

wright · line

technical environment solutions

# Critical Facilities Round Table

SUN Microsystems  
Friday, March 25, 2005



## Topic of Discussion

---

- Can standardization, non-uniform and high heat densities co-exist in the data center?
  - How can high density systems be deployed without compromising preset standards and avoiding costly MAC rates (Move, Add, Change)?

Presented by Martin T. Olsen  
Director of Product Marketing and Engineering  
Wright Line LLC

# Wright Line Cornerstones

---

## Manufacturing Capabilities

- One of the most advanced US based manufacturing plants in the industry
- 70+ years of experience

## Data Center Solutions

- Data Center in a box
- Patented and industry leading thermal dynamics
- Store, Cool, Power, Manage and Secure

## Direct Sales Force

- 165+ direct Wright Line Sales Representatives
- Like having your own engineering, manufacturing and quality assurance department in-house without the cost

## Technical Furniture Solutions

- State-of-the-art command consoles and lab environments
- Customized configurations using standardized components

## Strategic Partnerships

---

- Strategic technology partnerships based on research and development within the Fortune 500 community:
  - Oracle, American Express, Boeing, Blue Cross/Blue Shield, etc.
- Strategic business partnerships providing a one-stop-shop sourcing experience to our customers:
  - SBC, Verizon Wireless, Merck, Cingular Wireless, Equinix, etc.
- Strategic sourcing partnerships achieving best-of-grade data center infrastructure in a turn-key fashion
  - MGE UPS Systems, PDI Corp, BayTech, Johnson Controls, EBM-Papst and IT Watchdog

## Challenge: Standardization vs. Non-Uniform Densities

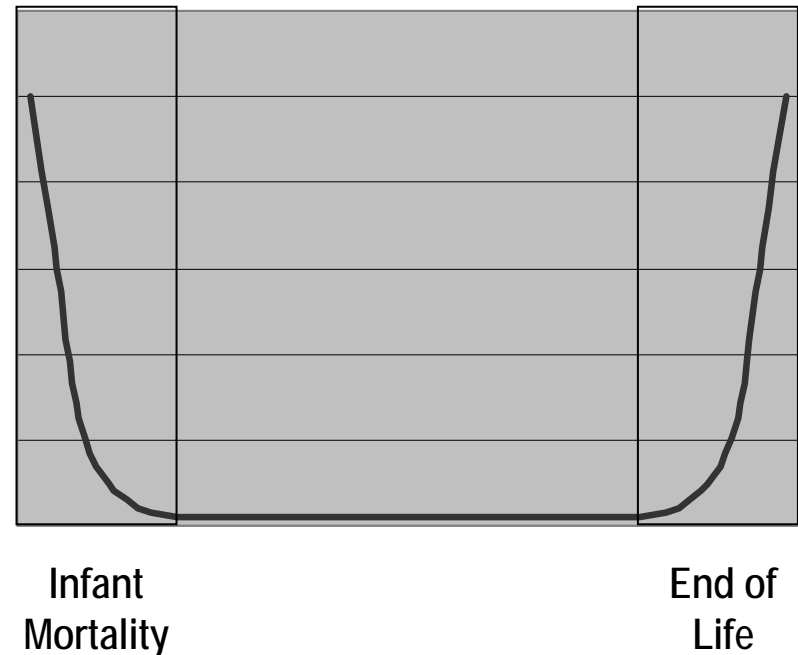
---

- Compromising standardization efforts that drives out defects at the expense of high density deployments
  - Rack consolidation cost vs. cost of space and infrastructure
  - Physical server requirements vs. environmental server requirements
  - Increasing MAC rates in the server environment
- ...increased heat density is the by-product of an increased number of applications. Increased number of applications require more IT devices (servers), that require more cabling, and more power, that in turn provide the users with 24/7 access - the heat should be dealt with keeping the cable, power, rack and security management in mind.

## Compromising Standardization – One Platform

- Standardization to one infrastructure platform drives out defects early on.
- Infant mortality is costly and compromises availability while consuming valuable resources.
- Standardization on a multi-vendor platform allows for a homogenous server environment that reduces MAC rates.

