APC® *by* Schneider Electric Solutions for Cisco® Unified Computing System (UCS) Blade Applications

The Cisco Unified Computing System is a next-generation data center platform that unites compute, network, storage access, and virtualization into a cohesive system designed to reduce TCO and increase business agility. The system integrates a low-latency, lossless 10GE unified network fabric with enterprise-class, x86-architecture servers. The system is an integrated, scalable, multi-chassis platform in which all resources participate in a unified management domain.

Blade server applications present unique challenges in terms of rack level power distribution, cable management and physical access space requirements for hot-swappable blade components.

This application guide provides recommendations for enclosures, rack power distribution, and cable management to best address the specific physical infrastructure needs of the Cisco UCS 5108 Blade Server Chassis. The recommended solutions in this guide are based on physical verification and testing of an actual Cisco UCS 5108 Blade Server Chassis mounted in APC enclosures.

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APC Rack Enclosures and Rack Mount Power Distributions Units (PDUs)

APC Advanced PDUs

- Integrates power management capabilities with other APC products including Symmetra® PX UPS, row and room PDUs, InRow cooling, NetShelter® SX enclosures, and InfraStruXure® Central, Capacity and Change Manager

- Features zero U, low profile design, optimized for high-density rack power solutions to minimize interference between the PDU and hot-swap blade components

- Superior current monitoring protection including active monitoring of 3 phases for upstream panel breaker and on-board input breakers

APC Full Featured Enclosures

- APC NetShelter® SX enclosures offer the most standard, out-of-box features to ease installation and speed deployment

- Single enclosure design is flexible enough to accommodate various networking and server applications.

- Sizes Available: 42U & 48U heights, 600mm (24") & 750mm (30") widths, and 1070mm (42") & 1200mm (47.2") depths.

APC is a world leader in data center infrastructure - cooling, UPS, power distribution, racks and management.

BLADE READY™

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Power Requirements for Cisco UCS 5108

The UCS 5108 Blade Server Chassis includes four, single phase, hot-swappable redundant power supplies with IEC C20 Inlet connections.

Source "A"
(2) C20
Connectors

Source "B"
(2) C20
Connectors

In a typical power configuration, two IEC C20 inlets on the UCS 5108 are connected to each power source.

The total power consumption per chassis for typical enterprise applications is 2.0 – 2.5 kW; while a typical peak power consumption is 2.8 – 3.0 kW. In order to allow for loss of one power source, each power source should be sized and provisioned for approximately 3.0kW per chassis loading scenario as indicated below.

Rack Enclosures with up to two UCS 6100 Series Fabric Interconnects AND	"A" Power Source Total Req'd Receptacles (per Source/Rack PDU)	"B" Power Source Total Req'd Receptacles (per Source/Rack PDU)	Total Power Provision Recommendation*
(1) UCS 5108 Chassis	(2) C19, (2) C13	(2) C19, (2) C13	3.5 kW
(2) UCS 5108 Chassis	(4) C19, (2) C13	(4) C19, (2) C13	6.5 kW
(3) UCS 5108 Chassis	(6) C19, (2) C13	(6) C19, (2) C13	9.5 kW
(4) UCS 5108 Chassis	(8) C19, (2) C13	(8) C19, (2) C13	12.5 kW
(5) UCS 5108 Chassis	(10) C19, (2) C13	(10) C19, (2) C13	15.5 kW
(6) UCS 5108 Chassis	(12) C19, (2) C13	(12) C19, (2) C13	18.5 kW

* Each Rack Power Distribution Unit should be provisioned to this Total Power Provision Recommendation in order to account for potential source redundancy loss; Total Power Provision recommendations include power for up to two UCS 6100 Series Fabric Interconnects

Note: High performance computing applications with extremely heavy loading conditions have been tested and measured to draw a peak power consumption of 3.2kW per chassis. Under these conditions, users should provision 3.2kW per chassis.

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Rack PDU Selection Tables

Steps to select the correct rack PDU to match site/application requirements:

1. **Select your region;** choose North America or International (for any location outside North America)

2. **If North America, select 3-phase power system (208V 3-phase or 415V 3-phase)**

3. **Select the desired number of UCS 5108 chassis per rack**

Table Results Indicate:

- Recommended total amps (single phase output) required to power the selected number of UCS 5108 chassis plus up to two UCS 6100 Series Fabric Interconnects

- Recommended branch circuit type and size

- Recommended APC rack PDU (metered rack PDUs are recommended to actively monitor and provide alarm warnings to protect critical power circuits from accidental overloads)

- Total rack PDU rated output (total max single phase amps output)

North America Solutions

STEP 2 ---->	208V 3-phase			415V 3-phase
STEP 3 ---->	Number of UCS 5108 Blade Chassis per Enclosure			
	1 to 3	2 to 5	6	1 to 3
Max Power Required (kW)*	9.5	15.5	18.5	9.5
Max Amps Required (1ph output)*	45.7	74.5	88.9	39.6
Recommended Branch Circuit	50A, 3-phase	60A, 3-phase	(2x) 50A, 3-ph	20A, 3-phase
Rack PDU Model	(1)AP7898	(1)AP7866 or (1)AP7866A	(2)AP7567A	(1)AP7557NA
Total Rack PDU Rating (single phase amps)	60A (12.5kW)	77.9A (16.2kW)	138.6A (28.8kW)	48A (11.5kW)

