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Compute Project

## **Project Olympus Chassis Mechanical Specification**

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## Project Olympus System Chassis Specification List

Table 1 lists the Project Olympus system chassis specifications pertaining to the chassis.

**Table 1: List of Specifications and Drawings**

Specification title	Description
Project Olympus Rack Specification	Describes the mechanical rack hardware used in the system
Project Olympus Server Tray Specification	Describes the sheet metal tray used in the system
Project Olympus PSU Specification	Describes the custom Power Supply Unit (PSU) used in the server
Project Olympus Power Management Distribution Unit (PMDU) Specification	Describes the Power Management Distribution Unit (PMDU)
Project Olympus Track Drawing	Describes the tracks that mount in the system rack.

This document is intended for designers and engineers who will be building chassis for Project Olympus systems.

# 1 Introduction to the Project Olympus Chassis System

The Project Olympus chassis system is a modular design to provide more flexibility in enabling servers and other components. Modules are designed to a simple envelope of 1U increments with blind-mate A/C power and management connection. Cooling and D/C power conversion is performed inside each module to enable rapid development without worry of interaction with other modules in the rack. This modularity also provides for costs to be paid only for the components employed. The Project Olympus chassis is comprised of the rack, 1U 'tracks', one and two U server trays with power supplies in them, and a Power and Management Distribution Unit (PMDU) that allow the system to be configured – mixed and matched – according to need. See Figures 1 and 2.

The general scheme is that the tracks are mounted to the EIA rails in the rack, the PMDU hangs on slots in the tracks at the left rear of the rack and is then secured with brackets at its top and bottom, and the server trays (one and/or two U) slide into the tracks and are stopped at the rear when the power supplies in the trays connect with the PMDU. The PMDU thus serves as a mechanical stop to the trays as well as supplying power to them. At U locations where a network switch or other device that has its own EIA rail mounting brackets is planned, the tracks are omitted.

This specification addresses primarily the general mechanical attributes of the system components. Detailed mechanical and electrical descriptions of the Project Olympus components can be found in their respective specifications.



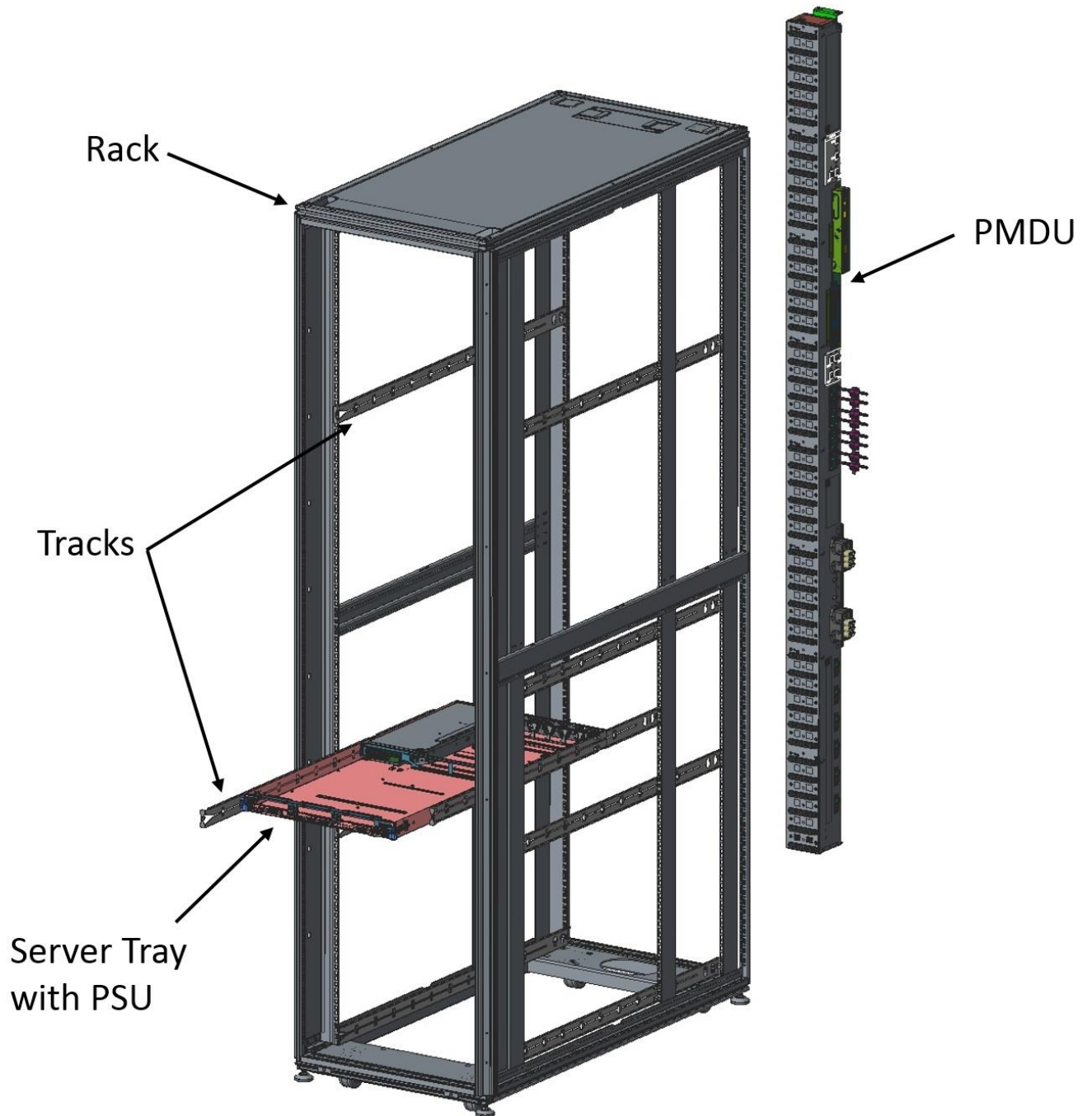


Figure 1. Project Olympus Chassis System

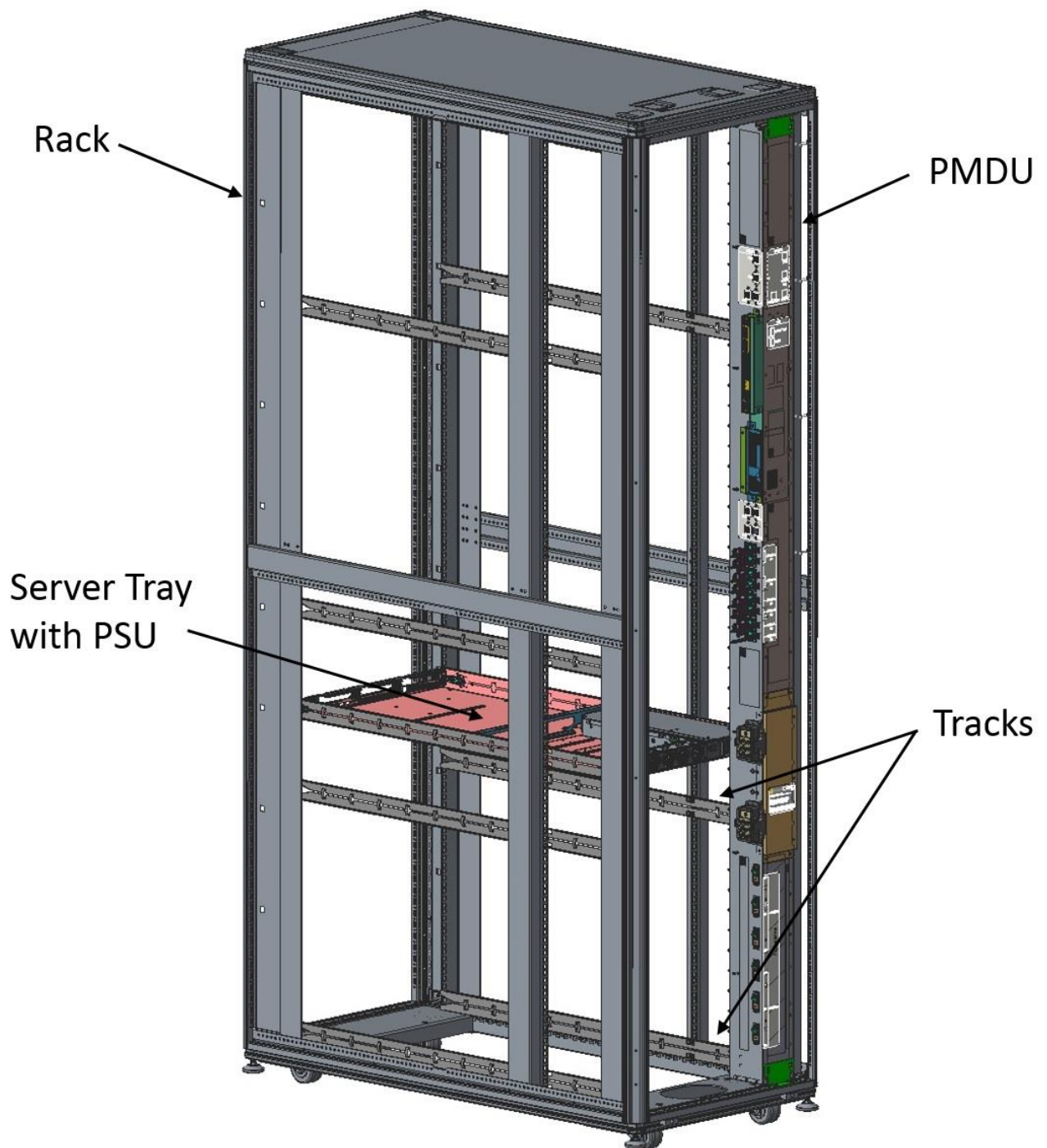


Figure 2. Rear View Showing Components Assembled (note that VAC cables from the data center enter the rack top at the rear, then connect to the two large connectors on the PMDU)

## 2 Chassis Specification by Component

### 2.1 Rack

Project Olympus encompasses both 42U or 48U racks that are 1200mm deep. The rack dimensions are shown in Figure 3.

