# Layer Zero® for the data center



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# PREPARE THE FUR

Data centers are the foundations of enterprises, vital to the daily operation of the entire organization - they no longer simply store data. Virtualization, smart buildings, unified computing systems and cloud computing have combined to make the data center the neural hub of the company. Consequently, networks require greater security, storage capacity and more in-depth processing to support their expanded roles.



#### **OPPORTUNITIES FOR THE DATA CENTER**

These demands necessitate a holistic approach to data center design to ensure next generation technology compatibility, enable virtualization and maximize network availability. Legrand | Ortronics provides a comprehensive approach to the physical infrastructure with the introduction of Layer Zero® solutions. TURE



## Layer Zero® the Infrastructure Layer™, stabilizes the network

The ISO/OSI model divides the network communications process into 7 layers across network architecture. Layers 7 through 4 relate to end-to-end communications between data source and destinations. Layers 3 through 1 pertain to communications between network devices. Layer Zero, the proposed infrastructure layer for the ISO/ OSI Network model, addresses the critical need for superior physical infrastructure support in the data center.

Layer Zero solutions encompass the entire physical infrastructure that supports your network, including racks, cabinets, advanced cable management, pathway solutions, underfloor and overhead systems.

By recognizing the importance of the underlying infrastructure layer and emphasizing best practices in pathway and physical support design, a new level of stability can be created for the network.

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## THE ELEMENTS OF LAYER ZERO® DATA CENTER DESIGN



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DENSITY

ENERGY EFFICIENCY

NETWORK PERFORMANCE

FLEXIBILITY

SCALABILITY

PROTECTION

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## **AIRFLOW**

Excessive heat is the primary enemy of most networking equipment. Heat exhaust recirculation and hot spots are fundamental challenges for data center managers, threatening the life span of network equipment if left unmanaged.

Layer Zero<sup>®</sup> infrastructure solutions manage heat and airflow across the entire network. They leverage the natural properties of hot and cold air to ensure proper ventilation and alleviate the heat that can contribute to equipment failure. It is critical to establish best practices during the physical infrastructure design phase in order to improve overall thermal management.



#### THE ELEMENTS OF LAYER ZERO® DATA CENTER DESIGN

## DENSITY

As chip power increases and density capacity rises, power requirements and heat output are concentrated to smaller areas.



The density demands of virtualization, convergence and consolidation can increase the power consumption of a single rack to 20kW or higher. Such an increase of power, without an increase of CRAC capacity, can drive energy costs up by dramatically driving the efficiency of conventional air conditioning systems down.

Layer Zero solutions help optimize network real estate by accommodating for higher density equipment. Cabinets and racks have ample space and static capacity for the latest switching equipment while implementing passive thermal management to balance the additional load.





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## ENERGY EFFICIENCY

Passive cooling is the most energy efficient way to manage airflow and thermal loads in the data center.

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True passive cooling systems lower the ambient room temperature without introducing the additional power consumption of fans. Adding fans both increases and decreases the power load at the same time. Power assisted fans reduce the power load by creating better airflow management, yet some of the reduced power load is diverted to the fans, thereby reducing the overall savings.

Legrand | Ortronics physical support systems use completely passive thermal management to increase airflow efficiency. Product innovations re-direct side venting equipment into the standard hot aisle / cold aisle configuration and reinforce the effectiveness of the aisle separation.

#### THE ELEMENTS OF LAYER ZERO® DATA CENTER DESIGN

## NETWORK PERFORMANCE

It is critical to the network to minimize signal loss to maximize system performance.





Layer Zero infrastructure products protect network performance by providing proper support for network equipment. By maintaining the integrity of the equipment, Layer Zero solutions are able to help reduce capital expenditures.



## **FLEXIBILITY**

Effective space utilization requires an infrastructure that is agile and can adapt to changing environmental conditions.



A well thought out Layer Zero infrastructure assures a flexible physical design that will support technology demands from the physical layer.

Ortronics<sup>®</sup> solutions are fully modular and are configurable to suit the needs of your specific installation. They can be adjusted even after installation, mitigating the impact of MAC work. Ortronics solutions are optimized for copper and fiber optic connectivity, as well as heavy equipment.

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## **SCALABILITY**

Data centers require infrastructure solutions that can be quickly and seamlessly reproduced, without disrupting the flow of business.



The faster new equipment can be deployed and brought online, the greater the cost savings to the network manager.

Layer Zero solutions are scalable, able to facilitate growth without creating major disruptions. Solutions can be designed for current business needs with ease and still be able to support future expansions in a timely and cost effective way.

## PROTECTION

Protecting the network means securing all elements, not just switches and servers.



Layer Zero solutions offer a comprehensive way to protect your network equipment:

- Physical security, such as preventing unauthorized access to servers
- Protecting network performance by safeguarding the integrity of the cables
- Monitoring current for power surges and temperature for hot spots

Each product integrates with each other, creating a unified system that provides complete protection from threats to your network.