* Total power and amps required includes power provision for up to two UCS 6100 Series Fabric Interconnects

International Solutions (230/400V 3-phase Power)

STEP 2 ---->	400V 3-phase	
STEP 3 ---->	Number of UCS 5108 Blade Chassis per Enclosure	
	1 to 3	4 to 6
Max Power Required (kW)*	9.5	18.5
Max Amps Required (1ph output)*	41.3	80.4
Recommended Branch Circuit	16A, 3-phase	32A, 3-phase
Rack PDU Model	(1)AP7857	(1)AP7856 or (1)AP7856A
Total Rack PDU Rating (single phase amps)	48A (11kW)	96A (22kW)

* Total power and amps required includes power provision for up to two UCS 6100 Series Fabric Interconnects

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Rack Enclosure Recommendation

The clearance access space required to access the hot swap blade chassis modules require special consideration in the selection and configuration of a proper rack enclosure to match the space requirements for access, power distribution, and data cabling. The specific selection of a properly sized rack enclosure depends upon your site specific data, cabling and rack power positioning preferences.

**Steps to select the correct enclosure to match site/application requirements:**

1. **Choose Region and Density:** Select the number of chassis expected per enclosure

2. **Choose enclosure width:** Wider enclosures offer the best use of cable management space and access to blade modules, however site specific limitations may require standard 600mm width enclosure

3. **Choose enclosure depth:** Deeper enclosures are an alternative to wider enclosures for increased cable management and PDU space

4. **Choose the Configuration:**   Reference the diagrams in this document for configuration recommendations and planning considerations

5. **Choose Enclosure and Cable Management** from the reference diagrams

Step 1	Step 2	Step 3	Step 4
Choose Region & Density	**Choose Enclosure Width**	**Choose Enclosure Depth**	**Verify Configuration (as shown in diagrams)**
North America (1 to 5 chassis)	600mm wide (24 in)	1070mm deep (~42 in)	Diagram A (note limited available space)
		1200mm deep (~47 in)	Diagram B1 or B2
	750mm wide (30 in)	1070mm deep (~42 in)	Diagram C1 or C2
		1200mm deep (~47 in)	Diagram C1 or C2
North America (6 chassis)	600mm wide (24 in)	1200mm deep (~47 in)	Diagram D
	750mm wide (30 in)	1070mm deep (~42 in)	Diagram E
		1200mm deep (~47 in)	Diagram E
International (1 to 6 chassis)	600mm wide (24 in)	1070mm deep (~42 in)	Diagram A (note limited available space)
		1200mm deep (~47 in)	Diagram B1 or B2
	750mm wide (30 in)	1070mm deep (~42 in)	Diagram C1 or C2
		1200mm deep (~47 in)	Diagram C1 or C2

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Diagram "A"
600mm wide x 1070mm deep

PROFILE VIEW
REAR OF ENCLOSURE
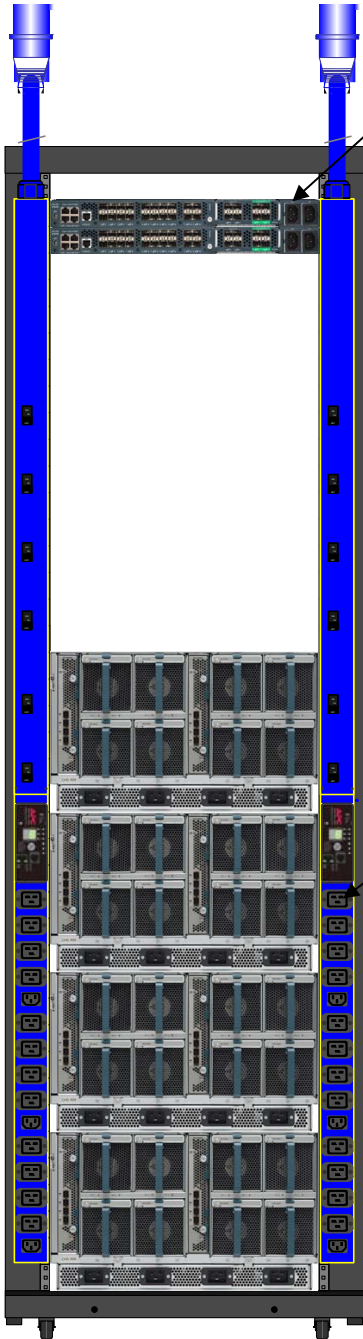
TOP VIEW

Optional UCS 6100 Series Fabric Interconnects
(can be positioned to customer preference)

In this configuration, data cabling space is very limited; use AR8621 tool-less hook & loop cable managers and fasten to vertical mounting rails (small space cavity between the rack PDU and UCS chassis is shown in yellow)
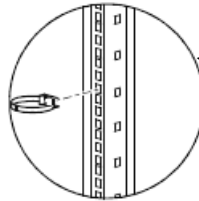
Cisco
UCS 5108
Chassis

