

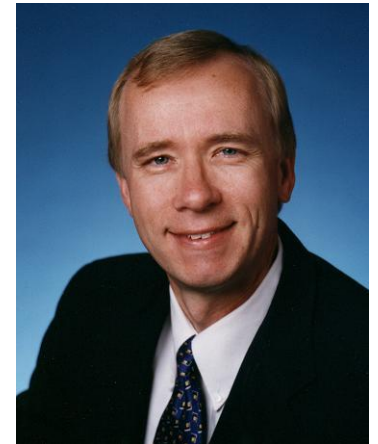
The Seven Seas Washing over Embedded Systems

RTECCCCC

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The Seven Seas

- ✧ 1) Convenience
- ✧ 2) Consolidation
- ✧ 3) Connectivity
- ✧ 4) Communication
- ✧ 5) Control
- ✧ 6) Energy Conservation
- ✧ 7) 'Conomy

Your Job is Not Just to Eat Lunch

Think about
each of these
in terms of
your product
or service



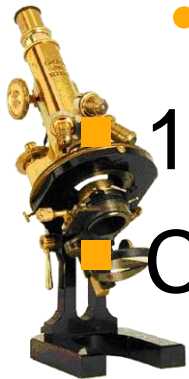
Convenience

- A) ALL – Does All
 - Cell Phone – 3G +
 - Set Top Box (STB) – Triple Play
 - Game Console
 - Automobile – Traveling Home / Office
- B) BETTER – Does one thing Better
 - Digital Still Camera (DSC)
 - “Flip” – YouTube Video Camera



Flip Video

- Just flat make it **SIMPLE**.
- Cell phone size camcorder
- Easy upload YouTube, MySpace, iMovie, PC
- “HD” H.264 1280 x 720
 - Earlier MPEG4 VGA
- 15% market share, <2 yrs
- CISCO buying Co.



Flip Mino

Consolidation

- Bring many functions into one
- Eliminate an indirect competitor
- Can narrow market



“Office Image I/O Device”


- Print / Photos
- Scan / Negatives
- Copy
- Memory Cards / LCD
- Burn CD/DVD
- Ethernet / Wi-Fi / USB
- No Fax !



HP C8180 All-in-One



Electronic Swiss Army Knife

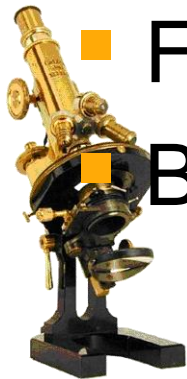
- Everything in your Pocket
- USB drive – 4GB-32GB
- ECC, AES, Fingerprint Enabled
- 2-button Remote/Mouse 
- Laser Pointer



- Flashlight
- www.victorinox.com Victorinox 4.6028.TG8



- Blades or “Flight-Friendly”



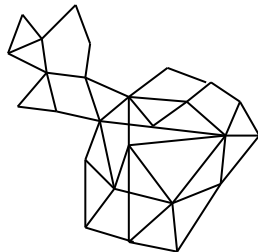
C



Connectivity

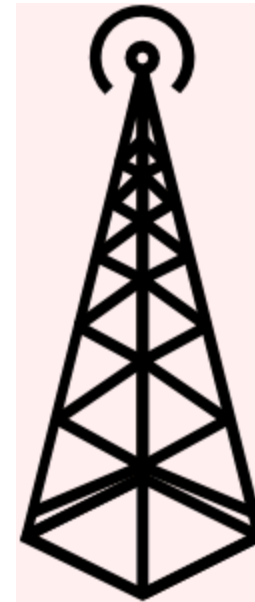
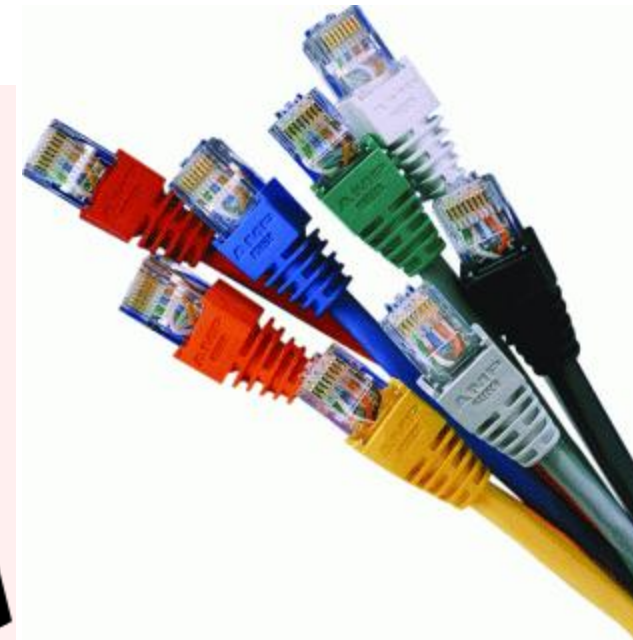


