



Transform Your Data Center with Hyper-Scale Architecture

Maximize compute, storage, and network hardware utilization with Intel® Rack Scale Design and Ericsson Hyperscale Datacenter System 8000*



Executive Summary

Data center managers from cloud service providers, communications service providers, and large enterprises face explosive data growth and an ever-increasing demand to provide new services. These professionals know that they need to modernize their data center infrastructures to remain competitive and take advantage of new opportunities. Ericsson hyper-scale infrastructure, based on Intel® Rack Scale Design, provides businesses with an efficient, cost-effective pathway to not only modernize, but to transform the very core of the data center. With this newfound agility, companies can:

- Respond rapidly to changing business needs
- Simplify IT hardware and software administration
- Reduce infrastructure spending by doing more with fewer resources

Overcoming Obstacles to Modernization

Opportunities for new business initiatives abound—from Internet and mobile services to projects based on big data, the Internet of Things (IoT), and the insights that those data streams provide. But for many organizations, the path to those initiatives is blocked by complex, costly infrastructure changes that are needed to adapt and support modernization.

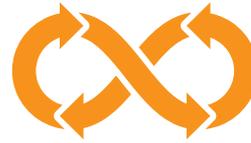
Savvy enterprises have responded to the problem by shifting from physical boxes to virtualization and cloud computing. Those options have helped to a degree, but they are no longer sufficient to keep up with changing business requirements. What happens when an organization needs to deploy a large-scale big-data platform for a short-term initiative? Or when a communications service provider needs to quickly ramp up video transcoding capabilities to accommodate a major sporting event? Virtualization helps, but each change still requires redeploying physical infrastructure to accommodate specific requirements. From CPU nodes to memory to storage to networking—every change results in IT workers moving cables, swapping boxes, purchasing additional storage, and reconfiguring virtual machines and applications.

Within this complex infrastructure environment, IT pros struggle to respond to ever-changing business needs, and they are continuously fighting against the headwinds of complexity and infrastructure costs. Each time an infrastructure stack is redeployed for a particular workload, IT needs to ensure that additional capacity is committed to that workload in order to accommodate usage peaks and meet service-level agreements (SLAs). All that extra hardware sits unused most of the time, which wastes resources and increases capital expenditures (CapEx) and operating expenditures (OpEx) for the business.



Growth

Volume of all stored data will double by 2019 from 1.4 ZB to 3.5 ZB¹



Inefficiency

Average CPU utilization for data center servers: <30%²

Figure 1. Data is growing at an exponential rate; modern businesses need more effective ways to access, store, and process that data by making better use of under-utilized resources in the data center

IT staffs need to contend with the management complexity of purchasing, deploying, and maintaining hardware components and appliances that are built or optimized to accommodate specific workloads. Those dedicated resources can't be easily reallocated when they are under-utilized, so they sit unused, taking up power, cooling resources, and space in the data center.

The Goals for Transforming Business

Clearly, businesses need greater flexibility so that they can:

- Reconfigure hardware and software as needed
- Scale on demand without costly over-provisioning
- Upgrade components in a systematic way, without replacing an entire infrastructure stack

Bring Agility to Your Infrastructure with Hyper-Scale Architecture

Hyper-scale architecture offers IT managers a better way to modernize their data centers by providing the ability to scale infrastructure in response to changing demands on the system. With hyper-scale architecture, enterprise companies and cloud service providers can respond faster to changing business needs, while helping to lower costs and simplify complexity for IT and the overall business. In fact, proprietary hyper-scale architecture is the secret to how technology giants like Google, Amazon, and Facebook have responded to massively complex workloads while lowering their costs for infrastructure, management, and related overhead.

Until recently, hyper-scale benefits have been available to only the top-tier service providers using internally developed tools and on-site engineering resources. Now Intel and Ericsson have democratized hyper-scale infrastructure. With the Ericsson solution, based on Intel Rack Scale Design, any enterprise organization or service provider can now modernize its on-premises data centers with hyper-scale infrastructure.