1070 mm

Chassis hot swap
component access

Place rack PDUs on each side of the enclosure with receptacles facing the rear door to allow access to hot swap blade components (outlet direction shown by arrow)

600 mm
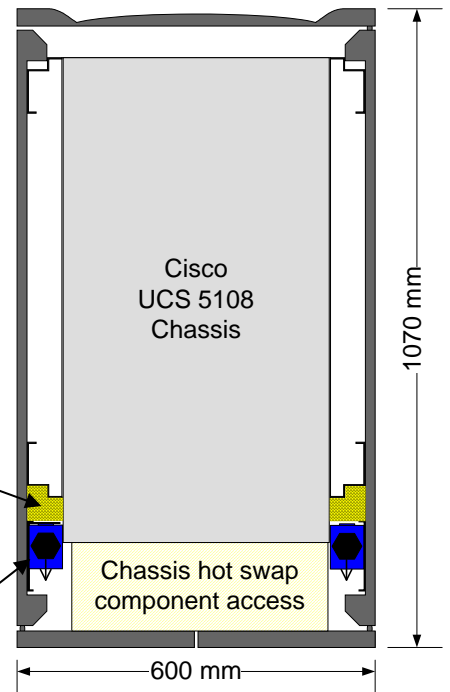
Use AR7711 bracket (one per side) to orient rack PDUs 90° (receptacles facing enclosure rear door)
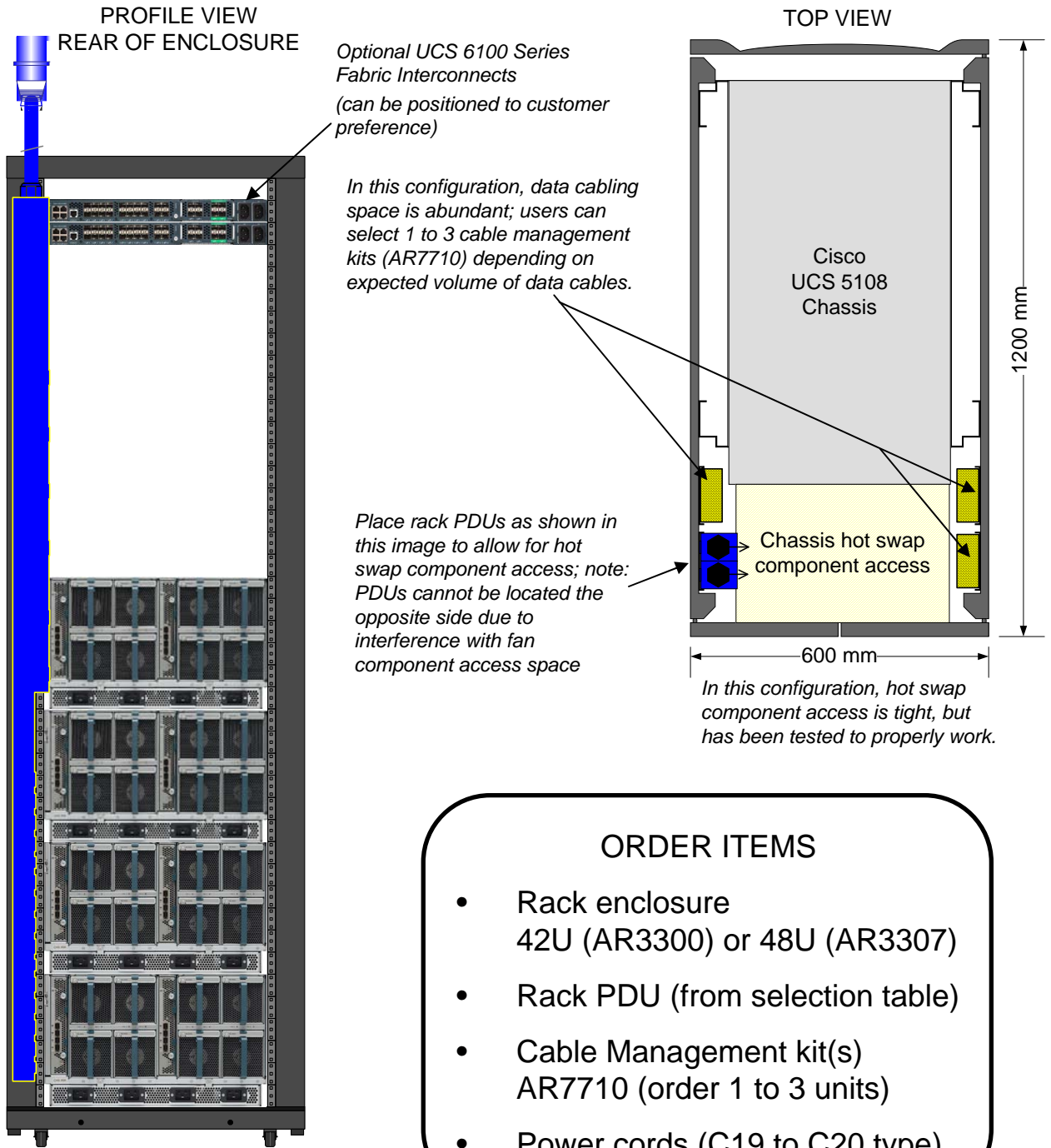
ORDER ITEMS

