Introduction

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Please connect to power
10% vs. 50% Annual Growth Rate
One watt steady power $\rightarrow$ $13^\circ C$ 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 $\alpha$ % 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