Transform Your Business with the Ericsson Hyperscale Datacenter System 8000

The Ericsson Hyperscale Datacenter System 8000* (HDS 8000*) solution, based on Intel Rack Scale Design, disaggregates resources, allowing multiple concurrent workloads to scale across compute, network, and storage. IT administrators can then efficiently pool and redistribute those resources as needed in response to rapidly changing workloads. This software-defined approach doesn't require proprietary, purpose-built appliances that lock businesses into costly, single-vendor solutions. Instead, it provides an architectural solution that improves efficiency, reduces capital infrastructure costs, and reduces IT administrative efforts when compared to traditional data center infrastructure management.

The Traditional, Monolithic Approach to Workload Management

With a traditional data center design, each part of the infrastructure is procured and deployed based on the workload requirements that every line-of-business (LOB) needs (see Figure 2). When LOB requirements change or workloads scale up or down, IT admins need to redeploy hardware components to accommodate the change. This process entails reconfiguring networking cables, adding storage, and potentially upgrading compute resources. Virtual machines and apps also need to be modified and redeployed. Every change involves IT administrative time and effort, and it might incur new capital costs to support both current and potential future needs, which can lead to over-provisioning for every workload. In a 2016 Mainstay survey, enterprise respondents said that they typically design 30 percent over-capacity for a standard workload and up to 60 to 70 percent for mission-critical workloads.³

