



ERICSSON

ENERGY EFFICIENT NETWORKS TODAY AND IN THE FUTURE

Magnus Olsson
Ericsson Research, Stockholm, Sweden



TO PUT IN CONTEXT...



1 year
mobile subscription

All included



1-2 hour
car travel

Only tailpipe CO₂



What about cars and roads..?

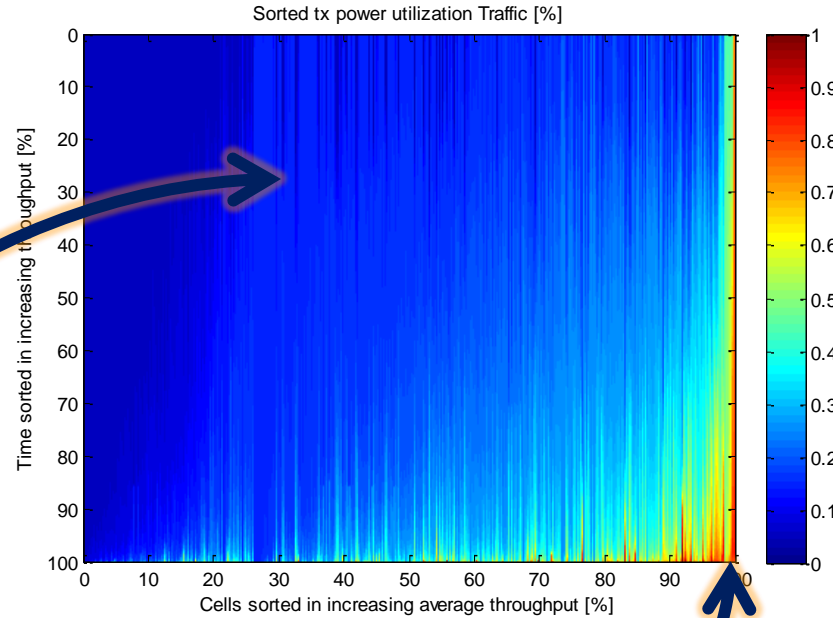
WHY ENERGY EFFICIENCY?



- › Economic
 - Enabling traffic growth without OPEX growth
 - Subscriber growth in off-grid and bad-grid markets
- › Environmental
 - Reduce CO₂ emissions
 - High interest from authorities
- › Engineering
 - Do more with less
 - Size, weight, enable new deployments, etc

Energy efficiency – Same answer, different questions

ENERGY SAVING POTENTIAL

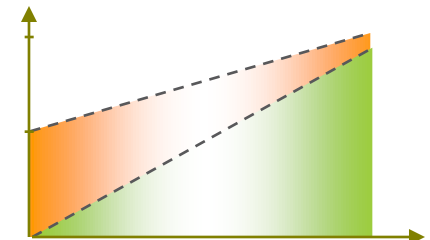


“Most parking spaces are unused most of the time”



“But not the one I want to use when I want to use it”

Power consumption

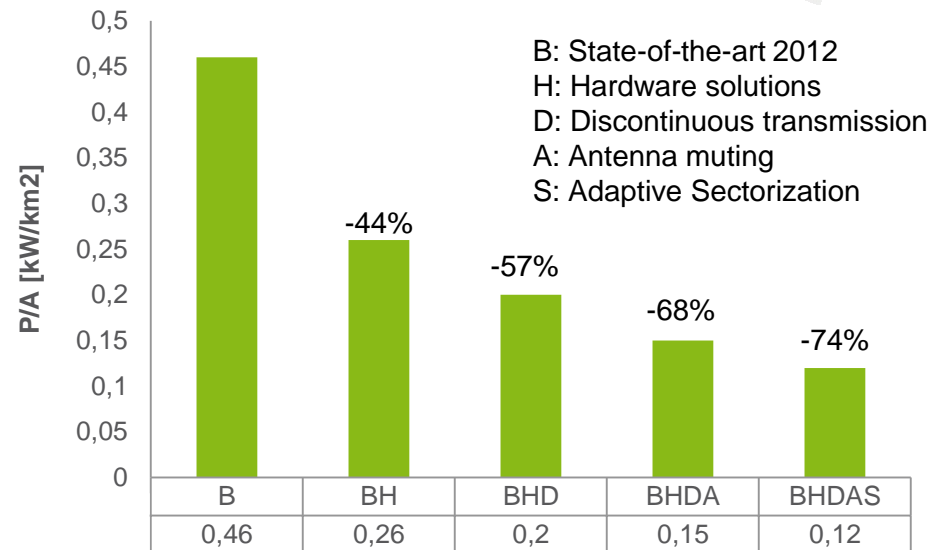


Load

WE KNOW HOW TO DO IT!



- › EU FP7 EARTH project 2010-2012
- › ~75% energy savings vs 2012 state-of-the-art
- › Received the Future Internet Award 2012
- › <https://www.ict-earth.eu>

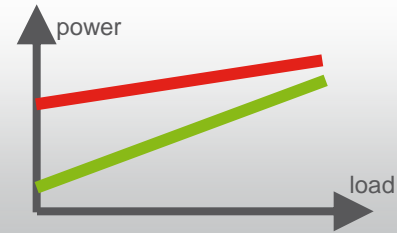


HOW TO MAKE IT HAPPEN?



