Welcome to the World of Standards

Workshop on Environmental Impact Assessment and Energy Efficiency

Organized by ETSI TC “Environmental Engineering” with support of:
- Greek Research & Technology Network (GRNET)
- ECONET project

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Outline

Workshop introduction

Overview of ETSI

The TC “Environmental Engineering”

Highlights on TC-EE activities:

- Energy efficiency measurements methods
- Life Cycle Assessment
- Energy efficiency monitoring
- Power architecture with better energy efficiency
Workshop goals

Evaluating and reduce the environmental impact of ICTs:

• Methodologies for the energy and environmental assessment
• Applicability of energy and environmental assessment standards
• Overview on the applicable research activities and their relationship with standardization
• Identify research activities used for energy and environmental impact assessment
• Identify gaps or overlaps and harmonization opportunities of the energy and environmental assessment standards/methodologies
• Analyze future requirements for energy and environmental assessment standardization of ICT equipment, networks and services.
Workshop sessions

- Setting the scene
- Current standardization initiatives
- Application of methodologies for environmental impact assessment
- Application of methodologies for energy efficiency measurements
- Findings from environmental impact assessments of ICT products, networks and services
- Technical solutions and best practice for energy efficiency and reduced environmental impact in ICT
- Research projects

Day 1

Day 2
Poster 1: Energy-aware Allocation of Traffic to Optical Lightpaths in Multilayer Core Networks
- Vassilis Foteinos, University of Piraeus

Poster 2: METIS - Mobile and wireless communications
Enablers for the 2020 Information Society, an Energy Efficiency overview
- Mauro Boldi, Telecom Italia

Poster 3: Energy Efficiency improvements arising from the EU R&D project BATS (Broadband Access via integrated Terrestrial & Satellite systems)
- Keith Dickerson, Climate Associates
Poster 4: Efficient power consumption in a mobile network consisting of macro and micro BSs
  • Trigka Revveka, University of Piraeus

Poster 5: GREENET: An initial training network on Green Wireless Networks,
  • Christos Vérikoukis, Telecommunications Technological Centre of Catalonia
European roots, global outreach

ETSI is a world-leading standards developing organization for Information and Communication Technologies (ICT)

Founded initially to serve European needs, ETSI has become highly-respected as a producer of technical standards for worldwide use.
Products & services

- Technical specifications and standards with global application
- Support to industry and European regulation
- Specification & testing methodologies
- Interoperability testing
ETSI partners

**International SDOs/Organisations**
- ITU
- IEC
- ISO
- e.g. UPU, ICAO, IEEE, UNECE...

**Regional Partners**
- APT
- CCA
- isacc.ccnt

**European Partners**
- CEN
- CENELEC
- ETSI

**Interregional Co-operation**
- GSC

**FORA & CONSORTIA**
- BBF
- CAB Forum
- CONTINUA Alliance
- DECT Forum
- DLMS
- DMR Association
- DVB
- ESMIG
- Global Platform
- HGI
- IMS Forum
- IMTC
- IPV6 Forum
- MSF
- NFC Forum
- NGMN
- OGF
- OIPF
- OMA
- TTCA
- UMTS Forum
- Etc…
Global Standards Collaboration

Interregional collaboration on selected standardization subjects between:

- **ETSI** (International)
- **ARIB** (Japan)
- **CCSA** (China)
- **TITC** (Japan)
- **TTA** (Korea)
- **TIA** (USA)
- **ATIS** (USA)
- **isacc cccnt** (Canada)
Introduction to
ETSI Technical Committee “Environmental Engineering”
“Multi-task” Technical Committee for ICT infrastructures

- Environmental topics (temperature, humidity, mechanical ....)
- Acoustic
- Equipment practice
- Power supply interface
- Power architectures and grounding
- Alternative energy sources
- Energy efficiency
- Eco-environmental impact assessment
Specifications for environmental and infrastructural aspects for telecommunication equipment and its environment

- Environmental requirements (EN 300 019-1-x series)
- Tests specification to verify compliance with the environmental requirements (EN 300 019-2-x series)
- Thermal management topics
- Acoustic noise limits for telecom equipment
Specifications of Power Supply interface requirements and grounding for telecommunication/data-com equipment

- Normal and abnormal voltage range, inrush current limits etc
- Powering of equipment in access networks
- Control and monitoring of TLC infrastructure and equipment
- Grounding and bonding
Specifications for Mechanical Structure and Physical design of telecommunication equipment

- Requirements for racks/sub-racks/cabinets
- Thermal management in ETSI enclosures
- Outdoor enclosures

EN 300119-x
Eco-Environmental specifications

- Measurement methods, metrics and Key Performance Indicators of Energy efficiency of TLC products/networks
- Methods for assessing the environmental impact of ICTs products/networks/services
- Use of alternative energy sources
HIGHLIGHT ON ETSI TC-EE DELIVERABLES ON ENERGY EFFICIENCY

Telecom products

DELIVERABLES IN THE SCOPE OF EU MANDATE M/462

“ICT to enable efficient energy use in fixed and mobile information and communication networks”
Energy Efficiency deliverables for TLC products

Wireline Broadband Access equipment

- **ES 203 215 V1.3.1, published 10/2011**
  - It replaces TS 102 533
  - It defines measurement methods of energy efficiency of network access equipment
  - Power consumption limits are defined in informative annex
  - NWI started to include vectoring interfaces

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
  - **TR 103 116 V1.1.1, published 10/2012**
    - It’s a practical application of the TS 102 706
  - The TS 102 706 is under revision to improve the measurement conditions
Energy Efficiency deliverables for TLC products

