

Indo-European dialogue on ICT standards & Emerging Technologies

(Growth, Profitability & Nation Building)

13-14th March 2014 • New Delhi, INDIA

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Energy efficiency of ICTs: EU initiatives and ETSI standards for its assessment

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- ❖ Energy efficiency in ICT: why needed?
- ❖ EU regulations on energy efficiency of ICTs
- ❖ ETSI standards for assessment of energy efficiency
 - ❖ measurement methods of ICT products
 - ❖ measurement methods of ICT networks



ENERGY EFFICIENCY IN ICT: WHY NEEDED?



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Energy efficiency in ICT needs to be improved?



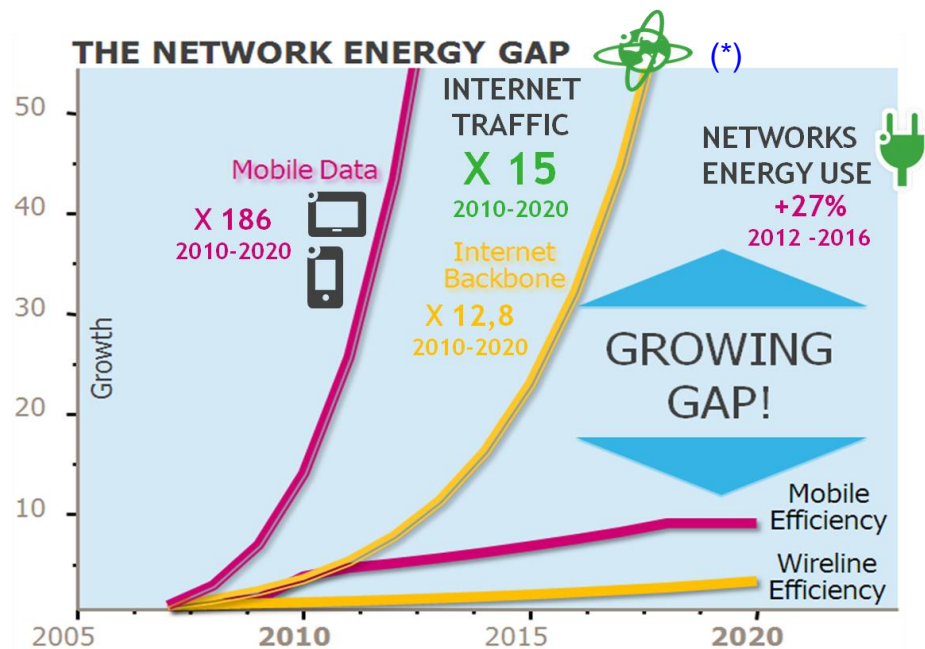
Global aviation industry



50 million cars

Global ICT Emissions: 2.3%, Growing at 4% YoY

GeSI "SMARTer 2020: The Role of ICT in Driving a Sustainable Future", 2012



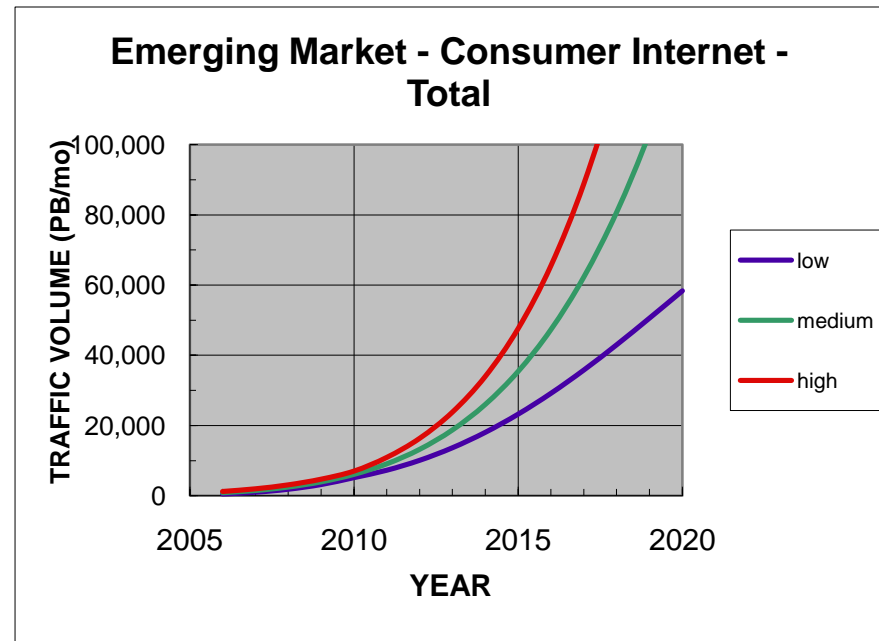
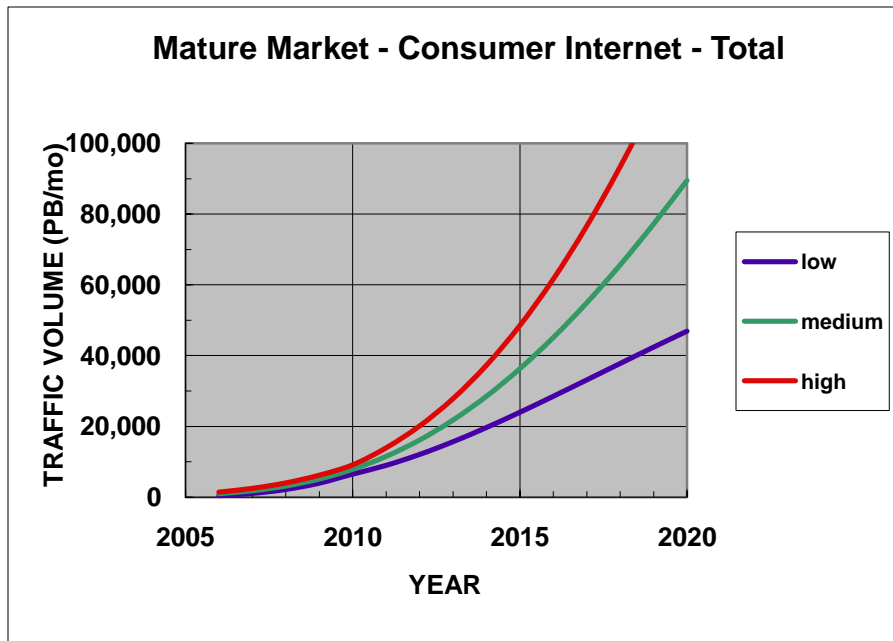
- Slow-down in technology improvements
- Network energy efficiency only increasing at 10-15% per year

ICT also has significant enabling effect to reduce global carbon emissions through increased and more intelligent use of communication and networking technologies

(*) GreenTouch source: <http://www.greentouch.org/index.php?page=about-us>



Traffic evolution, mature vs emerging markets (*)

