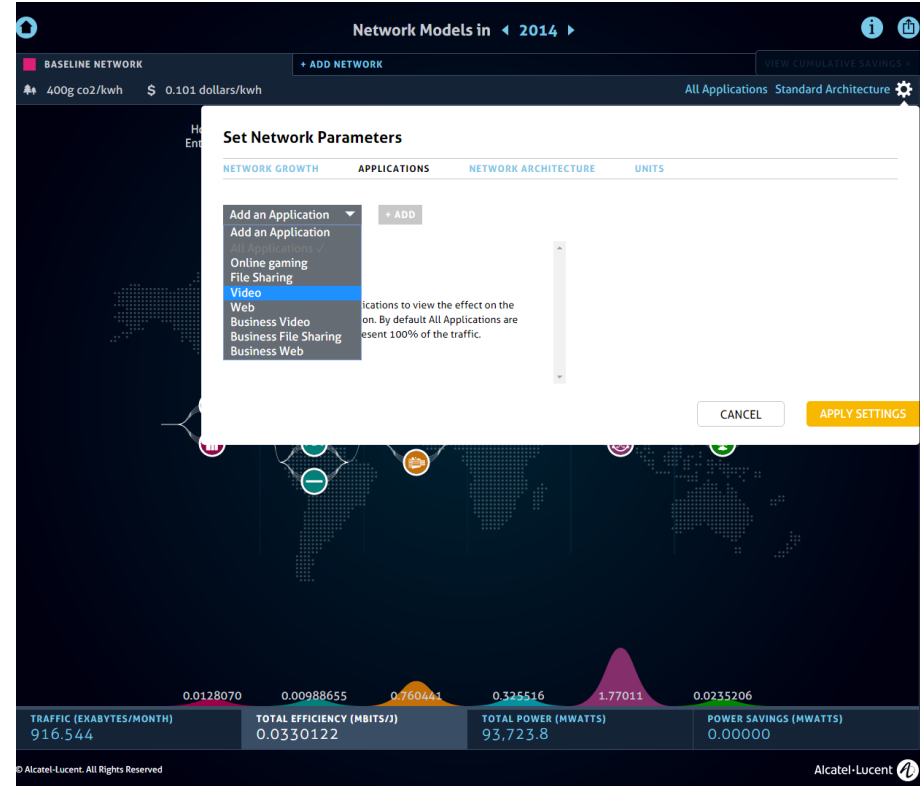
- This generates around 23 GW power savings in 2015 wrt to a legacy 2G-3G networks
 - Worldwide basis and for 100% replacement of old technologies by new LTE



GWATT: interactive application for network energy challenges and solutions

Energy consumed by a typical application: Video

- In 2014: the video traffic represents 59 GW out of a total of 94GW for the whole network
- GWATT allows the selection of various types of traffic/applications
 - Measure the impact of the deployment of a technology on a specific traffic pattern