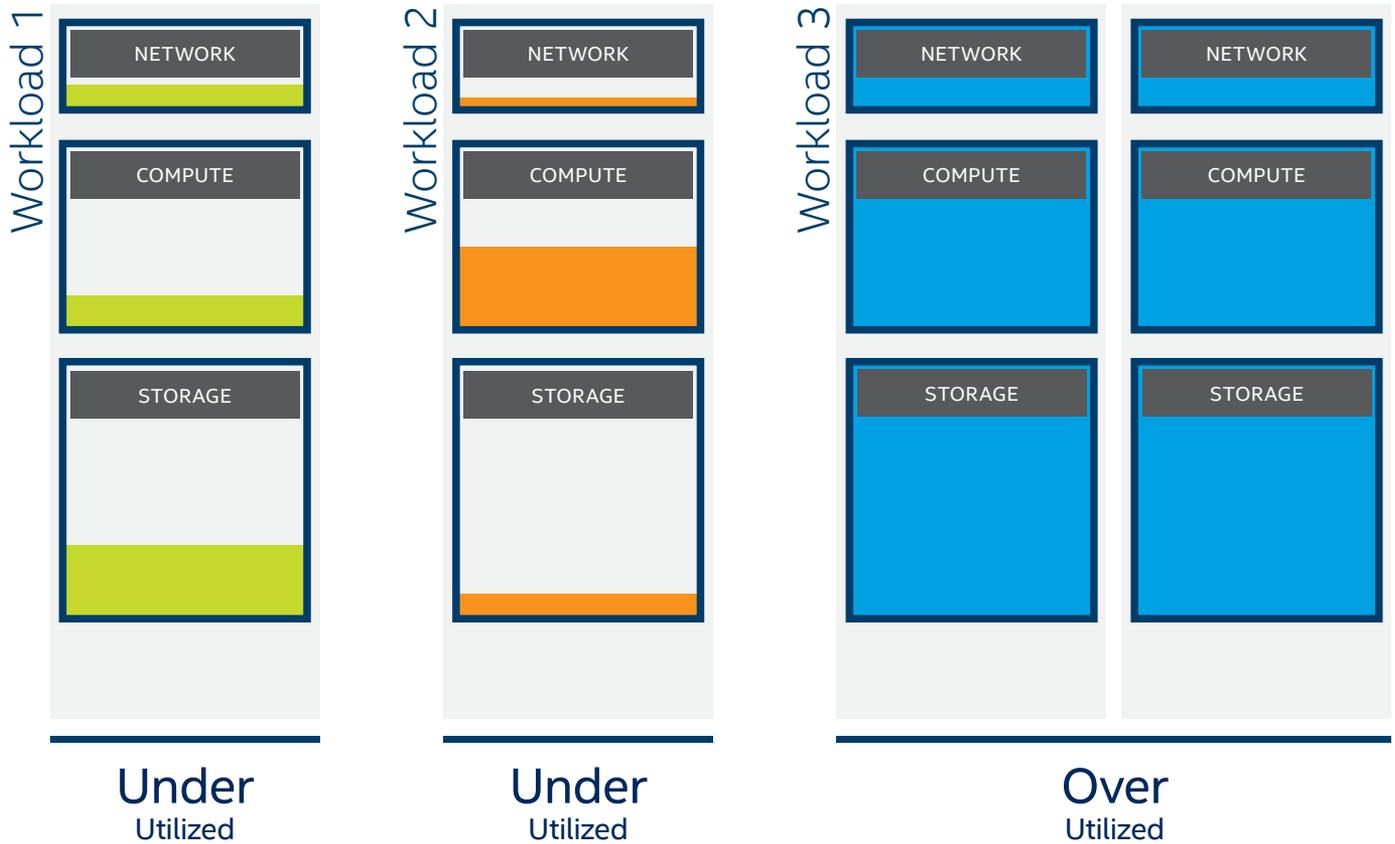


Figure 2. Traditional data centers rely on monolithic infrastructure and static provisioning of resources to support workloads, which can result in sub-optimal resource allocation, be that under-utilization, or in some cases, over-utilization of those resources

A New, Modular Approach to Workload Management

In contrast to traditional data center design, the Ericsson HDS 8000, based on Intel Rack Scale Design, takes a flexible, modular approach to infrastructure management and orchestration. With the Ericsson HDS 8000, all of the compute, storage, and network resources are physically assembled into hyper-scale performance-optimized “PODs.” A POD consists of the hardware chassis, an optical backplane, and the related components needed to connect, power, and manage the system. All of the compute, storage, and network resources from a POD can then be distributed into virtualized, performance-optimized environments called vPODs (see Figure 3). The resources of a vPOD can be physically dispersed, but because of the underlying PODs and Intel Rack Scale Design, they function as a single logical system.

The vPOD structure is key to how the Ericsson HDS 8000 can help optimize data center infrastructure. Because vPODs are actually virtual, software-defined partitions, they allow

IT to pool hardware resources to support multiple, concurrent cloud platforms, such as a telecom cloud, IT cloud, and commercial cloud, all running across the same switch fabric. IT admins can use the Ericsson Command Center* portal to assign whatever POD hardware is best suited to a particular workload. All storage, compute, and networking infrastructure is allocated as needed from different physical machines or racks. And because all infrastructure is software-defined, it's simple for an IT admin to scale or modify a vPOD as needed to correctly size it for a given workload.

Ericsson HDS 8000 can coordinate physical resources in near real time across machines and racks by using an optical backplane. This capability removes the limitations of traditional electrical-based connectivity between physical components. For example, with an optical backplane, memory and compute components can be connected over distances of hundreds of meters with minimal latency in performance.

