

Introduction

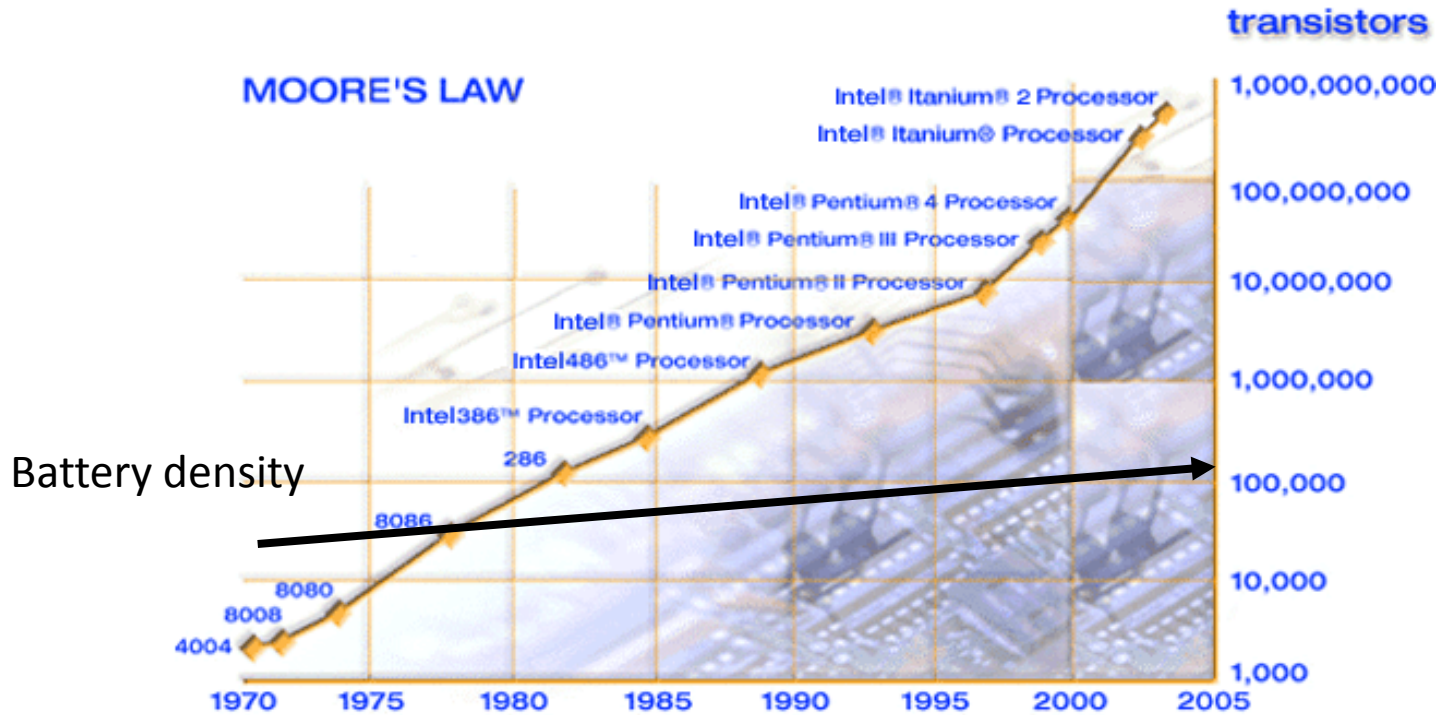
Lin Zhong

ELEC518, Spring 2011

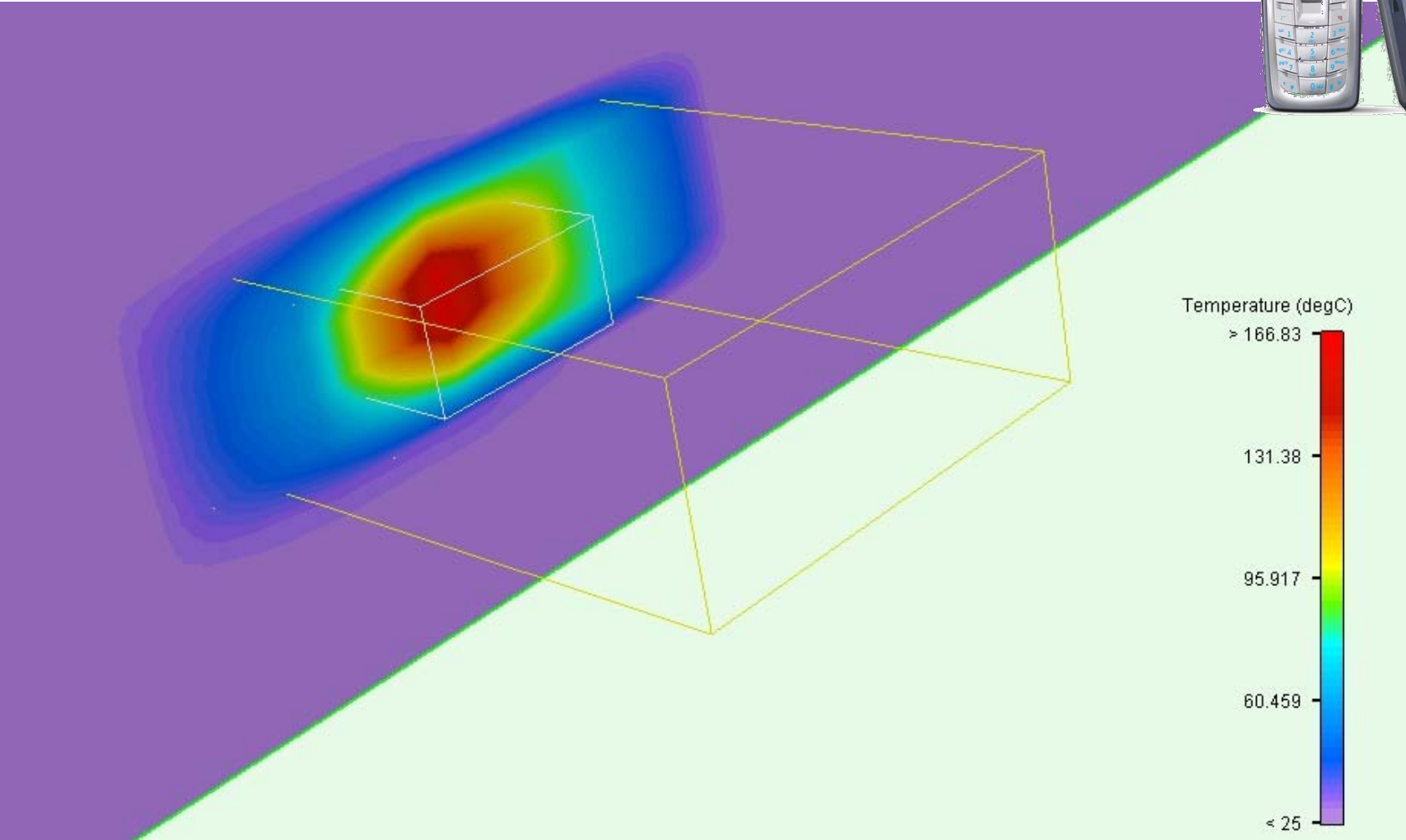


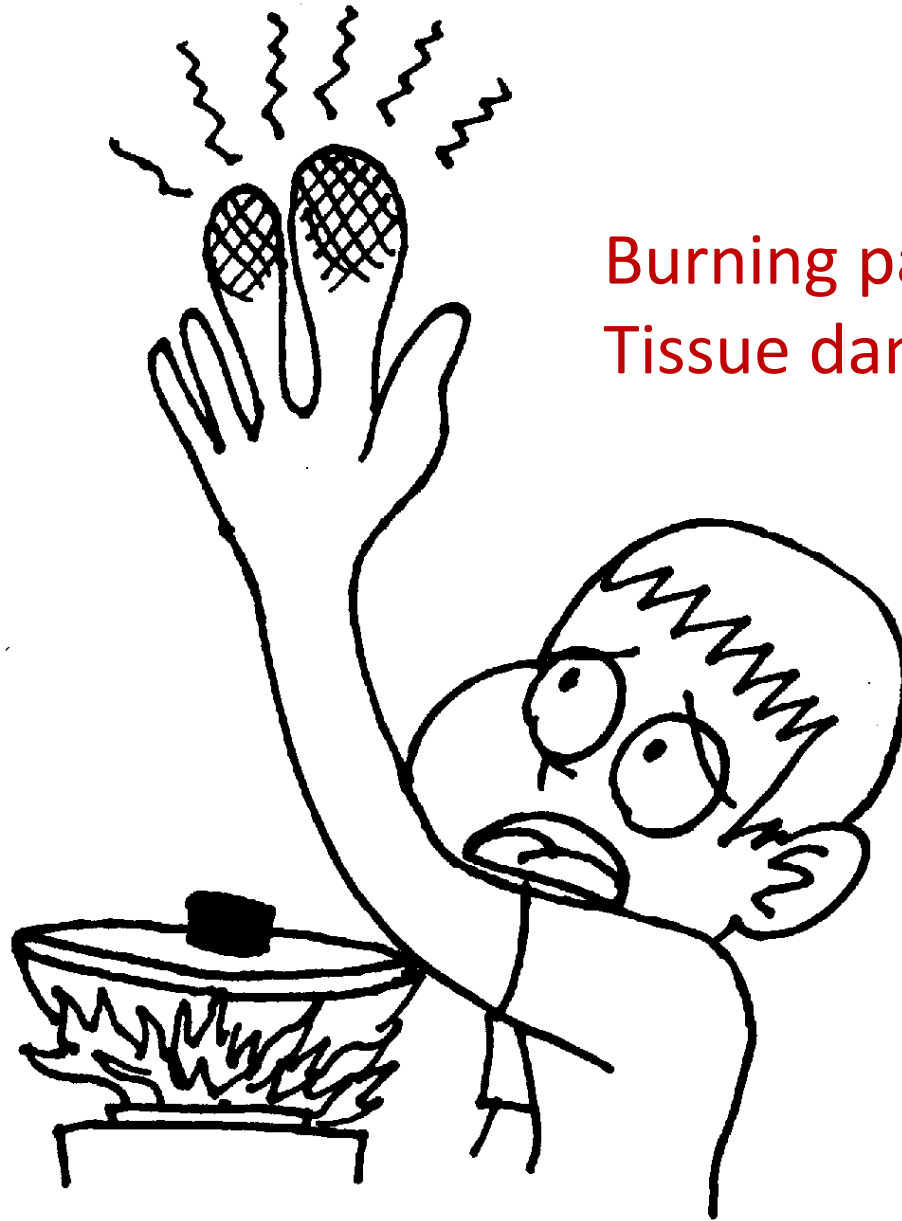
Please connect to power

10% vs. 50% Annual Growth Rate



One watt steady power \rightarrow 13°C surface temperature increase





Burning pain: 41-43°C

Tissue damage: 45°C



Temperature



iPhone needs to cool down
before you can use it.



