

RackSolutions®

HyperShelf
Technical White Paper

Contents & Navigation

01 Introduction

02 Redefining Workspaces: The Rise of Remote Work

03 High Density PC Mounting Solution

- RackSolutions HyperShelf
- Product Line HyperShelf

04 Cost Analysis Report

- Maximizing Data Center Space and Savings
- Optimizing Rack Space
- Cost Savings Breakdown
- ROI
- Why Choose a HyperShelf?

05 Conclusion

Introduction

In today's rapidly evolving digital landscape, the demand for a scalable, robust, and cost-effective IT infrastructure has never been greater. As businesses across the globe increasingly rely on data-driven operations, the role of data centers has become essential for ensuring data security, maintaining business continuity, and providing seamless access to information.

Whether you're a small business or a large organization, the RackSolutions HyperShelf provides a flexible and cost-savings solution to decrease deployment time and improve efficiency for enterprise deployments, hyperscale data center environments, and remote workspaces.



Contents & Navigation

01 Introduction

02 Redefining Workspaces: The Rise of Remote Work

03 High Density PC Mounting Solution

RackSolutions HyperShelf

Product Line HyperShelf

04 Cost Analysis Report

Maximizing Data Center Space and Savings

Optimizing Rack Space

Cost Savings Breakdown

ROI

Why Choose a HyperShelf?

05 Conclusion

Redefining Workspaces: The Rise of Remote Work

Traditionally, managing desktops machines in a data center required significant investments in the physical space, hardware, and ongoing maintenance. This led to inefficiencies and increased expenses. As businesses seek to improve the user experience and reduce costs, remote work solutions have become essential for data centers and business operations. By enabling employees to access data center resources from any location, remote work minimizes the need for extensive physical infrastructure while streamlining management. This enhances scalability and reduces operational costs, making it a key strategy for businesses looking to optimize their IT infrastructure and improve the overall experience for users. Consequently, as businesses gradually embrace more agile solutions, remote work solutions and cloud-based management have emerged as more efficient and economical options compared to traditional desktop management in data centers.

As the workforce shifts to remote work, users and IT leaders aim to drive growth and sustainability in the digital era. Generally, workstations provide the computing power required for graphics-intensive applications. With workstyles evolving, businesses needed high-performance desktops that served as a cost-effective alternative to the public cloud and virtual desktop infrastructure (VDI). This prompted businesses to integrate remote workstations into their operations, boosting efficiency, improving productivity, and enabling the management of complex projects from any location.

Industries that greatly benefit from remote work environments can range from information technology, healthcare, finance, marketing, sales, management, education, customer support, administration, project management, and more. These industries can create more agile, flexible, and cost-effective business operations. Key benefits for enhancing business operations include:

1. **Scalability and Performance**: Remote work allows businesses to scale IT resources more flexibly. Cloud services and virtual solutions can be immediately adjusted to meet changing demands without the physical hardware constraints. With remote workstations, it streamlines workflows, making them more efficient and responsive.
2. **Reduced Costs**: When reducing the need for physical office space, businesses can lower overhead costs. These costs may be related to rent, utilities, applications, resources, and hardware maintenance. This allows businesses to redirect their costs towards other areas of growth.
3. **Improved Cybersecurity**: Data security is critical when handling sensitive data. Businesses can strengthen their cybersecurity by implementing stronger security protocols to safeguard sensitive data and access points. These measures ensure controlled access and data integrity. Furthermore, implementing various web browsing protocols and security layers (physical, data link, network, transport, session, presentation, and application) creates a comprehensive cybersecurity strategy that effectively mitigates risks and enhances overall protection.
4. **Disaster Recovery and Business Continuity**: A well-implemented remote work strategy enhances business continuity plans, as data and applications are typically hosted in the cloud. This allows businesses to have better recovery options if disruptions occur.
5. **Enhanced Collaborative Tools**: Regardless of location, collaborative decision-making tools allow teams to directly interact with project files through virtual meetings, markup, and annotations. These tools may include Microsoft Teams, Slack, Trello, Zoom, Jira, Google Workspaces, and more. This enhances communication and efficiency, resulting in smoother workflows across teams.
6. **Robust Training and Support**: Users can remotely receive assistance, training sessions, and troubleshooting. This ensures that teams are prepared to efficiently make the most of their workstation setups. Additionally, remote work reduces turnover and the associated costs of recruiting and training employees, leading to higher employee productivity and satisfaction.