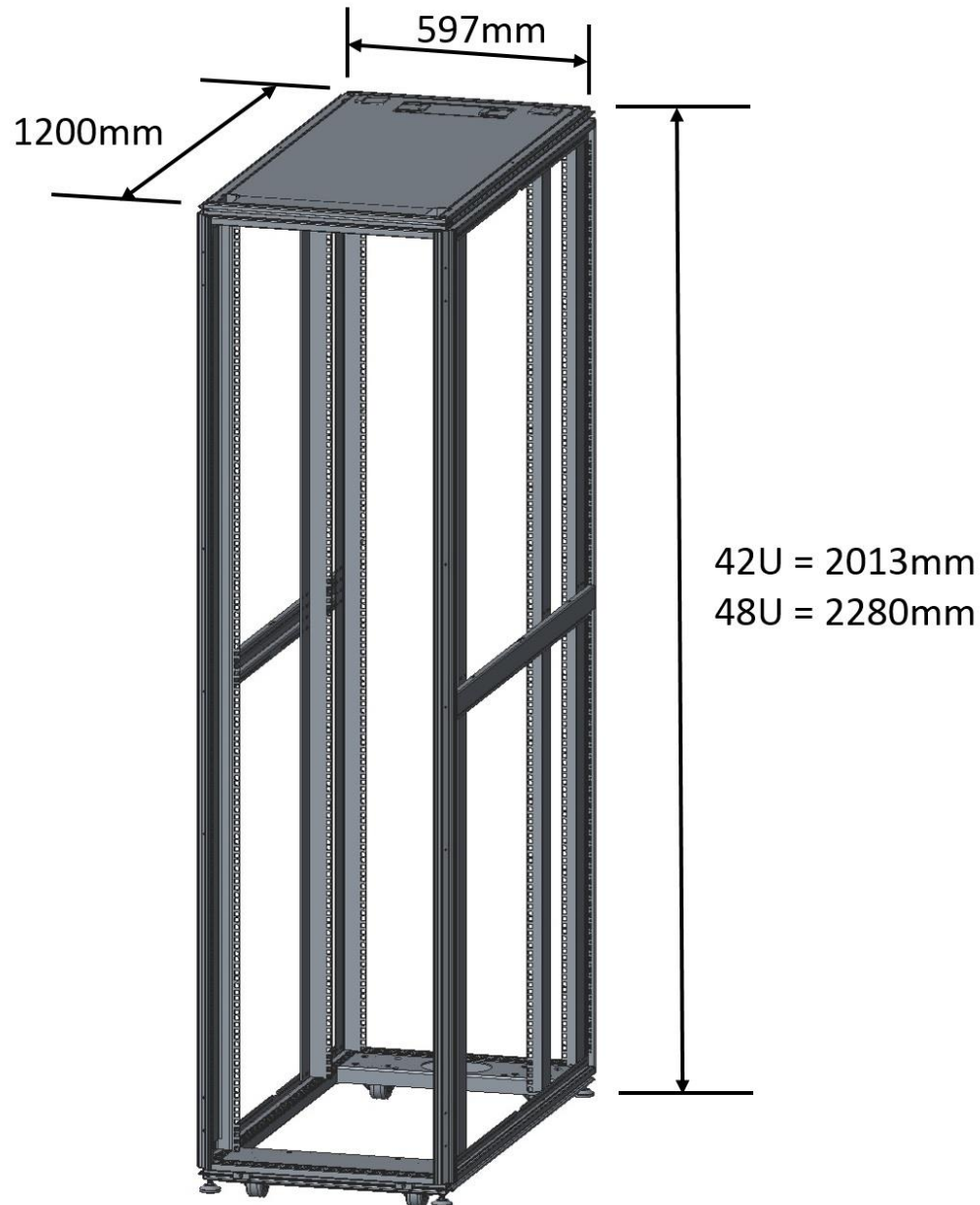


Figure 3. Rack Dimensions

The racks are built per EIA-310-D and UL 2416 standards. The distances between the front, mid, and back rails are shown in Figure 4. Figure 5 shows EIA rail mounting hole spacing across the front of the rack.

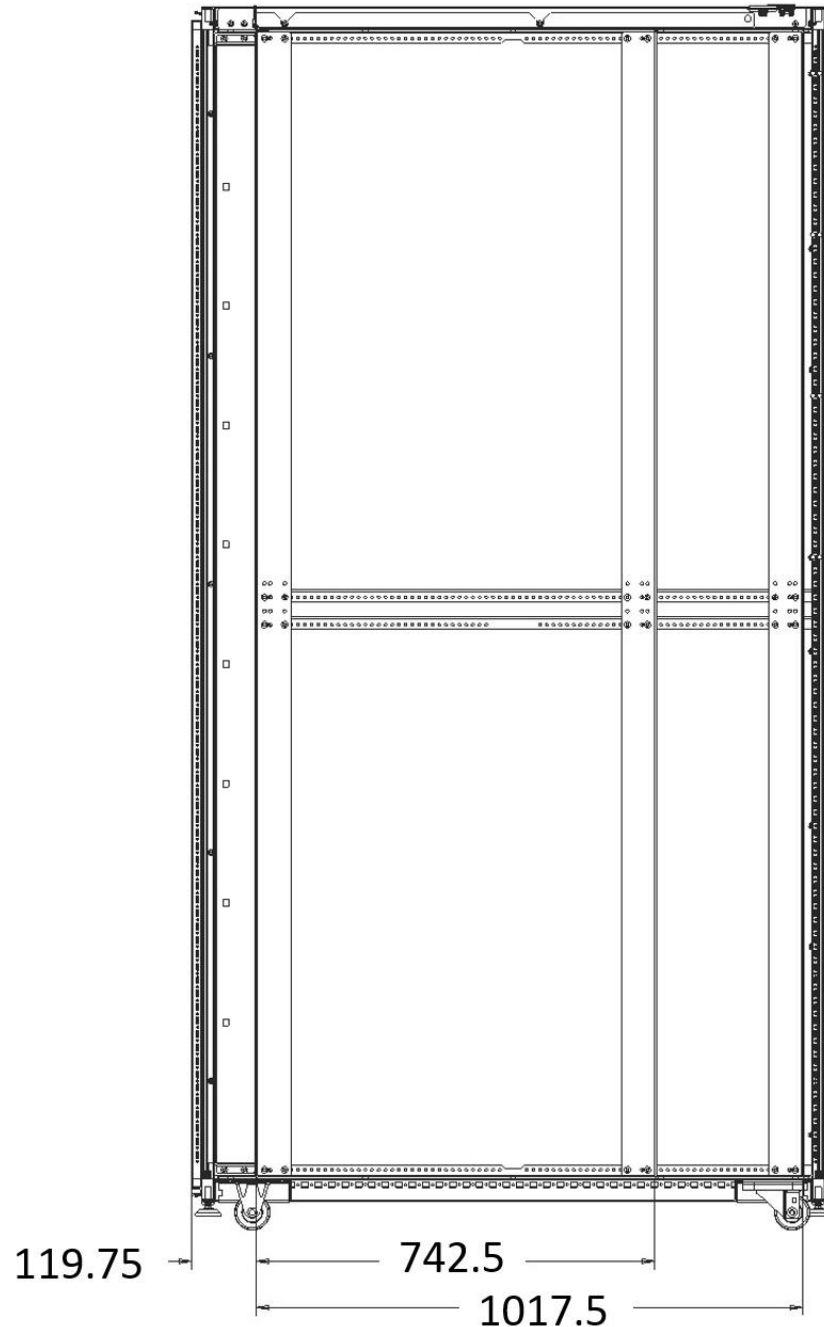


Figure 4. Right Side View - EIA Rail Spacing

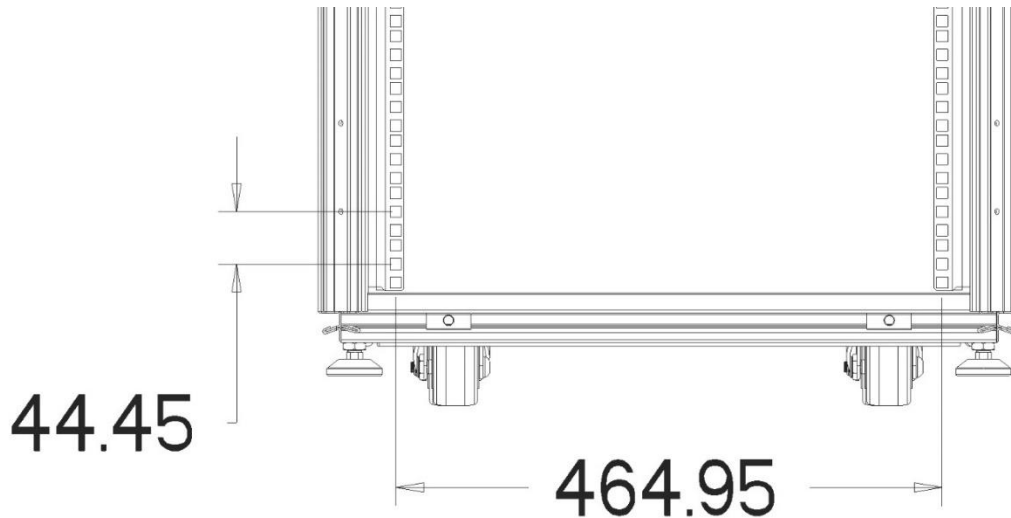


Figure 5. EIA Rail Mounting Hole Spacing

## 2.2 Tracks

The main feature of the Project Olympus mounting system is a 1U tall sheet metal piece called a track. It fits into the front, mid, and rear EIA rails with two bayonet features at each location, as shown in Figure 6. The tracks are installed in pairs, one for the left side and one for the right side, the same part for each side.

