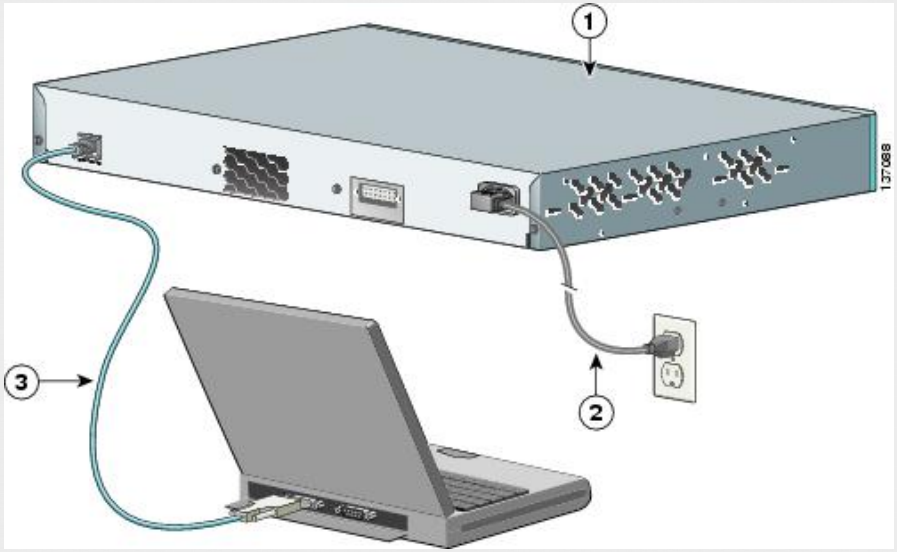
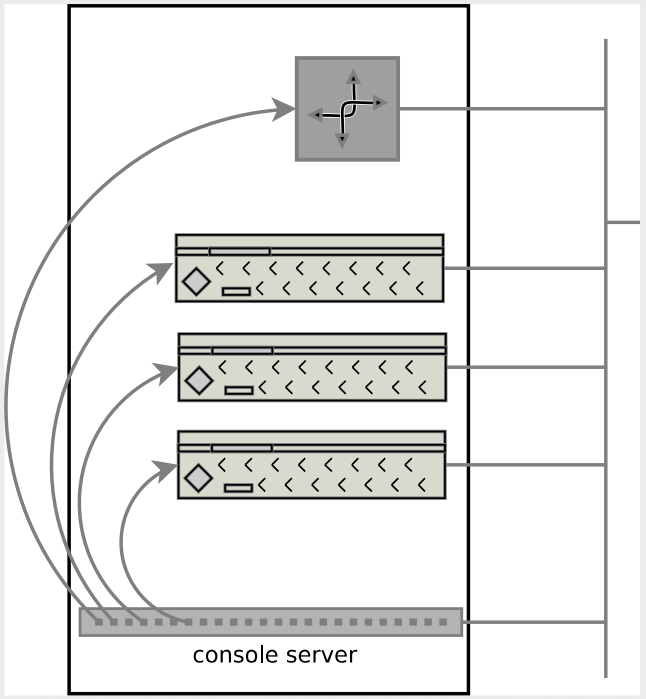
The Lights Out Problem

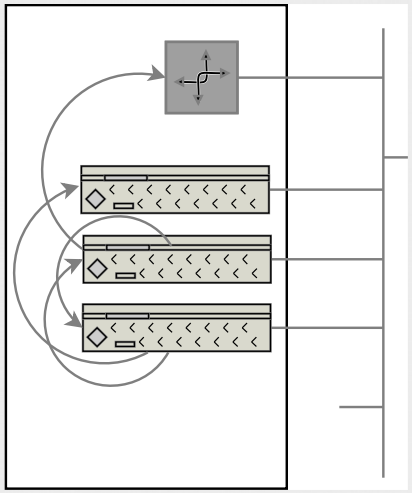
- Admin access to the consoles of routers, servers, media converters.
- Often critical during for emergencies
- needed for setup and initial configuration
- Desirable during firmware updates and other high risk activities



Existing Solutions 1

- Terminal servers.
  - Perfect for big cabinets
- Use multi-serial card
  - Uses PCI multi-port cards
  - Leverages junk hardware





What's PCI?

