Network Economics Group

Smart Information for Smart Energy Management

Tuan Anh Trinh

Network Economics Group

Budapest University of Technology and Economics

earth
Energy Aware Radio and neTwork tecHnologies

HSN Lab

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www.cost804.org
Action IC0804

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Economics of information

The **right** information
at the right **time**

Uncertainty and
associated **risk**

Partial information

Psychological effect

Economics of Information

Aspects of Information

- Uncertainty and trust
- Partial information vs. complete information
- Asymmetry of information flows and structure
- Timing

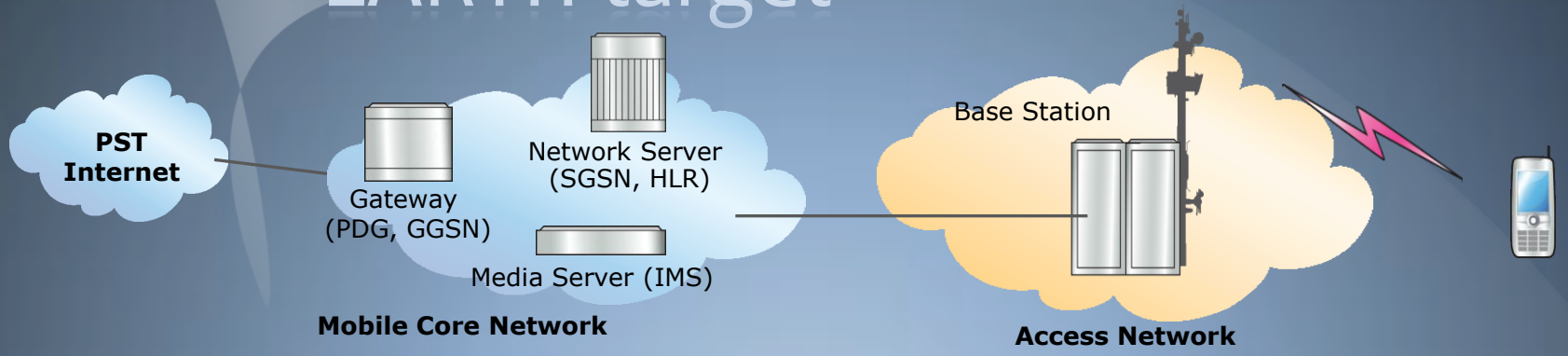
Economics of information for energy efficiency

Energy efficiency means business efficiency

- It is *not only* about our care for the environment, *but also* about our wallet
- Electricity bill is ~ 20% of OPEX of mobile operators
- Electricity bill of data centers is getting higher and higher

Energy-efficient ICT
The EARTH project

EARTH target



Energy Consumption (CO_2-contribution)