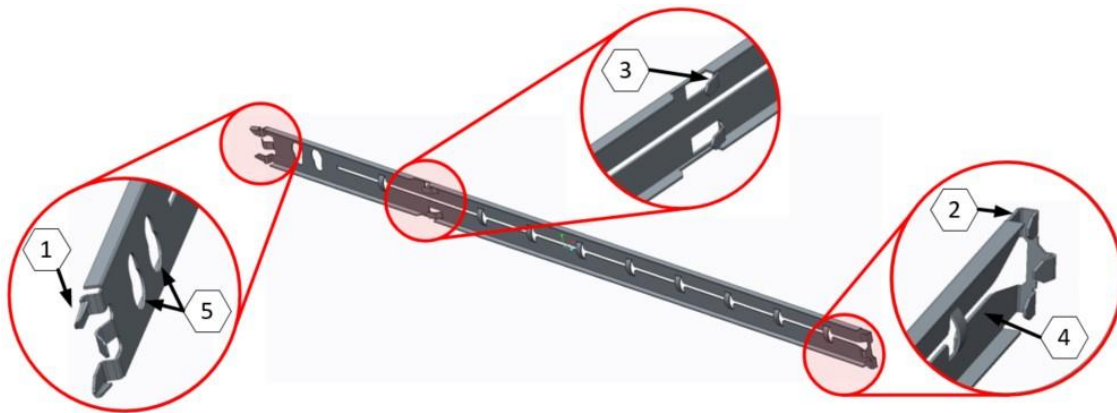
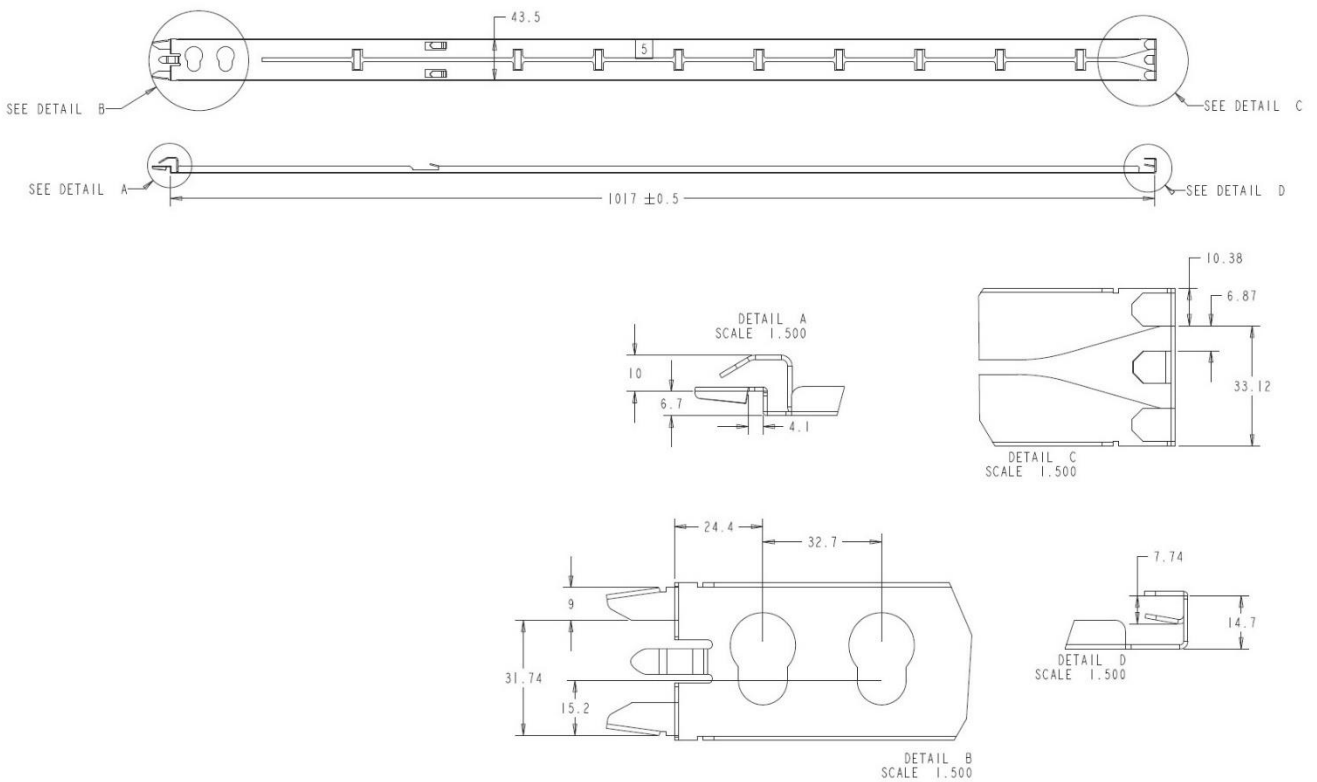


Figure 6. Project Olympus Tracks

Track Features:

1. Rear Rail Interface
2. Front Rail Interface
3. Middle Rail Interface
4. Blade Interface
5. Keyhole slots for PMDU mounting

The dimensions of the track are shown in Figure 7.



**Figure 7. Track Dimensions**

## 2.3 Power and Management Distribution Unit (PMDU)

The PMDU is a sheet metal enclosure that mounts to the Project Olympus tracks without the use of tools, and provides front-facing, blind-mate connectors having both power and signal contacts for each U location in the rack. Once mounted in the tracks, brackets at the top and bottom of the PMDU tie it to the rack with screws. When Project Olympus trays are inserted in the rack, they mate up with the PMDU via guide pin sleeves and the hot-plug, blind-mate connectors. There are guide pins mounted on the front face of the PMDU, located just above each connector. The pins pre-mate with the guide sleeves on the rear faces of the Project Olympus PSUs in the trays, providing initial guidance for the blind-mate connectors. Figure 8 shows the connectors and guide pins.

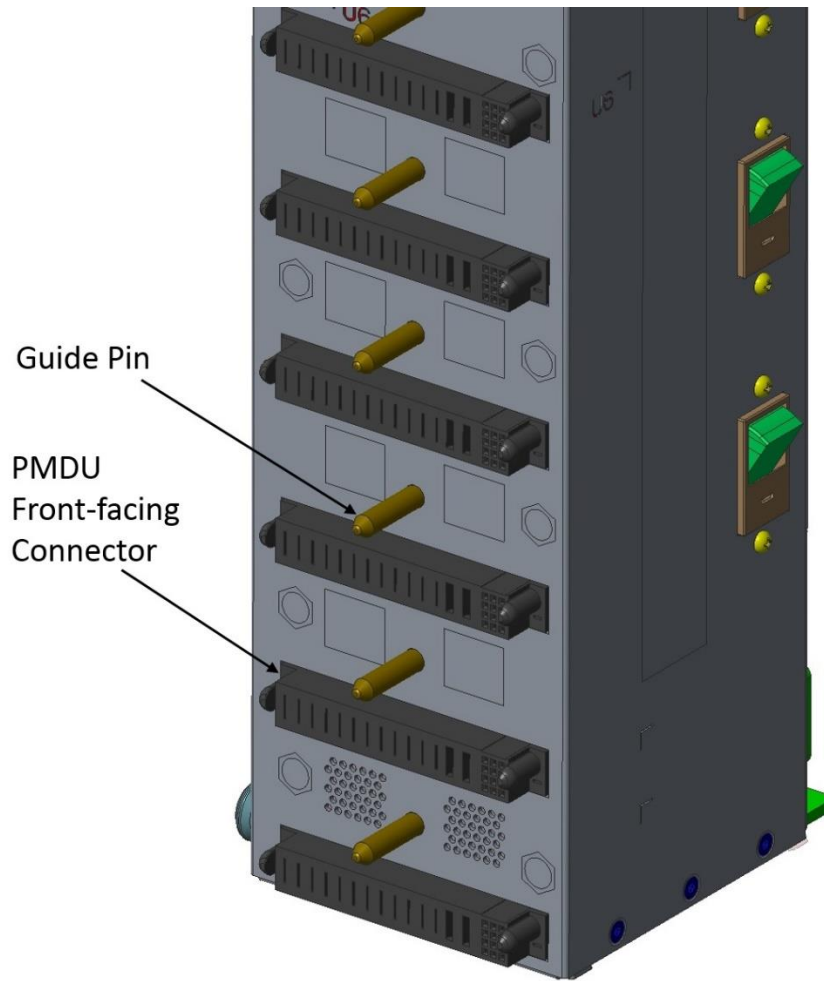


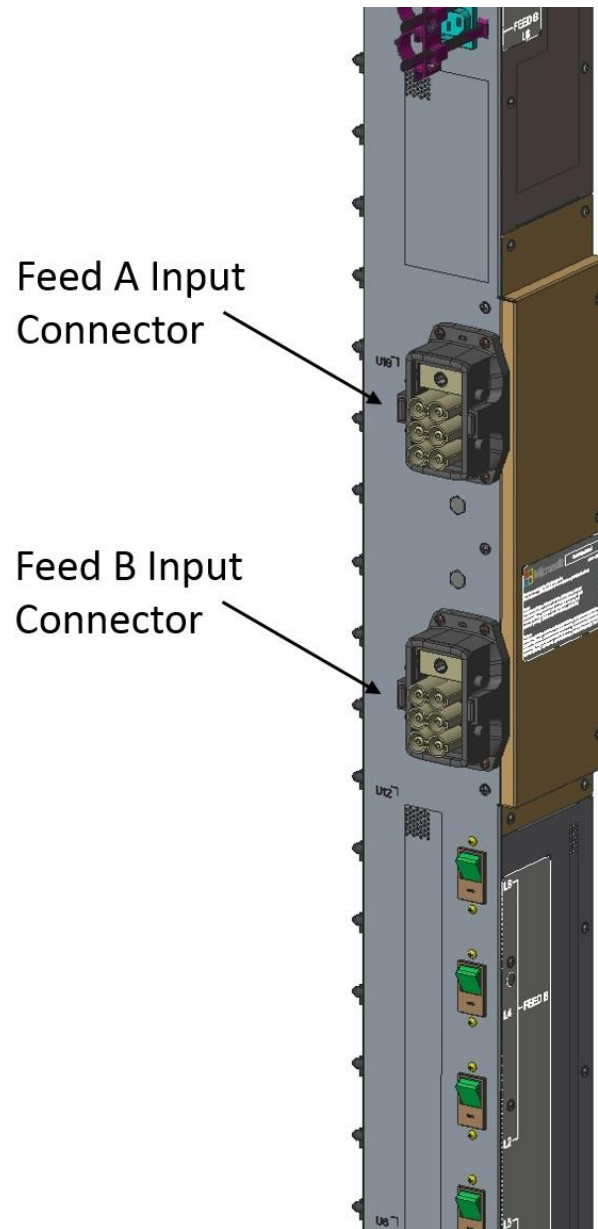
Figure 8. PMDU Front Face

The PMDU has both 42U and 48U configurations, and has two standardized input bulkhead-mount connectors, Figure 9, for VAC Feed A and VAC Feed B. The standardized input connector is a 7-pin connector comprised of earth ground and 3 phase-pairs rated at 250VAC per pair. The standardized connectors are both 4 wire and 5 wire facility cable assemblies having the desired voltage and amperage rating. The PMDU takes both the VAC Feed A and VAC Feed B through facility cables, and distributes the 6 phase-pairs (2 feeds X 3 phase-pairs/feed) to each U location in the system. The facility VAC cables enter the rack through access holes at the top rear of the rack cover, and when mated with the PMDU, are locked in place with built-in levers.

The PMDU also monitors and reports the voltage, current, and power for each of the 6 phase-pairs. The PMDU shall be able report values to the management system via the I<sup>2</sup>C communications port.