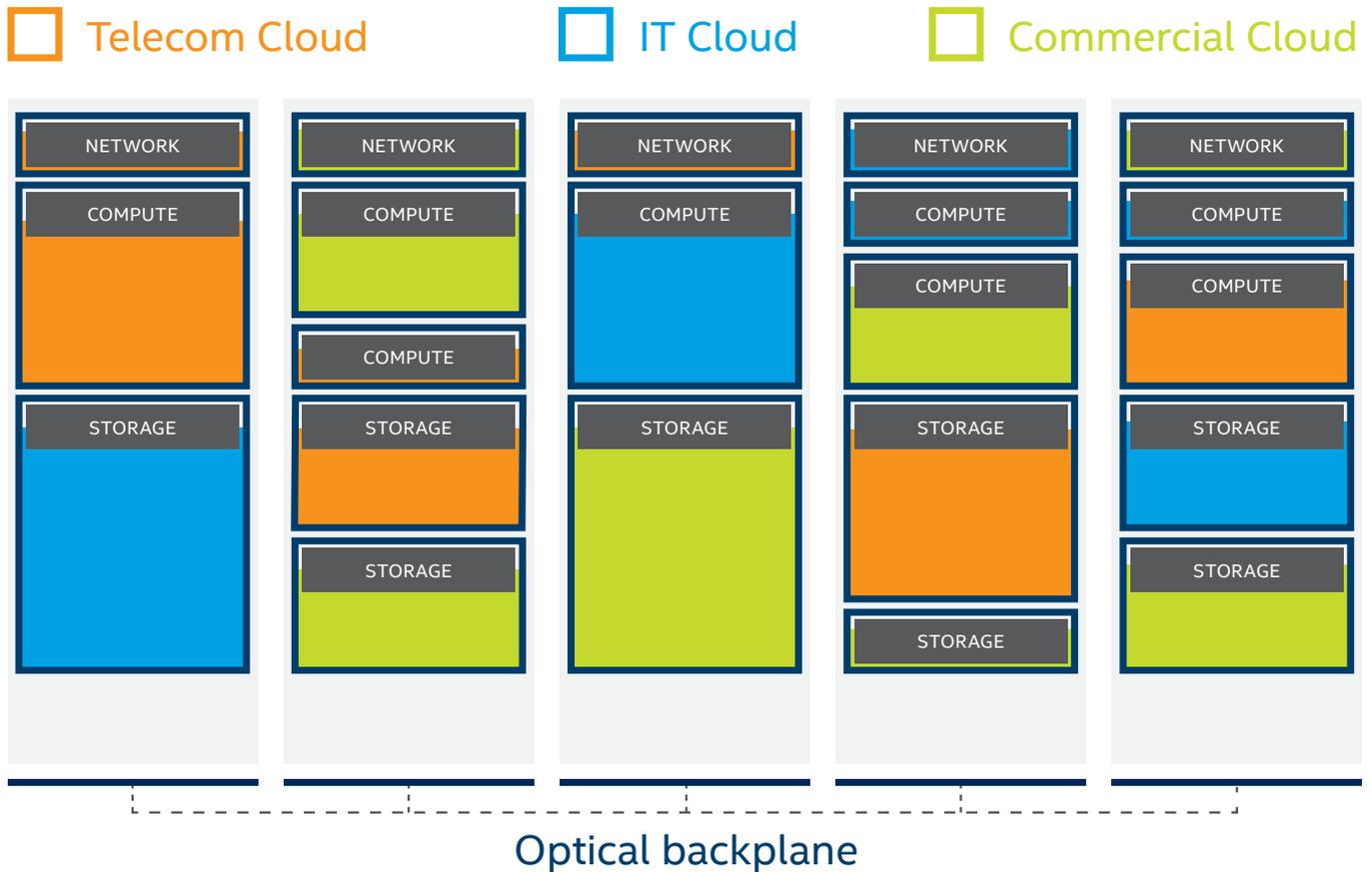


Figure 3. Ericsson HDS 8000*, based on Intel® Rack Scale Design, provides efficient distribution of clouds and their associated workloads across multiple servers and racks; for example, telecom workloads, internal IT workloads, and commercial cloud services workloads can all be combined and optimally distributed across the underlying infrastructure

Hyper-Scale Design Increases Agility while Lowering Costs

Intel Rack Scale Design and the Ericsson HDS 8000 allow IT admins to abstract resources in a way that completely transforms the data center to be much more flexible, efficient, and manageable. Hyper-scale architecture offers a number of compelling business benefits for companies looking to modernize incrementally and cost-effectively.

Reduce Capital Expenditures by Optimizing Resource Utilization

Ericsson HDS 8000 increases overall resource utilization in the data center by combining physical resources from multiple machines and racks into a unified pool. By eliminating multiple, siloed infrastructure stacks, IT admins can reduce or remove the need to purchase additional hardware for over-provisioning compute or storage.

