

Introducing “Energy Efficiency Aspects” in 3GPP SID/WID Descriptions

Orange

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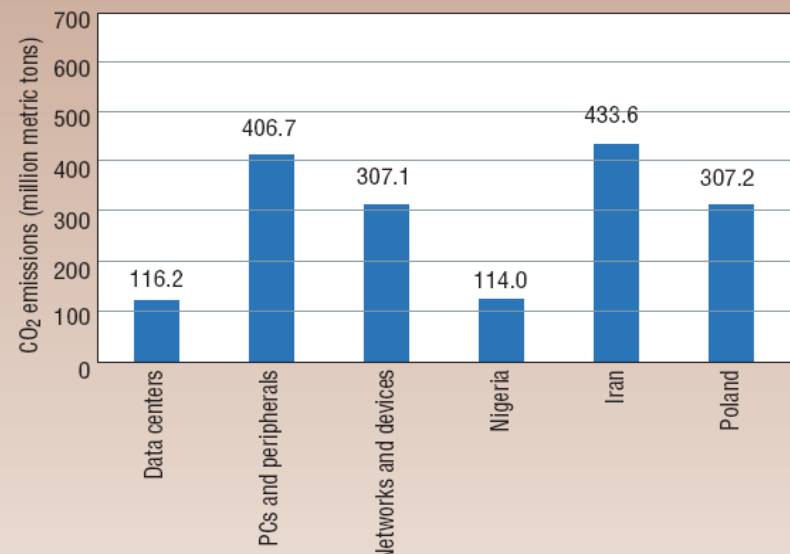


Energy Efficiency & Green ICT

- There are two main motivations that drive the quest for “green” ICT:
 - the environmental one, which is related to the reduction of wastes, in order to impact on CO₂ emission; Since 1970, the production of greenhouse gases has risen by more than 70 %, and this is having a global effect in warming the planet, causing changing weather patterns, rising sea-levels, desertification, shrinking ice cover and other worrying long-term effects.
 - the economical one, which stems from the reduction of operating costs (OPEX) of ICT services.

Gartner Group, Inc. *“The global information and communications technology (ICT) industry accounts for approximately 2% of global carbon dioxide (CO₂) emissions, a figure equivalent to aviation.”*

Note that the ICT sector develops much faster than aviation



About Energy Efficiency & Definition

- ❑ **Energy Efficiency:** the relation between the useful output and energy/power consumption

$$EE_{MN,DV} = \frac{DV_{MN}}{EC_{MN}}$$

where $EE_{MN,DV}$ is expressed in bit/J.

$$EE_{MN,CoA} = \frac{\text{coverage area}}{EC_{MN}}$$

where $EE_{MN,CoA}$ is expressed in m²/J

and EC_{MN} is the yearly energy consumption.

Ref: ETSI ES 203 228 Environmental Engineering (EE); Assessment of mobile network energy efficiency

- Scope: RAN only
- Energy Consumption (EC_{MN}) not measured via OA&M systems
- Data Volume (DV_{MN}) to be collected via OA&M
- Coverage Area; Design Coverage Area (DCA) and Effective Coverage Area (ECA). FFS may be required in ETSI/EE and 3GPP/SA5.



ETSI ES 203 228

Energy Efficiency in Networks

■ Customer Premises:

- Fixed and mobile devices
- Local access network and equipment:
 - Access Point:: e.g. set-top boxes

■ Telco Networks

- Access Network:
 - Fixed Access Network Equipment: local access/security gateways,
 - Mobile Access Network Equipment: base stations, local access/security gateways.
 - Backhaul Network Transmission: microwave, (Gabit)Ethernet, Fiber, Copper etc.
- Core Network
 - Mobile Core Network Nodes: MSC, SGSN, GGSN, MME, SGW, PGW,
 - Data Centre/Service Control: HLR/HSS/AAA, IMS Application Servers, Policy Server,
 - Digital Switches/Processing Equipment: PSTN nodes etc.
- Backbone Networks:
 - IP Routing: Router: local and core IP routers;
 - Transmission Cables: Gigabit Ethernet, Fiber, Copper, ...

3GPP/SA5 Activities re. EE (1/2)

- SA#60 (07/13): Creation of WID “Energy Efficiency related Performance Measurements” in SA5
 - Rapporteur: Nokia Networks
 - Objective:
 - identify whether or not the existing performance measurements and/or MDT data can be reused to support these needs;
 - define the new performance measurements if needed;
 - introduce the relevant L2 performance measurements if any newly defined by RAN2 to SA5 specification;
 - Originally targetting at LTE only
 - Extended to 2G and 3G upon Orange request (SA#60 – 06/15)
 - Low progress
 - Target date extended during SA5#104 (11/2015)

3GPP/SA5 Activities re. EE (2/2)

- SA5#100 (04/15):
 - S5-152141 (Orange, DT): “Discussion Paper - 3GPP/SA5 support of ETSI EE (Energy Efficiency)”
 - Analysis of ES 203 228
 - Identification of 3GPP mechanisms which support EE
 - identification of gaps
- SA5#103 (10/2015): WID “OA&M support for assessment of energy efficiency in mobile access networks” submitted to SA#70 for Approval
 - Rapporteur: Orange
 - Objective:
 - Conduct further detailed analyses of metrics and methods identified by ETSI ES 203 228 to highlight any potential requirements that need to be addressed by SA5;
 - Identify ETSI ES 203 228 metrics / methods - if any- which cannot be satisfied e.g. since they out of scope of 3GPP SA5 specifications;
 - Discuss and agree on the work remaining to be done by 3GPP SA5.



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Proposals

- 3GPP new standard features should include considerations on their impact on Energy Efficiency, where appropriate
 - “Energy Efficiency Aspects” is included in Study/Work Item Descriptions
 - Energy Efficiency KPI definition must be refined for clear measurements in practical operations
 - While Energy Consumption increases due to fast traffic growth, coverage expansion and increasing customer populations, Energy Efficiency must improve to reduce energy consumption in relation to the increase of traffic volumes.

A scenic landscape featuring a dirt path that curves through a row of tall, leafless trees. The trees have dark, intricate branch structures. In the background, a calm body of water reflects the sky, with a few white birds visible on the water's surface. The scene is bathed in a warm, golden light, likely from a low sun, creating long shadows on the path and a soft glow in the air. The overall mood is peaceful and serene.

THANK YOU