The standardized connector-to-facility cables shall come in three options: 5 Wire 415VAC 30A/32A, 4 Wire 208VAC 50A, and 4 Wire 208VAC 30A.





**Figure 9. PMDU 3-Phase Input Connectors**

Figures 10, 11, and 12 show the mechanical features of the PMDU that allow it to connect to the tracks and the rack. These interfaces will be covered later in the specification.





Figure 10. Cone Screw for Mounting PMDU to Tracks

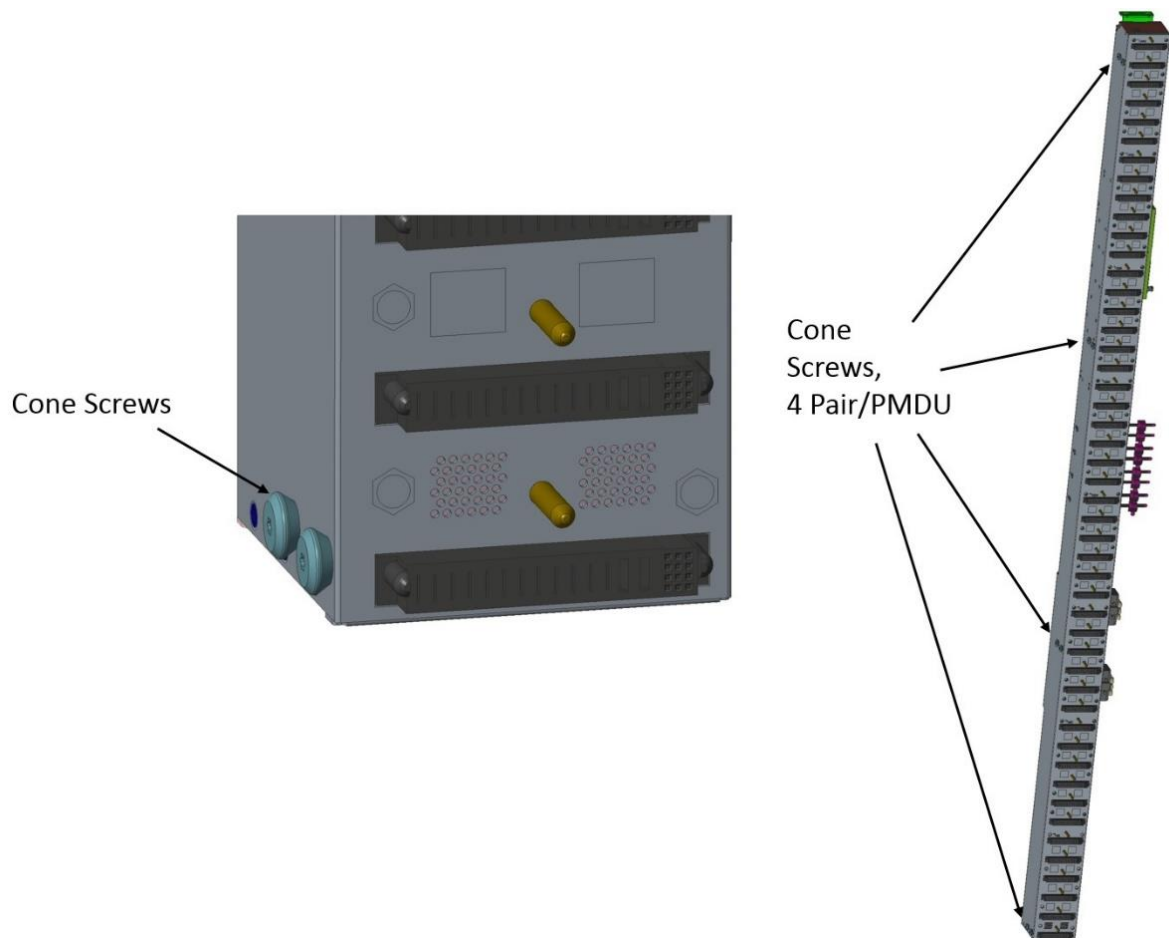
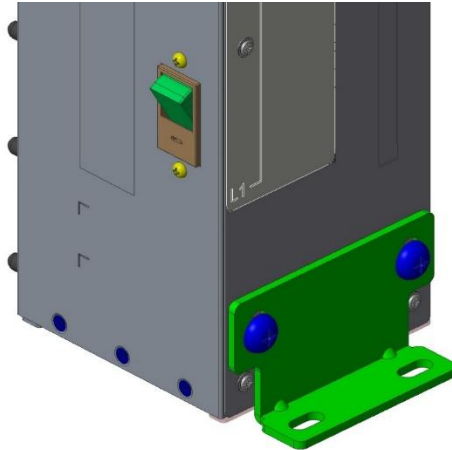


Figure 11. Cone Screws on Left Side of PMDU



**Figure 12. Bottom Mounting Bracket (top bracket identical)**

## 2.4 Server Tray and Power Supply

The Project Olympus server tray is a full-width sheet metal assembly. Because the server tray connects to and draws power from the Project Olympus PMDU via the Project Olympus power supply unit (PSU) mounted in it, the server tray and PSU are considered an integral unit, seen in Figure 13. The Project Olympus power supply is also a sheet metal enclosure, having output a power output connector on the front and an input connector at the rear.

The rear of the PSU – the input end – fits into a rectangular opening at the left rear of the tray. The front of the PSU is secured to the tray with two washers and screws. Both the rear and front mountings are loose, allowing the PSU to float slightly and absorb tolerance variations in the system assembly. The guide sleeve at the rear of the PSU aligns it with the PMDU when the server tray is inserted in the rack.

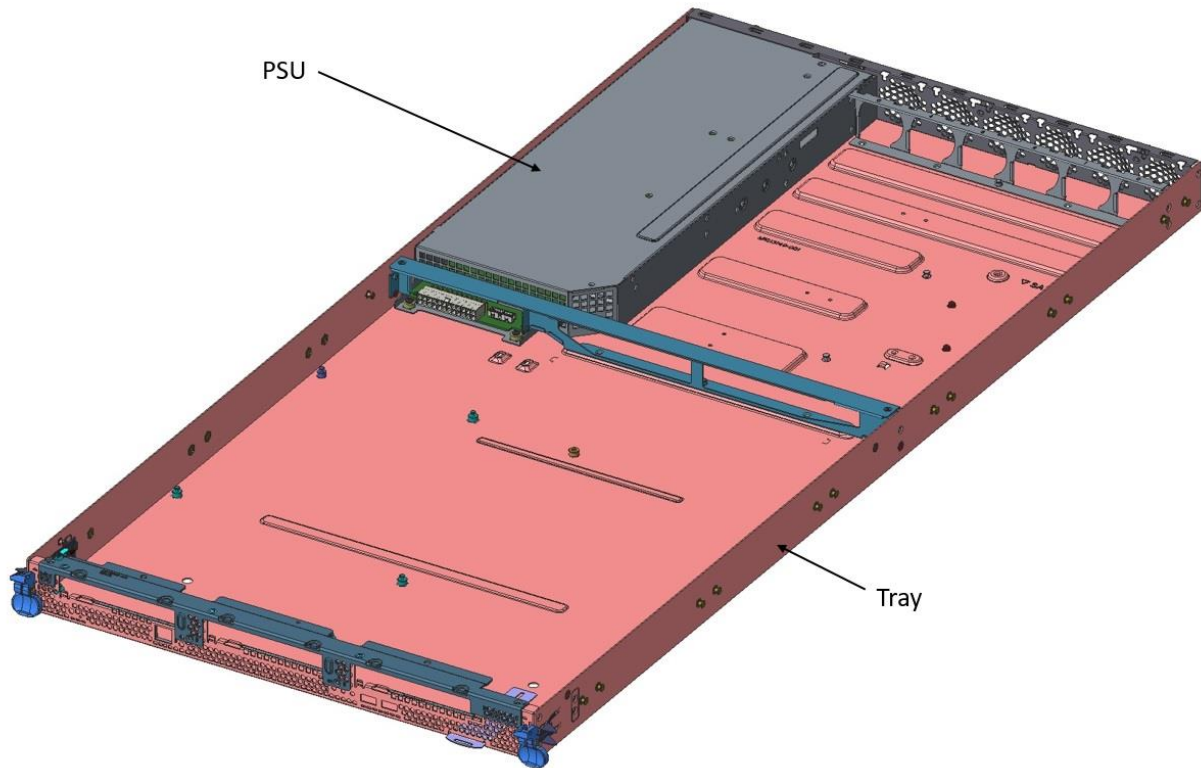
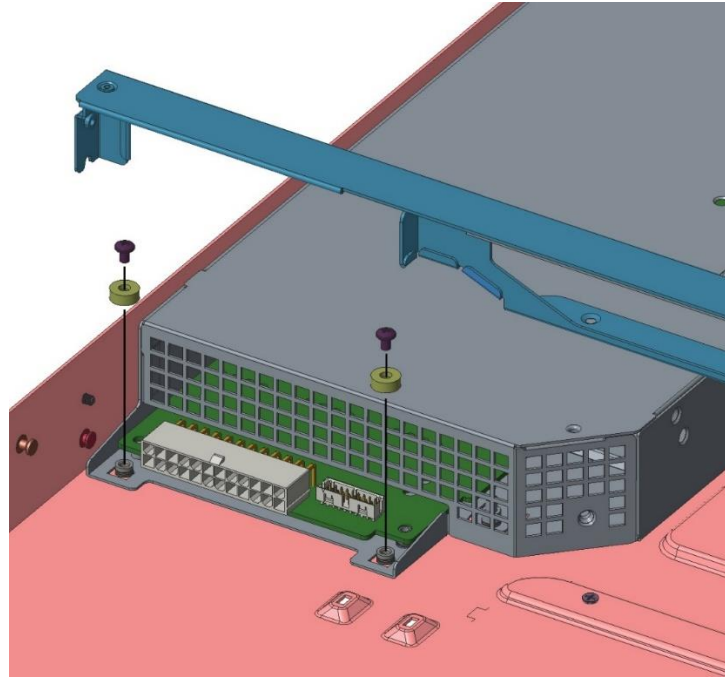


Figure 13. Project Olympus Server Tray and Power Supply Unit (tray top cover removed for clarity)

Mounting at the rear of the tray is shown in Figure 14, and front end mounting is shown in Figure 15. A flange at the rear of the tray captures the rear of the PSU.

