

Most organization's data centers that were designed before 2000 were we built based on technologies did not exist or were not commonplace such as:

- > Blade Servers and 1U Low Profile**
- > Servers w/ DualQuad Core Processors**
- > VM Virtual Machines**
- > SAN & NAS Storage Arrays**
- > VOIP**

Result: Datacenters that were built only 7 years ago were not designed to support today's High-Density Hardware requirements, much less tomorrow's constantly changing standards.

The result is that these design criterion and performance metrics have radically changed, directly affecting data center design factors such as:

Computing Capability per sq ft (i.e. MPS processing power)

Storage per sq ft (Gigabytes – Terabytes)

Power & Cooling per sq ft (Watts)

Infrastructure Scalability - Designing with the ability to scale up or down with constantly changing systems and demand while maintaining energy efficiency

Sample Data Center Power Requirements

	Low Density 1-2 KVA	Med Density 3-5 KVA	HI Density 6-10 KVA	EXT Density 12-20 KVA+
Cabs	Total KVA			
5	5-10	15-25	30-50	60-100+
8	8-16	24-40	48-80	100-160+
15	15-30	45-75	90-150	180-300+
25	25-50	75-125	150-250	300-500+

Sample Power & Cooling Requirements

High Density 1 U Servers

Information based on published specification

1U Servers	Each 1 U Server		U	Rack of 40 Servers		COOLING TONS
	WATTS	BTUs		WATTS	BTUs	
Model			1			
Dell Power Edge 850	345	1,173	1	13,800	46,920	3.9
IBM eServer X306	350	1,190	1	14,000	47,600	4.0
HP Proliant DL360	275	935	1	11,000	37,400	3.1
Sun Fire X2100 Server	300	1,020	1	12,000	40,800	3.4
			1			
Dell Power Edge 1850	550	1,870	1	22,000	74,800	6.2
IBM eServer X336	585	1,989	1	23,400	79,560	6.6
HP Proliant DL360R4	535	1,819	1	21,400	72,760	6.1
Sun Fire X4100 Server	550	1,870	1	22,000	74,800	6.2

Challenge ... for Data Centers based on 50-100 Watts Sq Ft

Copyright 2007 www.naat.com

20h 21h 22h 23h 24h 01h 02h 03h 04h 05h 06h 07h 08h 09h 10h 11h 12h 13h 14h 15h 16h 17h 18h 19h

Network Services Division
 North American Access Technologies, Inc.

Sample Power & Cooling Requirements

High Density Blade Servers

Blade Servers						COOLING
Model	WATTS	BTUs	U	WATTS	BTUs	TONS
Dell	Rack of 4 Chassis (40 Blades)					
DELL PowerEdge 1855	5,000	17,000	7U	20,000	68,000	5.7
IBM	Rack of 4 Chassis (56 Blades)					
IBM BladeCenter=H Class	8,000	27,200	9U	32,000	108,800	9.1
HP	Rack of 5 Chassis (40 Blades)					
HP BladeSystem p-Class	4,500	15,300	6U	22,500	76,500	6.4
SUN	1 Server (72Proc)					
Sun Fire E25K Server	25,000	85,000	~	25,000	85,000	7.1
Weber Genesis Silver Barbeque				26,000		2.2



Information based on published specification

Copyright 2007 www.naat.com

Network Services Division
 North American Access Technologies, Inc.

Challenge ... It's Very Very Hot in here

My Servers are Cooked

Heat Load Per Cabinet

14 Servers@550W = 7.5KW
= 26,000 BTUs = 1 Weber Grill !!

28 Servers@550W = 15KW
= 52,000 BTUs = 2 Weber Grills !!

42 Servers@550W = 22.5KW
= 78,000 BTUs = 3 Weber Grills !!



Information based on published specification

20h

21h

22h

23h

24h

01h

02h

03h

04h

05h

06h

07h

08h

09h

10h

11h

12h

13h

14h

15h

16h

17h

Copyright 2007 www.naat.com

Network Services Division
North American Access Technologies, Inc.