- Nearby
- Maintenance, system extension
- USB, CAN, RS-232, Bluetooth
- 802.15.4 – Zigbee, WirelessHART
- Wireless Sensor Networks



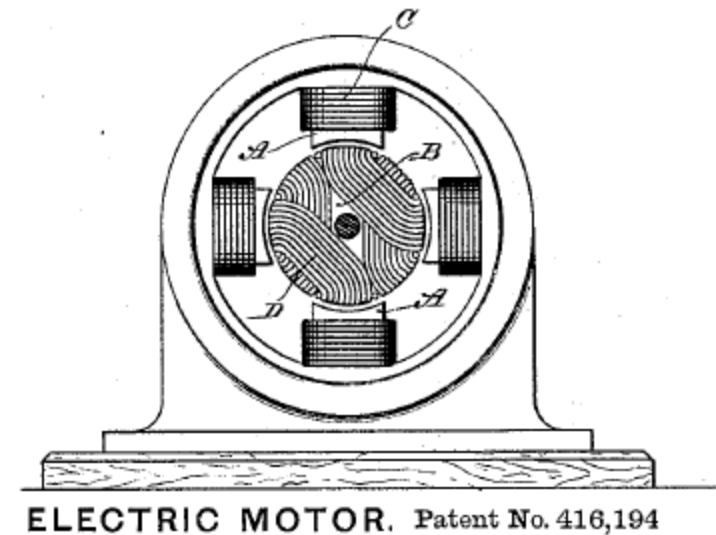
Communication

- Network – WAN, LAN
- Wired – Ethernet
- Wireless – Wi-Fi
- Distance
- Remote Access
- Embedded Browser
- Ubiquitous



Control

- Industrial Control, Highly Custom
 - Factory, Plant, Embedded
- Microcontrollers, DSP
 - IEEE 1588
- Lower Power,
Higher Precision,
Lower Cost
- Slow Uptake – Plant Managers