Overall, the rise of remote work has fundamentally reshaped business operations, offering notable benefits to data centers and IT environments. By minimizing the need for an extensive physical infrastructure, businesses can utilize remote workstations to lower operational costs, enhance scalability with cloud or virtualized solutions, and maximize resource utilization. Not only does this shift optimize operations, but it also makes IT systems more adaptable to evolving demands.

Contents & Navigation

01 Introduction

02 Redefining Workspaces: The Rise of Remote Work

03 High Density PC Mounting Solution

- RackSolutions HyperShelf
- Product Line HyperShelf

04 Cost Analysis Report

- Maximizing Data Center Space and Savings
- Optimizing Rack Space
- Cost Savings Breakdown
- ROI
- Why Choose a HyperShelf?

05 Conclusion

High Density PC Mounting Solution

If you're unfamiliar with hypescaling, it's an initiative to maximize computing power within a limited space. It is often linked to enhancing server density, optimizing monitoring capabilities, increasing scalability, and maximizing computing power. In today's remote work environment, businesses are increasingly looking for ways to scale PCs within their server rooms so employees can access them from anywhere.

This is where our HyperShelves come in. Inspired by data center optimization, our HyperShelf product line offers a cost-effective PC rack mounting solution that meets these evolving demands.

RackSolutions HyperShelf

Specifically designed for data center environments and enterprise deployments, the RackSolutions HyperShelf is engineered to optimize rack space, enhance accessibility, and drive operational efficiency. It serves as a desktop-as-a-service (DaaS) alternative when it comes to maximizing power while minimizing cost. The HyperShelf enables you to rack mount multiple workstations within 2U-5U of space without crowding while running at full load. Instead of using multiple rack shelves to manage your devices, a HyperShelf increases shelf density, decreases deployment times, and achieves a massive amount of computing power in limited space.

It maintains optimal environmental conditions and provides redundancy for essential resources such as power, cooling, network, storage, and servers. Furthermore, it offers efficient cooling and streamlined cable management while maximizing the floor space allocated for machines. With its built-in redundancy features, the HyperShelf improves uptime and supports both physical and virtual scaling.

The HyperShelf also provides functional and reliable features to ensure the longevity and performance of your devices. The integrated airflow system promotes optimal cooling and thermal efficiency while built-in cable management provides organized pathways for a tidy workspace. Its design ensures convenient in-rack serviceability and device replacement. The mounting holes at the rear of the shelf allow for an optional fan to be installed and the removable side/top panel allows for cable access and exhaust containment. Additionally, it includes isolated intake and exhaust ports, along with an optional blanking panel to control and improve cooling in the scenario of a missing PC or when the shelf is not at full capacity, making it a practical solution for any testing setup.

Incorporating HyperShelves into your work environment allows you to significantly elevate your rack space, streamline virtualization processes, and boost operational performance. These key features not only maximize your available resources but also contribute to a more efficient and productive workspace, making HyperShelves an essential addition for any modern data center. Compatible with Dell, Apple, and Lenovo devices (check for device compatibility), this high-density PC mounting solution is a game-changer for your business operation.

HyperShelf Product Line

Learn more about the HyperShelf product line here:

2U HyperShelf for 10 Apple Mac Mini (M4, 2024)	115-9156
5U HyperShelf for 6 Apple Mac Studio	115-8652
5U HyperShelf for 16 Apple Mac Mini	115-6875
5U HyperShelf for 16 Dell Optiplex Micro	115-7418
5U HyperShelf for 7 Dell Precision 3280 Compact Workstation	115-8995
5U HyperShelf for 8 Dell Precision 3260 Compact Workstation	115-8765
5U HyperShelf for 7 Lenovo ThinkStation P3 Ultras	115-8939

Contents & Navigation

01 Introduction

02 Redefining Workspaces: The Rise of Remote Work

03 High Density PC Mounting Solution

RackSolutions HyperShelf

Product Line HyperShelf

04 Cost Analysis Report

Maximizing Data Center Space and Savings

Optimizing Rack Space

Cost Savings Breakdown

ROI

Why Choose a HyperShelf

05 Conclusion

Cost Analysis Report

Maximizing Data Center Space and Savings

Data centers are under constant pressure to maximize efficiency while controlling costs. Traditional server racks often waste valuable space, forcing companies to expand their footprint or sacrifice scalability. The HyperShelf offers a game-changing solution that optimizes space, reduces costs, and increases rack density. Let's break down the numbers to show why upgrading to a HyperShelf is a smart investment.

Optimizing Rack Space

When considering the airflow and cable management, a standard 42U Data Center Server Rack typically holds around 30-35 RUs of servers. Based on the CPU counts in base models of industry-standard servers, this equates to 240–280 CPU cores.