Product Life Cycle Curve / Bath Tub Curve  
One infrastructure platform

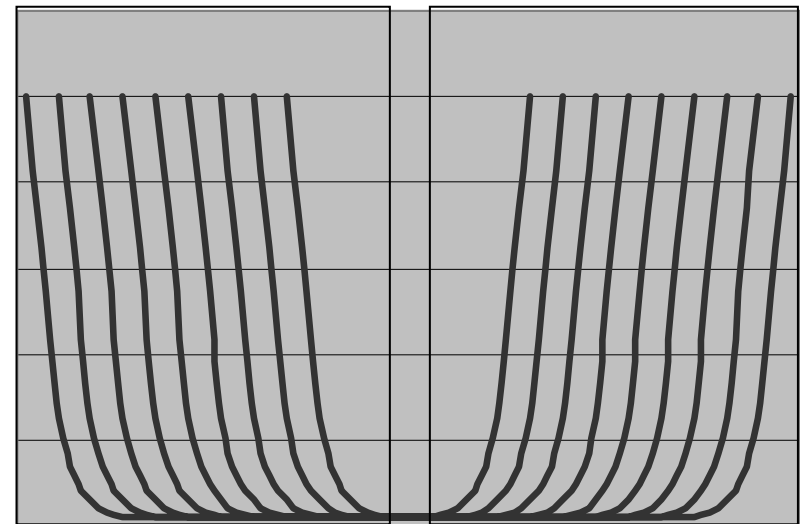


## Compromising Standardization – Multiple Platforms

- Extends the overall infant mortality time – extensive “fire-fighting” measures required.
- Significantly shortens the effective use of equipment – time between infant mortality and end of life replacement considerations is short.
- Costly commissioning and de-commissioning happening frequently.
- Increases MAC rates.

Product Life Cycle Curve / Bath Tub Curve

Multiple infrastructure platform



Infant Mortality

End of Life

## Cost of Infant Mortality

---

- Inadequate space planning
  - Larger than originally assumed \$1,350/sq ft \*
- Inadequate interior physical planning
  - Server equipment require different rails \$250.00/set
  - Cable management inadequate \$300.00
  - Lack of mobility (no casters) \$150.00/set
  - Lack of enclosure depth \$275.00/extension frame
- Inadequate power distribution planning
  - Wrong receptacles/input cord \$600.00/strip
  - Inadequate kW in the power strip \$800.00/circuit
  - New power strip for additional circuit \$600.00/strip
- Inadequate thermal planning
  - Perforation does not comply with server mfg. \$350.00/door
- Inadequate security planning
  - Zoned security requiring different locks \$95.00/lock

\* Ron Hughes,  
The Data Center Journal

*As much as 4,000 per enclosure during initial roll-out*



## Consolidation vs. Cost of Space and Infrastructure

At what point does it make sense to move from air cooled to liquid cooled deployments considering cost of space and infrastructure?

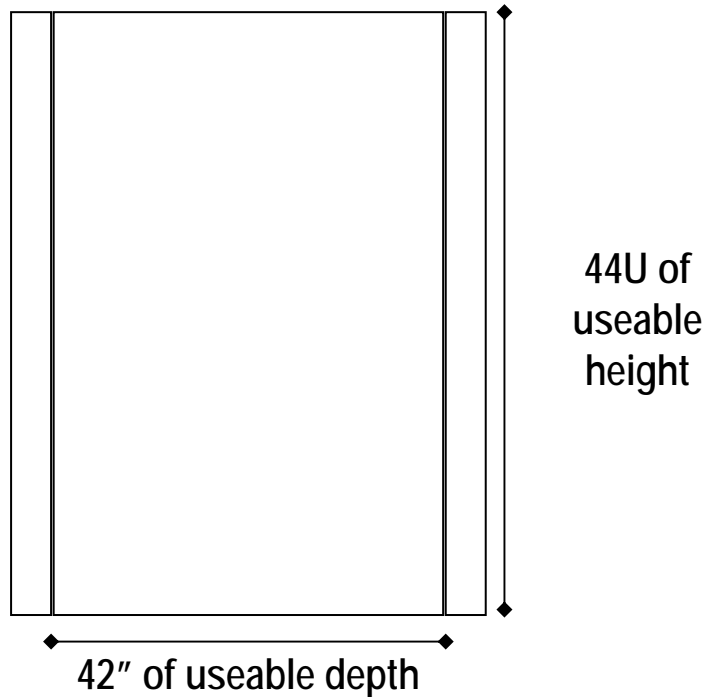
<b>kW</b>	<b>Type</b>	<b>Cost per Rack</b>	<b>Cost per Sq Ft Infrastructure</b>	<b>Cost per kW</b>	<b>Cost per sq ft</b>
3.5	Air	\$ 1,200.00	\$ 700.00	\$ 8,342.86	\$ 730.00
6	Air	\$ 1,700.00	\$ 1,100.00	\$ 7,616.67	\$ 1,142.50
8	Air	\$ 3,000.00	\$ 1,350.00	\$ 7,125.00	\$ 1,425.00
12	Air	\$ 4,600.00	\$ 1,500.00	\$ 5,383.33	\$ 1,615.00
20	Liquid	\$ 12,000.00	\$ 3,000.00	\$ 6,600.00	\$ 3,300.00

