



The New Truth in Data Center Management

Beyond spreadsheets with Data Center Infrastructure Management (DCIM) software to revitalize the management of space, power, equipment and connections

Table of Contents

Data Center Management Hits a Boiling Point	Page 3
Integrated Management of Your Data Center Operations	Page 3
Capacity Management and Energy Management Trigger New Opportunities	Page 4
Overcapacity or Undercapacity Are Equally Significant Problems	Page 5
A New Way: Data Center Infrastructure Management (DCIM) Software	Page 6
The New Truth: Raritan's Total DCIM Solution with Intelligent Capacity Management	Page 8
The Simple Truth	Page 16

Data Center Management Hits a Boiling Point

If you are a data center manager, network manager, operations manager, or a facility manager then this white paper has something for you. **That something is how you can increase the value you already provide to your company and your organization.** We will explore hidden areas for significant data center performance improvement while reducing costs and we will give you insight into the tools that can make that a reality. Data center management is becoming more difficult and traditional tools and methods just don't allow you to keep up with current job complexity and demands.

You have many challenges in your role of ensuring that your company gets the facility, IT, and networking support that it needs. Some of these challenges are polar opposites in that you are required to improve services on one hand while reducing costs on the other. This is a task that on the surface would seem to be impossible to achieve, especially in the increasingly demanding environment of a data center. At a minimum just finding a reasonable balance between the following objectives is difficult enough.

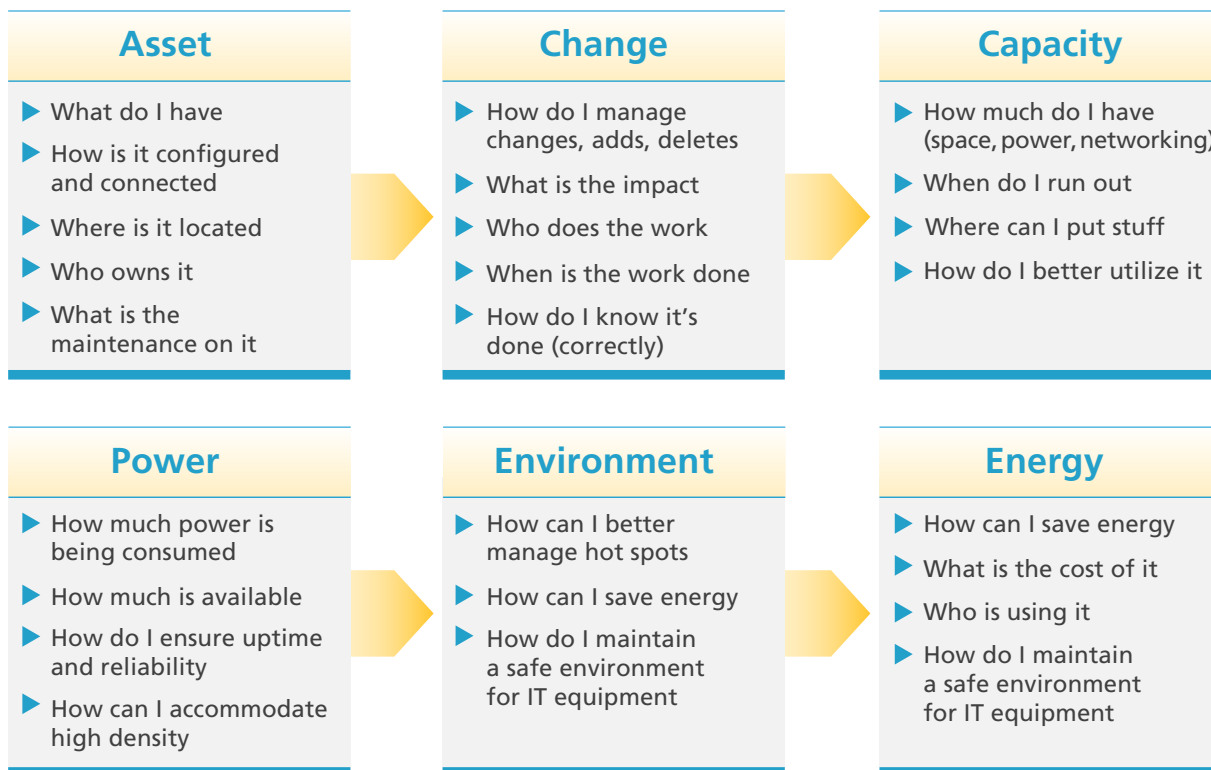
- ▶ Control expenses
- ▶ Improve productivity
- ▶ Support new applications
- ▶ Provide reliable service
- ▶ Project future needs