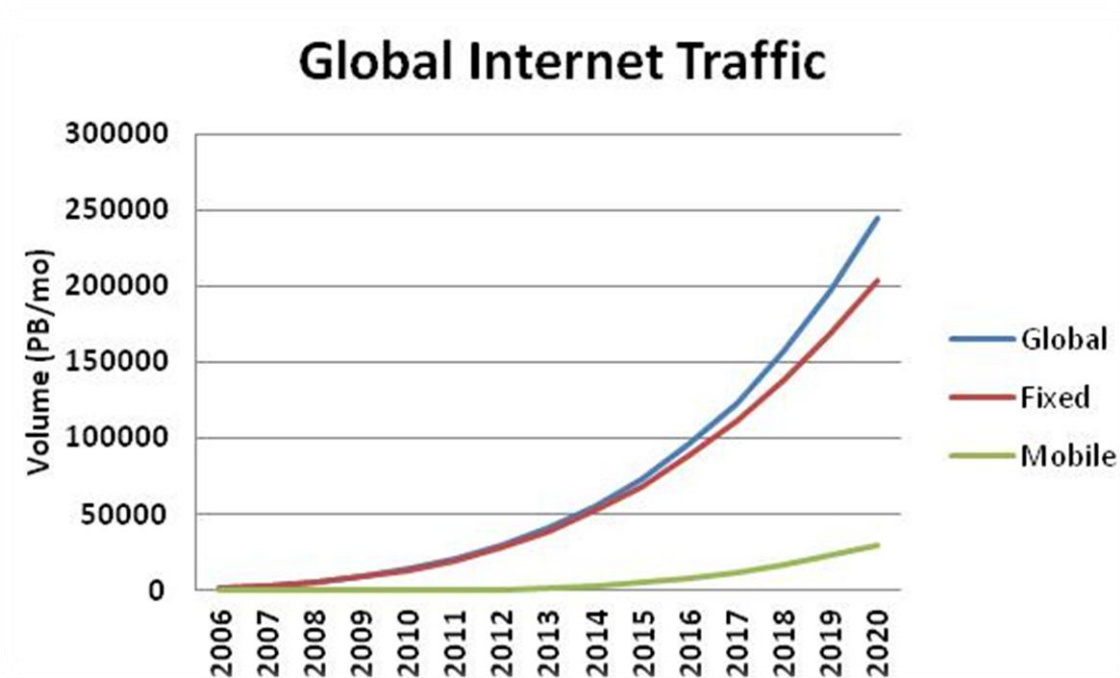


- ❖ Traffic is still growing
- ❖ Emerging Market traffic is projected to cross the Mature Market around 2017.

(*) GreenTouch source: <http://www.greentouch.org/index.php?page=about-us>



Traffic evolution, fixed vs mobile networks (*)



- ❖ Internet traffic over fixed networks still dominates
 - ❖ Today the total volume of fixed IP traffic is ~25 times larger than the volume of mobile IP traffic

(*) GreenTouch source: <http://www.greentouch.org/index.php?page=about-us>



Evolution of power consumption in networks

Video: 70% of Internet Traffic In 2014

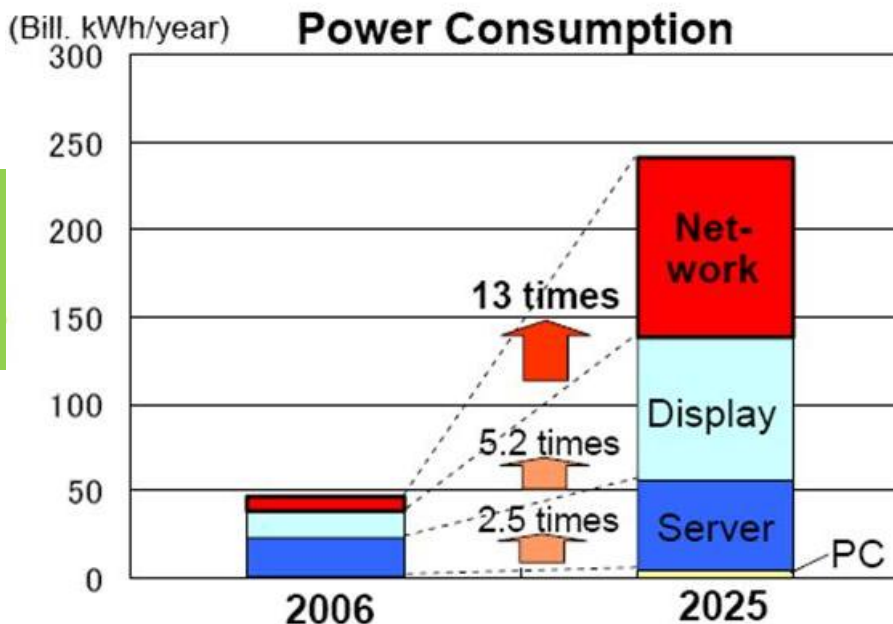


- Network Consumption represents ~75% of the energy bill of an operator
- Between 7 to 20% of its OPEX