\* Ron Hughes, The Data Center Journal - \*\* Sanmina-SCI Cost Comparison 02/15/2003

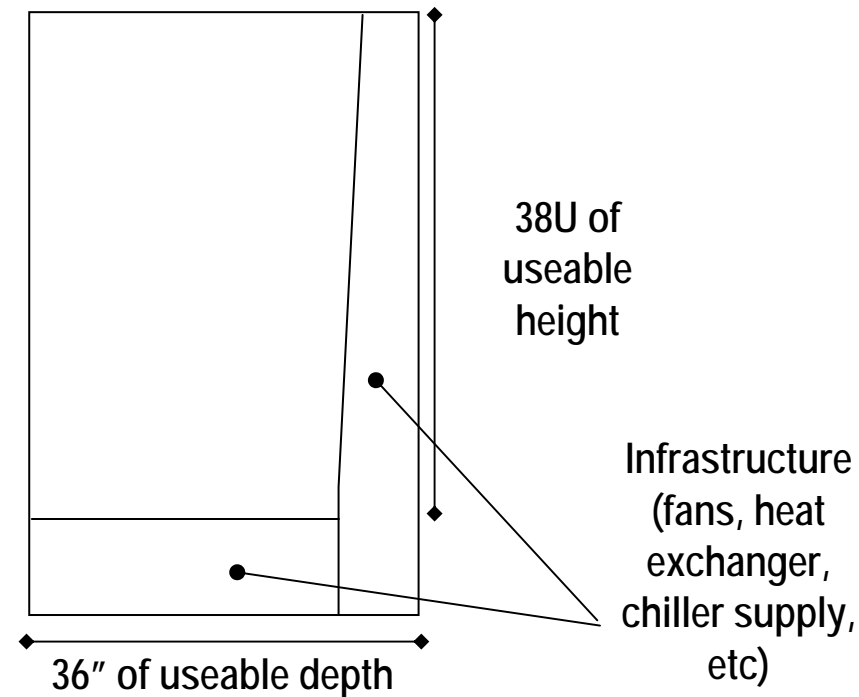
# Physical vs. Environmental Server Requirements

**Dilemma:** The greater the heat load the more infrastructure is required, both within the room and within the enclosure.