The growing complexity of data centers only adds to the problem. Increased density in data centers makes it more critical to track assets, manage space, and ensure safety is maintained. The addition of new technologies with new capabilities creates more challenges with integration and compatibility. However, there are new areas of opportunity for you to drive data center improvements and new tools to exploit them.

Integrated Management of Your Data Center Operations

Most day-to-day data center operational problems can be broken down into six key functional areas to manage; capacity, asset, change, energy, environment and power. These functional areas have their own set of individual management problems and questions that you deal with every day. With increased data center demands and complexity there is a growing need to better understand and manage the dependencies and relationships between these functions. It is not just enough to manage them individually but to manage them in an integrated way as part of a total solution approach. How you can better understand the impact and dependencies between asset, capacity, change, power, energy and environment is becoming an increasingly important question.

Typical Problems in Data Center Management



So how are you dealing with these problems? Are you still using traditional tools, methods, and processes that sometimes require manual efforts which can lead to human error? Are you relying on spreadsheets as your most automated tools for data input and reporting? Do you have any way of capturing critical information and making the decisions and changes that optimize your data center's performance?

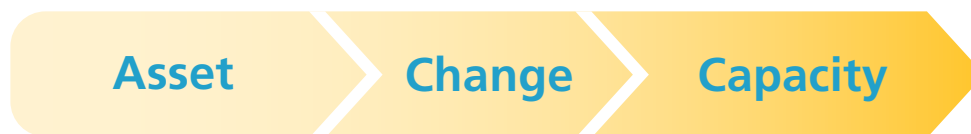
Capacity Management and Energy Management Trigger New Opportunities

Corporate objectives are not always aligned with data center objectives yet there is often a desire to impose one on the other. Today companies are stressed to reduce costs in all areas of business while trying to improve productivity and performance. In data center management these two objectives clash in two functional areas; capacity management and energy management. Power and uptime are the life blood of any data center with the high demands on availability but cutting energy consumption and doing more with fewer assets make data center management especially difficult today.

Intelligent Capacity Management

As a data center manager there is probably no more important factor to your success than having comprehensive, accurate, and real-time information about your data center capacity. Intelligent and efficient capacity management has enormous benefits because of the relationships that capacity has to space, power, electrical, cooling, cabinet,

cable and network. If you want Intelligent Capacity Management you need a tool that answers the following questions – How much do I have (space, power, networking)? When do I run out? Where can I put stuff? You also need accurate asset management and change management to feed necessary information into your capacity analysis. Intelligent and effective data center capacity management should and can be a major focus of every data center manager. It is the key to the maximum utilization of assets, reducing costs and efficient planning of data centers.



Overcapacity or Undercapacity Are Equally Significant Problems

Your data center is likely the most expensive square footage in your company, with today's larger data center builds costing tens of millions of dollars. With new builds so expensive, there are enormous incentives to make optimum use of existing capacity. Ad hoc management of capacity results in many issues: space and power shortages, stranded capacity, and fragmented resources. On the other hand, over-provisioning can lead to an enormous waste of capital and expenses. Finding the right balance is difficult without the right tools.

Since data center availability is critical to the organization's success, the common commandment from upper management is, "We want full-time availability." As a result in some data center environments current processes and tools are being stressed to dangerous levels to handle the many combined constraints needed to achieve improved capacity utilization and uptime.

In other data center environments the reaction to full-time availability has led to over-provisioning of resources – servers, storage, power, cooling – with redundancy of 50% above peak capacity requirement. This can represent an enormous and unnecessary waste of resources and money. Often when present data center capacity reaches the limit, companies elect to finance a multimillion dollar capital investment to expand, build, or acquire additional capacity, usually unaware that the existing data center holds an additional 25-50% of unused capacity.