- Rack enclosure
  42U (AR3100) or 48U (AR3107)

- Rack PDU (from selection table)

- Bracket kit AR7711 (one per rack PDU)

- Cable management AR8621 (2 each)

- Power cords (C19 to C20 type)

AP7866 rack PDU shown in illustration; however, configuration would be common for any PDU selection and number of UCS 5108 blade server chassis

Diagram "B1"
600mm wide x 1200mm deep

PROFILE VIEW
REAR OF ENCLOSURE

Optional UCS 6100 Series Fabric Interconnects (can be positioned to customer preference)

In this configuration, data cabling space is abundant; users can select 1 to 3 cable management kits (AR7710) depending on expected volume of data cables.

Place rack PDUs as shown in this image to allow for hot swap component access; note: PDUs cannot be located the opposite side due to interference with fan component access space

AP7866 rack PDU shown in illustration; however, configuration would be common for any PDU selection and number of UCS 5108 blade server chassis
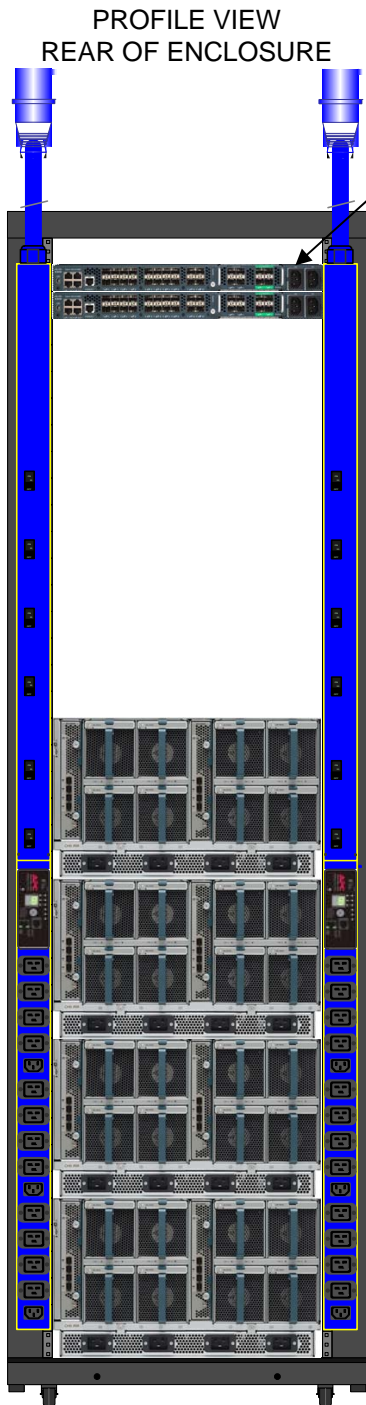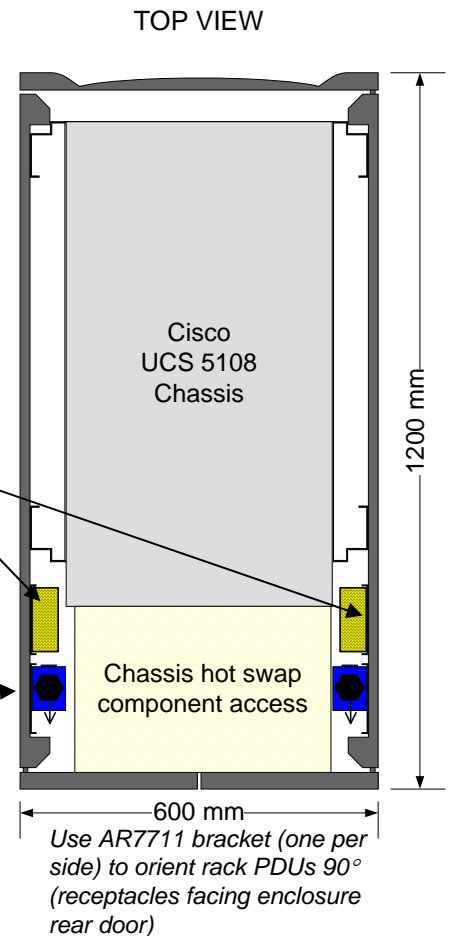
TOP VIEW

Cisco
UCS 5108
Chassis

1200 mm

Chassis hot swap component access

600 mm

In this configuration, hot swap component access is tight, but has been tested to properly work.

ORDER ITEMS

- Rack enclosure
  42U (AR3300) or 48U (AR3307)

- Rack PDU (from selection table)

- Cable Management kit(s)
  AR7710 (order 1 to 3 units)

- Power cords (C19 to C20 type)

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Diagram "B2"
600mm wide x 1200mm deep

PROFILE VIEW
REAR OF ENCLOSURE

TOP VIEW

Optional UCS 6100 Series Fabric Interconnects
(can be positioned to customer preference)

In this configuration, data cabling space is abundant; users can select 1 or 2 cable management kits (AR7710) depending on expected volume of data cables.