Compact Four-Way
Supremacy is Here

NOW WITH 550 WATTS OF POWER !!!



High Power Density

Watts per Rack ~

2KW-5KW-10KW~+30KW !!!!!

Watts per Sq. Foot ~

100W-150W-200W~+300W!!!!

Challenge...

Scalable UPS Power & COOLING !!

Information based on published specification

Network Services Division
North American Access Technologies, Inc.

IBM BladeCenter

H Class

9U = 14 Blades

Power=8,000VA

Heat=27,200 Btu/hr

with 4 per 42U rack

=32,000KVA Power

=105,000 Btu/hr

=9 Ton Cooling!!

12KW



Flexibility

- Traditional- Fixed Hardwire Electrical Distribution

+ **Modular** – Flexible Power Whips and Plug-in PDUs

= Easy Reconfiguration for Changing Loads & Equipment Types

Expandability & Growth

• Traditional- -Pre-build for Maximum (Traditional ~ Maximum Loads)

• +**Modular** = Growth On-Demand

IDL

Sample Data Center Power Costs

KW Hour	Day	Month	Year	5 Years
1	24	720	8,760	43,800

Cost Per KWH	Day	Month	Year	5 Years
\$ 0.10	\$ 2.40	\$ 72.00	\$ 876.00	\$ 4,380.00

Cost Per 100 KWH	Day	Month	Year	5 Years
\$ 10.00	\$ 240.00	\$ 7,200.00	\$ 87,600.00	\$ 438,000.00

Save 5%	\$ 12.00	\$ 360.00	\$ 4,380.00	\$ 21,900.00
----------------	-----------------	------------------	--------------------	---------------------

Cooling

Traditional-Data Center **Little/NO Flexibility**

-Fixed A/C Unit Size

-Pre-build for Maximum Expected Loads



Traditional CRACs were not designed to cool High-Density Racks. They can actually cost 100-200% more to run than the server loads, and still not properly cool the racks.

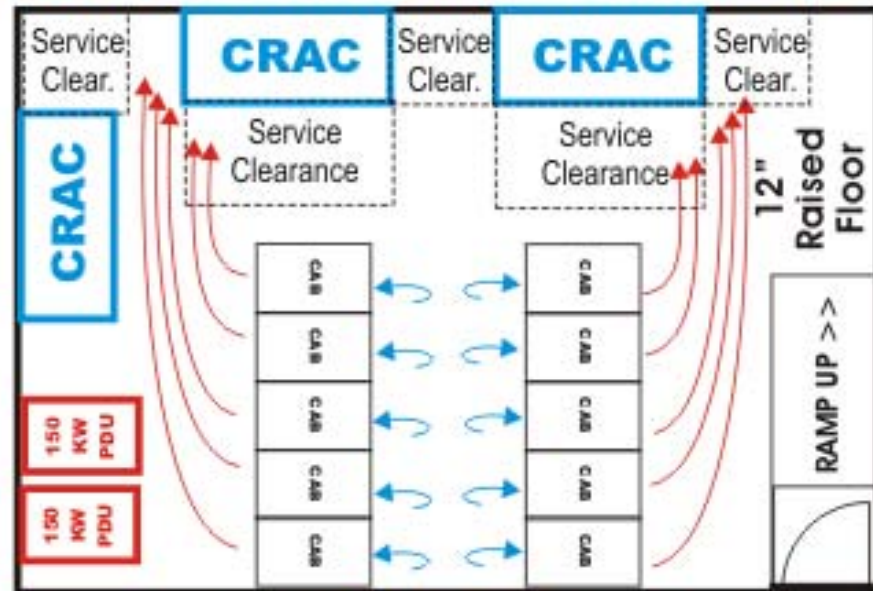
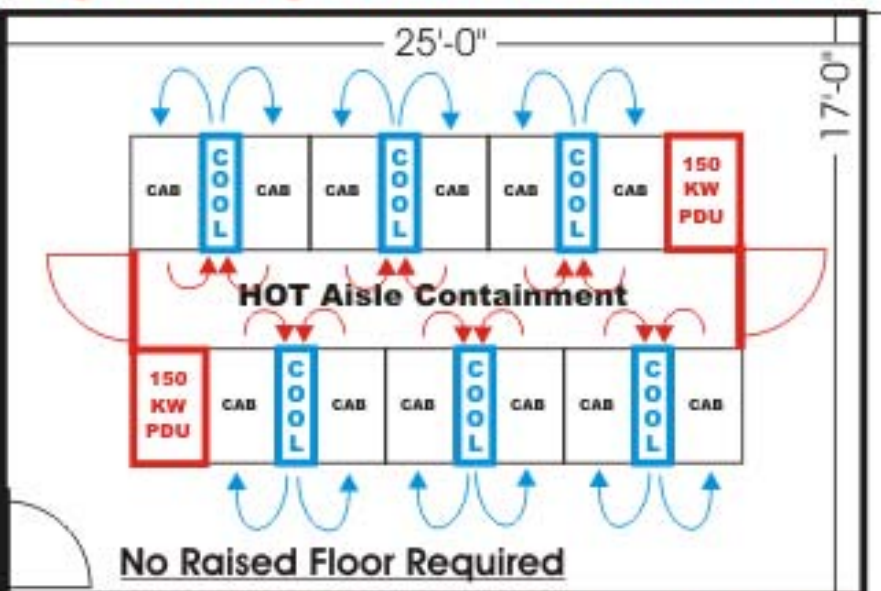
IN-ROW Cooling Technology

