



Innovations in Clouds,
Internet and Networks

19th
ICIN
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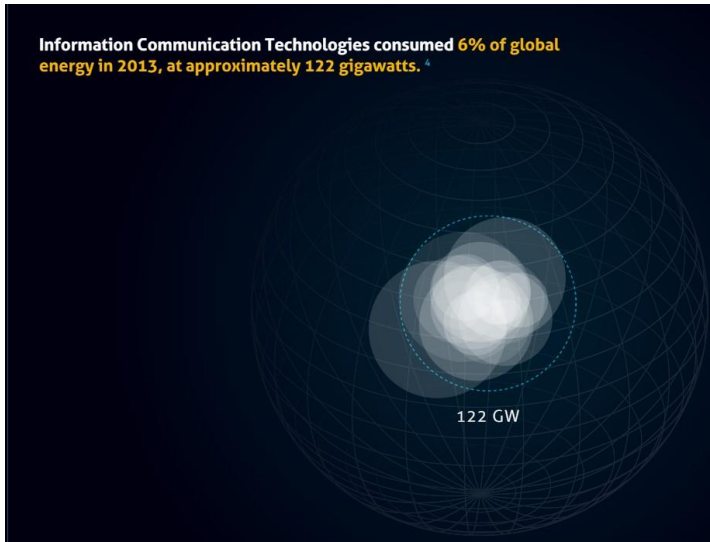
PARIS
MARCH 1 - 3, 2016