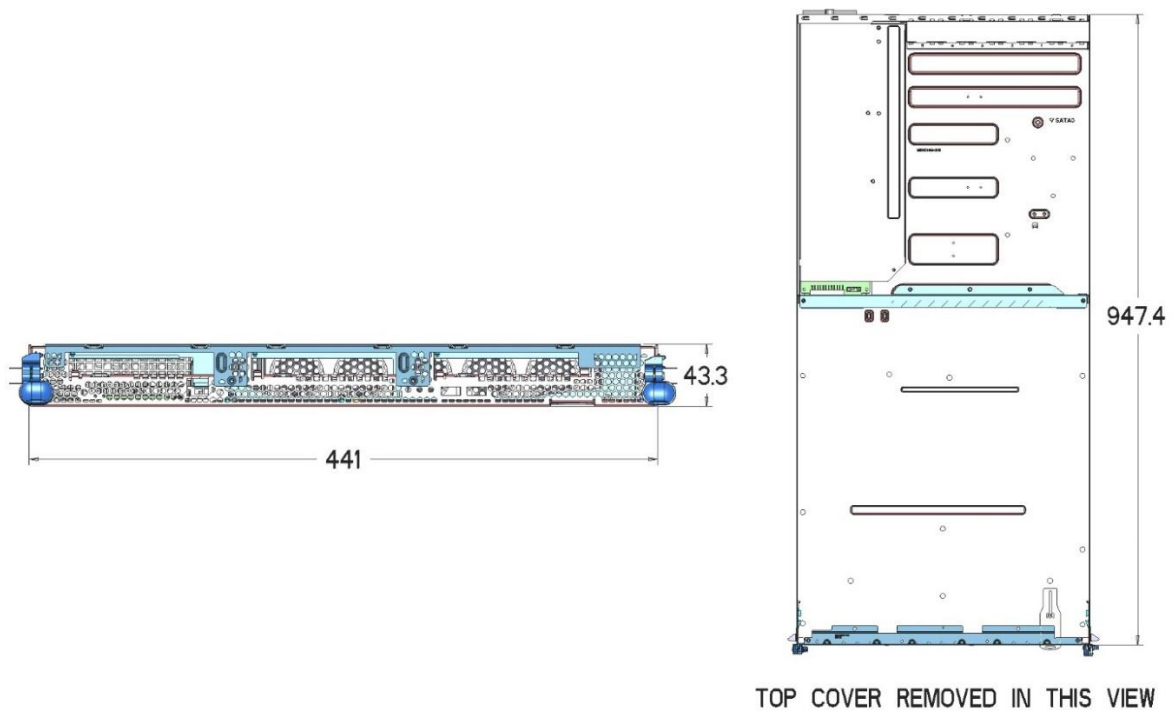


Figure 14. Rear Mounting of the PSU in the Tray (note guide sleeve and power input connector)



**Figure 15. Front Mounting of the PSU in the Tray**

The overall dimensions of the Project Olympus tray are shown in Figure 16, and the dimensions of the Project Olympus PSU are shown in Figure 17.



**Figure 16. Tray General Dimensions**

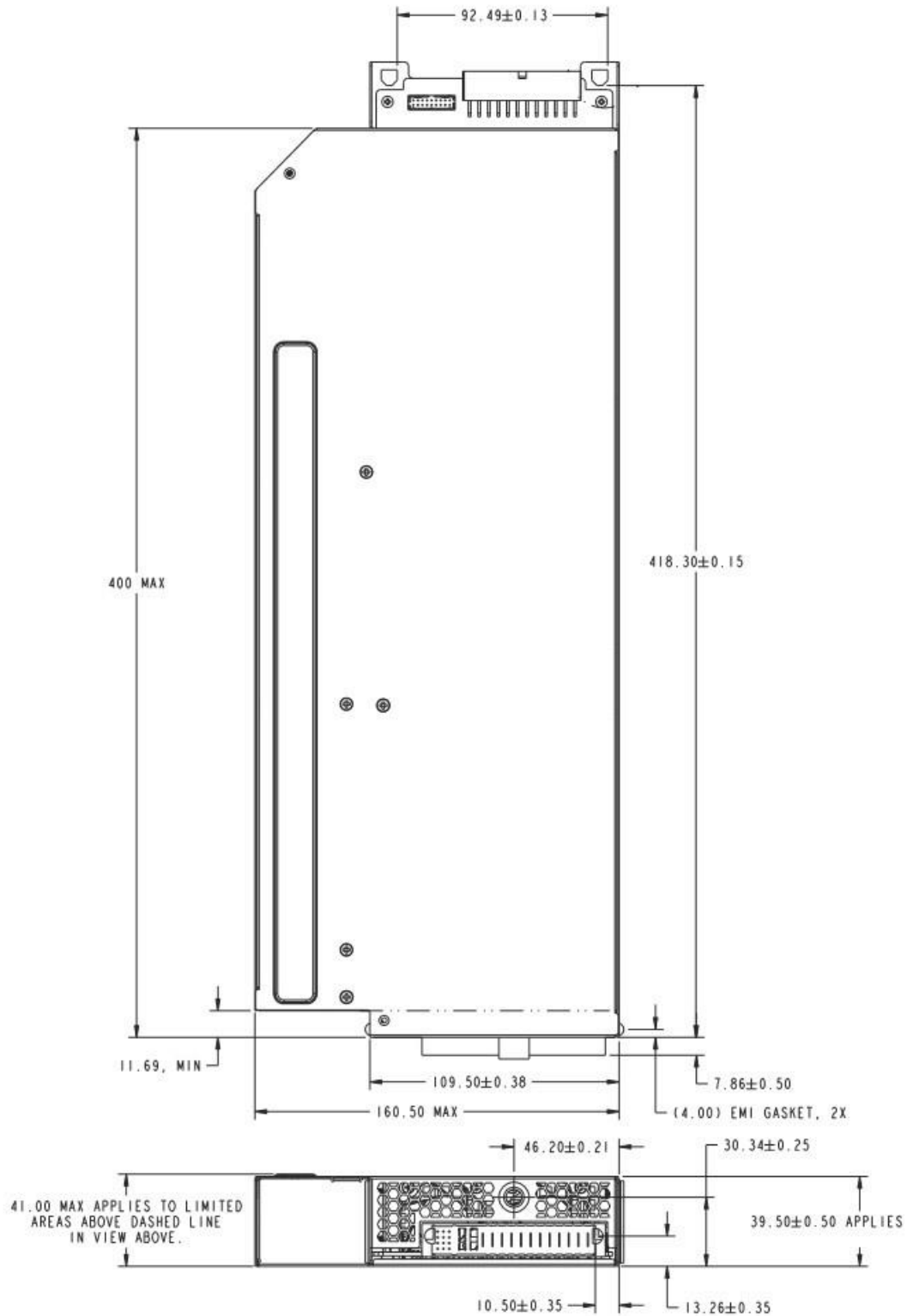
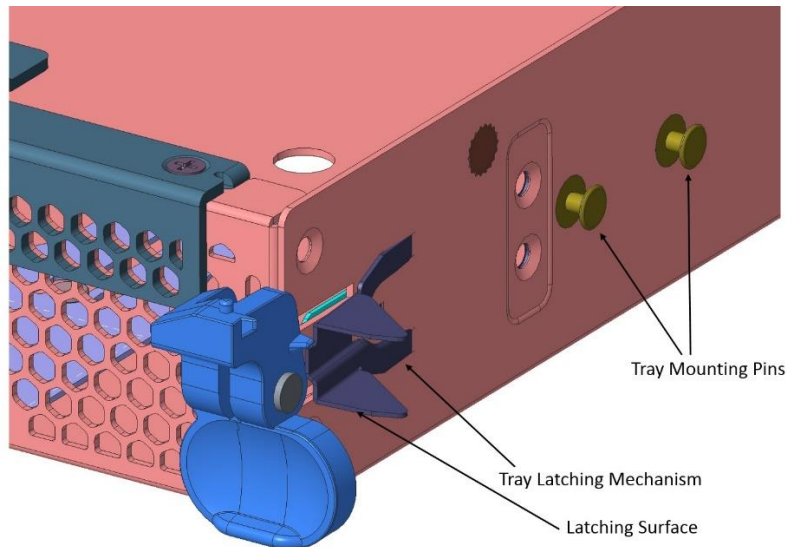
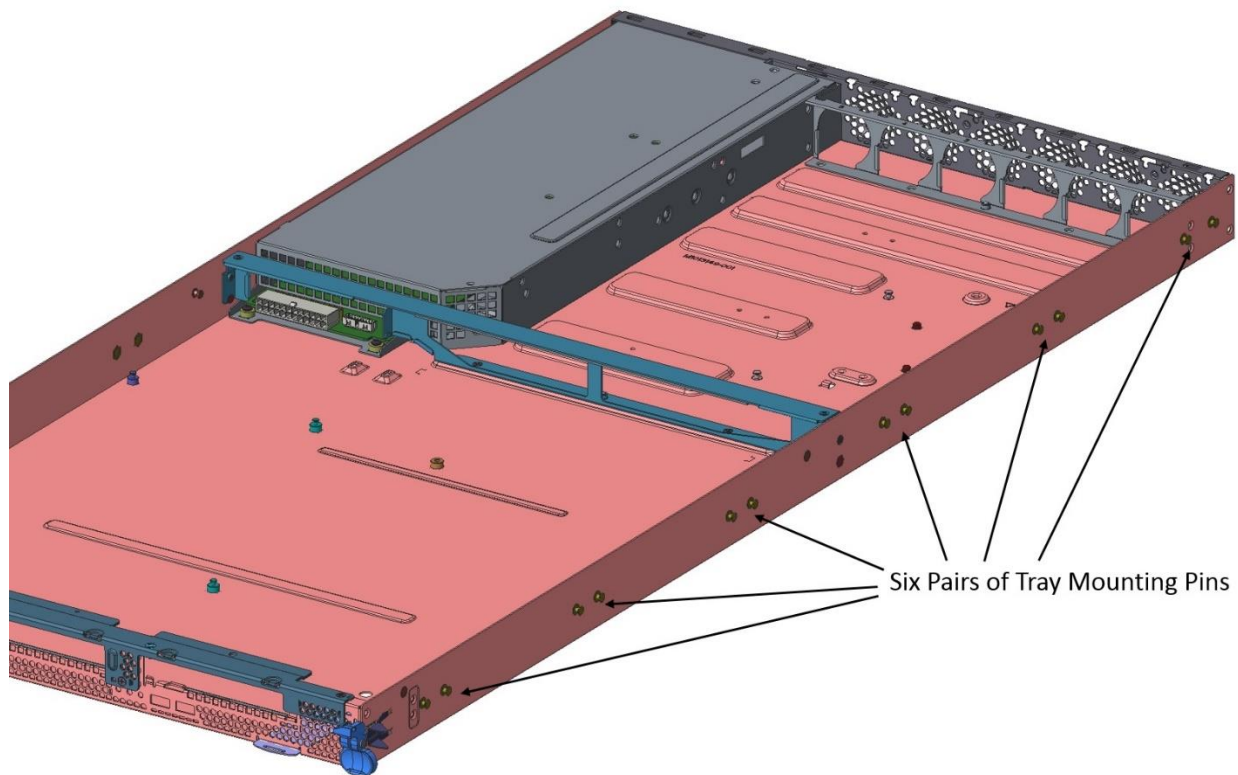


Figure 17. PSU Dimensions

Each tray has six pairs of headed metal pins installed in the sheet metal on its left and right side. See Figures 18 and 19 for details. When the tray is inserted into a rack with tracks, the pins ride on the bearing surfaces of the tracks and support the tray.