Place rack PDUs on each side of the enclosure with receptacles facing the rear door to allow access to hot swap blade components (outlet direction shown by arrow)

Cisco
UCS 5108
Chassis

1200 mm

Chassis hot swap
component access

600 mm

Use AR7711 bracket (one per side) to orient rack PDUs 90° (receptacles facing enclosure rear door)
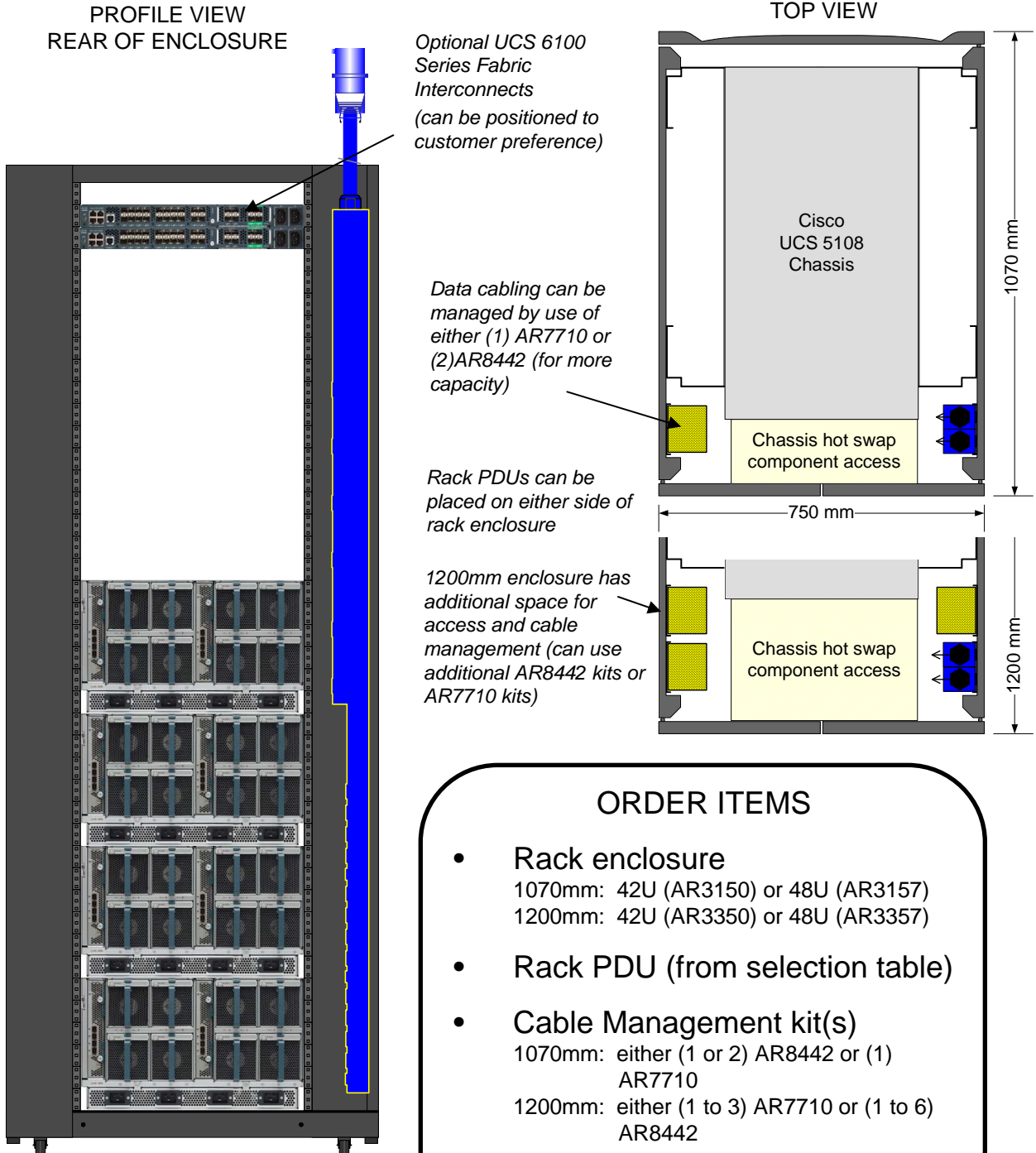
ORDER ITEMS

- Rack enclosure
  42U (AR3300) or 48U (AR3307)

- Rack PDU (from selection table)

- Bracket kit AR771 (one per rack PDU)

- Cable Management kit(s) AR7710 (order 1 to 3 units)

- Power cords (C19 to C20 type)

AP7866 rack PDU shown in illustration; however, configuration would be common for any PDU selection and number of UCS 5108 blade server chassis

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Diagram "C1"
750mm wide x 1070mm and 1200mm deep

PROFILE VIEW
REAR OF ENCLOSURE

TOP VIEW

Optional UCS 6100 Series Fabric Interconnects (can be positioned to customer preference)

Cisco
UCS 5108
Chassis

1070 mm

Data cabling can be managed by use of either (1) AR7710 or (2)AR8442 (for more capacity)

Chassis hot swap component access

750 mm

Rack PDUs can be placed on either side of rack enclosure

1200mm enclosure has additional space for access and cable management (can use additional AR8442 kits or AR7710 kits)