With the costs for raised floor data center space ranging from \$1,000-\$2,000/sq. ft., a new 25,000 sq. ft. data center represents a \$25-\$50 million+ capital investment. That's the bad news, but there is some good news. Most every data center is concealing almost as much capacity – rack space, servers, power, HVAC – as is being used. In fact a report by McKinsey & Company concluded that most servers are used at just 6% of their capacity and data center facilities as a whole are used at 50% of their capacity.¹

This is no surprise since most data centers have expanded, in some cases chaotically, to support increased user demand without the benefit of sophisticated new tools to manage the growth. This has resulted in considerable excess capacity just waiting to be reclaimed. The goal, of course, is to uncover and use that capacity efficiently without creating potential problems.

¹ McKinsey & Company – Revolutionizing Data Center Efficiency, 2008

Which Data Center Capacity Challenges Best Describe Your Situation?

The Over	The Under
<ul style="list-style-type: none">▶ Over-provisioning▶ Waste of resources and money▶ Lack of improvement▶ Unnecessary capital investment▶ 25-50% unused capacity	<ul style="list-style-type: none">▶ Limited resources▶ Lack of tools▶ Capacity constraints▶ High availability risk▶ Lack of growth planning

We have discussed some of the many challenges of managing data centers as they become more critical to the overall success of the companies they serve. We have pointed out that today data centers are more dynamic, have higher power density, and are more complex yet data center managers are being tasked with improving both uptime and capacity utilization at the same time.

If you are a data center operations manager without an effective process system to manage capacity (space, power, and connections), assets and change then you need a tool that will help you. If you are a data center or facility manager without an effective way to monitor and report energy, power, and critical environmental information then you need a tool to help you in these functions. What are needed and now available are the proper tools that will provide the visibility, control, and insight to better manage capacity and energy in an integrated way that will maximize data center efficiency.

A New Way: Data Center Infrastructure Management (DCIM) Software

Worldwide demand for new and more powerful IT-based applications, combined with the economic benefits of consolidation of physical assets, has led to an unprecedented expansion of data centers in both size and density. Limitations of space and power, along with the enormous complexity of managing a larger data center, have given rise to a new category of tools with integrated processes – Data Center Infrastructure Management (DCIM). Using spreadsheets has been an accepted way to track assets, but now, DCIM combines that capability with the added coordination of managing space, power and cooling.