**Figure 18. Close Up View of Pins and Latch**



**Figure 19. Right Iso View Showing Mounting Pins**

## 2.5 Project Olympus Component Interfaces

### 2.5.1 Tracks to Rack

The tracks connect to the racks in three locations, the front, middle and rear EIA rails, as shown in Figures 20, 21, and 22. Though the tracks fit loosely, once installed, they are held in by built-in spring features. The loose fit accommodates dimensional variations in the rack while still providing secure mounting for rack components.

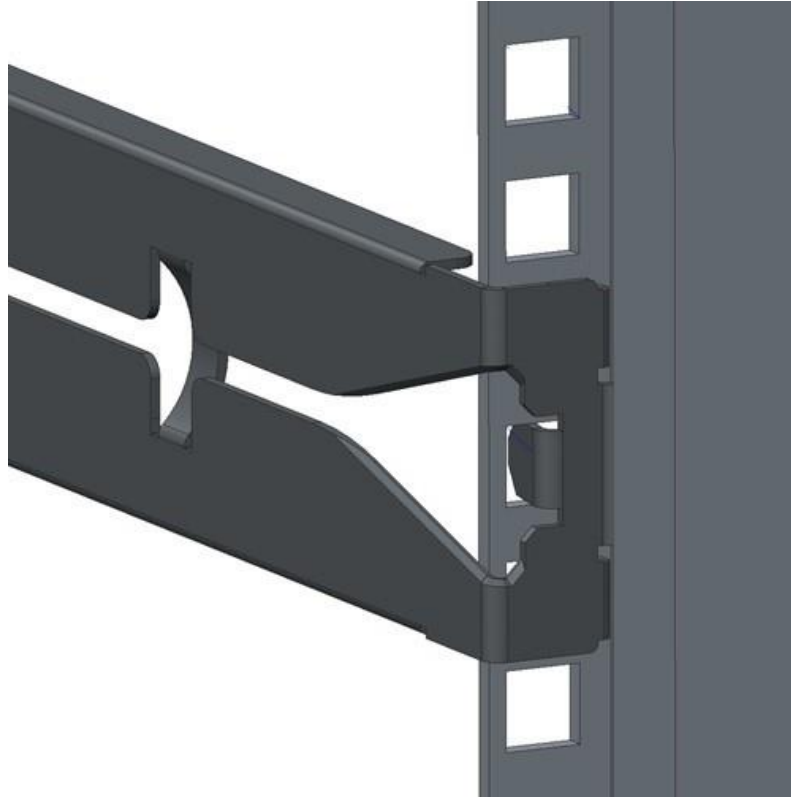


Figure 20. Track/Front EIA Rail Interface



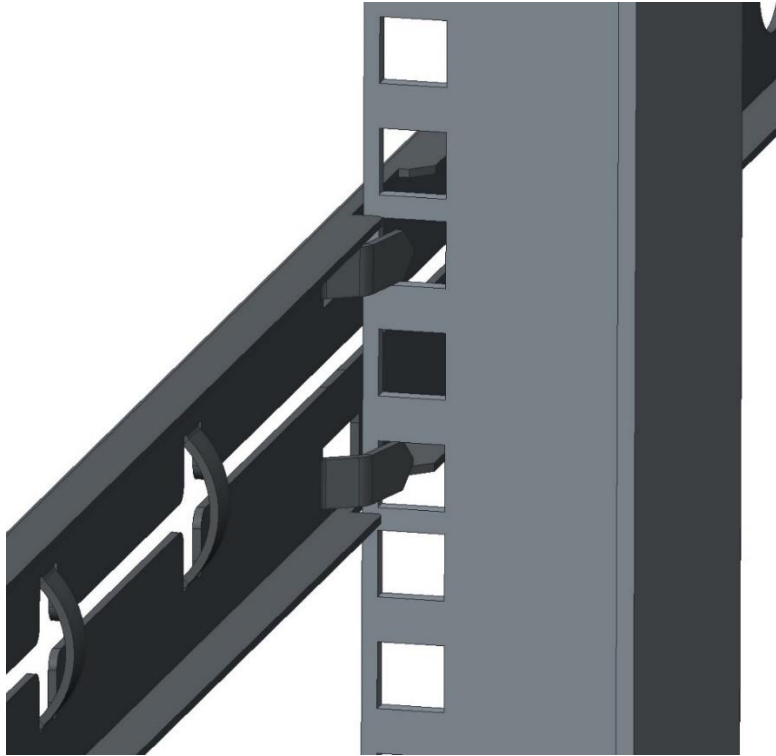


Figure 21. Track/Middle EIA Rail Interface

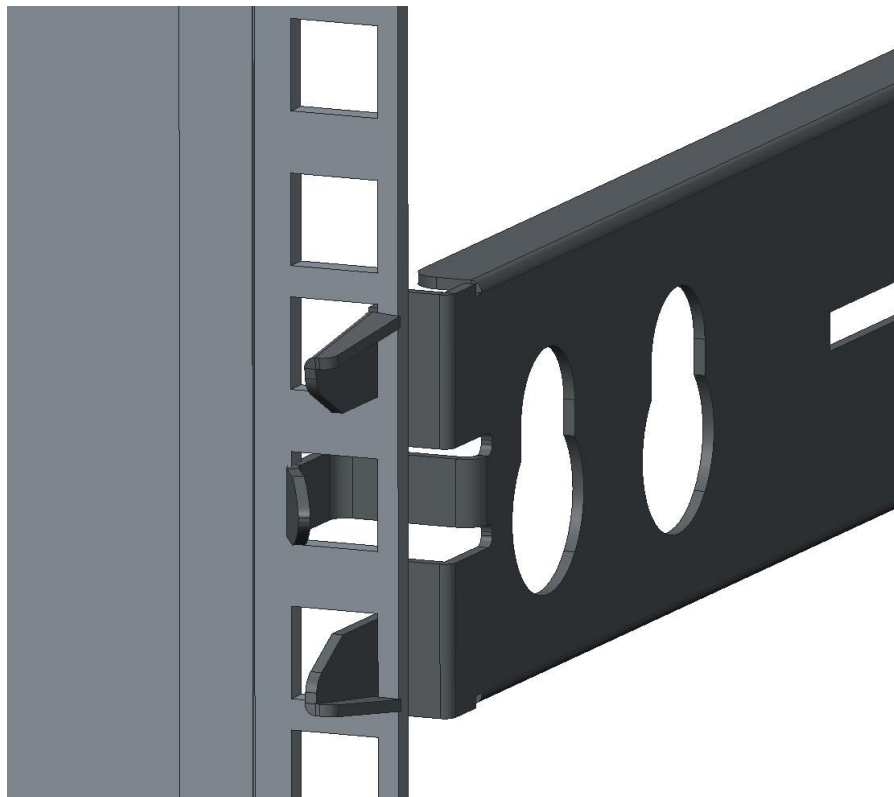


Figure 22. Track/Rear EIA Rail Interface



## 2.5.2 PMDU in Tracks

The PMDU is installed without tools into the tracks by virtue of cone-shaped screws on the left side of the PMDU fitting into keyhole slots in four of the tracks (U location of tracks dependent on configuration of rack, i.e., 42U or 48U). Figure 23 shows the screws just before installation, and Figure 24 shows the screws seated in the slots. The angled cone surfaces of the screws pull the PMDU snug against the tracks, and the weight of the PMDU holds it down in the bottoms of the keyholes.

