Fixing the Network Problem

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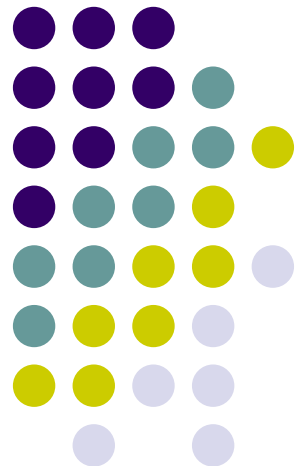
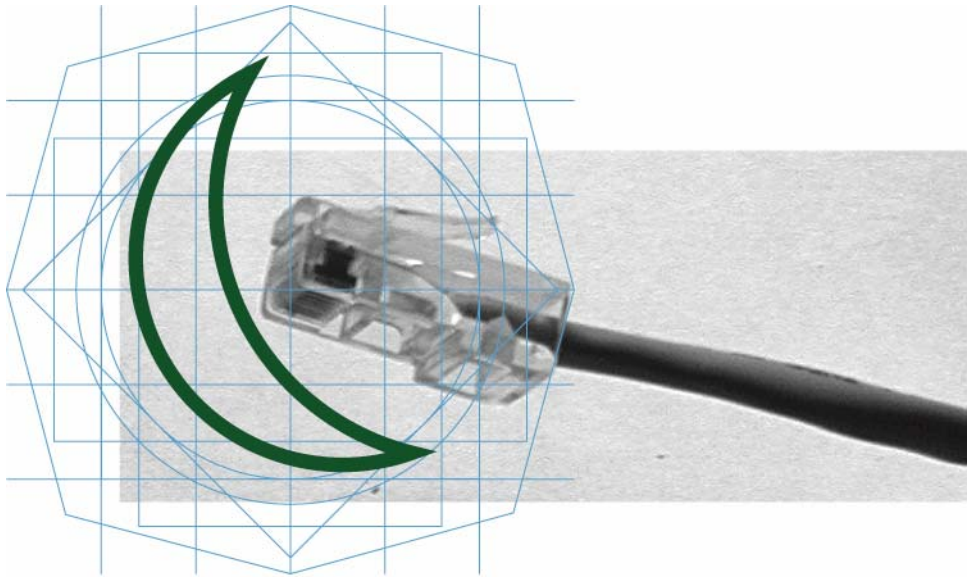


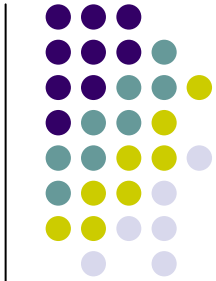
Fixing the Network Problem

- Background
- Context
- Savings
- Technical Issues
- Process
- Summary

When PCs go to sleep,
they "fall off" the network.



Network Problem: Background



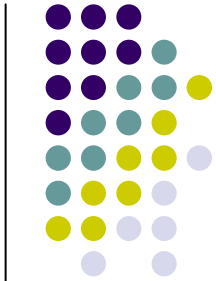
Sleep Modes

- The principal feature of first Energy Star spec (PC/monitor) and many since
- Industry has invested significant resources in making them more reliable and energy-efficient

Enabling

- PC Enabling rates a dismal 6%; However, LCD displays enabled 75% and printers over 90%
  - Power management is used when it meets users needs
  - EPA believes most of enabling problem today is networks
- Are other reasons for disabling — need to address them in parallel (“Enabling Problem”)

Network Problem: Context



Computers always available (on network)