slide for emergency

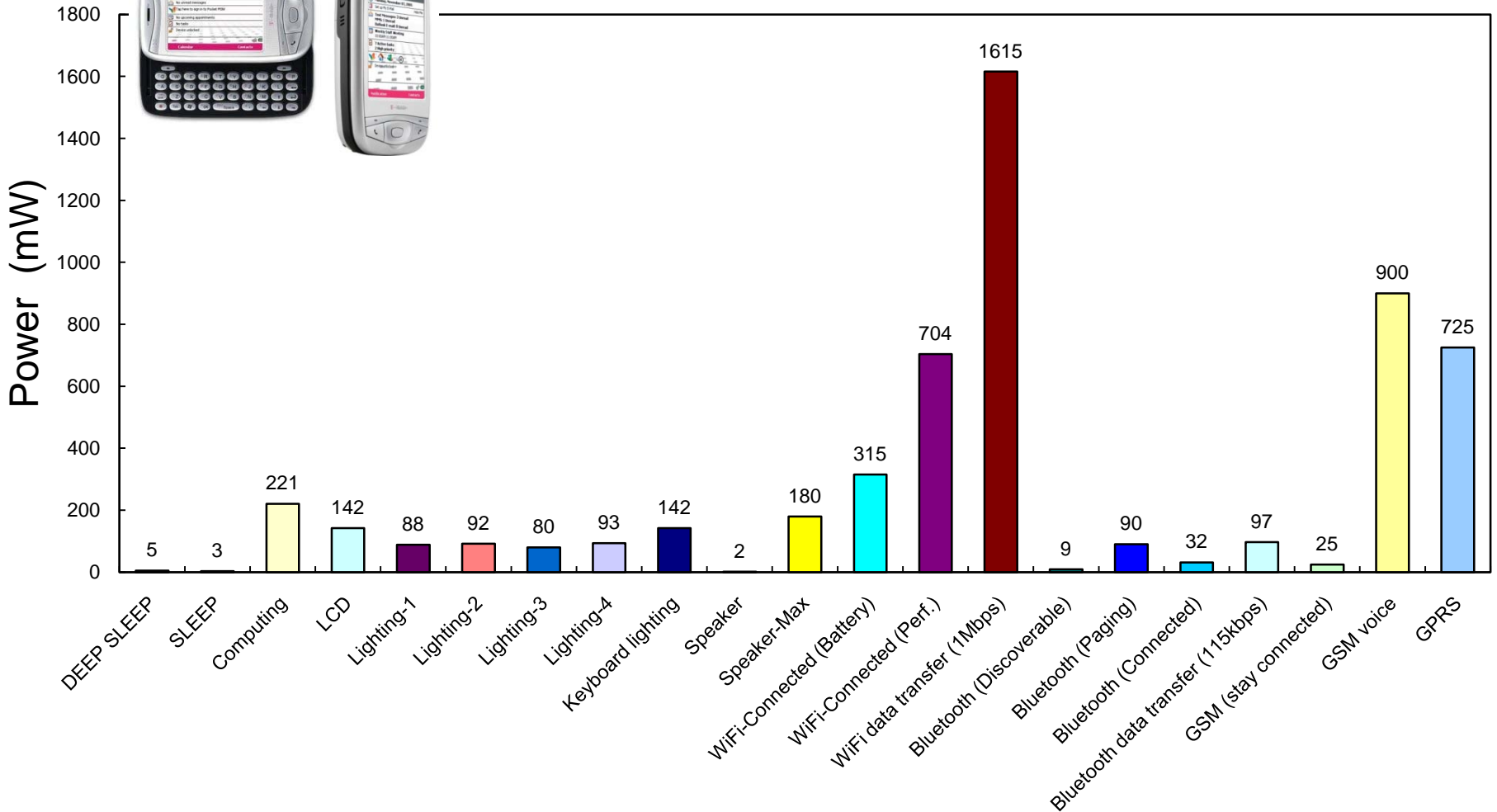
Electricity bill

- Data center
 - Electricity bill is more than equipment bill
- Home appliances

There is *no silver bullet* for an energy-efficient mobile device



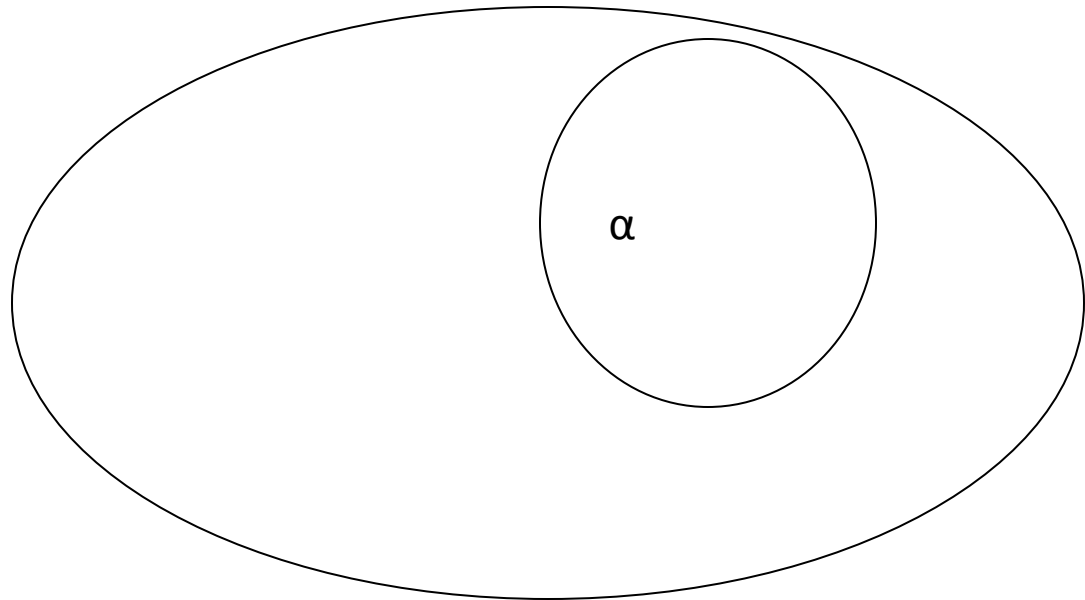
Power profile: T-Mobile MDA



Power profile != Energy profile

Rule No. 1

- Focus on the big one!
 - Amdahl's Law
 - Reduction of the power of α % of the system by p % leads to $\alpha \cdot p$ % reduction of the total power



Rule No. 2

- Minimize static energy consumption
 - IC consumes static power when it is merely powered

Rule No. 3

- Minimize activity
 - When not doing things useful
 - Turn it off
 - Stop the clock
 - Check the manual for power-saving modes
 - Be aware of state transition overhead
 - Interrupt-driven instead of polling

Rule No. 4

- Don't forget parasites
 - More integrated solution leads to lower energy

