KVM Over LAN for Oceanographic Data Acquisition Systems

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Keyboard, Video, Mouse

- A KVM is a hardware device that allows the control of multiple computers from a one or more keyboard, monitor, and mouse.

  - A need for centralized data visualization increased in the past two decades as DAS is hosted digitally (sub-bottom profilers, visualized serial data)

- Past solutions

  - Daisy chaining various splitters, extenders, 2-4 port KVMs (eg. IOGear, Tripplite products)
 - Rackmount KVM with display
  - Rackmount KVM switch (Aten, NTI, etc…)

KVM over LAN for Oceanographic DAS

Reasons For Switching

- Wiring   and Scalability
  - Previous solutions are less modular, which leads to quick-fixes that add up from cruise to cruise
    - Regardless of turnover notes, it always turns into a mess.
    - Inconsistent installations
  - Not limited to the number of ports of a single KVM unit
  - Not a single point of failure, as most KVM's are not really built to enterprise standards (redundant power supplies, failover, enterprise-grade components)
- Leverages UPS-backed PoE
  - No wall warts, no extra power cables utilizing dirty power
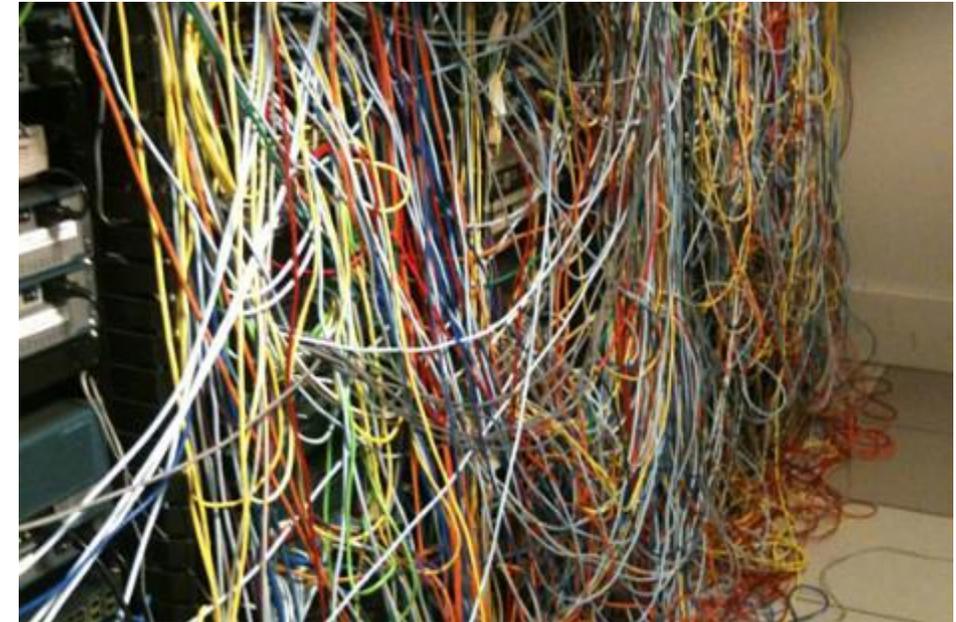
Black Box's Mediacento IPX series

- The only solution that transmits HDMI (A/V) and USB over LAN with true plug-and-play
  - Matrox Maevex series provides similar capability, but no USB; and costs more
  - Up to 16 sources is plug-and-play
    - No software configuration required, on-device ID switch
    - More than 16, requires advanced configuration
  - PoE
  - EDID and HDCP support
- 1080p HD and 4K models
- Discrete hardware for scalability and affordable spares

Robust Network Infrastructure

- IGMP-snooping compatible switches required
  - Most efficient use of the network
  - Without it, risk of network saturation
- 10GB backbone
  - R/V Sally Ride "IMCOS" switches all had to be replaced for this to work ship-wide
- LACP preferred
  - Link Aggregation Control Protocol can double your backbone pipe
  - LACP is best viewed as a reserve and/or backup in case of failover – High availability, redundancy, reliability
    - Side point: Data, internet, VoIP, and now KVM all dependent on LAN
- Enterprise-grade
  - LACP over two switches, redundant power supplies, high quality internal components

LAN Metrics

- Each display utilizes 60Mb/s (7.5MB/s)
  - 100Mb switches will get saturated with only two units
  - 1Gb, Approximately 10 units limit, perhaps more with LACP
  - 4k upwards of 4x throughput?
- For one 1Gb switch, LACP is a must
  - Using LACP, roughly 43%+ utilization with 2 1Gb NICs and 15 Mediacento RX units
  - Without LACP, easily see it's 86%+ utilization
    - No headroom for network spikes