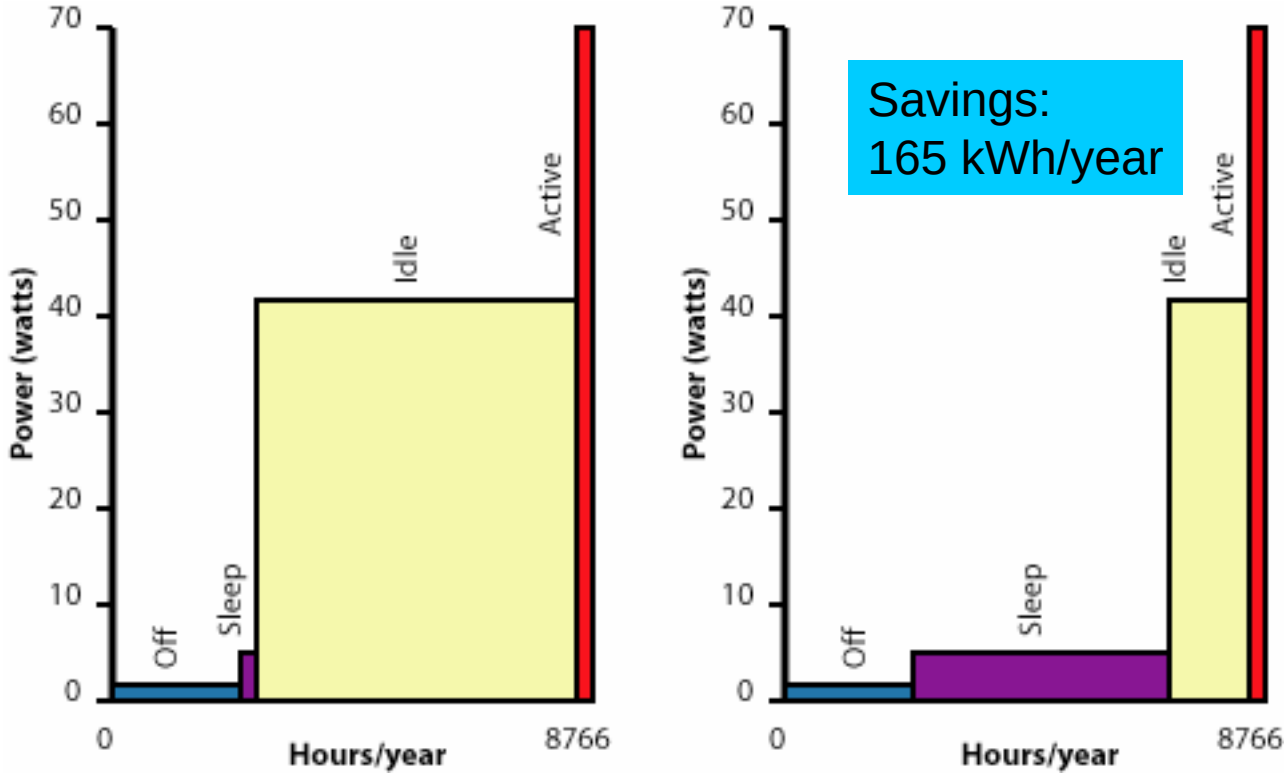
- More applications which rely on network connectivity (work and home)
- More houses with high speed Internet connections; more than one PC; more with networked CE devices
- Demand for 24/7 availability in commercial sector (IT staff, others)

Principles/Goals

- Most PCs asleep most of time
- CE devices becoming like PCs faster than reverse

Network Problem: Savings

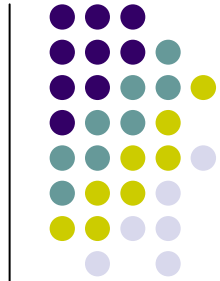
Energy Use By Mode



Tier 1 **w/ Network Problem Fixed**

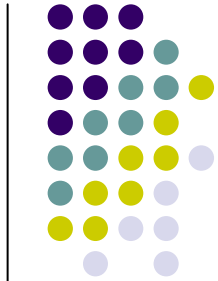
Commercial PC: active or idle 8 hours/day, 200 days/year

Network Problem: Technical Issues



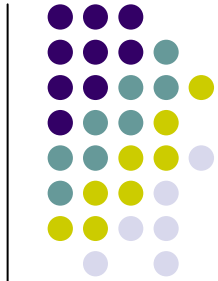
- Existing mechanisms not adequate for today or future
  - Wake On LAN (WOL), Magic Packet, Directed Packet Filtering, …
  - Machines wake up too often, or not often enough
- Likely Solution: Smart NIC (network interface)
  - Ignore most packets
  - Generate routine responses and requests
  - Wake up system when (and only when) truly needed
- Modest extra hardware cost but quick payback
- With technical solution in hand, work out non-technical issues

Network Problem: Process



- Identify relevant individuals (at partner companies) and others (e.g. NIC component vendors and OS companies)
- Collect relevant data — including other reasons for disabling
- Define a solution (Smart NIC minimum capability) — Industry led
- Incorporate into ENERGY STAR
- Incorporate into relevant industry specifications

Network Problem: Summary



- Enabling rates need to be much higher.
  - Fixing the network problem is not 100% of solution, but is most of it and indispensable
- Solution is not trivial or free, but doable and very cost-effective
- Roll into Computer PA ASAP; others as revised

Call to Action

- Forward key contacts to ENERGY STAR
- Forward information about other significant contributors to disabling
- Assess implications for non-PC products

Dynamic Link Rate Reduction

[Separate topic to address in parallel]

Problem: Rising network speeds
=> more power for Network Interface (NIC)
(at computer and switch)

Extra power for NIC (W)

(above that needed for 10 MB/s link)

	100	**1G**	**10G** (optical)
On	0.2	2.9	**18**
Sleep	0.2	1.4	?

Dynamic Link Rate Reduction, Cont.

Opportunity

Ethernet protocols already include link speed negotiation

- But: Changing speed too slow and extension to higher speeds unclear
- However: solution likely has no incremental cost

Needs

- Fast speed changes across wide range (10 MB/s -> 10 GB/s)
- Mechanisms to initiate changes (OS, HW)

To Do

- Explore topic in same process as network problem; less savings but simpler issue

Questions

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