Intel® Rack Scale Design Forms the Foundation for the Ericsson Hyperscale Datacenter System 8000* (HDS 8000*)

Intel Rack Scale Design transforms the cloud platform by defining a logical architecture that:

- Disaggregates compute, storage, and network resources
- Introduces the ability to pool these resources
- Simplifies management of disparate resources
- Creates the ability to dynamically assemble resources based on workload-specific demands

Ericsson Hyperscale Datacenter System 8000 (HDS 8000) provides simplified component pooling, comprehensive management, and light-speed data transmission using an optical backplane.

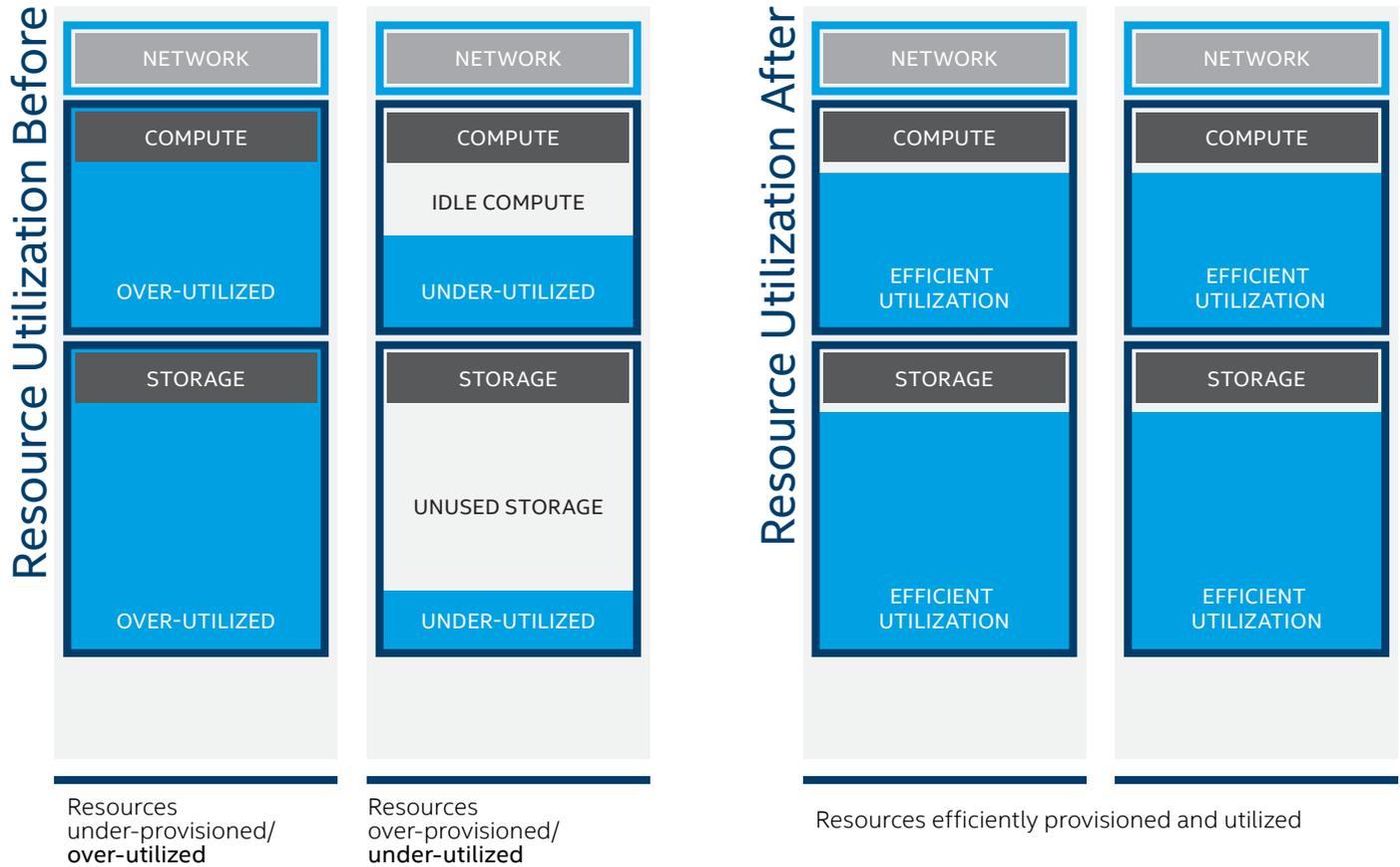


Figure 4. Ericsson HDS 8000*, based on Intel® Rack Scale Design, lets IT admins more efficiently distribute infrastructure to support multiple workloads