However, with the HyperShelf's high-density configuration, you can increase the CPU core count housed in a 42U Data Center Rack significantly, accommodating up to 336-392 CPU cores per rack.

That's 40% more CPU core capacity without increasing your data center footprint.

Cost Savings Breakdown

Moreover, expanding a data center is expensive for businesses. The average cost per square foot of data center space is $100 - $250, and that doesn't include the additional expenses for power, cooling, and maintenance. By increasing the capacity per rack, a HyperShelf enables businesses to save on the following:

- **Floor Space Costs**: Fewer racks needed means less costs on expansion or leasing.
- **Power and Cooling**: Consolidating machines into fewer racks increases data center resources more efficiently.
- **Hardware Investment**: Maximizing the number of machines per rack reduces the need for additional enclosures, along with the extra equipment required to support them.

For example, here is a comparison of a small data center's CPU core allocation using a standard server rack configuration versus a HyperShelf-optimized rack configuration.

CPU Core Allocation	Server Racks Needed	HyperShelf Racks Needed	Space Savings
2000 CPU Cores*	8-9 Racks	6 Racks	~25-33%
4000 CPU Cores	15-17 Racks	11-12 Racks	~26-29%

*Disclaimer: The numerical findings and performance outcomes presented in this cost analysis report are based on an internal case study using the 5U HyperShelf configured with seven Dell Precision 3280 Compact Workstations. These results reflect a specific customer's setup and operational environment. Actual outcomes may vary depending on individual configurations, hardware, usage patterns, and business requirements. This information is provided for illustrative purposes only and does not guarantee similar outcomes.

Contents
& Navigation

01 Introduction

02 Redefining Workspaces: The Rise of Remote Work

03 High Density PC Mounting Solution

RackSolutions HyperShelf

Product Line HyperShelf

04 Cost Analysis Report

Maximizing Data Center Space and Savings

Optimizing Rack Space

Cost Savings Breakdown

ROI

Why Choose a HyperShelf

05 Conclusion

Cost Analysis Report (cont.)

ROI

By reducing the number of racks required, a small data center deploying HyperShelves for a 4,000-core CPU allocation, utilizing 30 RUs of rack space, could save between $8,000 - $20,000 in rack space-related costs alone. These savings scale even further when factoring in lower power and cooling expenses, as well as the cost difference of the machines themselves when comparing the PCs in the HyperShelf Configuration to the servers in the Server Configuration.

Why Choose a HyperShelf?

- **Increase Density**: Maximize your rack capacity without increasing footprint.
- **Increase Computing Power**: 40% increase in computing power per rack.
- **Reduce Infrastructure Costs**: Save on space, power, and cooling.
- **Scalability Without Expansion**: Accommodate future growth within the same footprint.
- **Proven Efficiency**: Real-world deployments show up to 25% reduction in rack usage.

The HyperShelf isn't just a shelf—it's a cost-saving, efficiency-boosting investment for any data center looking to scale smarter.

Contents & Navigation

01 Introduction

02 Redefining Workspaces: The Rise of Remote Work

03 High Density PC Mounting Solution

RackSolutions HyperShelf

Product Line HyperShelf

04 Cost Analysis Report

Maximizing Data Center Space and Savings

Optimizing Rack Space

Cost Savings Breakdown

ROI

Why Choose a HyperShelf

05 Conclusion

Conclusion

RackSolutions has been at the forefront of designing, building, and delivering premium products that transform how our customers work and live. Since 1999, we've been proven as the "mounting problem solvers" for industry leaders by supplying top-of-the-line server racks and IT accessories. We're dedicated to helping you achieve your data center goals with tailored solutions that meet your unique requirements.

Our unwavering commitment to creative, customer-centric design fuels our mission to deliver efficient, customized hyperscale solutions for a diverse range of applications. With our HyperShelves, you can optimize your setup and enhance performance, ensuring you get the most out of your workstations.

We promise you're going to have a great experience. We'll help you figure out what you need, get it to you fast, and we'll stand behind it. If we can't mount it, no one can. Don't see a HyperShelf that works for your device? We've got you covered—custom solutions are our specialty. If your setup needs something unique, we'll design and build it for you. No compromises, just exactly what you need.



RackSolutions®

Contact us today to see how the HyperShelf can transform your data center strategy.

RackSolutions Website

HyperShelf Product Catalog

"RackSolutions®", "RackSolutions.com" and "Innovation First" are registered trademarks of Innovation First, Inc. © Copyright 2025. All Rights Reserved.
All other marks of others are property of their respective owners. Patents and/or Patents Pending: innovationfirst.com/patents