Smartphones: 2.5 billion devices by 2015 32x increase per km2

Mobile Internet : ~ 70% of mobile traffic by 2014



(*) GreenTouch source: <http://www.greentouch.org/index.php?page=about-us>



EU REGULATIONS ON ENERGY EFFICIENCY OF ICTs



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EU regulations and other initiatives on energy efficiency of ICTs

❖ Regulation:

- ❖ Directive 2009/125/EC (21 October 2009) on eco-design

❖ Other initiatives:

- ❖ **Mandate 462** on Standardization in the field of ICT to enable efficient energy use in fixed and mobile information and communication networks
 - ❖ End-user equipment under the scope of directive 2009/125/EC are excluded
 - ❖ Addressed to improve the energy efficiency of the provider infrastructure to counterbalance the growth in telecommunications networks
- ❖ **Code of Conducts (#)**
 - ❖ Energy Consumption of Broadband Communication Equipment
 - ❖ Data Centres Energy Efficiency
 - ❖ Digital TV Services
 - ❖ Efficiency of External Power Supplies
 - ❖ AC Uninterruptible Power Systems

(#) <http://iet.jrc.ec.europa.eu/energyefficiency/ict-codes-conducts>



Directive 2009/125/EC (21 October 2009)

- ❖ Replacing Energy-using Products Directive 2005/32/EC of 6 July 2005
- ❖ Framework defining the «rules» for setting product-specific requirements/ legislation on energy efficiency and further parameters.
- ❖ Implementing measures affecting ICTs
 - ❖ Simple set-top boxes regulation No 107/2009
 - ❖ External power supplies regulation No 278/2009
 - ❖ Televisions regulation No 642/2009
 - ❖ Standby and Off Modes regulation No 1275/2008 (17 December 2008)
 - ❖ Networked Standby regulation No 801/2013 (22 August 2013) amending regulation No 1275/2008



Regulation No 1275/2008

- ❖ It applies to electrical and electronic household and **office equipment**
 - ❖ Electrical and electronic household and office equipment means any energy using product which
 - ❖ is sold as a single functional unit and is intended for the end-user
 - ❖ is dependant on energy inputs from the mains power source in order to work as intended; and
 - ❖ is designed for use with a nominal voltage rating of 250 V or below
 - ❖ Not put on the market with a low voltage external power supply
 - ❖ External power supply with a nameplate output voltage < 6 Volts and a nameplate output current ≥ 550 mA
 - ❖ **About ICT:** “Information technology equipment intended primarily for use in the domestic environment” (typically class B equipment according to EN 55022)
- ❖ Limits from 7 January 2013:
 - ❖ 0,5 W Off mode and stand-by without display
 - ❖ 1 W stand-by with display