ICT ENERGY CHALLENGES, IMPACT AND SOLUTIONS

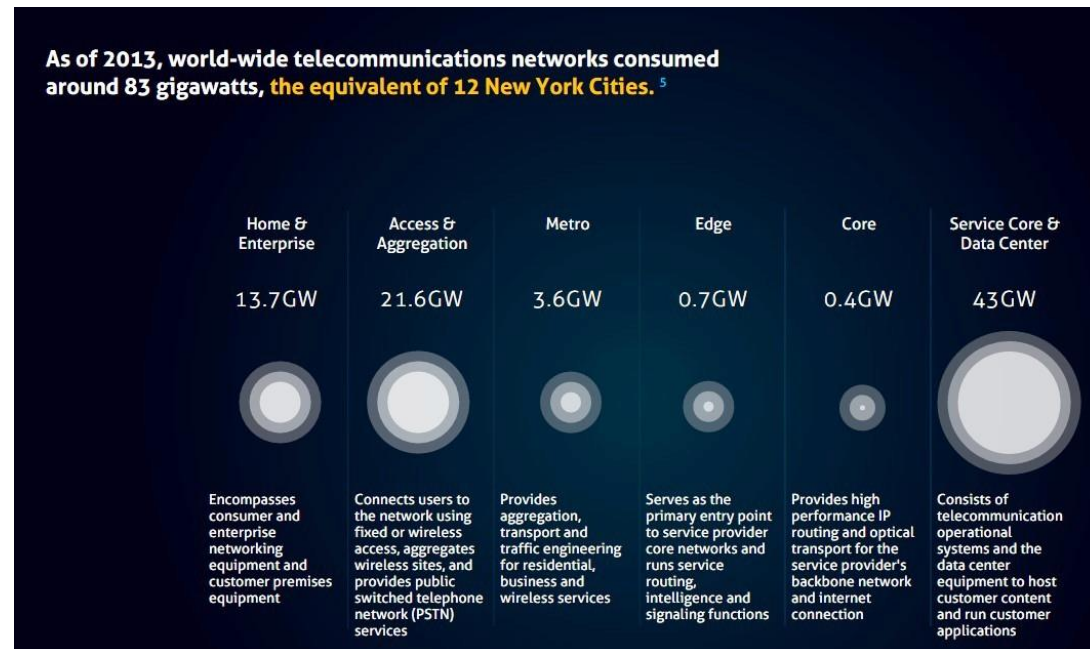
Philippe Richard

NOKIA

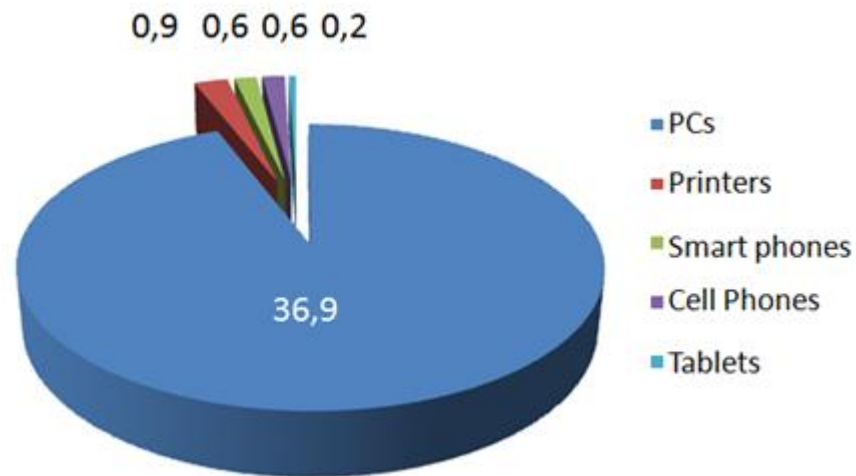
- ICT consumed 6% of total energy in 2013, likely to be closer to 10% as of now



- The networks (inc. DCs) consumed 83 GW of power

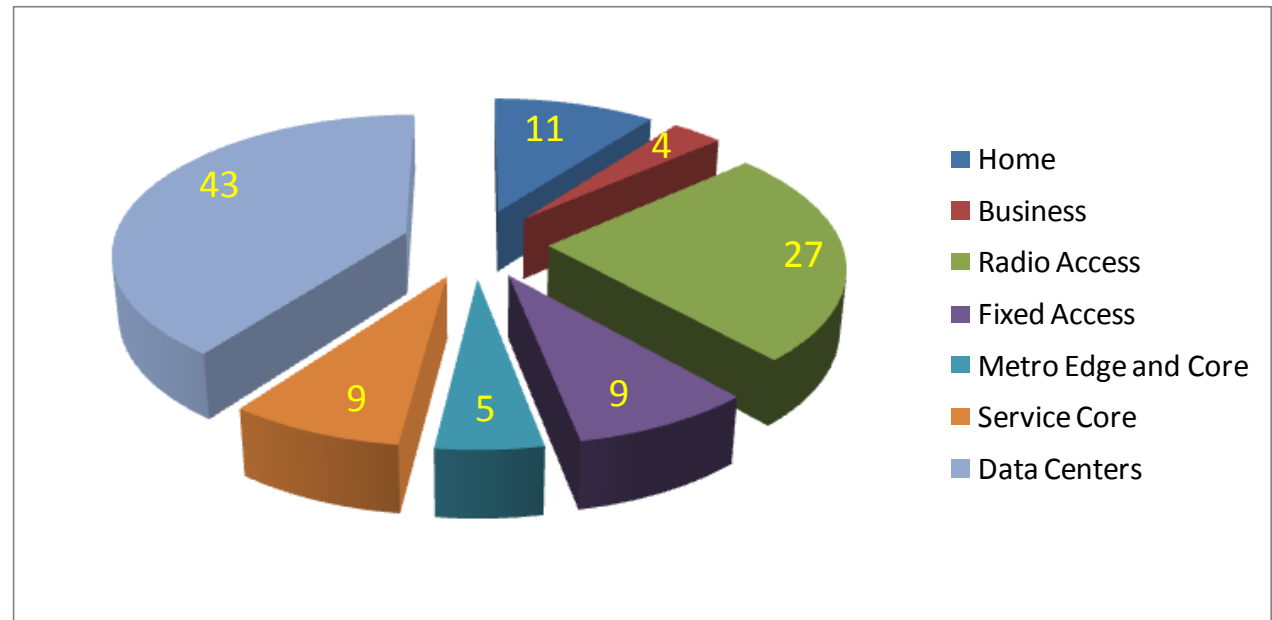


- Likely not to increase thanks to users switching from PCs to tablets



Average power consumed by the terminals in 2013 (GW)