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

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
This ES is under revision to include Radio access control nodes (RNC, BSC)

Core Network equipment
Energy Efficiency deliverables for TLC products

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
Liaison has been established with 3GPP

Verify complexities of network measurement in live network

Verify complexities of network measurement in lab

Network complexity is taken into account in respect to energy efficiency

• Verify complexities of network measurement in live network
• Verify complexities of network measurement in lab

Models and simulations for network level energy efficiency is also studied

The covered technology is GSM, UMTS, LTE

Liaison has been established with 3GPP

This WI is in cooperation with ITU-T SG5
ETSI TC-EE DELIVERABLE ON ENVIRONMENTAL IMPACT ASSESSMENT

DELIVERABLE IN THE SCOPE OF EU MANDATE M/478

“Greenhouse gas emissions”
Methods for assessing the environmental impact of ICTs

TS 103 199 V1.1.1 “Life Cycle Assessment of ICT equipment, ICT network and service: General definition and common requirement”

Published (11/2011)

The purpose of this TS is to:

- harmonize the LCA of ICT:
  - Equipment
  - Networks
  - Services

It includes specific requirements for LCA of ICTs in respect to:

- ISO 14040 Environmental management, Life cycle assessment, Principles and framework
- ISO 14044 Environmental management, Life cycle assessment, Requirements and guidelines
- International Reference Life Cycle Data System (ILCD) Handbook - General guide for Life Cycle Assessment
RES/EE-EEPS006 New Work Item on the revision of TS 103 199
Life Cycle Assessment (LCA)

- TS 103 199 was evaluated during the European Commission pilot test
- During the pilot test, some questions have been raised that allowed to identify the strengths and weaknesses of the ETSI LCA document
- The identified weaknesses will be addressed in this revision of TS 103 199
- Improvements will be:
  - Provide more guidance for recycling allocation rules
  - Clarification on how to assess the LCA uncertainty
  - More guidance/clarifications on Network and Service LCAs
  - Clarify applicability of annexes when only GHG emissions are assessed
- This Work Item is in cooperation with ITU-T SG5 in order to define a common methodology
ETSI TC-EE DELIVERABLES FOR MONITORING ENERGY EFFICIENCY
OF TELECOMMUNICATION EQUIPMENT & INFRASTRUCTURES
Energy Efficiency monitoring

ES 202 336-x: “Infrastructure equipment control and monitoring system interface” series

11 subparts for each specific interface/application

- “1” General interface (V1.2.1, 07/2011)
- “2” DC power systems (V1.1.1, 03/2009)
- “3” AC-UPS power systems (V1.1.1, 10/2009)
- “4” AC distribution power system (V1.1.1, 03/2013)
- “5” AC-diesel backup generators (V1.1.1, 04/2010)
- “6” Air conditioning systems (V1.1.1, 09/2012)
- “7” Other utilities (V1.1.1, 12/2009)
- “8” Remote power feeding (V1.1.1, 09/2009)
- “9” Alternative power systems (V1.1.1, 09/2012)
- “10” AC inverter power system control (V1.1.1, 09/2011)
- “11” Battery systems (in preparation)
- “12” Telecommunication equipment (in preparation)

Control processes defined in these publications reduce the energy consumption by optimizing equipment settings (e.g. cooling systems)

Furthermore, the remote monitoring and setting reduce the CO2 emissions (less on-site interventions)
Energy Efficiency monitoring

DES/EE-02037-12 New Work Item on “Monitoring and Control Interface for Telecom/ICT equipment Power, Energy and Environmental parameters”

- It will define the control/monitoring interface of telecommunication/ICT equipment to keep under control the power consumption and environmental values.

- Parameters to be monitored are:
  - power consumption
  - environmental parameters (e.g. temperature)
  - Traffic/data parameters (throughput, number of connected lines, radio setting, etc)
DES/EE-0030  New Work Item of “Green Abstraction Layer (GAL),
power management capabilities of the future energy
telecommunication fixed network nodes”

- This WI is in cooperation with EU project ECONET
- The Green Abstraction Layer (GAL) is an architectural interface that will
give a flexible access to the power management capabilities of future
energy aware telecommunication fixed network nodes
- It will allow the adapting of energy consumption of the network nodes
  with respect to the load variations.
- The WI will cover the definition of:
  - the Green Abstraction Layer general architecture
  - the interoperable interface between the Network Control Protocols
    and the power management capabilities of the fixed network devices
  - the Energy States describing the different configurations and
    corresponding performances with respect to energy consumptions
ETSI TC-EE DELIVERABLE OF POWER DISTRIBUTION WITH BETTER ENERGY EFFICIENCY
Energy Efficiency power architecture

Power supply interface requirements for products to be connected to:

- direct current source up to 400 V: EN 300 132-3-1, V2.1.1 (02-2012)
- alternating current source up to 400 V: EN 300 132-3-2 (to start)
- rectified current source up to 400 V: EN 300 132-3-3 (to start)

Energy efficiency of this power architecture up to 400 V is greater than the classical 48V-DC solution.

It is a power distribution, with backup, suitable to supply all type of equipment in a data center without using UPS or AC/DC converters at 48 V.

The EN 300 132-3 series define the requirements for the power supply interface of the equipment to be connected to such power architecture (nominal voltage, abnormal service voltage, inrush current, etc.)

EN 301 605 V1.1.1 “Earthing and bonding of 400 VDC data and telecom (ICT) equipment”

In approval process following the resolution meeting of Public Enquiry.
THANK YOU!

http://www.etsi.org/EEWORKSHOP
Backup slides

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