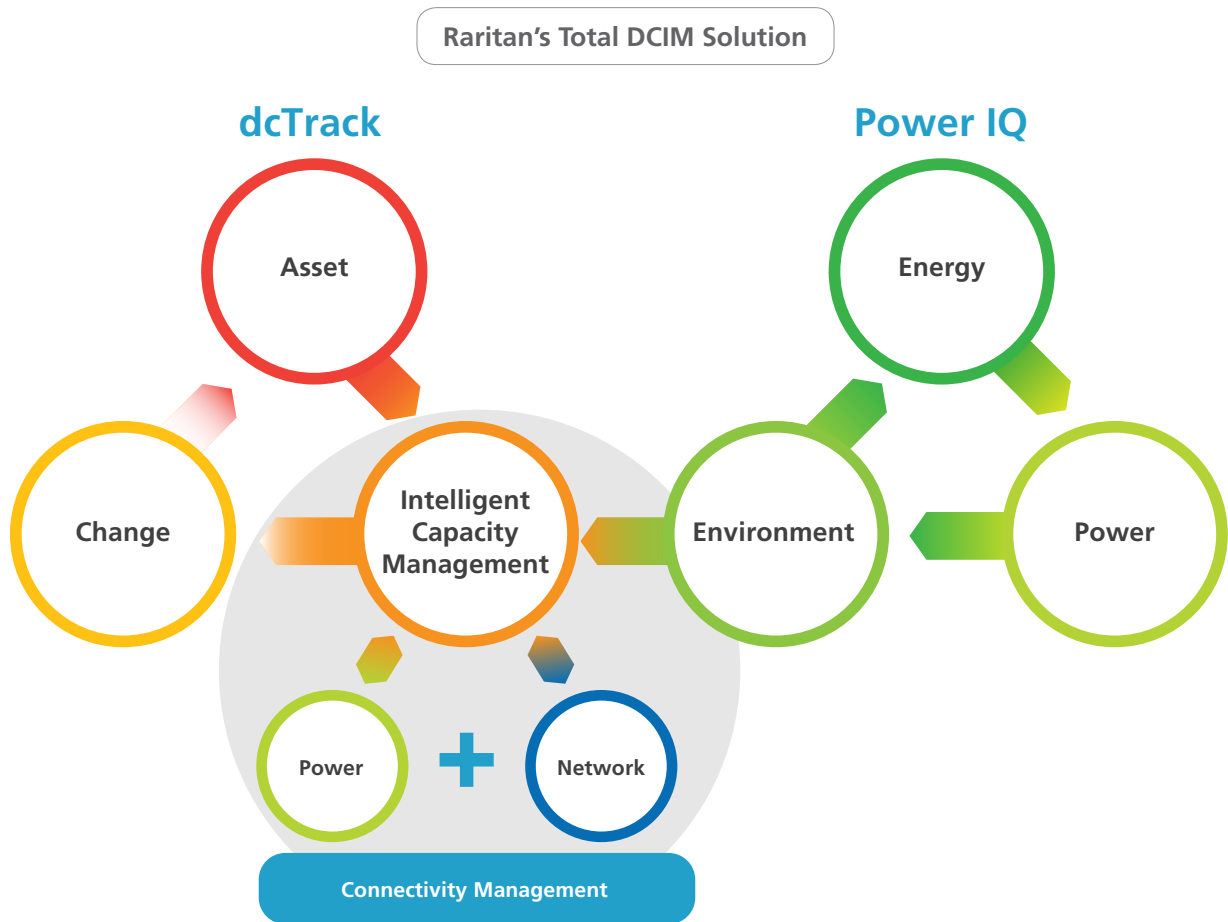
The New Truth in Data Center Management

Once properly deployed, a comprehensive DCIM solution provides data center operations managers with clear visibility of all data center assets along with their connectivity and relationships to support infrastructure – networks, copper and fiber cable plants, power chains, and cooling systems. DCIM tools provide data center operations managers with the ability to identify, locate, visualize, and manage all physical data center assets, simply provision new equipment, and confidently plan capacity for future growth and/or consolidation. These tools can also help control energy costs and increase operational efficiency. Gartner predicts that DCIM tools will soon become the mainstream in data centers, growing from 1% penetration in 2010 to 60% in 2014.

Basic DCIM components and functions include:

- ▶ Capacity Management: Capacity planning tools to determine requirements for future floor and rack space, power, cooling expansion, what-if analysis, and modeling
- ▶ Asset Management: Tools to capture and track assets, their details, relationships, and inter-dependencies
- ▶ Change Management: A process-driven structure with workflow procedures to ensure complete and accurate adds, changes and moves
- ▶ Energy Management: Real-time data energy collection and integration with real-time monitoring systems to collect actual energy consumption to optimize capacity management
- ▶ Power Management: Real-time power data collection and integration with real-time monitoring systems to collect actual power usage to optimize capacity management
- ▶ Environmental Management: Real-time data collection and integration with real-time monitoring systems to collect actual environmental data to optimize capacity management
- ▶ A Single Repository: One accurate, authoritative database to house all data from across all data centers and sites of all physical assets, including data center layout, with detailed data for IT, power and HVAC equipment and end-to-end network and power cable connections
- ▶ Visualization: Graphical visualization, tracking and management of all data center assets and their related physical and logical attributes – servers, structured cable plants, networks, power infrastructure, and cooling equipment
- ▶ Real-Time Data Collection: Integration with real-time monitoring systems to collect actual power usage/ environmental data to optimize capacity management, allowing review of real-time data vs. assumptions around nameplate data
- ▶ Reporting: Simplified reporting to set operational goals, measure performance and drive improvement
- ▶ A Holistic Approach: Bridge across organizational domains – facilities, networking and systems, filling all functional gaps; used by all data center domains

The New Truth: Raritan's Total DCIM Solution with Intelligent Capacity Management



The new truth in data center management is Raritan's total DCIM solution with Intelligent Capacity Management. Raritan is a recognized industry leader in DCIM. Raritan's DCIM solution is composed of its award-winning dcTrack® and is complemented by its Power IQ® infrastructure management software product. Raritan's dcTrack and Power IQ software solutions make up a comprehensive and industry-leading DCIM solution that can help you with the challenges of managing and maintaining a data center today and into the future.