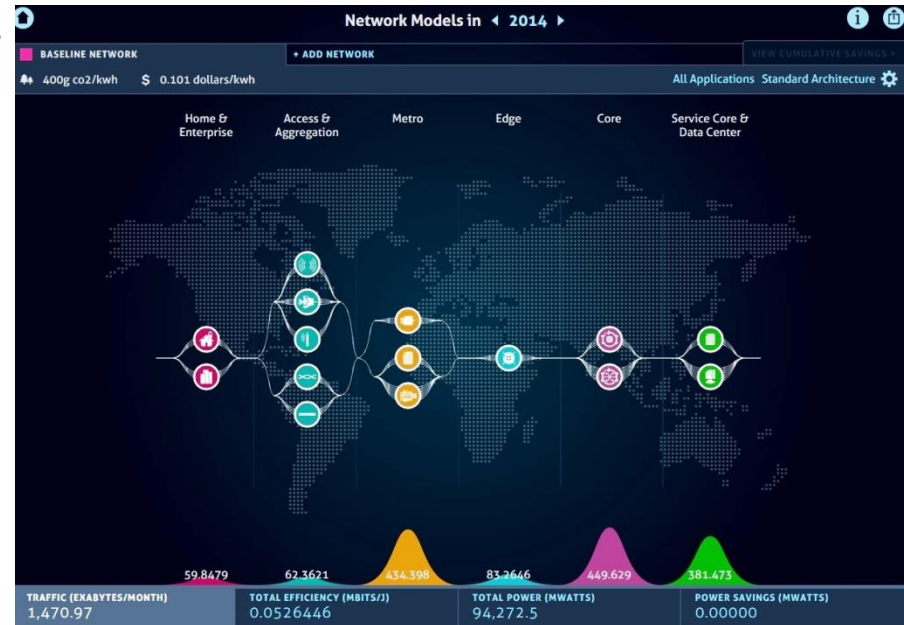
- Two hot spots:
 - Access: 36 GW
 - Data centers: 43 GW



Power consumption for the networks' infrastructure domains in 2015 (GW)

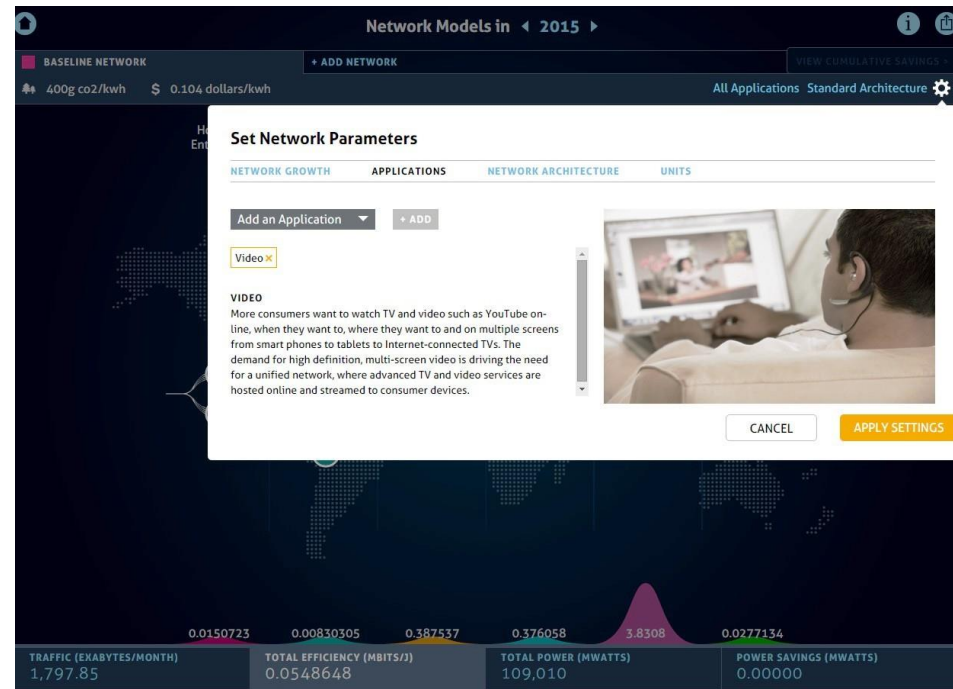
GWATT: interactive application for network energy challenges and solutions

- An interactive Bell Labs application to model ICT network energy consumption, cost and carbon footprint.
- To date, accessed by over 28,000 users.
- Increase awareness of the network energy challenge among ICT stakeholders.
- Identify network hotspots and validate impact of targeted improvements in energy efficiency.
- Forecast trends in energy cost, consumption and carbon footprint and impact of technology evolutions.