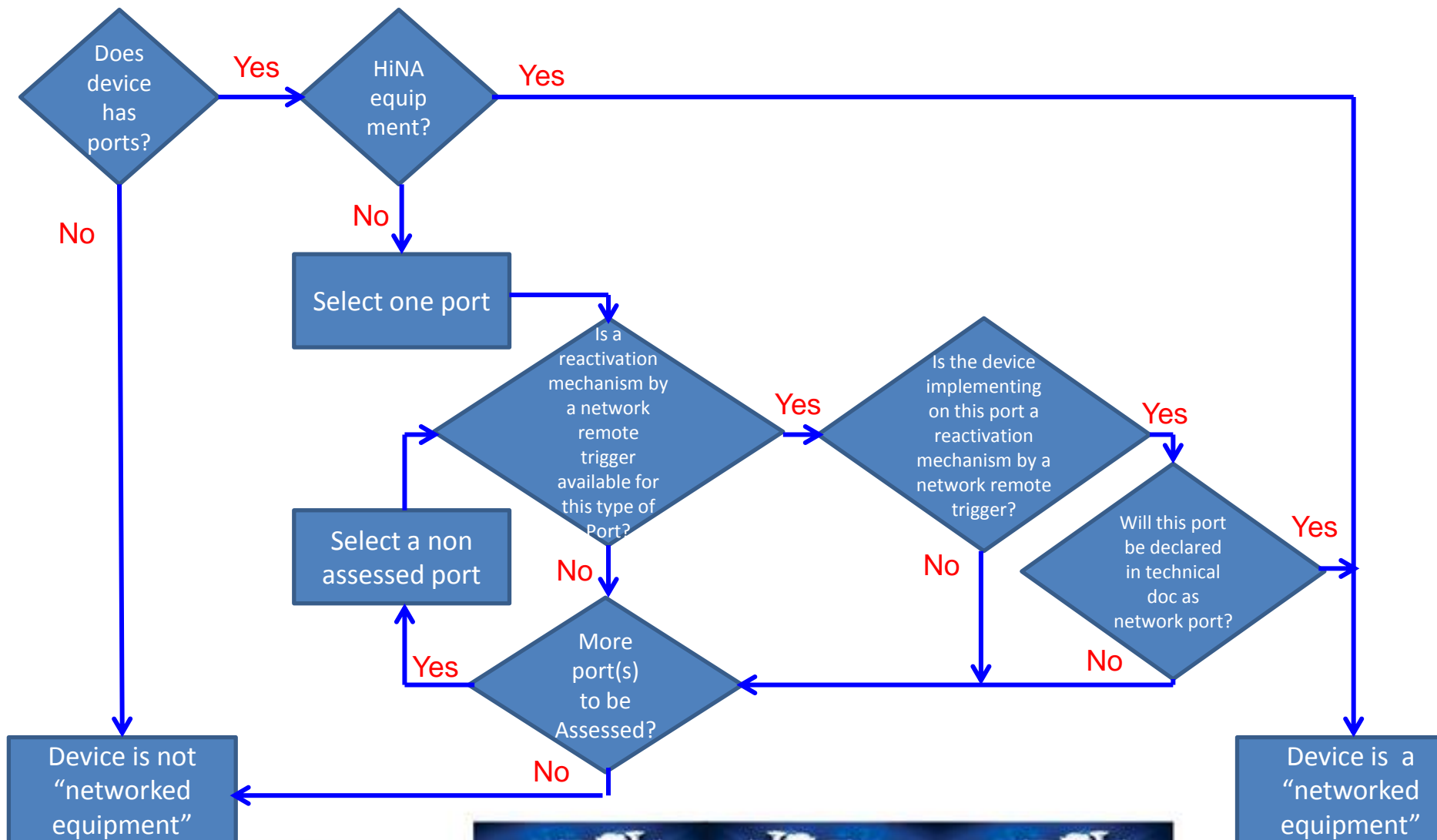
Regulation No 801/2013 (1/3)

- ❖ Scope remains the same or regulation No 1275/2008
- ❖ Extra requirements for networked products
- ❖ Networked products need to have power management into a network standby mode, with target limits
 - ❖ “Network port”: a wired/wireless interface of the network connection at the equipment through which the equipment can be remotely activated
 - ❖ “Networked Equipment”: equipment that has the ability to be connected to a network and has one or more network ports;
 - ❖ Three classes of products:
 - ❖ 1) HiNA: equipment with router, switch, wireless access point, VoIP phone, Video phone as main function
 - ❖ 2) Equipment with HiNA functionality: equipment that includes a router, switch, WAP as side function
 - ❖ 3) LoNA: all the rest of networked equipment
- ❖ Need to declare in test report which interfaces are network ports,

HiNA equipment = Networked equipment with high network availability



Regulation No 801/2013 (2/3)



Regulation No 801/2013 (3/3)

❖ Requirements

- ❖ When networked equipment is not providing its main functions and when other energy-using product(s) are not dependent on its functions, equipment shall, unless inappropriate for the intended use, offer a power management function, or a similar function, that switches equipment after the shortest possible period of time appropriate for the intended use of the equipment, automatically into a mode having networked standby.