PRODUCT SOLUTIONS FOR A LAYER ZERO® DESIGN RACKS & **CABINETS** 



#### Mighty Mo® racks and cabinets

are specifically designed for higher density applications such as data centers. Each has been uniquely designed for above the standards performance, managing heat and airflow to support the next generation of data center switches. They are built with high weight thresholds, allowing equipment to be added as necessary. This provides greater flexibility, as well as scalability, supporting equipment upgrades without requiring new support structures.





#### Mighty Mo<sup>®</sup> Racks

The Mighty Mo 10 rack features patented honeycomb side rails. The wide perforations allow better airflow for side venting equipment, mitigating the effect of exhaust heat.

The Mighty Mo 10 rack is built with cable management waterfalls to route cable to and from overhead trays. The Mighty Mo waterfalls are designed with bend limiting curves to ensure that cable are properly supported.

The frame is constructed of 14 ga. steel and aluminum with a 1,500 lb static frame load capacity.

#### **PRODUCT SOLUTIONS FOR A LAYER ZERO® DESIGN**

## RACKS & CABINETS

#### Mighty Mo® GX Cabinets

The Mighty Mo GX Cabinet is fully modular and configurable to suit the needs of your specific installation. Each cabinet can be assembled with as few or as many accessories as needed to properly support your servers, switches and patch panels. The cabinets are designed to stand alone or easily gang together, as your network demands increase.

It is available in 29 different frame sizes and two colors, black or white.

The Mighty Mo GX Cabinet Series is Made in the USA.



#### Mighty Mo® Cabinets

Legrand | Ortronics is a verified cabinet vendor for the Cisco Nexus 7010 and 7018 data center switches.

Mighty Mo cabinets can be fully customized. The cabinet arrives fully assembled, built to specification with your selected mounting rails, doors, panels and accessories installed. The frame is designed to route cable openings, pathways and management where they are needed: in the front for networking equipment and in the back for server equipment.

The frame has a 3,000 lb static load capacity to support the demands of high density applications.





#### Mighty Mo<sup>®</sup> Airflow Baffles

Mighty Mo airflow baffles isolate and direct intake and exhaust air from the cold aisle to the hot aisle more effectively. The baffles, combined with the Mighty Mo cabinet or rack system, maximize the airflow of network equipment.





#### Mighty Mo Cable Management

Mighty Mo cable managers allow up to 48 Category 6a or 6 patch cords per rack unit on a single side of the rack or cabinet. Deeper cable channels provide ample room for cables, even when the switch is loaded to capacity. Ortronics® Mighty Mo cable managers are optimized to organize patch cords vertically and horizontally, with a larger finger design that encourages defined and traceable routing of individual patch cords. The cable managers extend beyond the face of the switch to create a smoother bend radius as the patch cords are routed to the side, reducing stress on switch ports. These features organize cable bulk and allow for more patch cords per rack unit, while still increasing cooling efficiency.

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#### PRODUCT SOLUTIONS FOR A LAYER ZERO® DESIGN



## Cablofil overhead wire mesh cable tray

Cablofil cable tray is constructed of precision-engineered, high quality welded steel wire. The tray enables airflow across cable, easily supports and delivers overhead cable, and reduces floor loading.

> Cablofil® pathways provide flexible and easily deployed solutions to route copper, fiber optic or power cables. Cables are protected and out of the way in a simple and scalable configuration.

Overhead or under floor,

**Cablofil® under floor systems (UFS)** Cablofil UFS have uniquely designed supports and trays that snap together without the need for complex tools or fasteners. This flexible solution reduces installation time and allows the system to be installed through the floor tile openings. UFS trays attach to all Cablofil tray and accessories without adjustment. Legrand offers two solutions for overhead fiber routing in the data center, ensuring maximum network performance. **Ortronics® Mighty Mo® Fiber Raceway** provides an easy to install, flexible plastic option that's ideal for routing fiber above racks and cabinets. With **Cablofil® Fiber Trough,** the steel construction provides additional strength and security for applications running long distances. Both solutions provide a path for critical network cabling in a variety of environments, including telecommunications exchanges, data centers, universities and hospitals.





#### **Overhead pathway racks**

Ortronics<sup>®</sup> overhead cable pathway racks fully integrate with Cablofil cable tray, providing alternative cable management and pathways, as well as room for overhead patch panels. They can be mounted on either Cablofil wire mesh cable tray or ladder racking, preserving valuable space by allowing patching outside of the rack or cabinet.

