

GREEN NETWORKS

&  earth
Energy Aware Radio and neTwork tecHnologies



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OUTLINE



- › Challenges for the near future & today
- › Evolution of architectures
- › Hardware & operational improvements

CHALLENGES

NEAR FUTURE & TODAY



40% → 75%
3G LAND COVERAGE

5% → 40%
LTE POP. COVERAGE

MBYTES → GBYTES
MONTHLY TRAFFIC PER SUBSCRIBER

OPERATORS
ENERGY BILL IN
HUNGARY
~10 BILLION HUF/Y



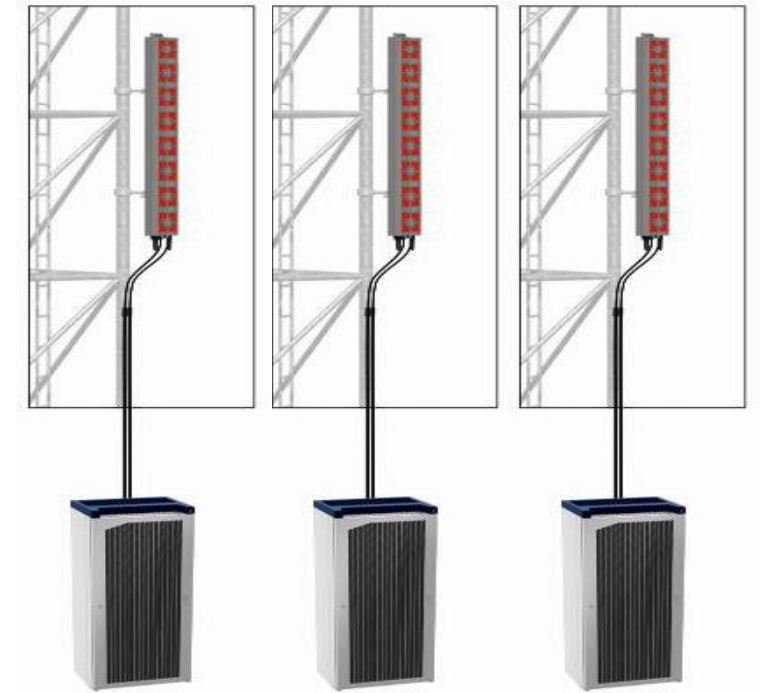
4 DAYS OF NUCLEAR
POWER PLANT IN PAKS
OR
100 DAYS OF ALL HYDRO-
ELECTRICITY PLANTS

ARCHITECTURES

EVOLUTION



> INDEPENDENT RATS



ARCHITECTURES

EVOLUTION



› INDEPENDENT RATS



› MULTI-STANDARD SOLUTIONS



ARCHITECTURES

EVOLUTION



› INDEPENDENT RATS



› MULTI-STANDARD SOLUTIONS



› REMOTE RADIO UNIT



ARCHITECTURES

EVOLUTION



› INDEPENDENT RATs



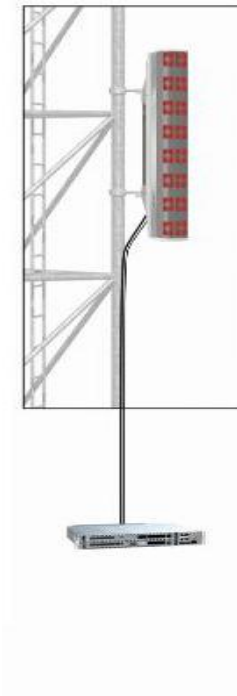
› MULTI-STANDARD SOLUTIONS



› REMOTE RADIO UNIT



› ANTENNA INTEGRATED RADIO



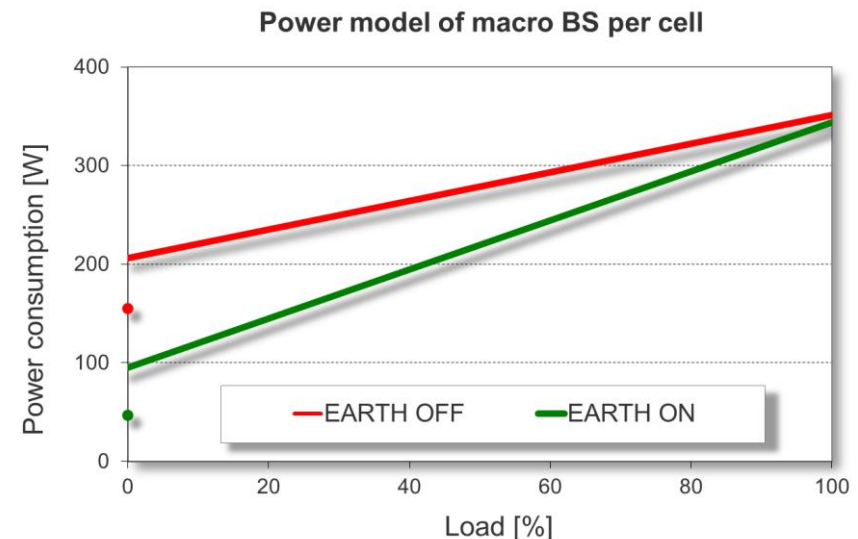
BASE STATIONS

HARDWARE IMPROVEMENTS



- › 80% of energy is consumed by base stations in mobile networks [source: ETSI]
- › Earlier focus on Spectral Efficiency (SE) and Joule/bit
 - But 100% SE improvement provides only 2-3% real energy saving
- › High offset power of empty networks and “low” utilization

