WHITE PAPER
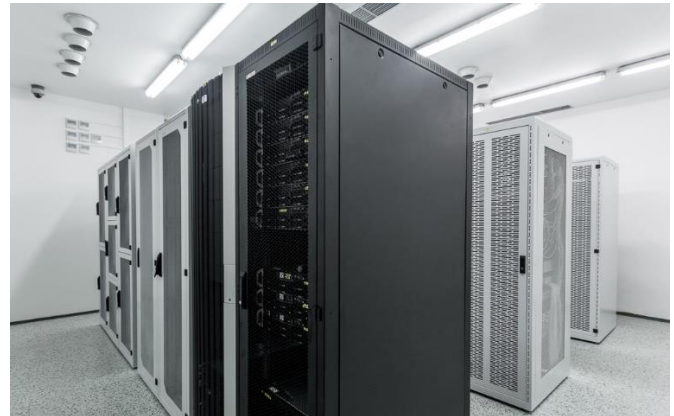
ArcTiv Data Center Solutions Provide High Density Technologies for Colocations and Server Rooms

Colocations

Server Rooms

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Abstract

Medium and large sized companies are commonly implementing a hybrid-cloud data management architecture, leaving critical or latency-sensitive servers on-site and pushing the non-critical data to the cloud or off-site colocations. The traditional on-site data center is then replaced with a smaller, manageable server room which can be easily retro-fitted into the existing building's design without the need for raised floors or changing the building cooling system. The key factors in implementing data center solutions for colocations and server rooms include:

- Current and future IT equipment requirements
- Building power capacity and access
- Cabling capacity and access
- Cooling capacity and access
- Room and rack level security
- Floorplan and ceiling spacing
- Installing and servicing equipment through the lifespan
- Remote monitoring and management
- Fire protection

The priorities of successfully implementing these solutions include:

- Customized products which can be tailored to the site
- Ensuring a cohesive form, fit & functionality between key components
- High-quality products to ensure reliability through the system lifespan
- Common supplier to ensure equipment ships together

ArcTiv Technologies Data Center Solutions offer high-density products which can be customized to the application; minimizing the total investment and operating costs throughout the system lifespan.

DATA CENTER
SOLUTIONS

ArcTiv Data Center Solutions provide high-density infrastructure solutions for on and off-premise IT equipment. The product line offers the greatest value by combining high-performance products which can be easily interchanged and customized based on the application requirements. Colocation space and server rooms can be retrofitted to support growing IT system capacity while minimizing building modifications.

The Data Center Solutions are offered in multiple configurations and can be customized to each application with a wide-range of accessories. The product line includes:

- iPDU's
- Rack Sensors and Access Control
- Server & Network Racks
- Aisle Containment
- High Density Cable Management
- Micro Data Centers
- Next-Gen DCIM
- Automatic Transfer Switch

Cooling Management Techniques in Server Rooms

Room-Level Cooling (Raised Floor)

Traditional data centers utilize raised floors and/or chimneys to recirculate controlled air throughout the data room to isolate hot & cold air while also provide underfloor pathways for cabling. The benefits of these topologies are greater system efficiency and adjustable configuration but require a building-level cooling system along with raised floors.
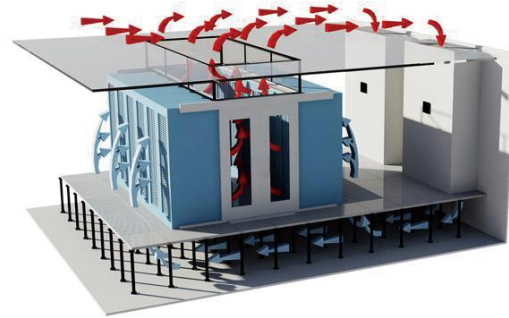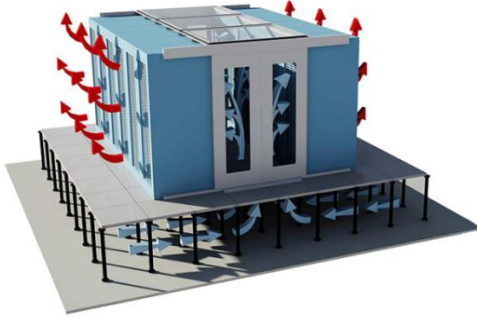
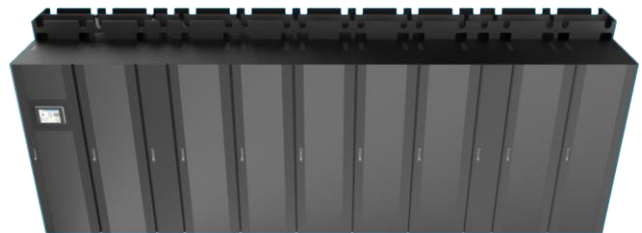| Cold-Aisle Containment	Hot-Aisle Containment
• Sliding or manual doors • Automated top panels (fire suppression) • Hot-air telescopic chimneys (not shown)	• Sliding or Manual doors • Automated top panels (fire suppression) • Hot-air aisle recirculation

