Energy-Efficient Internet Access

Slavisa Aleksic¹, Gerald Franz², Thomas Bogner² and Oskar Maier am Tinkhof²

¹ Vienna University of Technology, Institute of Telecommunications, Favoritenstrasse 9-11/E389, 1040 Vienna, Austria
² Austrian Energy Agency, Mariahilfer Straße 136, 1150 Vienna, Austria
slavisa.aleksic@tuwien.ac.at, gerald.franz@tuwien.ac.at, thomas.bogner@energyagency.at, oskar.mair@energyagency.at

Energy Consumption in Access Networks

- Ever-increasing number of broadband subscribers
- Broad use of advanced applications increasingly drive the need for high capacity
- The most complex part of today’s Internet is the access network area, which also contributes mainly to the high total energy consumption of the global network infrastructure
- To fulfill the vision of the Internet of Things, a huge number of intelligent, self-communicating devices need to be connected to the Internet
- All these trends indicate an urgent need for more efficient access networks [1, 2, 3]

The Goal

- Model and study energy efficiency of access networks and end-user devices
- Active involvement of stakeholders
- Estimate the energy efficiency of the current internet access
- Identify and assess energy saving methods and potentials
- Develop scenarios for future developments (BAU, best case, worst case, …)
- Develop recommendations for policy makers in order to support a development and a wide use of energy-efficient concepts and devices

End-User Equipment

- Estimation of the number of units in use
- Variety of input parameters influence the sales flow over the next years
- Product lifetime and replacement probability determine how long equipment remains in use
- End of a technology lifecycle triggers a coming changeover to new technology
- Affinity to buy, assessed product presence, presence of products for sale, etc. change over time

Recommendations for Improving Energy Efficiency

- Passive and active site and network sharing by several network operators
- Promoting deployment of energy-efficient optical technologies
- Dynamic network operation and energy management
- Standardization of efficient low-power and standby modes for network equipment
- Deployment of energy-efficient HVAC and free cooling systems
- Utilizing alternative energy sources (solar, wind, …)
- Regulative support for optimal network planning and deployment

References


Users, Applications, Traffic

- Socio-demographic parameters
- Application usage patterns
- Traffic volume over the day
- Urban, suburban and rural areas
- Wireless (GSM/GPRS/EDGE, UMTS/HSPA, LTE) and wired access technologies (xDSL, HFC, Optical)
- Multiple network providers
- Traffic models, trends
- Technology and socio-demographic peculiarities
- Configuration, topology, limitations
- Energy Efficiency (e.g. bit/loule)

Model of Access Networks

- Number of Devices Connected to the Internet
- Power Consumption of Access Networks

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