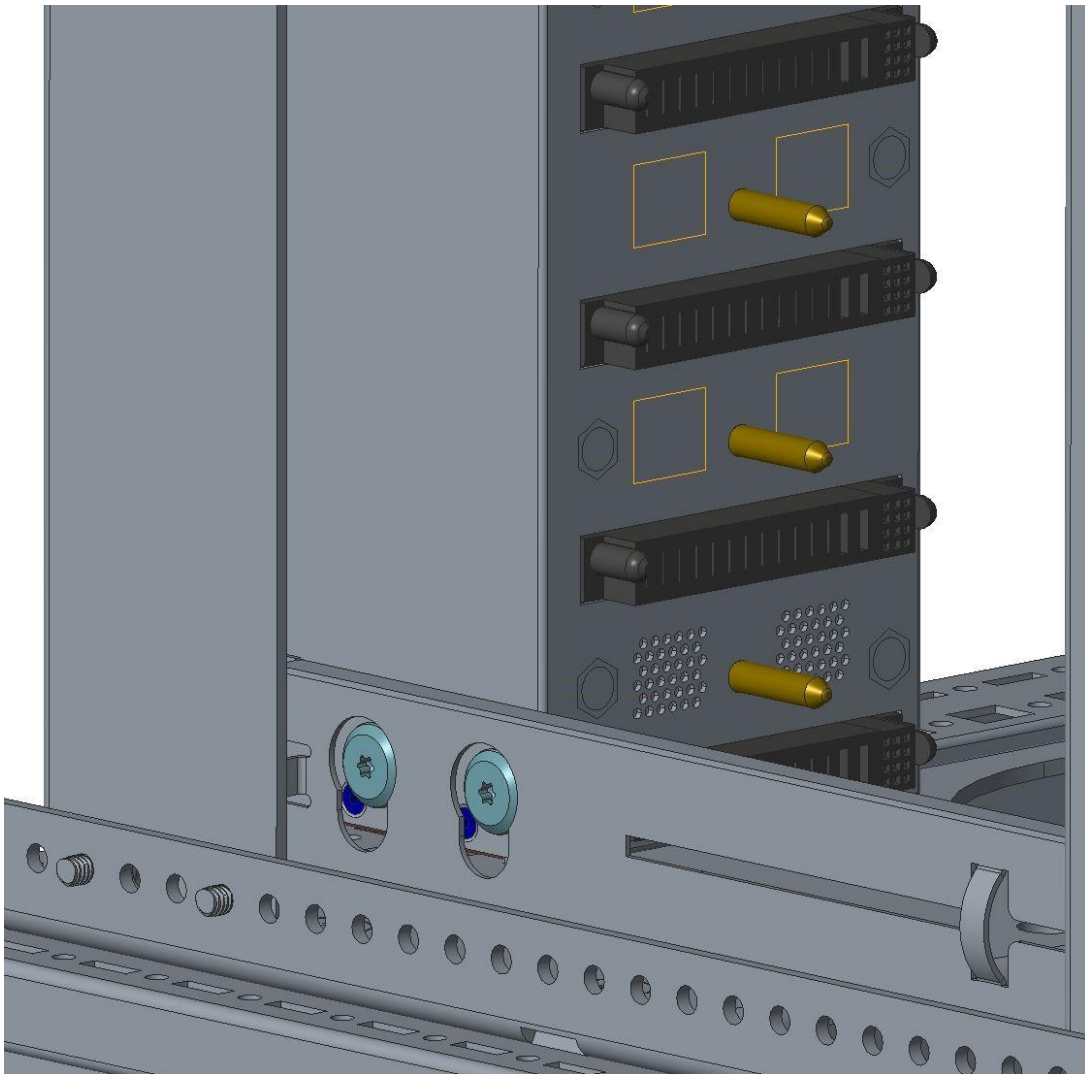
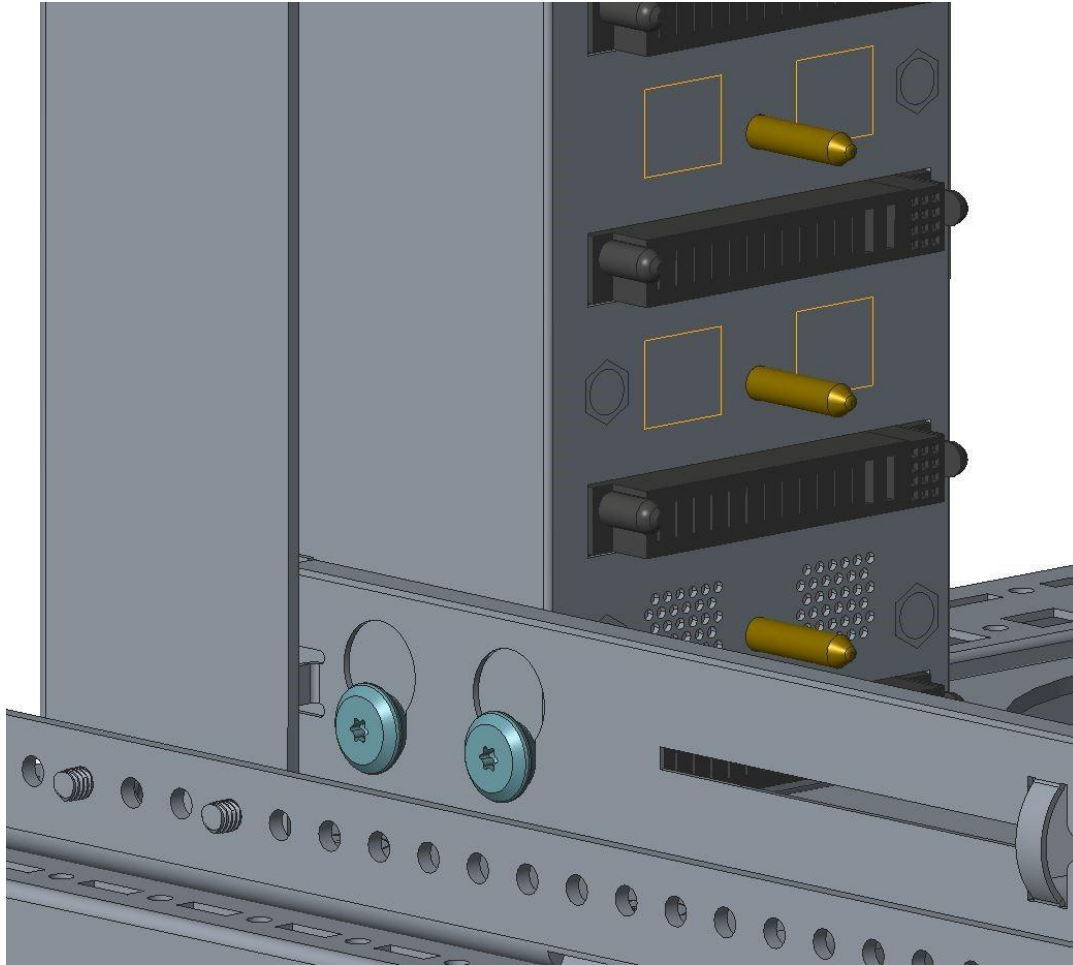


Figure 23. Cone Screws on PMDU Prior to Insertion in Track



**Figure 24. Cone Screws Seated in Keyhole Slots**

Once the PMDU is seated in the tracks, it is fastened to the rack via a bracket and two screws at the bottom and a bracket and two screws at the top. The two brackets connect to cross pieces in the rack. See Figure 25. This secures the PMDU during transport, and prevents rotational movement during server tray installation.

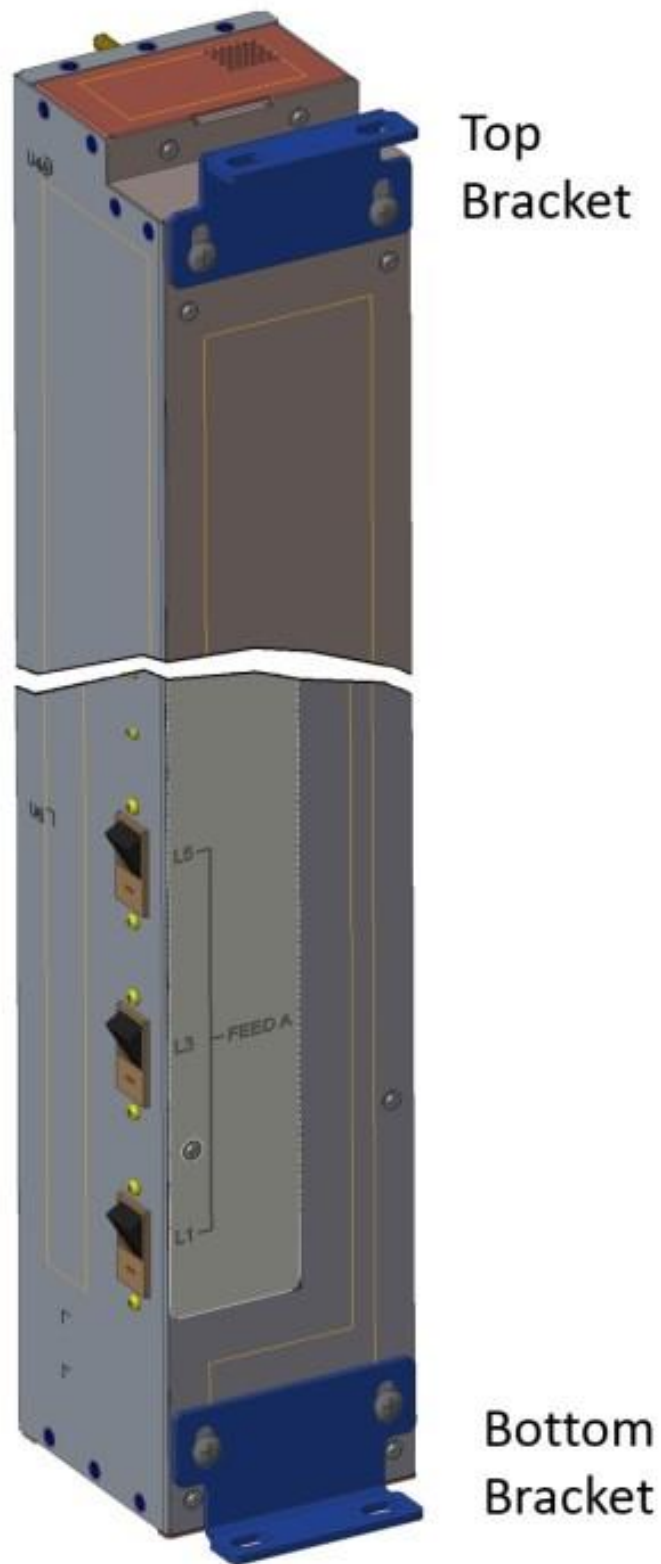
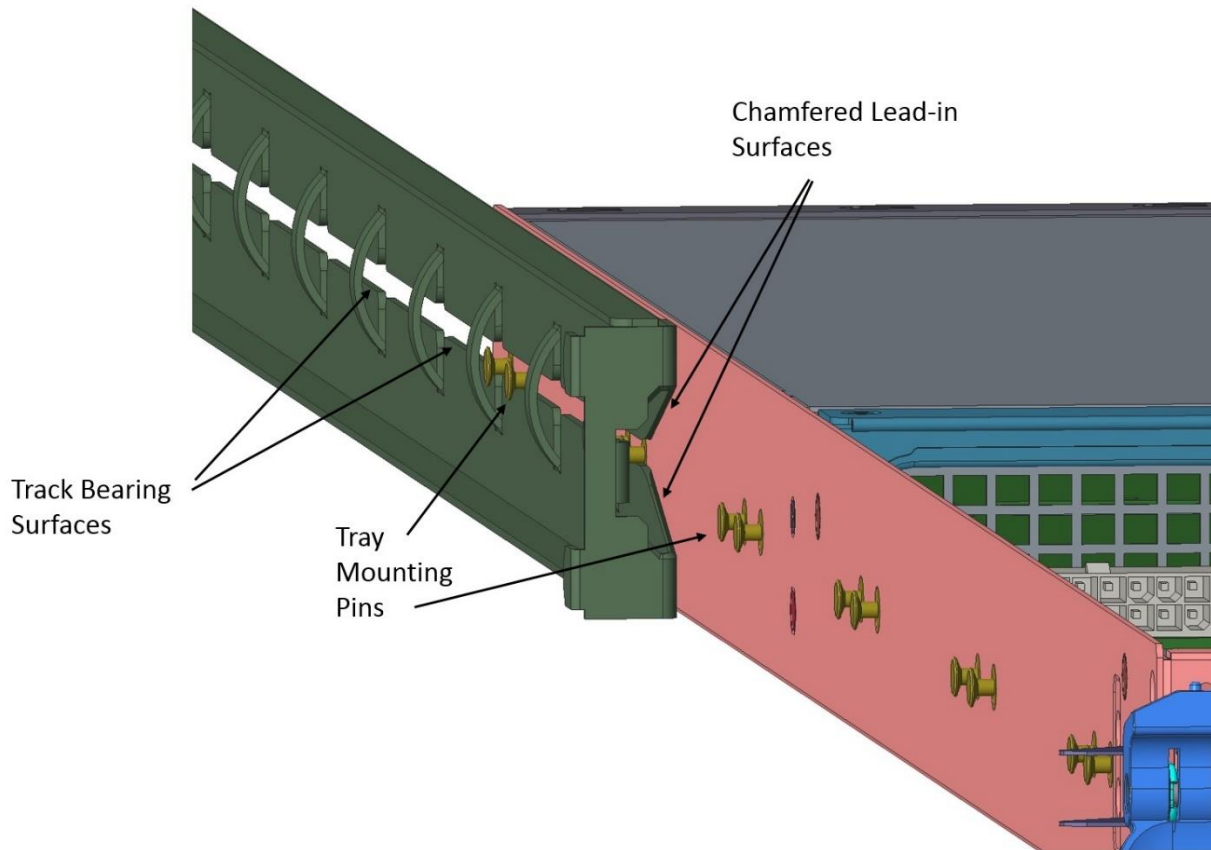