Key Application Considerations:
- Building or room-level cooling capacity and efficiency
- Hot-air chimney or open-air recirculation
- Seismic stability of raised floor
- Current and future power of IT equipment

In-Row Cooling

For existing floorspace where raised floors or building-level cooling systems are not available, retrofitting the room with an integrated rack cooling system can provide flexibility and performance for the application. The in-row cooling modules can be added to both aisle and row topologies for fully isolated cooling channels while networking and power cables can be routed overhead via top-mount cable troughs, requiring **no raised floor**. In addition, the systems are scalable; allowing minimal overall investment to support the current IT equipment which can be expanded as the server capacity increases.

Aisle Containment with In-Row Cooling	Micro Data Center with In-Row Containment
• 0U cooling system mounting • Scalable • High efficiency	• 0U cooling system mounting • Scalable • Compact footprint

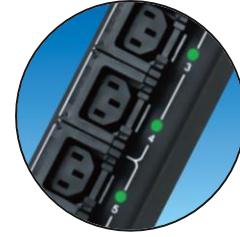*Key Application Considerations:*
- Room dimensions, floor style and ceiling clearance
- Cooling and power capacity requirements (current and future)
- External environmental conditions (temp, humidity, seismic)
- Room and rack level security
- Fire suppression
- External cooling condenser installation (outside)

Rack-Level Power Management

Rack PDU's

PDU's are commonly offered in 3 configurations, Basic, Metered and Managed (Switched); each performing growing functionality as shown below. All configurations deliver reliable power to the servers and IT equipment, with the Managed iPDU's providing outlet-level switching for remote monitoring and server reboot. 1% billing-grade accuracy is required for measuring power consumption by iPDU, phase or outlet-level metering.

Basic PDU	Metered iPDU	Managed iPDU
• Customizable (outlet / plug) • Max outlets per rack • Lowest cost	• 1% accuracy • Remote management • Rack environment monitoring • Modular outlet design • Max outlets per rack	• 1% accuracy • Remote management • Rack environment monitoring • Modular outlet design • Outlet-level metering and switching

Key Application Considerations:

- Rack Power consumption (kW) and redundancy (A + B feeds)
- Customizable outlet & plug styles
- Communication with DCIM or SCADA system (Modbus, SNMP)
- Remote management and alarms
- Environmental monitoring requirements (temperature, humidity, door)
- Low-profile mounting for easy access to equipment

Rackmount UPS and Automatic Transfer Switch

For small server rooms, rackmount back-up power systems may be preferred to provide expandable capacity. Rackmount UPS power ranges can extend up to 10kVA (single-phase) and 20kVA (3-phase) providing power to multiplie racks in series.   Extended battery modules can be added to provide greater back-up time, generally up to 30 minutes. Automatic Transfer Switches (ATS) can be added to provide support during power disruption.