Status	Index	Name	Total Utilization %
🟢	25	Gi1/0/23	62.42
🟢	26	Gi1/0/24	22.03
🟢	36	Po23	42.22
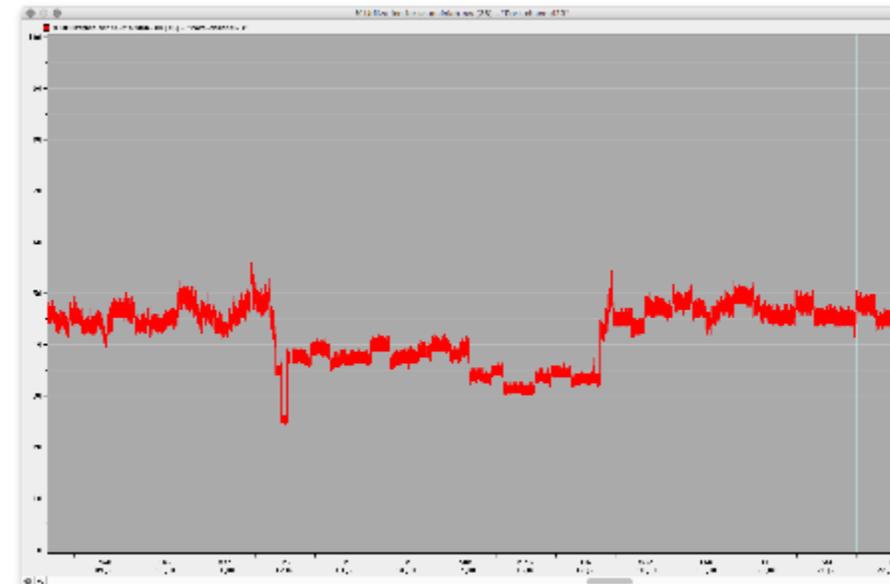
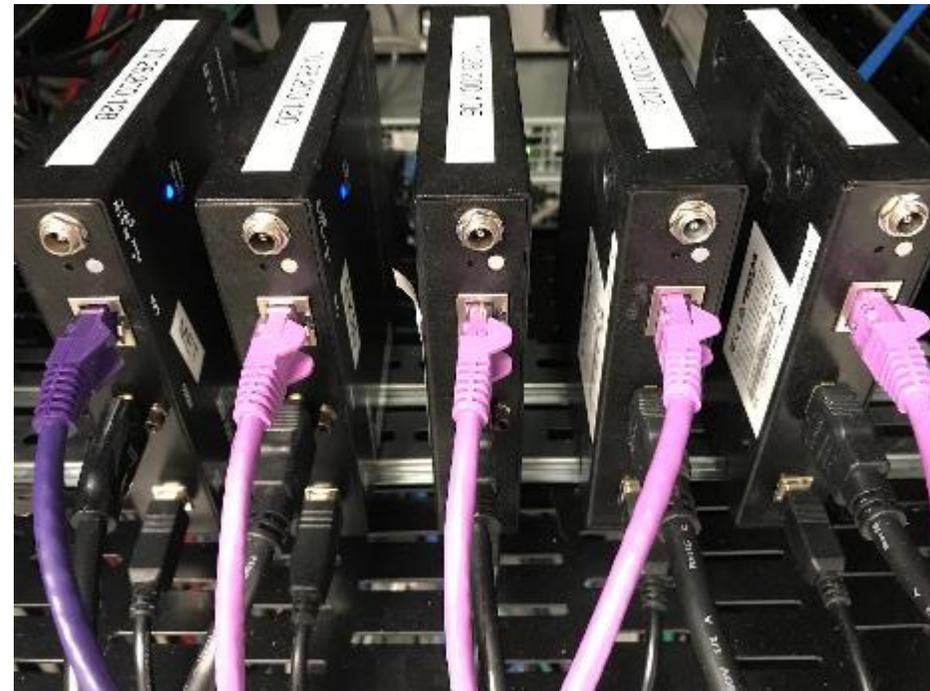## Cons
- Expensive at scale
  - $700/pair, 15 1-to-1 displays already hits $10k
  - Increasing scale may require expensive network infrastructure
- Cybersecurity is nonexistent
  - Telnet to control the devices, and no password required; anyone can go in and change settings
  - Puts importance again on a robust network infrastructure for a secure LAN
- Troubleshooting can be complicated
  - Multiple pieces of hardware
  - CLI

Pros

- Easy to Install
- Modular
- Scalable

KVM over LAN Pros & Cons

Pros (Continued)

- **Excellent latency and video quality**
  - Almost no perceived input lag, or video stuttering
  - Nearly no noise or artifacting introduced from EM noise
- **EDID passthrough**
  - Sends proper monitor resolution data from the monitor to the source; so proper drivers and resolutions can be used
- **Local serial console**
  - Produces excellent logs to troubleshoot nearly any issue
- **PoE**
  - Power redundancy offloaded to resilient enterprise-grade PoE switches that are on multiple UPS'
- **Impact from failure is minimal**
  - Compared to past solutions, discreet components can be swapped out and configured quickly
  - This is not Enterprise-grade hardware, so discreet hardware with, on-hand spares is the way to go
- **Networked**
  - Can monitor and measure using network monitoring tools
  - Being on the network means you can collect metrics and identify trends
- **Not a VNC**
  - Separate instance from the actual OS
  - It will not take away any processing cycles away from that precious DAS computer chugging away at I/O.
- **Happy Technician**

Questions? Thanks!