Paramount Close-Coupled Thermal System  
– Side View

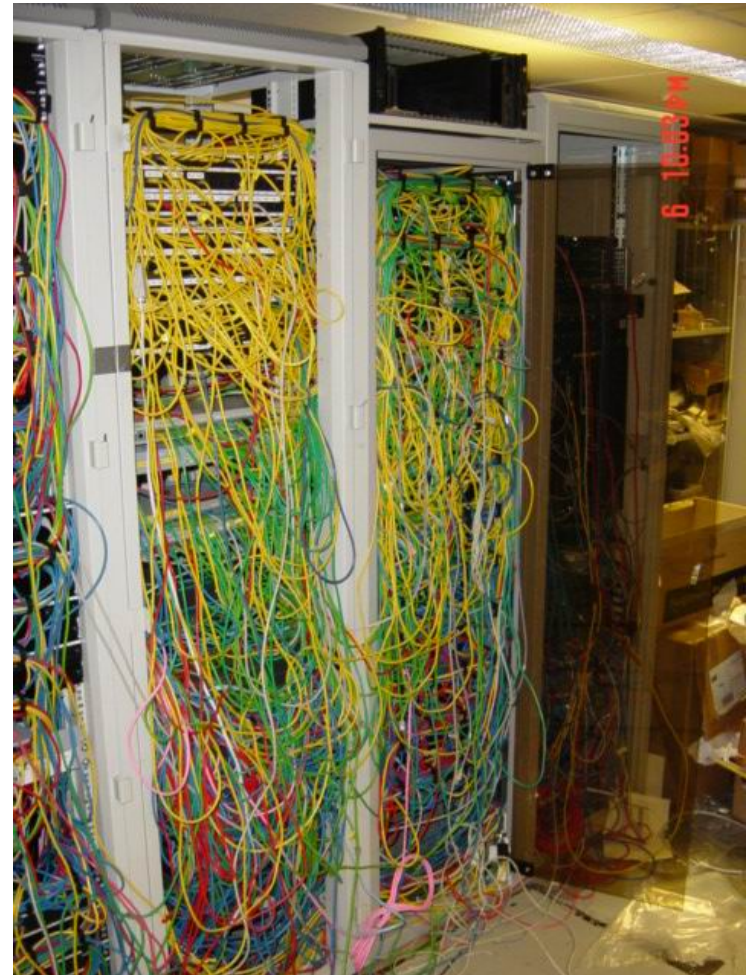


Liquid Cooled Enclosure – Side View



## Decreasing MAC Rate Through Standardization

- The MAC rate directly affects capital and operating expenses in the data center.
- Choosing an enclosure platform that is proprietary from both a thermal and equipment standpoint can be devastating.
- Frequent enclosure platform change increases infant mortality cost and capital expense and reduces “shared learning”.



## Paramount Enclosure Platform

---

- Guaranteed compatibility taken to the next level
- 3.5kW to 12kW of thermal management in just ONE enclosure platform
- Optional Active Thermal Management System that helps reduce electricity cost up to 53% and doubles the life expectancy of the infrastructure
- Safe and secure mounting of up to 2,200 lbs. of server equipment
- Adopted as the standard of choice by a number of Fortune 500 customers
- Power, thermal, management and security options retrofit to any Paramount enclosure previously deployed while addressing today's requirements.

# Paramount Enclosure Platform



**COMPATIBILITY**  
**GUARANTEED**

We guarantee that all 19" TIA/EIA-310-D compliant equipment will physically fit into the Paramount enclosure.\*



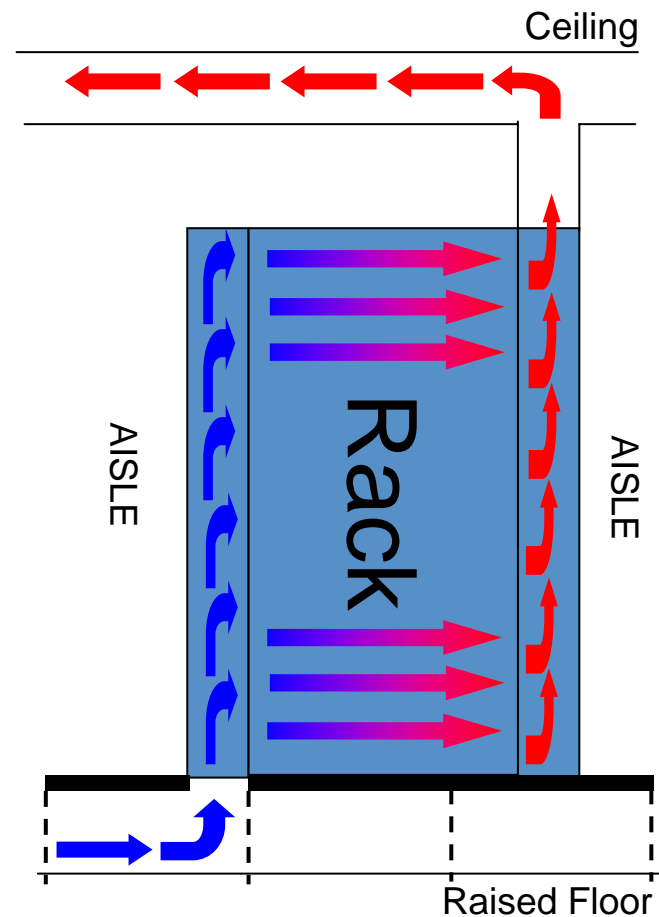
# Paramount Close-Looped Thermal Solution