Chassis hot swap component access

1200 mm

AP7866 rack PDU shown in illustration; however, configuration would be common for any PDU selection and number of UCS 5108 blade server chassis

ORDER ITEMS

- ### Rack enclosure
  1070mm: 42U (AR3150) or 48U (AR3157)
  1200mm: 42U (AR3350) or 48U (AR3357)

- ### Rack PDU (from selection table)

- ### Cable Management kit(s)
  1070mm: either (1 or 2) AR8442 or (1) AR7710
  1200mm: either (1 to 3) AR7710 or (1 to 6) AR8442

- ### Power cords (C19 to C20 type)

Diagram "C2"
750mm wide x 1070mm and 1200mm deep
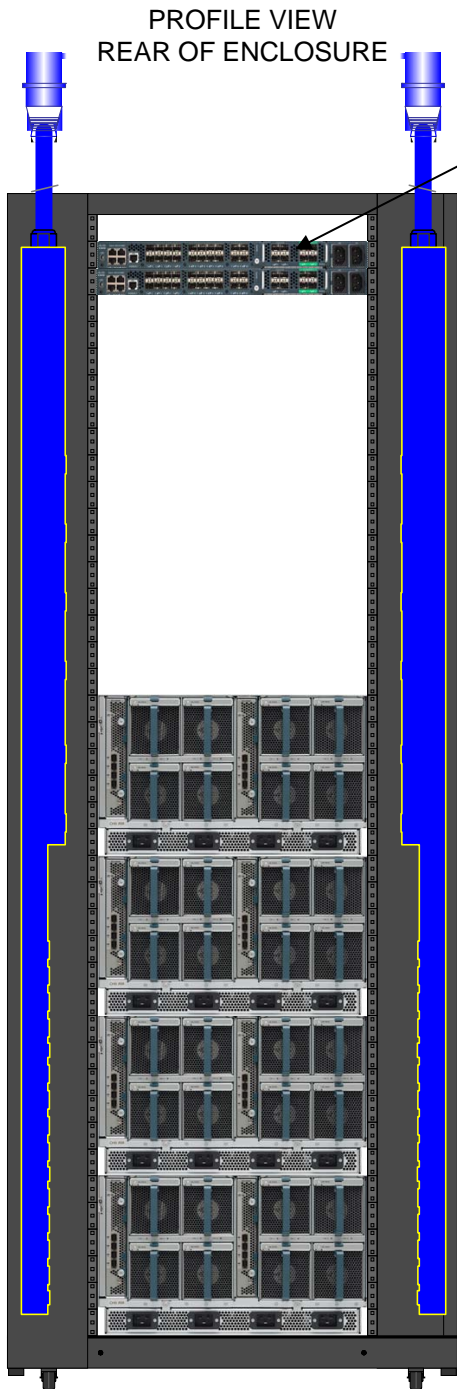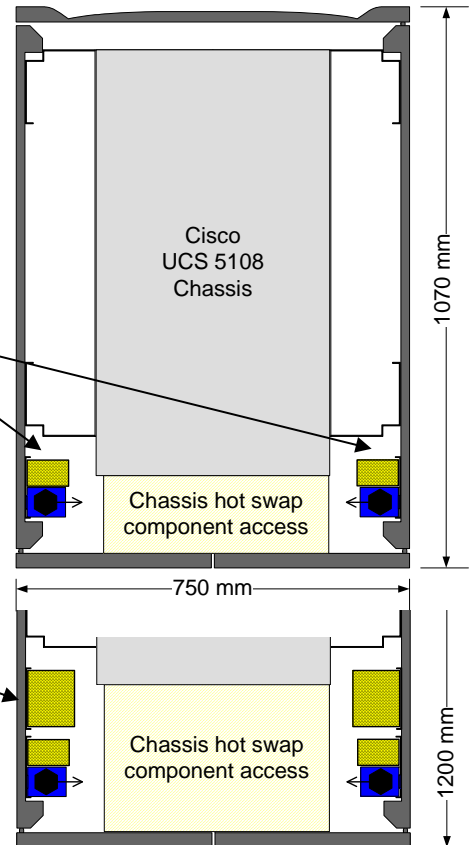
PROFILE VIEW
REAR OF ENCLOSURE

Optional UCS 6100 Series Fabric Interconnects (can be positioned to customer preference)

Data cabling can be managed by use of AR8442 (1 or 2 units)

Rack PDUs placed on both sides of the rack enclosure

1200mm enclosure has additional space for access and cable management (can use additional AR8442 kits or AR7710 kits)

AP7866 rack PDU shown in illustration; however, configuration would be common for any PDU selection and number of UCS 5108 blade server chassis

TOP VIEW

Cisco UCS 5108 Chassis

1070 mm

Chassis hot swap component access

750 mm

1200 mm

Chassis hot swap component access

ORDER ITEMS

- Rack enclosure
  1070mm: 42U (AR3150) or 48U (AR3157)
  1200mm: 42U (AR3350) or 48U (AR3357)

- Rack PDU (from selection table)