#### Wiremold<sup>®</sup> Zone Enclosures

Legrand | Wiremold offers a full line of enclosures to support integrated zone systems in data centers. These enclosures create the opportunity for additional copper and fiber connectivity locations, facilitating moves, adds and changes. At the same time, Wiremold remote consolidation points and zone enclosures conserve valuable floor space for other data center equipment that requires continuous access. They allow the user to save space in tight areas and reduce cooling requirements in crowded equipment and data rooms by moving active equipment to alternative locations.



PRODUCT SOLUTIONS FOR A LAYER ZERO® DESIGN AISLE CONTAINMENT

Containment provides additional separation of hot and cold airflow in the data center. Legrand | Ortronics offers Mighty Mo® Air Control containment solutions that are designed to augment the cold aisle / hot aisle separation.

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#### Mighty Mo® Air Curtain

Air Curtains separate hot and cold airflow with drop-ceiling mounted partitions. The partitions form a containment rectangle around the aisle and can be customized to address any aisle set-up, including cityscapes.



The Air Panel Roof is an aisle cover system that attaches to the top of the racks or cabinets to create a barrier that prevents hot air and cold air from mixing. The roof frame is constructed of heavy gauge aluminum that supports translucent drop away panels. These panels are molded of heat sensitive ceilume polyvinyl chloride plastic. The panels shrink when exposed to heat and drop out of the supporting frames, ensuring there is no interference with the operation of the overhead automatic sprinklers.



## PRODUCT SOLUTIONS FOR A LAYER ZERO® DESIGN AISLE **CONTAINMENT**

#### Mighty Mo® Air Plugs

Air Plugs are the most efficient way to fill in openings in your data center. Air Plugs are safe to use around all types of cabling including fiber optic cables. The plugs come in several standard sizes that will cover any opening required. The plug is soft, flexible and made of Sandel<sup>™</sup>, a fireproof material that uses sand as the principal ingredient.





#### **Mighty Mo Air Booth**

The Air Booth is a three sided containment system that isolates cold air provided by a perforated tile. The Air Booth creates a supply of air, targeted specifically for the intake of individual racks or cabinets. By providing exclusive access to cold air, the Air Booth **spot cools** high density and high powered equipment. The Air Booth is an effective containment system for isolated racks and cabinets.



#### PRODUCT SOLUTIONS FOR A LAYER ZERO® DESIGN ACCESSORIES

## Air Guard<sup>®</sup> brush cable grommets

Air Guard grommets help to reduce the overall temperature of a data center by significantly reducing bypass airflow. Cable access holes allow air leaks. Air Guard grommets are a clean, neat way to seal leaks and prevent cold air loss without crowding cables.



#### **Clegrand**<sup>®</sup> | Ortronics

#### Cable management spools

**Locking Solutions** 

to the data center.

Spools effectively manage excess copper or fiber optic cable slack. They mount at rack unit intervals, providing flexibility and ensuring proper bend radius for cables.



#### **PDUs**

PDUs tailored for the high density data center are also available. Models are available with current and temperature monitoring and can be tailored to your needs with secure remote access.





## PARTNERSHIPS



#### Cisco Technology Development Partner

The Cisco Developer Network is a consortium of Cisco technology partners that develop, market and sell products or services that compliment and/or enhance Cisco's network platform.

Participation and investment in the Cisco Developer Network signifies a relationship that Legrand | Ortronics has with Cisco and that we understand Cisco technology and solution sets and can suggest compatible Layer One and Layer Zero® solutions to end user customers who are deploying Cisco equipment. Legrand | Ortronics is an approved cabinet vendor for the Cisco Nexus 7000 Series Data Center Switches.

## **ALLIANCES**



#### Ortronics<sup>®</sup> Computational Fluid Dynamics (CFD) Design Services powered by SubZero Engineering

CFD analysis is used to identify ways to decrease energy usage and increase cooling efficiency. CFD simulations provide you with an accurate computer model of the airflow in your data center. CFD simulations can also provide insight and guidance in reconfiguring existing facilities with the goal of optimizing the facility's cooling system.





#### Triad River Cooling System™ tiles

Triad high density airflow tiles are optimized for side-to-side cooling and designed to work in concert with the Mighty Mo® racks and cabinets. Triad tiles improve cooling at the top of the rack or cabinet and disperse air directly into the switch or server through the intake side of the Mighty Mo solution. The use of Triad tiles, together with the Mighty Mo airflow baffle system, improves Airflow Utilization Efficiency® (AUE) values. AUE is the difference between the supply air temperature and the temperatures at the top of the rack. Lower AUE values mitigate cold air loss.



#### NetClear<sup>®</sup> cabling solutions

NetClear cabling systems are co-engineered Layer One network infrastructure solutions from Berk-Tek and Legrand | Ortronics and are designed to meet the needs of the most demanding data centers. NetClear cabling systems ensure full network and application availability by providing robust, high performance channels. They are engineered to provide unparalleled reliability for networks running at 100 Mb/s to 100 Gb/s.

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#### designed to be better.™



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