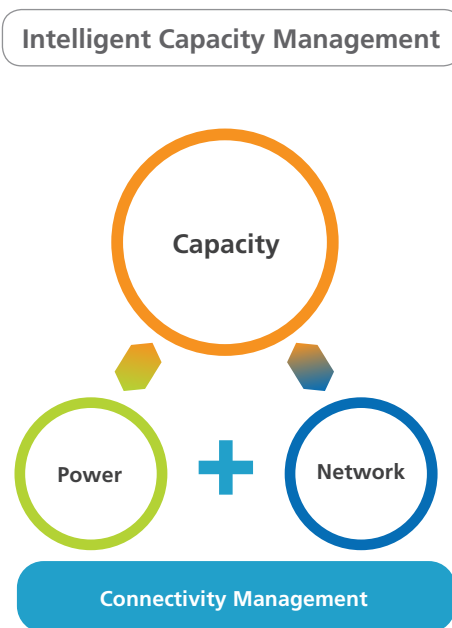
- ▶ Raritan's dcTrack is a data center capacity, change and asset management solution. dcTrack won Network Computing's New Product of the Year Award for 2011
- ▶ Power IQ is a data center power and energy management software product that compliments dcTrack by providing real-time energy, power and environment data

The New Truth in Data Center Management

- ▶ dcTrack is an easy-to-use data center infrastructure management (DCIM) solution that provides you with real-time information about your facilities, networks, and IT. dcTrack clearly visualizes your infrastructure to help you manage placement of your IT equipment, make informed capacity management decisions, and keep accurate track of your data center assets. dcTrack not only tracks your assets but the relationships between them making it a uniquely powerful tool. dcTrack is easy to implement, integrate, administer and operate, providing a fast ROI

Raritan's dcTrack– Asset, Change, and Intelligent Capacity Management

Raritan's DCIM solution offers all of the features and benefits of a basic DCIM and much more with its intelligent capacity management capabilities.



Intelligent Capacity Management is a capability unique to Raritan's DCIM solution. The key components of Capacity Management are; visibility, intelligent search, place and reserve, along with connectivity management. Connectivity management has two sub-components; power management and network connectivity management.

Capacity Management transforms an already powerful DCIM solution with basic capacity management capabilities into one with enormous additional performance and financial benefits. Capacity Management provides complete visibility into your data center capacity, the ability to control all critical relationships within capacity, and the insight to make intelligent capacity plans about the future.

Capacity Management will not only help you optimize your data center planning but more importantly allow you to better manage, on a real-time basis, your resources through its connectivity management capabilities involving full power chain management and network connectivity management.

The New Truth in Data Center Management

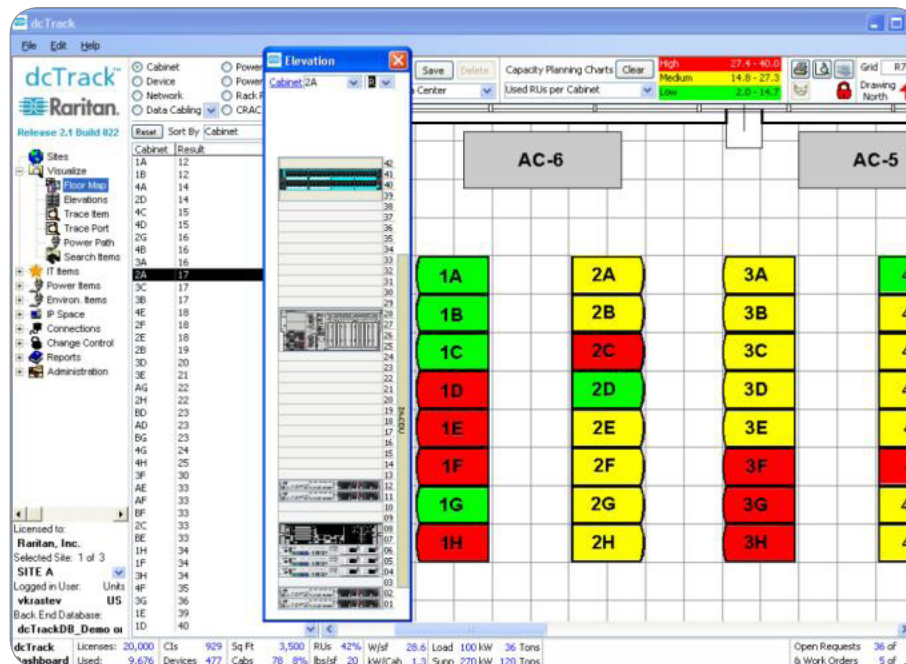
Capacity Management has sophisticated visualization, analysis and reporting so that you can achieve the following:

- ▶ Visualize
 - ▷ How much you have
 - ▷ Where you can deploy new IT equipment
 - ▷ How you can better utilize equipment
 - ▷ When it will run out
- ▶ Find available power, space and network
- ▶ Search, place and reserve IT equipment
- ▶ Capacity trend and forecast
- ▶ Make informed capacity planning decisions

The benefits of capacity management are enormous – by carefully managing and utilizing existing capacity, you can defer costly equipment purchases, delay new builds and make full use of your existing resources. By evenly balancing power, cooling and space, you can avoid stranded and fragmented resources. You'll make use of your data center assets, minimize capital expenditures and put an end to the constant reorganizations to free up resources.

Visualization Example: Coordination of Space, Power, Cooling, and More

Floor Map: The dcTrack floor map view is linked in real time to AutoCAD or Visio floor plans. CAD drawing changes are immediately visible and recognizable as new dcTrack objects. Customers can use multiple color-coded charts to view heat, space, weight and power load distributions.



The Connectivity Management Component

Data center managers often think of capacity planning as just being about physical space and power at the rack, things that you can manage with Visio and Excel Spreadsheets. In reality, capacity planning should correlate a number of additional attributes that will require you to have a comprehensive DCIM solution to perform. Power Chain Management and Network Connectivity Management are elements of Capacity Management and provide that extra level of correlation. Combined they create an entirely new DCIM solution capability called “Connectivity Management.”

What Is Connectivity Management?

Connectivity management encompasses two areas – full power chain and network connection management:

- ▶ **Full power chain management** is the ability to track the data center power path from the UPS to the PDU to the Branch Circuit to the Rack PDU to Outlet the Load. It tracks power capacity, nameplate, actual load, connector type and color code at each power connection point
- ▶ **Network connection management** tracks from the device NIC to switch to the patch panel to the structure cable to the router to the uplink. It tracks connections usage or availability, protocol data rate connector type, and color code

Why Is Connectivity Management Important?

A dynamic data center will have frequent adds, moves, and changes. Each of these actions in a high density environment requires you to answer the following questions – What is the impact on my power chain? Do I have available power and network connection capacity? Full power chain and network connection management provide fast, accurate answers to these and other questions which greatly reduces time and increases the reliability of making changes in the data center. It budgets power the same way an electrical engineer would, only the calculations are done in real time by the system before you make the change. This just might save you from overloading and faulting a branch circuit.

Have you ever needed a fast, accurate answer for the following question? – “How is this connected?” This question is frequently asked just after a service incident when time means money. You can improve your ability to respond to incidents by ensuring that you have your full power chain and all network connections documented for easy access to aide in tracking routes. You can search by Cable ID and display full connection paths with one click. Color code labels allow for easy identification in the troubleshooting and service-restoration process.

Most data center managers are tasked with getting the most out of the existing facility. This means uncovering all stranded capacity before you spend the millions of dollars to build a new facility. Full power chain and network connection management plays an important part in finding stranded capacity. By tracking power capacity and actual load at each point in the power chain you know exactly how much load you can add to each circuit. No need to strand capacity by over-engineering.

How Can Connectivity Management Benefit You?

Connectivity Management is part of a DCIM solution that offers a modern, easy to use web interface with intelligent guidance for creating power and network connections. This will save you time in making moves, adds and changes within your data center.

End-to-end power chain management gives you the ability to budget power at every connection point and the calculations are done instantly eliminating manual calculations and possible human error. It also prevents you from overloading a power circuit, and a visual trace route helps you reduce troubleshooting time and ultimately improves all important data center uptime. You also have the ability to view nameplate, budgeted and actual power (when metered) at every connection point. This provides the added advantages of helping you increase capacity planning accuracy and reduce unused power, which lowers PUE.