VS

Traditional Cooling Technology

High Density Hot-Aisle Containment

Cool Air From Perforated Floor Tiles



Power=150KW 100% Redundant (2N)

Cooling=150KW (N+1) 6 x 30KW

Payload Space=12 Cabinets=504U

Power & Cooling per Cab=12.5KW

Floorspace=17' x 25"=425 Sq. Ft.

No Raised Floor Required

Power=150KW 100% Redundant (2N)

Cooling=80KW (N+1) 3 x 40KW

Payload Space=10 Cabinets=420U

Power per Cab=15.0KW

Cooling per Cabinet Limited to 5KW*

Floorspace=17' x 25"=425 Sq. Ft.

UPS is External for both examples

**Cooling Limited by Airflow*

Copyright 2007 www.naat.com

20h 21h 22h 23h 24h 01h 02h 03h 04h 05h 06h 07h 08h 09h

Network Services Division
North American Access Technologies, Inc.

Sample Data Center Cooling Power Costs

Cost Per 100 KWH	Day	Month	Year	5 Years
\$ 10.00	\$ 240.00	\$ 7,200.00	\$ 86,400.00	\$ 432,000.00

Power Cost for Cooling / percent of Electrical Load=100KW

% of Load	KW	Month	Year	5 Years
50%	50	\$ 3,600.00	\$ 43,200.00	\$ 216,000.00
75%	80	\$ 5,400.00	\$ 64,800.00	\$ 324,000.00
100%	100	\$ 7,200.00	\$ 86,400.00	\$ 432,000.00
150%	150	\$ 10,800.00	\$ 129,600.00	\$ 648,000.00
200%	200	\$ 14,400.00	\$ 172,800.00	\$ 864,000.00
300%	300	\$ 21,600.00	\$ 259,200.00	\$ 1,296,000.00

By reviewing the design and equipment of your data center, proper support for High-Density systems can be achieved, while significant energy saving can be realized.

Please contact us to discuss your requirements

1-800-392-3299 or info@naat.com

www.naat.com

Copyright 2007 www.naat.com

20h 21h 22h 23h 24h 01h 02h 03h 04h 05h 06h 07h 08h 09h 10h 11h 12h 13h 14h 15h 16h 17h 18h 19h 20h 21h 22h 23h 24h

Network Services Division
North American Access Technologies, Inc.