Energy Conservation

- Reduce Power Consumption



- Voltage, Current, Frequency
– Leakage –



Energy Conservation

- Reduce Power Consumption

Performance

Handheld

Heat

Battery Life



- Voltage, Current, Frequency
– Leakage –



Servers Near Power Generation

200 MW
eqpt,
100 MW
else

1,000,000 servers

Mega Server
Station

water
cooling

400
containers

2,500
servers per
container

source:
IEEE Spectrum, February 2009
www.spectrum.ieee.org

Illustration: Bryan Christie Design



D-Link Switches to Green

GigE 5-Port SOHO Switch

↓ 44% Turn Idle Ports Off

↓ Optimize to
Cable Length

↓ 27% Power Off by
Time-of-Day

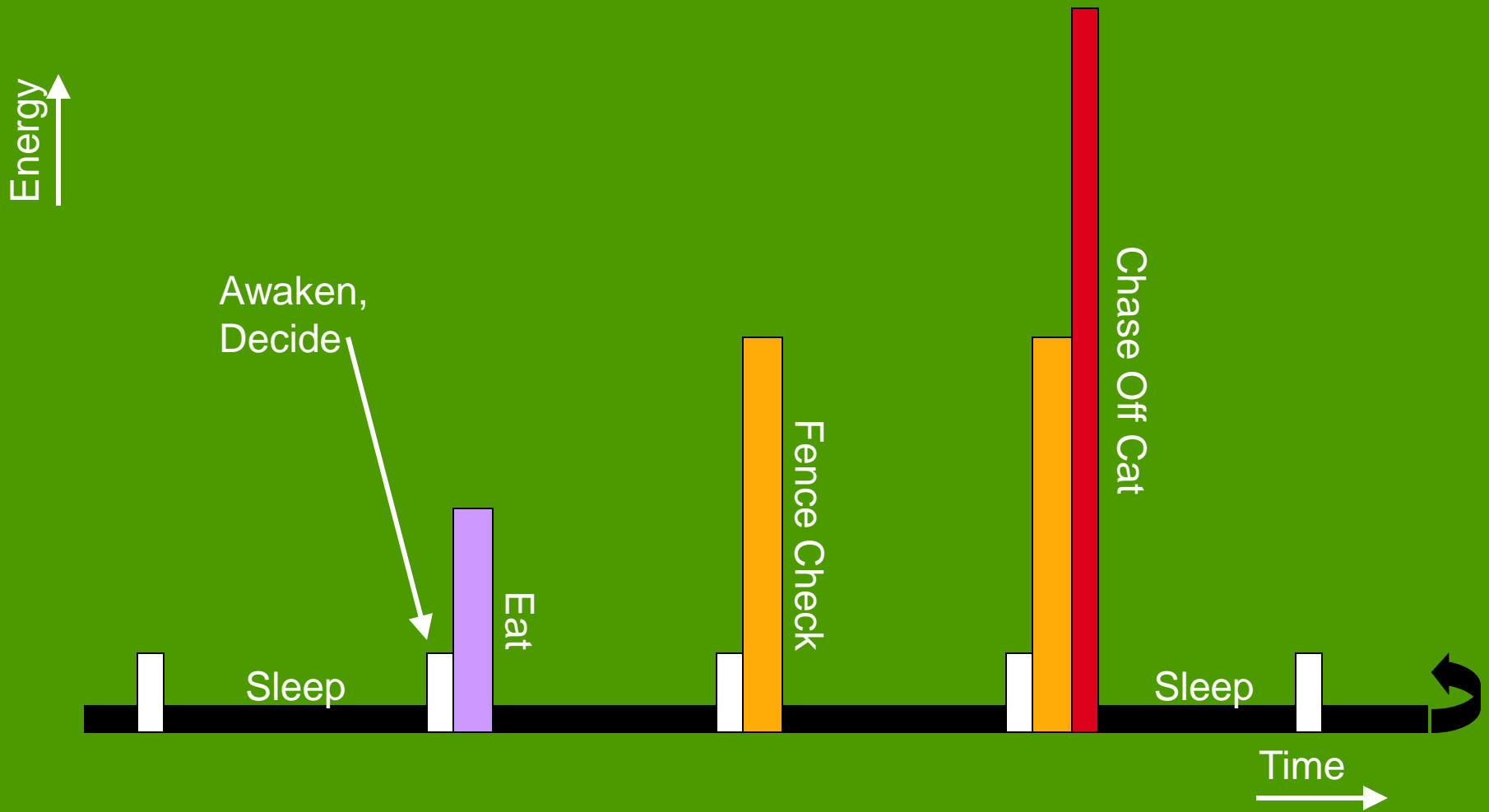
↓ Energy Star Wall Wart



D-Link DGS-2205



Dog Day Afternoon

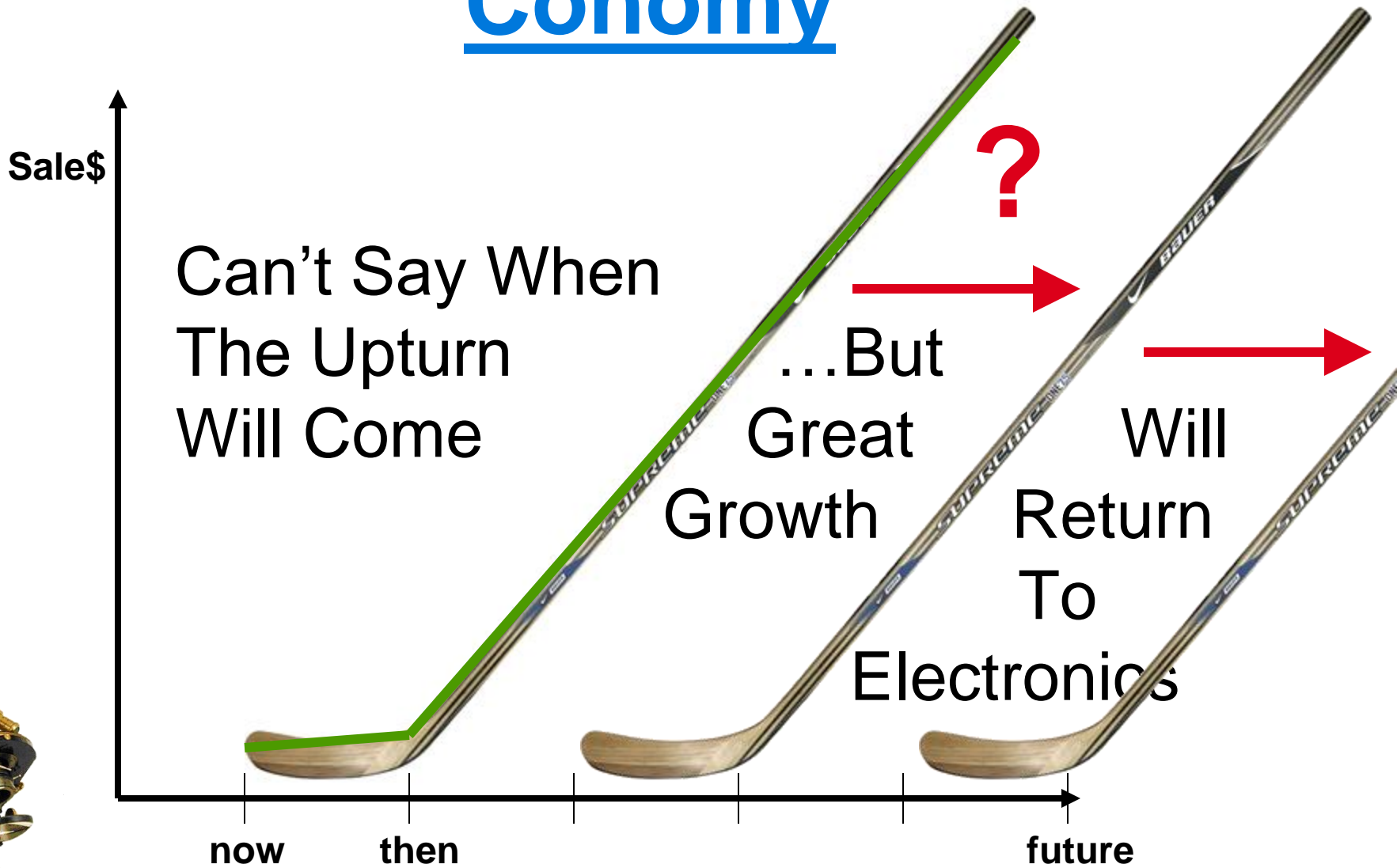


Battery-Powered Devices

- Handhelds, Instruments, Personal Medical
- Heterogeneous Processor Elements
- Periodic Bursts of Activity
- Extend Battery Life – 5 to 10 years!
- Critical: Standby Current
- Energy Harvesting
- Wireless Mesh Sensor Networks



'Conomy



The Seven C's

✧ Convenience

✧ Consolidation

✧ Connectivity

✧ Communications

✧ Control

✧ Energy Conservation

✧ 'Conomy

Be Aware of Them

Consider How They Can
Enrich Your Product

Embrace Them



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- The Real-Time & Embedded Computing Conference (RTECC) is a single-day conference and exhibition showcase focused for people that are developing computer systems and time-critical applications serving multiple industries; this includes: industrial control, data communication and telephony, military and aerospace, instrumentation, consumer electronics, image processing, process control, vehicular control and maintenance, embedded appliances and more.