Screenshot of G.W.A.T.T. Network Model in 2013

- Energy consumed by a typical application: Video
 - In 2015: the video traffic represented 69 GW out of a total of 109 GW 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 application energy consumption



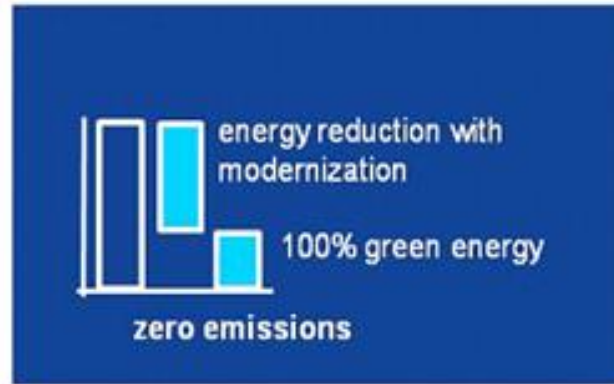
Selection of an application

- Example of use: impact of a an SDN/NFV transformation: Virtual Video CDN
- GWATT computes per domains
 - New power
 - New efficiency
 - New traffic patterns
- In this example, If a virtual video CDN transformation was applied, 19GW could be saved

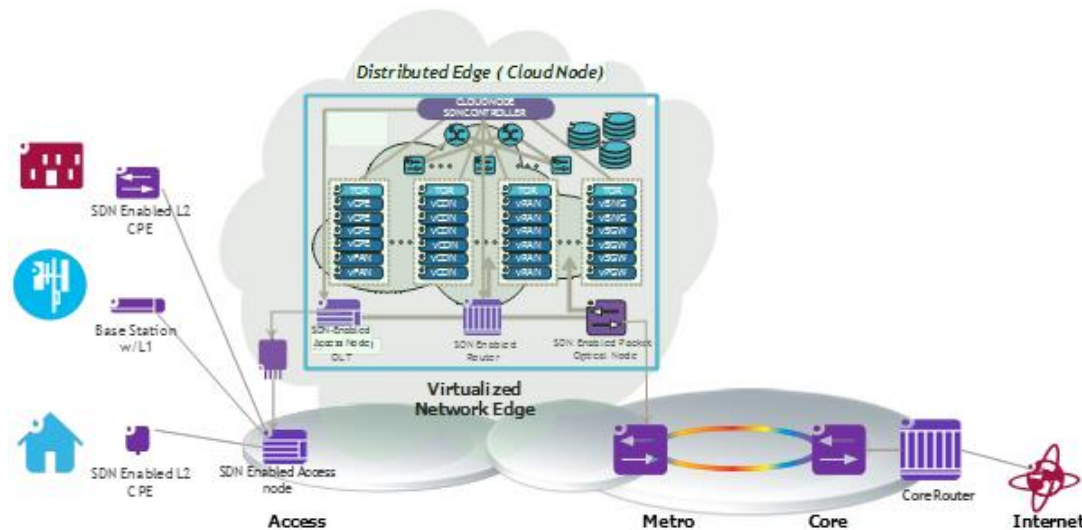


Power view

- Mobile networks
 - Flattened energy consumption for the 5G & improved battery life
 - 1000 times traffic by 2020 (with respect to 2010)



- Future Internet to be dominated by interaction-intensive cloud services & applications running on massive numbers of resource-limited end points
 - Centralized network to evolve to highly distributed, converged cloud integrated network platform (CIN)
 - What are the impacts of virtualization on network energy consumption?
 - Energy to be fully part of network design/virtualization
 - e.g. energy savings up to 15% on a 10 year period for a virtualized distributed edge architecture
 - Impact of the IoT on ICT's energy consumption?
 - At the same time IoT is expected to decrease other uses of energy





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Thank you!

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