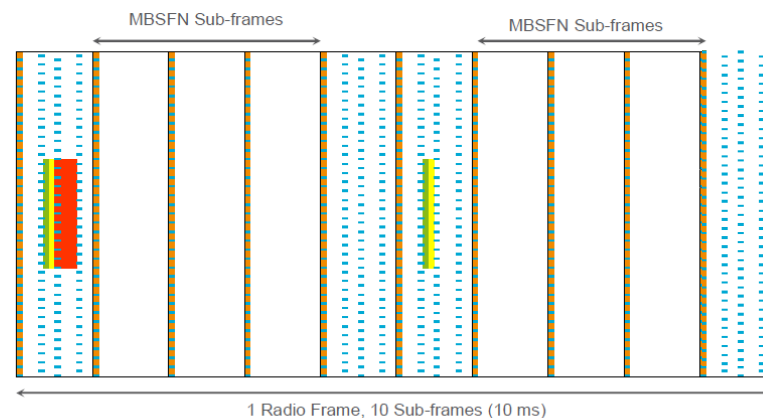
NEW FOCUS ON SCALING
WITH LOAD PROVIDES
40% SAVING IN WATT/KM²



RADIO INTERFACE DEACTIVATION

EXAMPLE OF DTX IN LTE

- › Be efficient when not transmitting
 - Discontinuous transmission (DTX) and sleep mode
 - Service **WHEN** needed
- › LTE Rel-8 compliant versions of cell DTX
- › Hardware support for effective and fast radio on/off



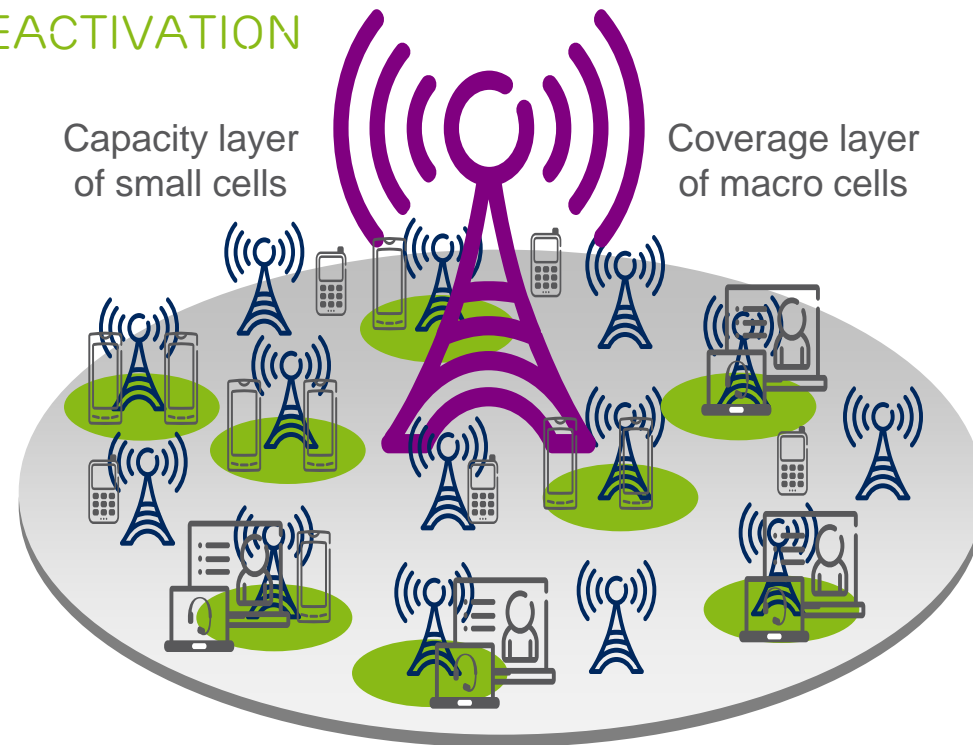
IDEAL SOLUTION FOR SUBURBAN & RURAL
ENVIRONMENT WITH 60% SAVING

HETEROGENEOUS NETWORKS

EXAMPLE OF CELL ACTIVATION/DEACTIVATION

› Adaptive cell activation & deactivation in the capacity layer of heterogeneous networks

- Service **WHERE** needed
- Combines well with cell DTX supported by base station improvements



IDEAL SOLUTION FOR URBAN ENVIRONMENT WITH
40% SAVING AND 75% IN COMBINATION WITH DTX

SUMMARY

ACHIEVEMENTS



- › EARTH target of 50% by **70%** saving w/o degrading QoE
- › Publication of 3 book chapters, 2 top journals, >20 conf., 4 patents by Ericsson Hungary
- › Visualization of combined techniques via EARTH integrated solution
- › Test plant at operator, e.g., cell activation & deactivation
- › Evolution to be continued ...
 - If we reach 90% saving, then solar panel could be a feasible solution





ERICSSON