- 8 – 12kW close-looped patented thermal management system
- Addressing heat removal and stratification
- Incremental growth in heat load without putting a strain on the building infrastructure
- Proven installed base of more than 600 systems
- Performance testing completed by Center for Environmental Energy Engineering, University of Maryland



## Paramount Close-Looped Thermal Solution

- 30° delta T (68° inlet and 98° outlet temperature)
- Stratification limited to 4° F
- Fully isolated cold and hot air streams for increased efficiency
- Thermal management through power outages when the CRAC/air handlers turn during transition from utility to generator power



# Paramount Power Management

- Basic, Metered and Managed power options that fit seamlessly into the most dense Paramount enclosure
- High density power distribution that provides up to 10kW in just one circuit

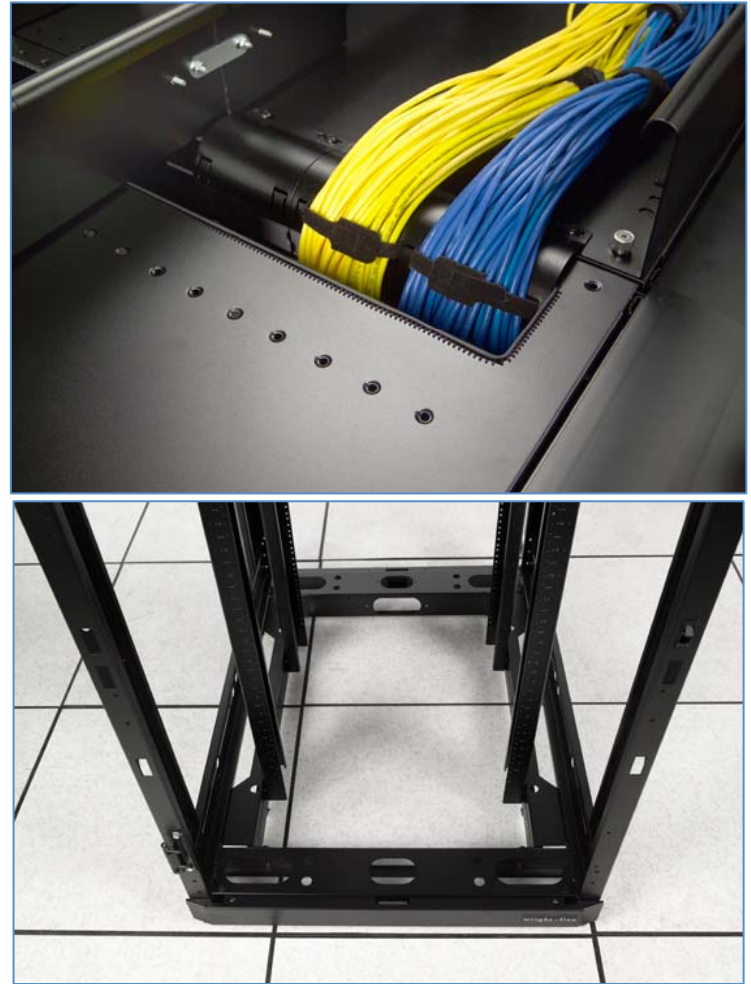




# Paramount Cable Management

- Industry leading cable management – by addressing transitions that typically cause cable bends and breaks
- Unobstructed cable access along the sides, top, bottom, front and rear.
- Full compliance with TIA/EIA-568 cable management requirements

Unprecedented for a high-density enclosure platform



# Paramount Security Management

- 200 different locking options to address various security levels in the data center
- Electronic locking options for tracking rack level entries
- Cage products to add zoned security levels for individual pods or customers



*Electronic Key Lock*



*Electronic Keypad Lock*



## Summary

---

- Cooling and heat removal continues to be one of the biggest challenges in the data center.
- It is paramount that standardization initiatives deployed to drive out defects and increase productivity are not compromised in the pursuit of a high-density solution.