Figure 25. PMDU Top and Bottom Rack Brackets

### 2.5.3 Server Tray/PSU into Rack

When a Project Olympus server tray is inserted in a rack, chamfered surfaces on the tracks guide the tray mounting pins onto the bearing surfaces of the tracks. See Figure 26.



**Figure 26. Tray Insertion Detail**

As the tray is moved further into the rack and the PSU in the rear of the tray approaches the PMDU, the guide pin sleeve on the rear of the PSU begins to engage with the guide pin on the front of the PMDU. This can be seen in Figure 27.

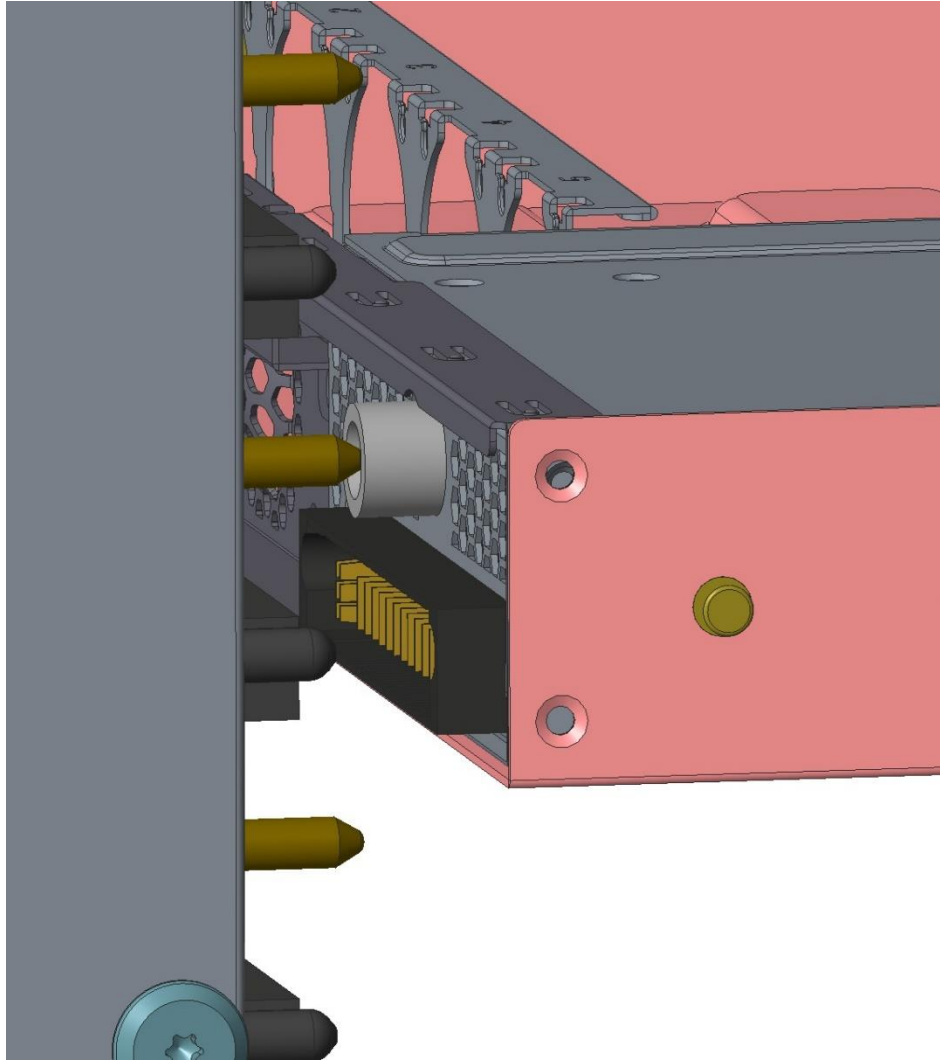
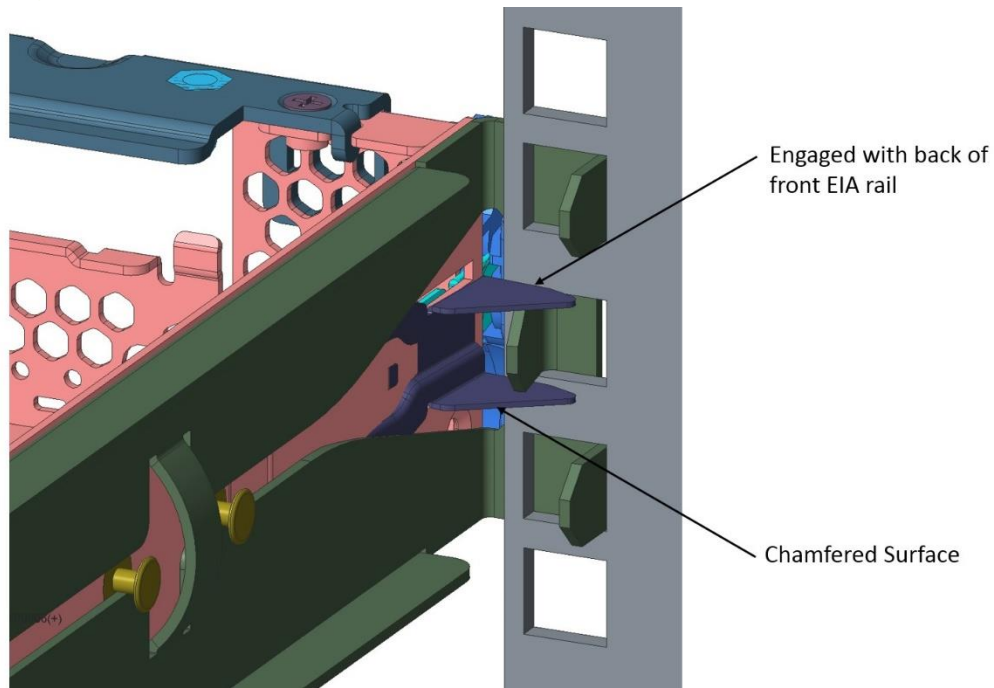


Figure 27. Tray and PSU Mating with PMDU, Left Side View

The tray stops forward travel when the face of the guide pin sleeve touches the front face of the PMDU. In this position, the connectors are unmated 0.5mm. Even with all tolerances taken into account, there is still 2.5mm of contact engagement at  $4.5\sigma$ . If there is any misalignment between the guide pin sleeve and the guide pin as they begin to engage, the floating capability of the rear of the PSU in the tray will accommodate this.

At the same time that the tray is stopping its forward travel due to the PMDU, the side latches at the front of the tray engage with the back surfaces of the front EIA rails, preventing the tray from disconnecting. Chamfered leading edges on the latches allow them to be pushed out of the way as the tray is pushed in. Built-in spring action pops them back out for engagement with the EIA rails. See Figure 28.



**Figure 28. Tray Latch Engagement**

The tray can be removed from the system by pulling out on the blue tabs on either side of the tray. The left tab is shown in Figure 29.

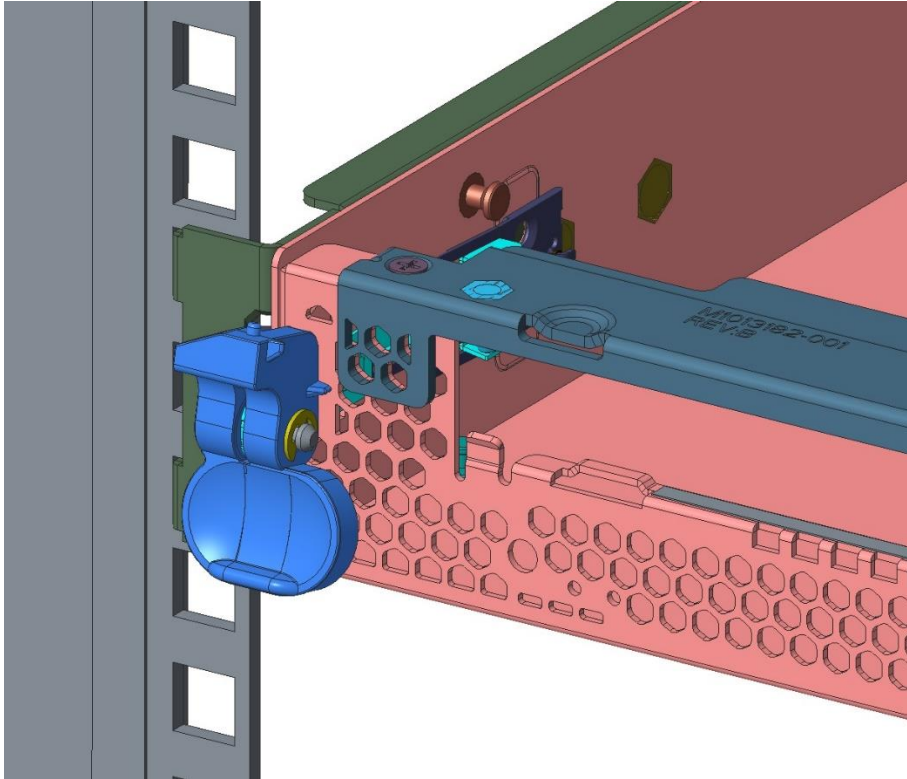


Figure 29. Blue Release Tab