10-20%

70-80%

2-10%

reduce by 50%

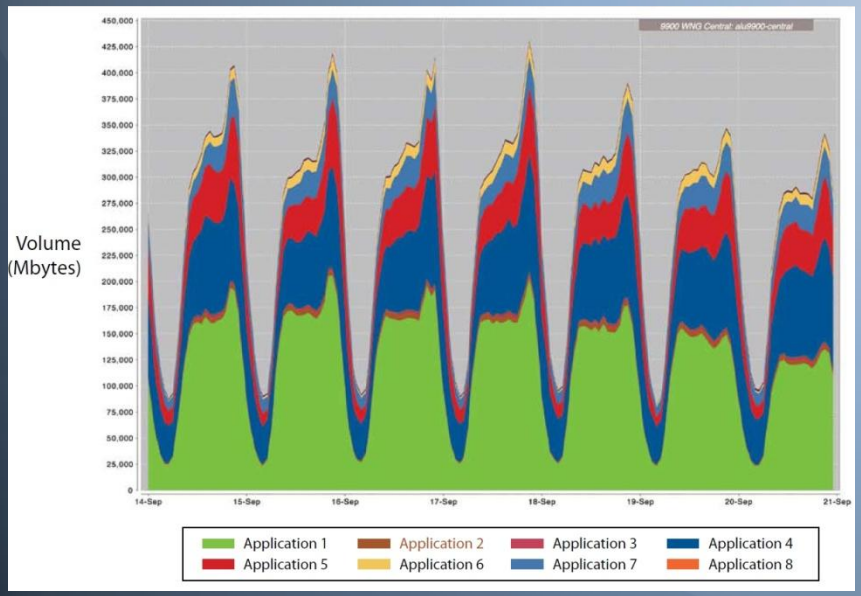
Green Networks

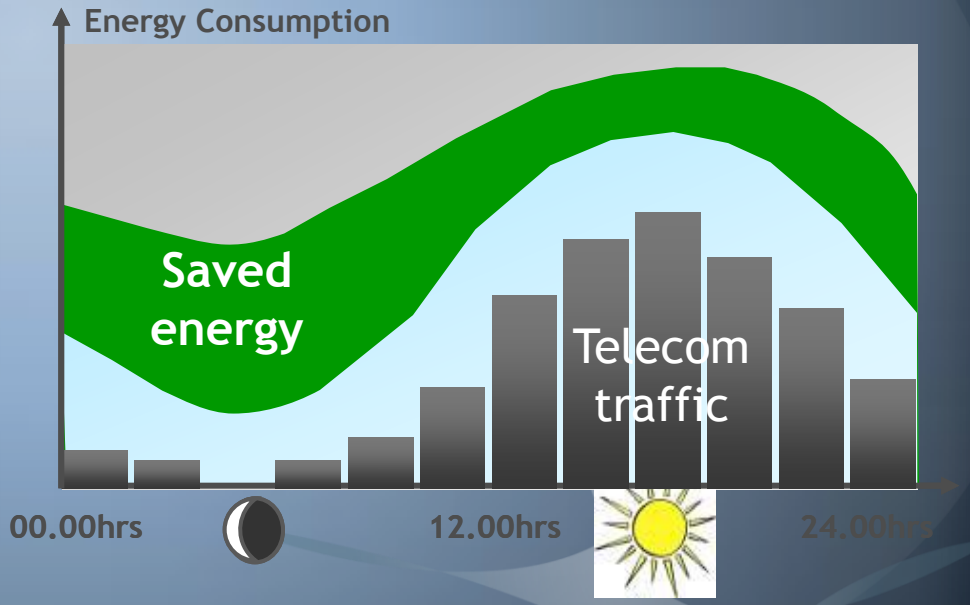
Green Radio

earth
Energy Aware Radio and neTwork tecHnologies

Focus on present and future mobile cellular networks (LTE-A,…)

Energy saving by sleep modes / power reduction





Source: Alcatel-Lucent 9900 Wireless Network Guardian, Technology White Paper, 2008

ICT for Energy Efficiency

What was the greatest engineering achievement of the 20th century?

- The motor car?
- The computer?

In 2000, America's National Academy of Engineering gave a different answer:

"The vast network of electrification"

An argument

- The traditional grid made most of the innovations and technological advances of the 20th century possible
- The smart grid will support the key green advances of the 21st century possible

Issues with the current grids

- Lack of efficient energy storage techniques
- Energy is transmitted through long distances
  - Energy leakage ~ 2%
- Utilities have to produce to peaks
- Part of the produced energy in off-peak hours is wasted
  - This is inneficient, expensive, and more pollutive

Lack of information!!!

Challenges with smart grids

- The information issue
  - Smart metering
  - Sensors
- Efficient communication of information
- Efficient management of information
- Incentive engineering
  - Prosumers & change in business models
  - Efficient pricing
    - Dynamic pricing

Source: Interactive Institute, Sweden

It is possible to make profit by good management of information, and make it **energy efficiently!**

(win-win situation!)

Thank you for your attention!

http://netecon_group.tmit.bme.hu

Recent Research Interests

- Energy-efficient networking and computing (wired-cum-wireless)
- Green data centers
- Incentive engineering

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