- Cable Management kit(s)
  1070mm: either (1 or 2) AR8442
  1200mm: either (1 or 2) AR7710 or (1 to 6) AR8442

- Power cords (C19 to C20 type)

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Diagram "D"
600mm wide x 1200mm deep
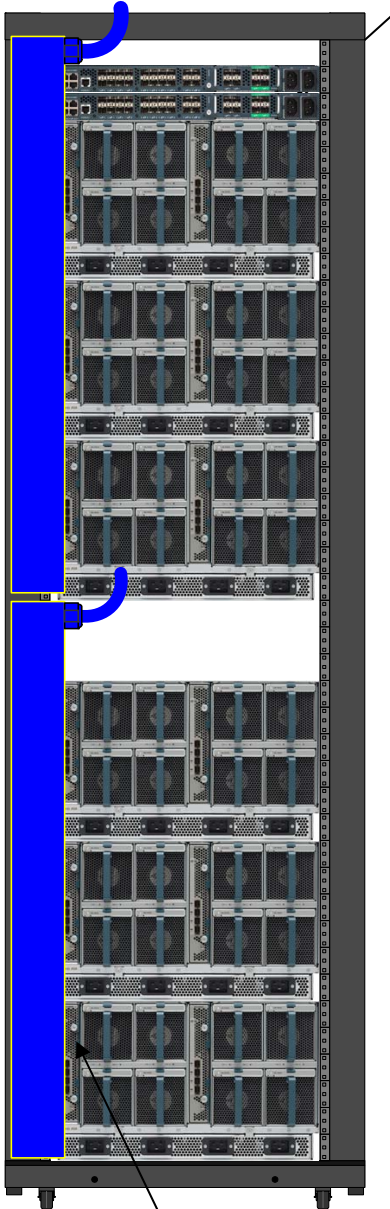
PROFILE VIEW
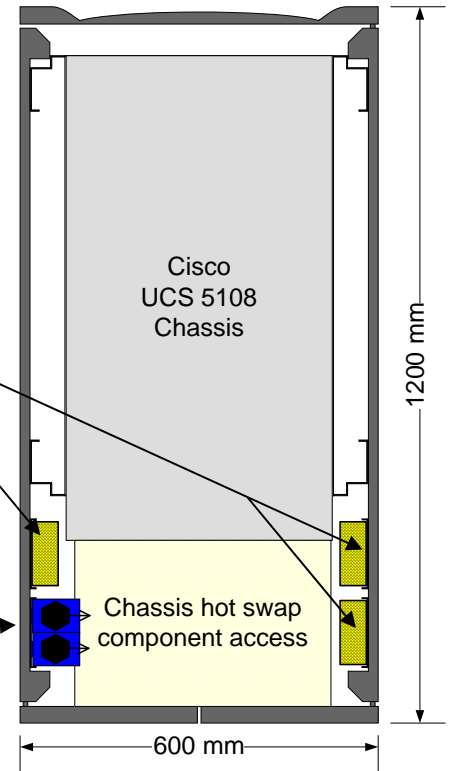REAR OF ENCLOSURE

TOP VIEW

Optional UCS 6100 Series Fabric Interconnects
(can be positioned to customer preference)

In this configuration, data cabling space is abundant; users can select 1 to 3 cable management kits (AR7710) depending on expected volume of data cables.

Cisco
UCS 5108
Chassis

1200 mm

Place rack PDUs as shown in this image to allow for hot swap component access

Chassis hot swap
component access

Note: PDUs cannot be located on the opposite side due to interference with fan component access space

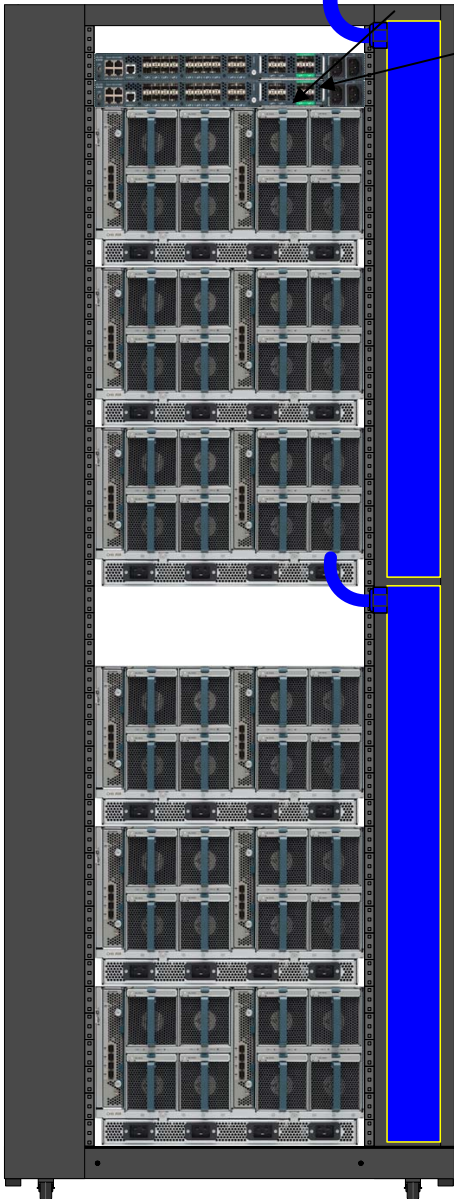600 mm

ORDER ITEMS

- Rack enclosure
  42U (AR3300) or 48U (AR3307)