Virtual to physical network connectivity is a powerful component that provides the capability of connectivity of your physical devices to the virtual host. This is important for IP management, network color coordination, troubleshooting, planned outages, and building redundancy into your network to ensure availability. Having the ability to generate a visual trace route of the network chain is like that of the power chain and it also helps reduce troubleshooting time by gaining a perspective on the circuit to determine problems.

Intelligent search and place capabilities will correlate space, power, cooling, and connection resources and this will help you improve your data center capacity utilization. You have the ability to cable pathway from origin to termination when only the cable ID is known.

Connectivity Management Benefits Summary

- ▶ Circuit overload prevention
- ▶ Reduced troubleshooting time
- ▶ Improved data center availability
- ▶ Increased capacity planning accuracy
- ▶ Reduction in unused power
- ▶ Increased capacity utilization

Raritan's DCIM: Intelligent Capacity Management Application Examples

Data Center Visualization, Reports – Reclaiming Capacity. For all new DCIM users, for the first time they will be able to have point-and-click access to visualize and identify every physical asset in the entire data center; i.e. where each rack is located, what device is installed in each rack elevation, how each device is powered and connected in the network. This visualization alone offers managers a new perspective and confidence to understand what they have and what low-hanging fruit is available for improvement – empty open rack space, excess PDU capacity, and network connections. DCIM tools will also enable you to “drag and drop” servers into empty rack space and quickly search for necessary power, HVAC and network resources that are available and avoid possible circuit overloading. Detailed reports provide information on all items present in racks, cabinets and ports with exact information about capacity that will help avoid over- or under-utilization.

Power Consumption/Reduction – All server manufacturers provide nameplate information on peak power load, a conservative number that will be far greater than actual power requirements. Many data center managers, without automated tools like a DCIM, will use this nameplate data as a guide for server-PDU connection and therefore minimize the number of servers supported within a rack and a PDU, resulting in a significant, unnecessary waste of money and energy. Merely adopting an industry-accepted standard of de-rating nameplate power by 30% and using a DCIM to measure and manage the effect will increase the number of servers supported by a PDU by 37% with corresponding savings in floor, rack and PDU costs while maintaining quality service levels.

Data Center Expansion, Consolidation Modeling – Once you have a complete, accurate representation of all data center physical assets, both IT and executive management will have the confidence to establish operational benchmarks, performance goals, and procedures for measuring improvements toward maximizing the use of existing data center capacity. Ongoing DCIM controls and reports will facilitate the alignment of the IT function with the organization’s overall business plan, which may result in data center expansion and/or consolidation. DCIM modeling tools with sophisticated “what-if” scenarios enable IT management to “build and layout” the entire data center and then work with executive management to smoothly plan, finance, manage and complete the project.

dcTrack Product Capabilities and Benefits Summary

Capabilities	Benefits
Intelligent Capacity Management <ul style="list-style-type: none"> ▶ Available power, space and network ▶ Search, place and reserve IT equipment ▶ Capacity trend and forecast 	<ul style="list-style-type: none"> ✓ Improved Planning ✓ Reduced costs ✓ Increased service levels ✓ Handle application growth ✓ Better power and space utilization ✓ Increased staff efficiency ✓ Delay capital expenditures ✓ Eliminate over-provisioning ✓ Avoid stranded and fragmented resources ✓ Balance power, cooling and space ✓ End reorganizations to free up resources ✓ Circuit overload prevention ✓ Reduced troubleshooting time ✓ Improved data center availability ✓ Increased capacity planning accuracy ✓ Reduction in unused power ✓ Increased capacity utilization
Change Management <ul style="list-style-type: none"> ▶ Workflow for moves, adds and changes ▶ Approvals and status ▶ APIs to third-party ticketing 	
Accurate Asset Management <ul style="list-style-type: none"> ▶ All data center physical resources and logical connections ▶ Maintenance and lease information ▶ Intelligent rack asset strip 	
Energy, Power and Environmental Management <ul style="list-style-type: none"> ▶ Accurate view of power usage ▶ Real-time power and environmental monitoring ▶ Easily monitor energy trends 	
Visualization <ul style="list-style-type: none"> ▶ Dashboard ▶ Floor plans ▶ Rack and row elevations ▶ Power chain ▶ Network and data ports 	

dcTrack: The Rest of the Story

Raritan's dcTrack allows you to create a single data base as the trusted repository of all assets, their attributes and their relationships. It provides the software tools to discover, document, visualize, and report on physical and virtual data center assets – e.g., floor space, racks, servers, PDUs, UPS, panels, storage, network environment and cables.