IT can also reduce hardware requirements across the organization by more efficiently redistributing software-defined compute, storage, and networking resources in response to changing business needs or peaks in usage (see Figure 4). Previously idle resources can be used more effectively, which reduces the need to purchase additional servers or storage to scale or change a given workload. For example, suppose a communications service provider wants to ramp up compute capabilities for a workload in response to a new streaming-video offering. Ericsson HDS 8000 lets the company redeploy existing resources from a deprecated workload instead of purchasing additional costly hardware.

Efficient orchestration of resources can also decrease energy use in the data center. During non-peak hours, workloads can be coalesced to run on fewer servers, which then frees up unused servers to be switched off to reduce power and cooling costs.

Optimizing hardware utilization is only one way in which the Ericsson HDS 8000 solution helps reduce CapEx. The modular rack design of the Ericsson HDS 8000 enables more cost-effective infrastructure upgrades. IT workers can't just swap out a hardware component with traditional data center infrastructure. Instead, they are often forced to replace the entire stack that is dependent on that component.

Intel Rack Scale Design allows IT workers to easily replace components incrementally without disrupting workloads or the rest of the platform. When Intel releases a new generation of data center processors, those CPUs can be added to an existing POD without disrupting the workloads above.

Incremental hardware replacement also has a long-term benefit for lifecycle management. Instead of replacing entire servers after a standard three-year usage cycle, IT admins can replace each individual component on its own schedule. For example, the refresh cycle for CPU and RAM might continue to be three years, but IT managers can amortize solid-state drives (SSDs) and hard-disk drives (HDDs) over longer periods, such as five years, before replacement. Other components, such as the chassis, might have cycles as long as eight years. Disaggregating components this way reduces spending on hardware over time.

Intel® Rack Scale Design gives IT the freedom to replace individual components as needed, instead of swapping out complete servers. This more granular approach to lifecycle management helps reduce spending and stretch the lifespan of data center infrastructure.

Reduce Operational Expenditures by Improving Data Center Operations

In a traditional data center, IT admins often struggle to maintain a current inventory of all hardware resources and how that hardware is utilized. An entire rack of servers might be dedicated to a particular LOB workload that is significantly over-provisioned, whereas a separate set of machines might struggle to meet demand for another, disparate LOB workload.