❖ Within 20 minutes

	Tier 1 (1-Jan-2015)	Tier 2 (1-Jan-2017)	Tier 3 (1-Jan-2019)
HiNA	12 W	8 W	8 W
Eq. with HiNA	12 W	8 W	8 W
LoNA	6 W	3 W	2 W

Standards to address the network stand-by mode will be produced soon



ETSI STANDARDS FOR ASSESSMENT OF ENERGY EFFICIENCY

Measurement methods of ICT products



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ETSI standards to determine energy efficiency of telecom products

- ❖ Well defined test methods for each type of product
 - ❖ Measurement conditions
 - ❖ Measurement uncertainty
 - ❖ Equipment configuration
 - ❖ Reporting measurements
- ❖ Specific metrics for each type of product
- ❖ Standards in support of mandate M/462



Energy Efficiency of TLC products (1/3)

Wireline Broadband Access equipment

- **ES 203 215 V1.3.1, published 10/2011**
- It replaced TS 102 533
- It defines measurement methods of energy efficiency of network access equipment
- Power consumption limits are defined in informative annex
- **WI started to include vectoring interfaces and test conditions of small ONU → EN**

Wireless Broadband Access equipment

- **TS 102 706 V1.3.1, published 07/2013**
- It defines measurement and calculation methods of energy efficiency of radio base stations
- It takes into account traffic conditions
- **WI started to enhance the test method in traffic conditions → ES**
- **TR 103 116 V1.1.1, published 10/2012**
 - It's a practical application of the TS 102 706



Energy Efficiency of TLC products (2/3)

Customer Premises equipment

- **EN 301 575 V1.1.1, published 5/2012**
- It defines methods and test conditions to measure power consumption of end-user broadband equipment in the scope of EU regulation 1275/2008 in:
 - Off mode
 - Standby mode
- It defines also measurement method for on-mode power consumption

Core Network equipment

- **ES 201 554 V1.1.1, published 04/2012**
- It defines measurement methods for:
 - IP Multimedia Subsystem (IMS) core functions (HSS, CSCF, etc)
 - Fixed core functions (softswitch)
 - Mobile core functions (HLR, MSC, GGSN, SGSN, EPC, etc)
- Core network equipment are defined in TS 123 002
- **Under revision to include Radio access control nodes (RNC, BSC)**



Energy Efficiency of TLC products (3/3)

Transport Equipment

- **ES 203 184 V1.1.1, published 03/2013**
- Measurement method and transport equipment configuration
- It considers work done by ATIS-NIPP TEE but more details on the tests conditions and equipment configuration are added
- The gain of amplifier is part of the metric

Switching and Router equipment

- **ES 203 136 V1.1.1, published 05/2013**
- Measurement method and switching/router equipment configuration
- It considers the work in ITU-T SG5 and ATIS-NIPP TEE but more details on the tests conditions and equipment configuration are added