Rackmount UPS	Automatic Transfer Switch (ATS)
• Up to 20kVA capacity • Back-up time expandable via external battery module • On-line and line interactive options	• Automatic operation during power disruption • Alarms (audible & visible)

Key Application Considerations:

- Total IT load and back-up time
- Power efficiency and redundancy (N+1)
- Future scalability
- Automatic operation and remote access

Rack Size and Density

Server & Network Racks

Selecting the right size and style of rack is critical before finalizing the system design as it will have an impact on the total floorspace and system height along with providing easy management of cabling and the IT equipment throughout their lifecycle. IT and facility managers should consider ease of maintenance of the network systems since the equipment will be frequently serviced and changed.

| Server Racks	Network Racks
• High load rating • High airflow capacity • Easy adjustable rails and accessories	• Easy adjustable rails and accessories • High cabling capacity • Greater equipment access

Key Application Considerations:
- Total equipment load rating and dimensions
- Access to the font, sides and rear of the cabinet for maintenance
- Airflow capacity for high-power servers
- Seismic ratings

High-Density Cable Management

A critical element of server racks is supporting both servers and high capacity cabling devices such as switches, routers, patch panels, etc. Before installing the equipment, it is recommended to identify the racks based on the application (ie. network, server) so that dimensions and cabling accessories can be properly managed. With the combination of high-density vertical managers, horizontal cable managers and rear-channel accessories, the server and network racks can maximize the RMU capacity while providing easy access for cable routing.
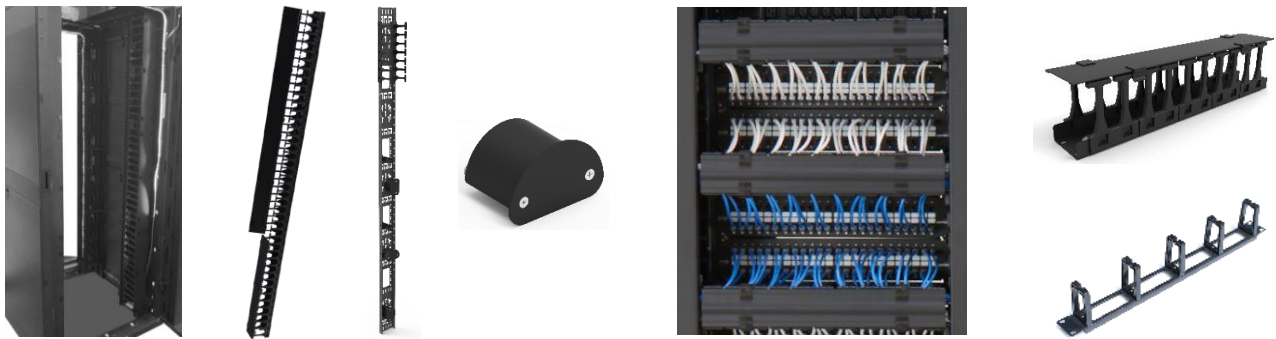
Vertical Cable Management
- High capacity & density plastic fingers
- Front & rear mounting (for 800mmW Racks)
- Rear channel PDU & spool mounting

Horizontal Cable Managment
- High capacity & density plastic fingers
- D-Rings for power cables and bulk cabling
- Support copper and fiber cabling

Key Application Considerations:
- Copper vs. Fiber cabling capacity
- Rack dimensions and floor space
- Cable entry (overhead or underfloor)
- Total available RMU for horizontal management

Conclusions

ArcTiv Data Center Solutions offer high-density solutions which can be tailored to meet the room requirements of new installation and retro-fitted on-premise server rooms. By eliminating the need for raised floors or changing the building cooling system, the total investment is dramatically reduced, while leaving room for scalable expansion in the future. ArcTiv provides a wide-range of products ranging from power, racks, cooling, networking and security to provide a turnkey infrastructure solution.

Using the guidelines and techniques addressed in this white paper, the user can design the best solution based on the room, building and IT equipment requirements. For more information, contact the author or visit our website at www.arctiv-tech.com.

About the Author

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Over 15 years of experience in international business and product development for Fortune 500 companies in the data center, industrial automation and defense industries. MSEE in power systems engineering with extensive product development experience in power electronics and data center infrastructure.

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