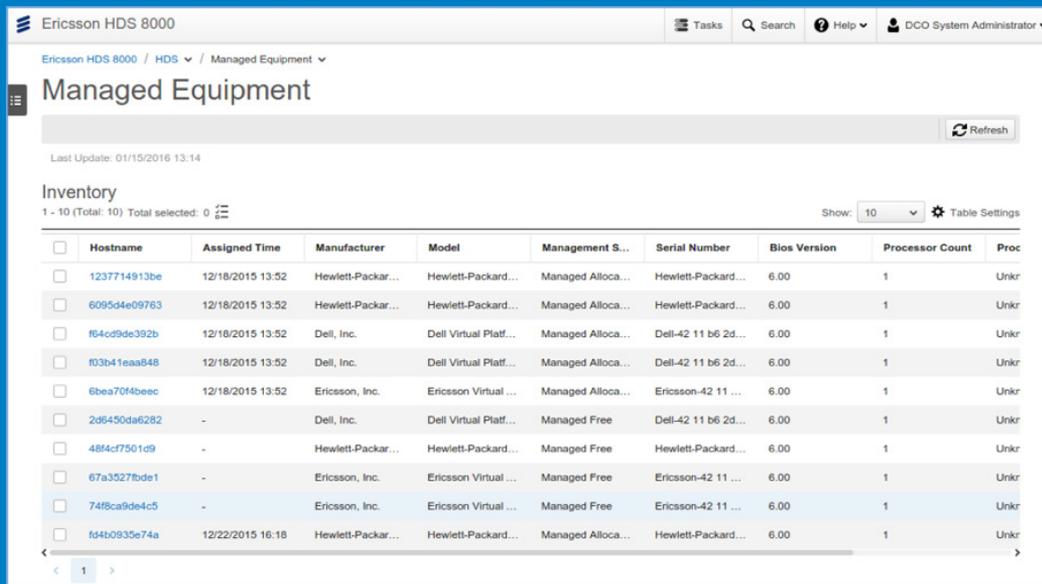
In contrast, the Ericsson HDS 8000 solution provides the Ericsson Command Center, which enables better visibility and reporting of data center resources from a single combined view, so IT admins can gain detailed knowledge into what is going on inside the data center. This insight can help companies reduce waste from unidentified resources sitting unused or underused. Better visibility also helps organizations determine the best way in which to distribute existing resources for their current and planned workloads. With a more complete picture of company-wide compute, network, and storage infrastructure, IT organizations can plan for future needs in a more systematic way.

Lower Networking Costs by Implementing Software-Defined Networking

Traditional data center network infrastructure is monolithic, costly, and can be difficult to manage. In contrast, the Ericsson HDS 8000 offers a hyper-converged approach to network switching that can reduce costs and simplify management, while increasing flexibility for how IT allocates resources.

The Ericsson HDS 8000 accomplishes this by providing a common pool of high-speed optical network resources that can be assigned to workloads as needed. The physical network is sliced into logical partitions that are each assigned to a vPOD. All of the configuration and management capabilities are available in Ericsson Command Center, which also provides network-traffic analytics that can be viewed in real time or stored for later analysis.

By converging physical network switches into software-defined networking, IT can redistribute resources as needed, through vPODs, for maximum agility and higher utilization of existing network infrastructure.



The screenshot displays the Ericsson HDS 8000 Command Center interface. At the top, it shows the title 'Ericsson HDS 8000' and navigation options like 'Tasks', 'Search', 'Help', and 'DCO System Administrator'. Below this, the main heading is 'Managed Equipment' with a 'Refresh' button. A 'Last Update' timestamp of '01/15/2016 13:14' is shown. The 'Inventory' section indicates '1 - 10 (Total: 10) Total selected: 0'. A table with 10 columns is displayed: Hostname, Assigned Time, Manufacturer, Model, Management S..., Serial Number, Bios Version, Processor Count, and Proc. The table lists various server models from manufacturers like Hewlett-Packard, Dell, and Ericsson, with their respective management statuses and processor counts.

<input type="checkbox"/>	Hostname	Assigned Time	Manufacturer	Model	Management S...	Serial Number	Bios Version	Processor Count	Proc
<input type="checkbox"/>	1237714913be	12/18/2015 13:52	Hewlett-Packar...	Hewlett-Packard...	Managed Alloca...	Hewlett-Packard...	6.00	1	Unkr
<input type="checkbox"/>	609504e09763	12/18/2015 13:52	Hewlett-Packar...	Hewlett-Packard...	Managed Alloca...	Hewlett-Packard...	6.00	1	Unkr
<input type="checkbox"/>	f64cd9de392b	12/18/2015 13:52	Dell, Inc.	Dell Virtual Platf...	Managed Alloca...	Dell-42 11 b6 2d...	6.00	1	Unkr
<input type="checkbox"/>	f03b41eaa848	12/18/2015 13:52	Dell, Inc.	Dell Virtual Platf...	Managed Alloca...	Dell-42 11 b6 2d...	6.00	1	Unkr
<input type="checkbox"/>	6bea70f4beec	12/18/2015 13:52	Ericsson, Inc.	Ericsson Virtual ...	Managed Alloca...	Ericsson-42 11 ...	6.00	1	Unkr
<input type="checkbox"/>	2d6450da6282	-	Dell, Inc.	Dell Virtual Platf...	Managed Free	Dell-42 11 b6 2d...	6.00	1	Unkr
<input type="checkbox"/>	48f4c7501d9	-	Hewlett-Packar...	Hewlett-Packard...	Managed Free	Hewlett-Packard...	6.00	1	Unkr
<input type="checkbox"/>	67a3527bde1	-	Ericsson, Inc.	Ericsson Virtual ...	Managed Free	Ericsson-42 11 ...	6.00	1	Unkr
<input type="checkbox"/>	74f8ca9de4c5	-	Ericsson, Inc.	Ericsson Virtual ...	Managed Free	Ericsson-42 11 ...	6.00	1	Unkr
<input type="checkbox"/>	f64b0933e74a	12/22/2015 16:18	Hewlett-Packar...	Hewlett-Packard...	Managed Alloca...	Hewlett-Packard...	6.00	1	Unkr