Existing Solutions 2

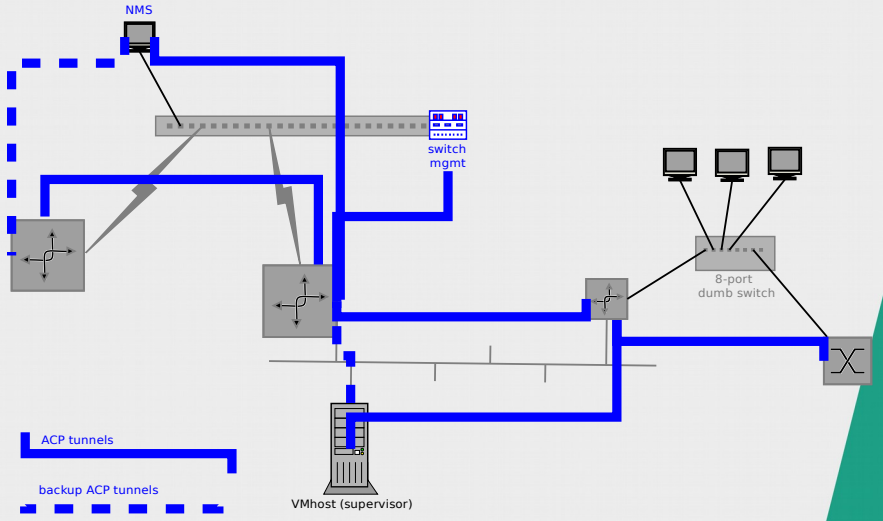
- HP: Guardian Service Processor and iLO, Dell: iDrac, IBM: Remove Service Adapter
  - Works for servers
  - Primarily IP-KVM, rather than serial console
    - (but, in theory, IPMI provides serial ports)
  - High bandwidth requirements, poor copy and paste, and very poor logging options.
    - How to you copy&paste kernel crash message into google?
- SNMP and other mgmt options for switches/routers tends to be vendor specific, and network focused

Challenges with existing solutions

- Built-in server methods are vendor specific, interact poorly with non-Windows environments, and can be bandwidth expensive.
  - Bandwidth (more so, latency) is usually a problem during a crisis!
- Terminal server options do not scale to smaller data centers. (8-port devices can cost $1000+)
  - Terminal servers with remote power control are available, but rare and expensive.
  - Unknown security, few security updates, hard to customize.
- PC-based systems are hard to scale beyond 4-ports, require available PCI slots (rate in 1U and 2U servers). Expansion cards are harder and harder to obtain.
  - USB based serial ports often do not enumerate consistently
  - Easily customized, sometimes too custom to be easily replicated or maintained.
  - Harder and harder with move to virtualized servers, as ESXi does make serial port access easy.
- All solutions result in significant risk of in-band exposure to control interfaces, or worse, lack of access to interfaces.
- “dialup” and “DSL” options are fading fast, and what if you **are** the DSL provider in the area?

ANIMA based solutions

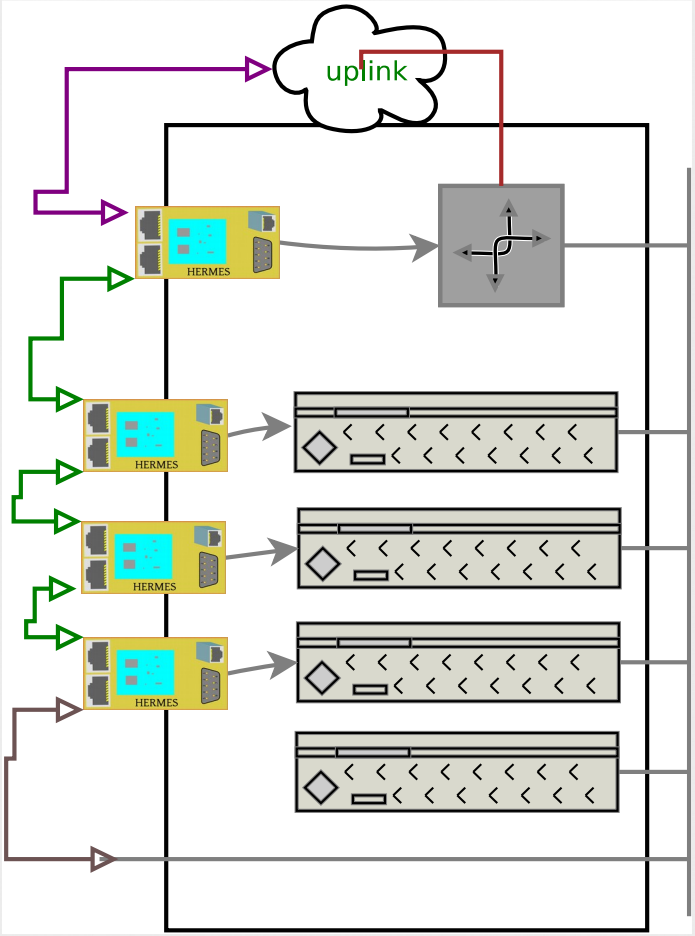
- Within 2 product life cycles (~5 years) expect ANIMA and Autonomic Control Plane (ACP) solutions to be everywhere.
- The ACP is the IPv6 out-of-band VPN that lives on top of the in-band network, is automatically created.



HERMES

Have the ACP now for legacy (console/craft) devices using an inexpensive small box.

- Daisy chain units
- Expand incrementally
- Optionally Control power
- Connect to private VLAN for mgmt access (e.g. ESXi/vSphere, switch VLAN 1)
- Uplink via any DHCPv4/v6, create a tunnel home.
- Cross link between cages via optional ad-hoc wifi.



Technical details/Standards

- New units auto enroll using ANIMA bootstrap mechanism.
- Connect cables in any desired way, use as many hubs, switches or WAN links as desired.
- Access to serial port is via rfc2217 using ssltelnet, can be be kerberized. (or via ssh)
- ANIMA ACP uses auto configured IPsec/IKEv2 for traffic.
- ACP uses RPL (RFC6550) L3 routing protocol for (redundant) connectivity.
- RPL finds shortest path and keeps redundant paths available.