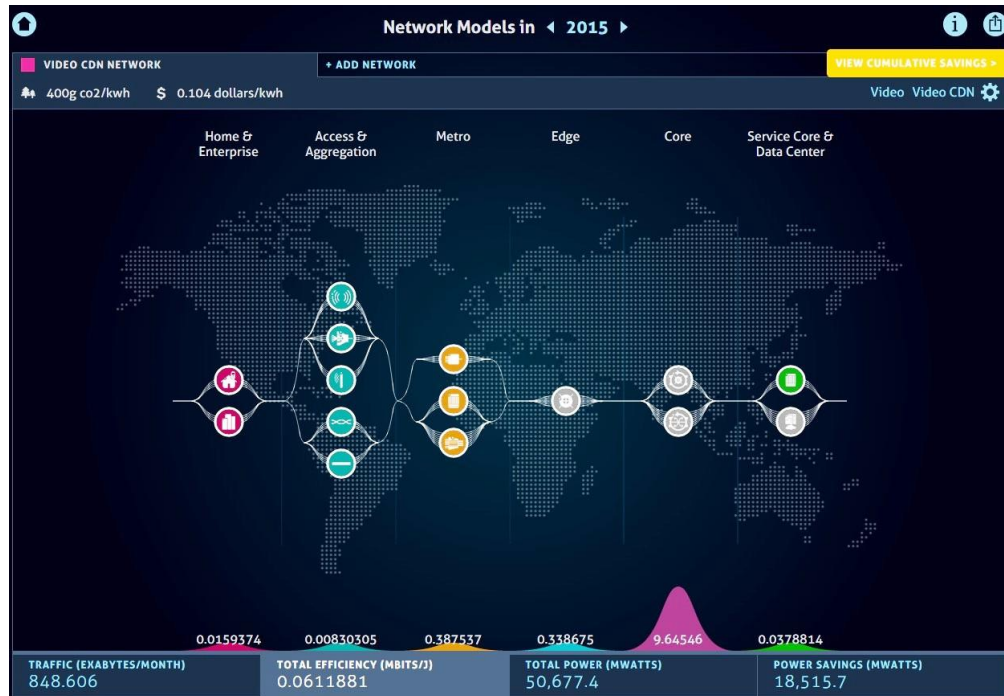


GWATT: interactive application for network energy challenges and solutions

Energy consumed by a typical application

SDN (Software Defined Networking) and NFV (Network Function Virtualization) are major changes on the way the networks are architected, deployed and operated

- Brings flexibility and CAPEX and OPEX savings but what about the energy consumption?
 - In 2015: 18GW out of a total of 68 GW can be saved thanks to the virtualization of the content delivery network

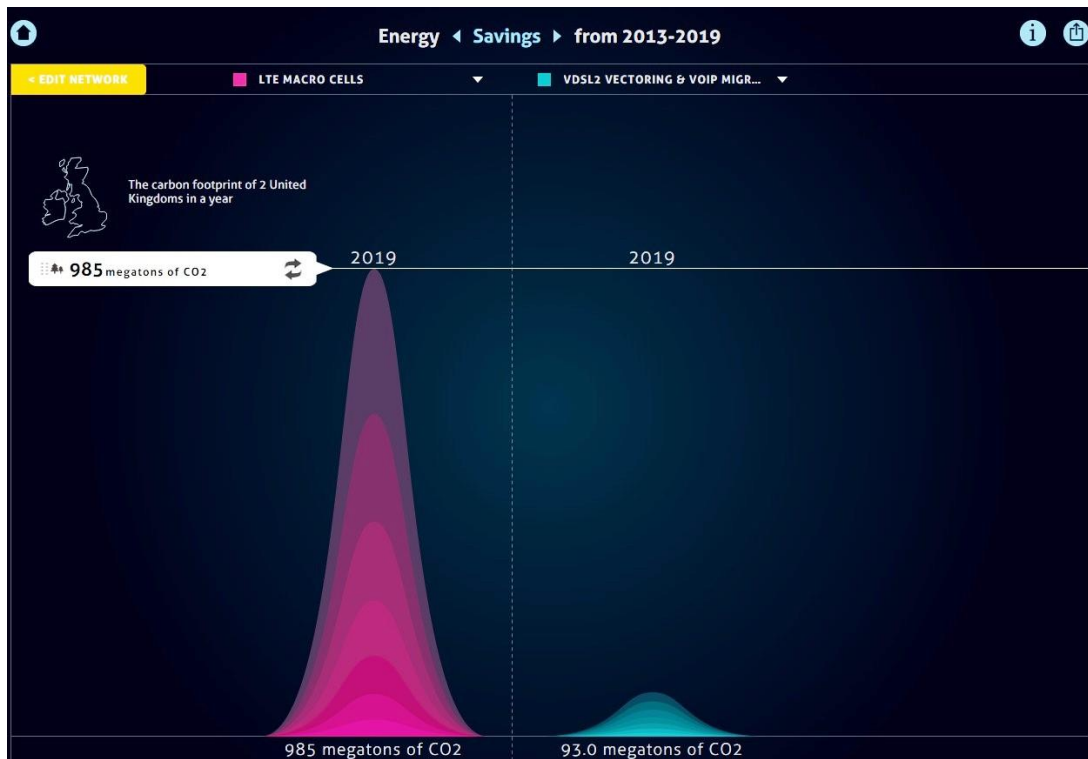


GWATT: interactive application for network energy challenges and solutions

Impact of the deployment of new technologies

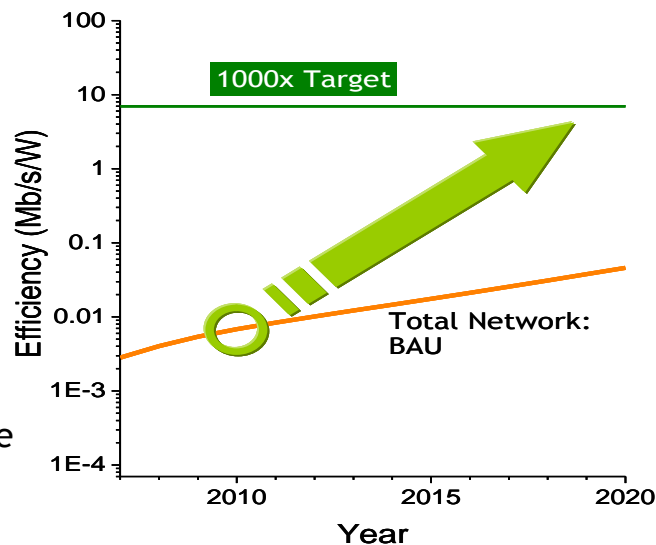
Thanks to GWATT, one can compare the respective impacts of two different network evolutions on a cumulated view:

- Here we compare the LTE versus the VDSL2 and PSTN replacement strategy
 - On 6 years we can save the equivalent of the CO₂ emissions of 2 United Kingdoms by replacing all the legacy radio access in the world mobile network by the LTE



Delivered June 2015 Architectures, Specifications and Solutions and Demonstrate Key Technologies to Increase Network Energy Efficiency by a Factor 1000 Compared to 2010

- Bell Labs Initiated Global Research Consortium representing industry, equipment vendors, service providers, research institutes and academia
- Launched in 2010 with focus on energy efficiency, sustainability and growth
- Holistic and ambitious goal of 1000x
- Moving from pre-competitive research area through standardization
- 48 member organizations with 350+ leading scientists
- New innovation and collaboration model for R&D
- Recognized by the World Economic Forum as an industry-led best practice toward sustainability. Winner of 2014 Telecoms.com Green Technology Award

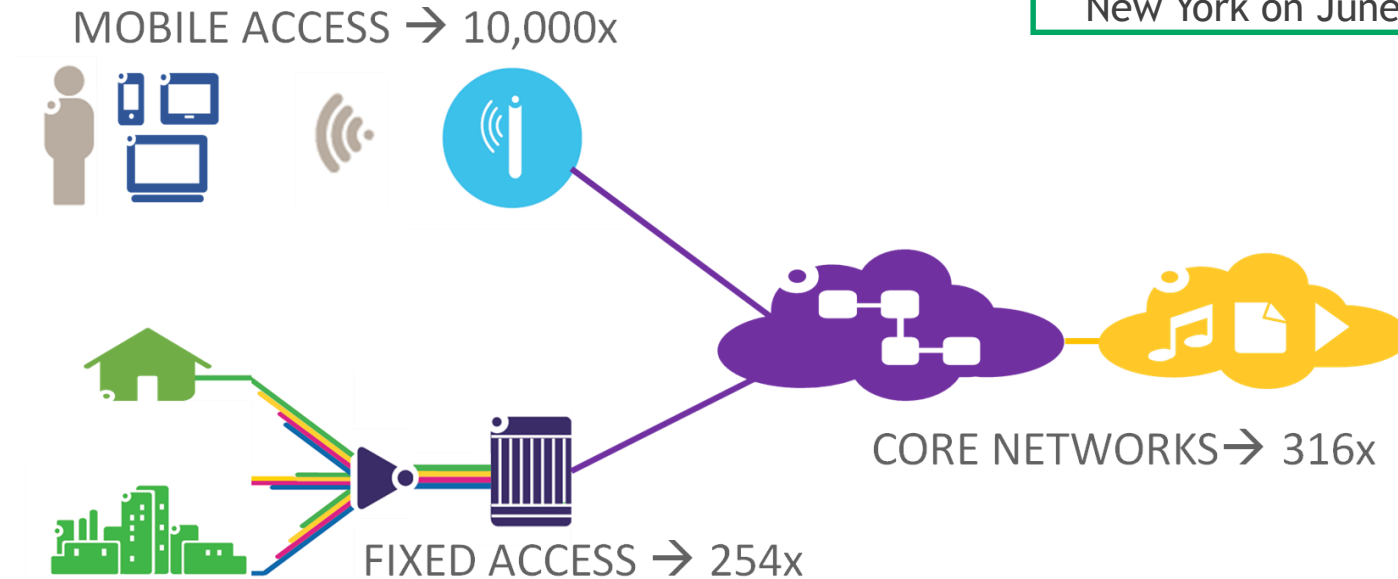


Raising the Bar for the ICT Industry Through Dramatic Energy Efficiency Improvements

GreenTouch final results



Final results announced at event hosted by Bell Labs in New York on June 18, 2015



98% Reduction in Net Energy Consumption in End-to-End Network while Supporting Traffic Increase from 2010 to 2020 and Equivalent Greenhouse Gas Emissions from 5.8M Cars

- A dedicated GWATT has been designed for demonstrating the GreenTouch results

gwatt.greentouch.org/intro/1



Every success has its network