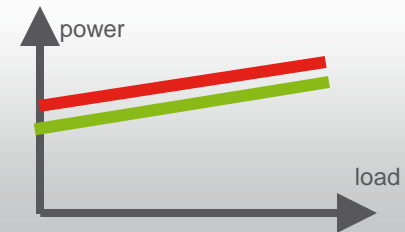
SYSTEM DESIGN / STANDARDIZATION

“Design energy efficient systems from the start”



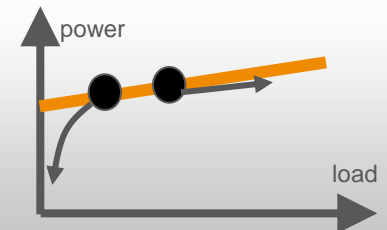
PRODUCTS AND SOLUTIONS

“State of the art energy lean hardware and software”



NETWORK MANAGEMENT

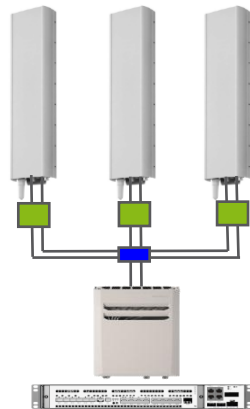
“Reduce overall energy consumption in case of excess capacity”



PRODUCTS AND SOLUTIONS



- › Antenna integrated radio (AIR)
 - Unique design that integrates the radio unit and the antenna
 - Reduced feeder loss and simplified cooling results in 40% lower energy consumption



- › Ψ (Psi) coverage solution
 - One radio connected to three antennas
 - Innovative HW and SW
 - Maintains coverage and performance with 40% lower energy consumption

STANDARDIZATION




- › Consider energy performance broadly in all system/product standardization
- › E.g., reduce mandatory signaling, in particular frequent signaling
 - Sets the limits for how efficient the implementation can be





The Future

NEXT EXIT 

A NETWORKED SOCIETY



- › Unconstrained access to information and sharing of data
- › Available anywhere and anytime to anyone and anything

KEY CHALLENGES



Massive growth in Connected Devices

Massive amount of
communicating machines

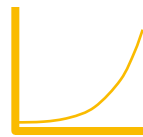


“500 billion devices”

Massive growth in Traffic Volume

Further expansion of
mobile broadband
Additional users and
increased usage

Additional traffic due to
communicating machines



“>1000x”

Wide range of Requirements & Characteristics

Multi-Gbps in
specific scenarios

Hundreds of Mbps
generally available

Ultra-low latency

New requirements and
characteristics due to
communicating machines



Affordable and sustainable



5G ENERGY EFFICIENCY

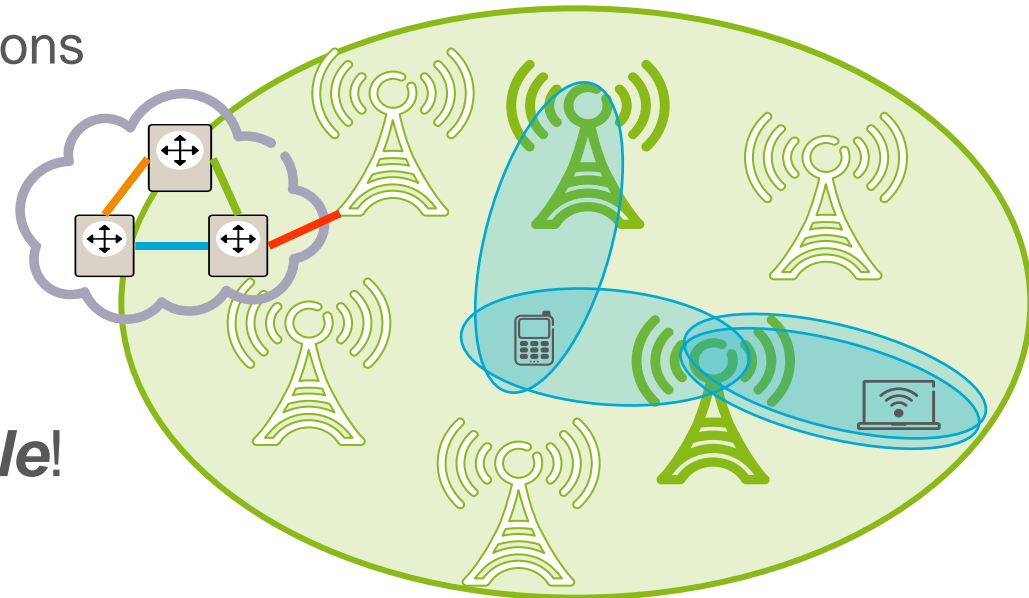


› Energy efficiency as important as coverage, capacity, latency, etc.

› Possible technology components

- New system architecture
- Massive antenna configurations
- Ultra-dense deployments
- Etc.

› From *always on...*
...to *always available!*



5G RESEARCH



› METIS

- Mobile and wireless communications Enablers for the Twenty-twenty Information Society
- <https://www.metis2020.com>

› 5GREEN

- Towards Green 5G Mobile Networks
- <http://www.eitictlabs.eu/innovation-areas/networking-solutions-for-future-media/5green-towards-green-5g-mobile-networks/>



SUMMARY



- › Why energy efficient networks?
 - Economic, environmental, engineering

- › There is energy saving potential, and we know how to capture it!

- › How to make it happen?
 - Build products and solutions. And ask for them!
 - Make the “green” part of main stream (in standardization, in 5G research, etc.)
 - It’s time to “walk the talk”!

- › Mobile access is, and will continue to be, a green business!





ERICSSON