ETSI STANDARDS FOR ASSESSMENT OF ENERGY EFFICIENCY

Measurement methods of ICT networks



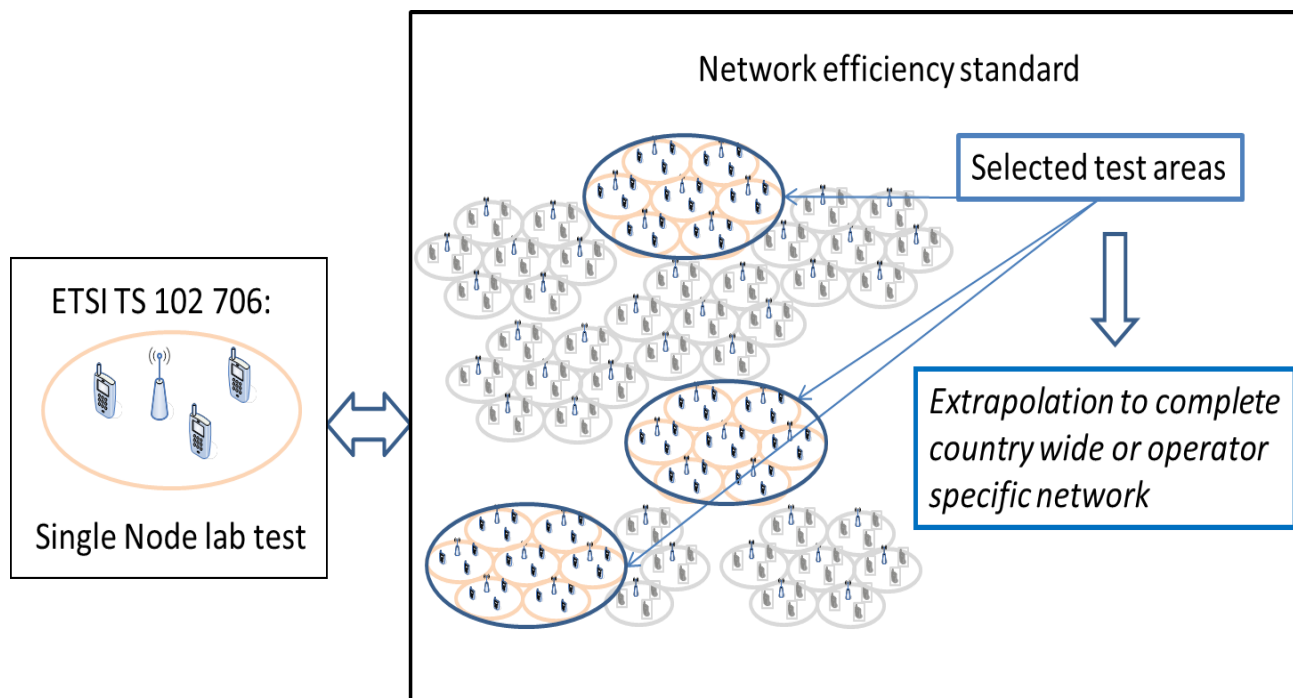
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Energy Efficiency of Mobile Networks

- ❖ Mobile Green Manifesto 2012 (#): “mobile industry will reduce its Green House Gas (GHG) emissions per every connection by 40 % by 2020”
- ❖ ~ 80 % of the energy consumption and GHG emissions are due to networks
- ❖ **Issues:** complexities of energy efficiency measurements in real networks and in laboratory → TR 103 117



(#) "<http://www.gsma.com/publicpolicy/wp-content/uploads/2012/06/Green-Manifesto-2012.pdf>"



Energy Efficiency of Mobile Networks

- ❖ ETSI Standard (ES 203 228) on energy efficiency of mobile networks in preparation
 - ❖ Energy consumption metrics (all equipment in the network)
 - ❖ Performance metrics (traffic volume with a defined quality of service)
 - ❖ Energy efficiency metric (ratio of performance and energy consumption)
 - ❖ Measurement method
 - ❖ Assessment report content
- ❖ Work Item with ITU-T SG5/WP3 and ...
- ❖ In cooperation with 3GPP
- ❖ **Next step → define assessment method of entire network**



Conclusions

- ❖ Global GHG emissions of ICTs is low in respect to other sources but is not negligible
- ❖ ICT world has to pay its contribution to reduce the energy consumption and provide more sustainable service
- ❖ Initiatives have been launched in Europe to address the energy efficiency of ICTs
- ❖ ETSI is actively contributing in providing reliable measurement methods to assess the energy efficiency of ICTs equipment and networks



THANK YOU!



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