Ericsson Command Center* Helps You See Everything

Ericsson Command Center configures and manages the compute resources, storage capacity, and network connectivity of the Ericsson Hyperscale Datacenter System 8000* (HDS 8000*). Ericsson Command Center also manages the Ericsson HDS 8000 power systems, firmware, and related functions.

Ericsson Command Center can manage a standalone system or the complete infrastructure for a data center, all from a single configurable dashboard that provides a comprehensive view of the current state of your hyper-scale system and the rest of your data center. You can use that information to analyze your needs and plan your operations down to the component level in order to better match your services to the most appropriate hardware.

Ericsson HDS 8000 uses a RESTful API to provide inventory and status information about physical assemblies (PODs) and virtual infrastructures (vPODs) to third-party management platforms.

To learn more, visit ericsson.com/hyperscale/cloud-infrastructure/hyperscale-datacenter-system/managing-hyperscale-system.

Conclusion: Transforming the Data Center from Monolithic to Agile

Ericsson HDS 8000 is a disruptive technology that is transforming data centers from monolithic and siloed to agile, optimized, and efficient. This new approach to infrastructure management offers greater utilization of existing resources, helps eliminate wasteful over-provisioning, and can simplify adding or replacing hardware in a systematic, low-impact fashion.

The benefits of Ericsson HDS 8000 go beyond resource optimization and CapEx and OpEx savings. The system is built on Intel Rack Scale Design, which abstracts hardware into comprehensive, orchestrated software-defined infrastructure. This unique design offers companies a level of agility previously available only to the technology giants, like Google. This agility means that enterprise businesses,

software service providers, and communications service providers can use the flexibility of Ericsson HDS 8000 to modernize and transform their businesses in response to mobile, big data, and IoT opportunities.

Over time, the benefits of Intel Rack Scale Design and Ericsson HDS 8000 will increase as these transformative technologies continue to develop. Today, visibility, consolidation, and optimization are the first steps. The ultimate goal is to enable intelligent policy profiles and fully automated infrastructure reallocation. Organizations that implement these technologies today will have a considerable competitive advantage both today and into the future.

Further Reading

Learn more about Intel® Rack Scale Design and Ericsson HDS 8000*:

intel.com/intelrsd

ericsson.com/hyperscale/cloud-infrastructure/hyperscale-datacenter-system



¹ Cisco. "Cisco Global Cloud Index: Forecast and Methodology, 2014–2019 White Paper." April 2016. cisco.com/c/en/us/solutions/collateral/service-provider/global-cloud-index-gci/Cloud_Index_White_Paper.html.

² Ericsson. "Three Ways to Boost Datacenter Utilization." March 2016. <http://cloudblog.ericsson.com/3-ways-to-boost-datacenter-utilization>.

³ Mainstay. "An Economic Study of the Hyperscale Data Center." January 2016. <http://cloudpages.ericsson.com/hubfs/Content-Offers/Economic-Study-Hyperscale-Datacenter.pdf>.

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