- Rack PDU (from selection table)

- Cable Management kit(s)
  AR7710 (order 1 to 3 units)

- Power cords (C19 to C20 type)

Space is extremely limited in this configuration; hot swap modules must be removed at an angle to avoid interference with PDU

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Diagram "E"
750mm wide x 1070mm and 1200mm deep

PROFILE VIEW
REAR OF ENCLOSURE

TOP VIEW

*Optional UCS 6100 Series Fabric Interconnects (can be positioned to customer preference)*

Data cabling can be managed by use of either (1) AR7710 or (2)AR8442 (for more capacity)

Rack PDUs can be placed on either side of rack enclosure

1200mm enclosure has additional space for access and cable management (can use additional AR8442 kits or AR7710 kits)

Cisco
UCS 5108
Chassis

1070 mm

Chassis hot swap component access

750 mm

Chassis hot swap component access

1200 mm

PDUs are ½ enclosure height; place 4 units on the same rack side to reduce interference from incoming power cords
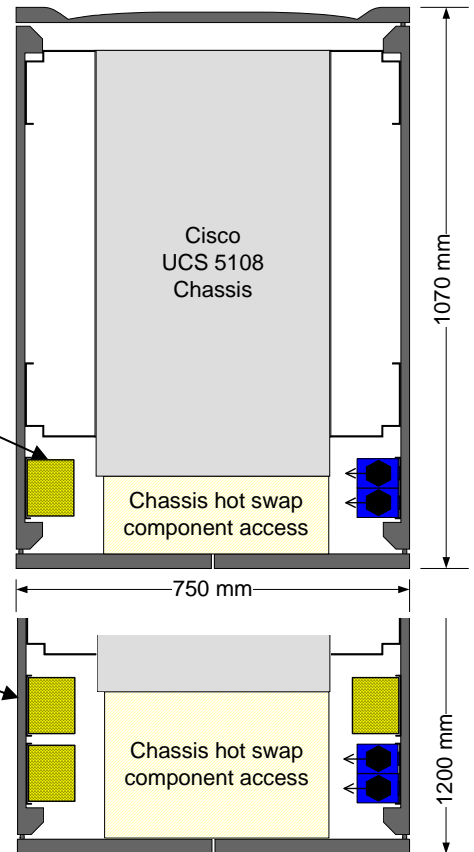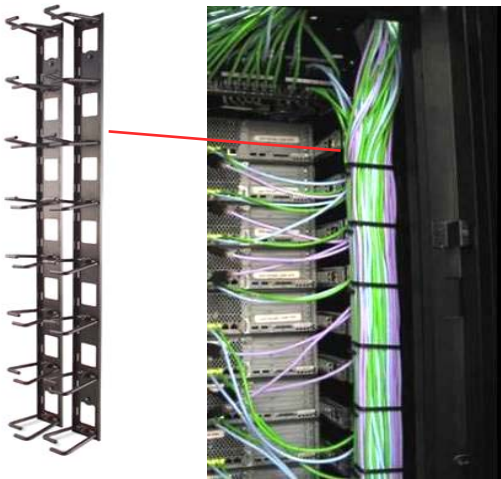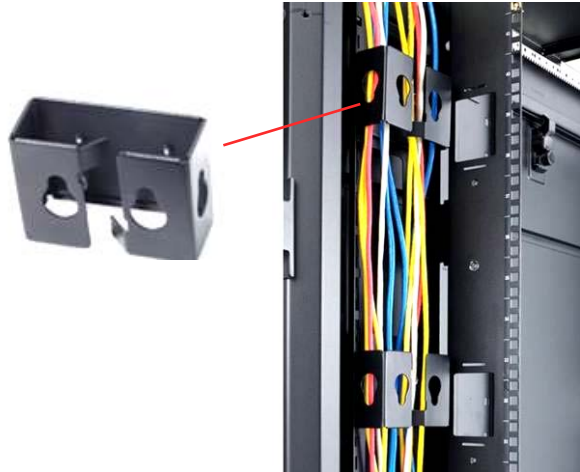
ORDER ITEMS

- Rack enclosure
  1070mm: 42U (AR3150) or 48U (AR3157)
  1200mm: 42U (AR3350) or 48U (AR3357)

- Rack PDU (from selection table)

- Cable Management kit(s)
  1070mm: either (1 or 2) AR8442
  1200mm: either (1 to 3) AR7710 or (1 to 6)
           AR8442

- Power cords (C19 to C20 type)

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Cable Management Accessories

AR8442
Toolless Vertical Cable Organizer

AR7710
Toolless, Low-Profile
Vertical Cable Organizer

AR7711
Zero U Accessory Bracket

AR8443A & AR8444
Fiber Spool Kits

AR8621
Toolless Hook and Loop
Cable Managers

AR7580
High Density Cable Manager
(for wide racks)

For more information visit:
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www.thedcofthefuture.com
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