It includes the automated functions to facilitate building and maintaining the database. It contains the automated processes for all users to manage the entire cycle of all changes with complete audit trails to ensure the continued accuracy of the database. In addition, it has the capability to interface with monitoring tools to collect data on power usage to ensure that conditions for potential system failures (e.g., overloading power circuits) are avoided.

It offers compatibility with any current Excel and/or Visio worksheets so that the setup and transfer of existing information is quick and easy. It has a common data model, cross database integrity and it is open to third-party applications.

dcTrack contains automated preloaded product libraries for additional setup efficiency with automated calculating capabilities to convert certain data elements into powerful real-time analytics. It provides key dashboard summary data and graphics with the ability to drill down a little or a lot for whatever level of detail is needed at any particular time. It offers a high degree of "visualization" capabilities to instantly see floor plans, physical assets, power chain and network chain connecting points, and to enhance reporting.

dcTrack and Power IQ are designed to work together. Enter data once in dcTrack, and it's automatically populated into Power IQ. Additional assets are automatically uploaded using dcTrack's intelligent asset management tags for real-time accuracy and precision down to the 1U level. Immediate alerts occur if an asset is moved, which keeps your data accurate and virtually eliminates costly miscalculations in space and capacity.

Raritan's DCIM solution virtually allows you to mechanize your world, allows you to mechanize it now, and gives you the ability to meet today's data center challenges. It allows you to be proactive and get ahead of growing future facility and IT needs in data center

A dcTrack Testimonial

"With dcTrack we have an up-to-minute picture of capacities in all our data centers in terms of power, space, networking and cooling. As a result, we are able to track our data center capacity more accurately and assess our infrastructure needs for the future. Before we deployed dcTrack, it would mean a trip out onto the data center floor to confirm or deny that a server is in a certain location. Now, we can just pull up the asset information on the dcTrack screen and see that server X is located in this rack, in this U; or see that it is no longer a physical server, but is now a virtual server. Accurate asset records have given us a 50 percent gain in efficiency in terms of locating an asset's physical location within the data centers. dcTrack leads us through each step of the process to fulfill a new server request. Once the IT equipment gets delivered to us, we then go do the physical racking, connecting, labeling – and then come back and close out the request in dcTrack, which notifies LANDesk that the equipment is ready to go. This process makes it easier to make adds and changes, and improves the accuracy of our asset inventory."

Joseph Keena
Manager of Data Center Operations,
Shands Healthcare

planning, management, and optimization. Consider this: dcTrack offers you the possibility to “Future-Proof” your environment by allowing you to prepare for almost any business scenario related to data center management.

Finally, you will find Raritan’s DCIM solution with dcTrack to be financially affordable and flexible with the ability to demonstrate a positive ROI to your organization. It includes the internal analytical tools to accurately calculate the bottom line cost savings with the ability to do it real time, per week, and yearly. It captures your total investment in dcTrack, performs the change analysis that shows savings and completes the ROI and payback period.

Options to Deploy Raritan’s DCIM Solution

Raritan’s dcTrack and Power IQ offer you a complete solution that is flexible and future-proof. You can purchase the entire solution for full coverage, or choose what you need right now and add on later. Your investment is protected because Raritan has been in business for 25 years and it is not going anywhere.

You can choose to deploy as much or as little as you want, when you want to. The range of data center problems noted above are common in most data centers today. Which problem areas are most critical to your company only you know for sure but you probably have multiple areas immediately in mind that you would like to attack right now.

One reasonable approach then is to do just that and utilize Raritan’s dcTrack as part of a pilot to prove a hypothesis around an important business need related to your data center. Because dcTrack is easy to deploy with module flexibility you can isolate one or more key problem areas to focus on right now. Once you have realized the initial benefits then the ability to expand into other key elements for extended coverage and greater benefit can be realized. This gives you the flexibility to architect a larger solution after pilot success.

Creating a measured upgrade cycle over time would be a logical next step. Gaining the necessary budget approval in advance will be easier because your previous investments would have proven successful in controlling expenses, improving productivity while achieving more reliable service and increased availability.

“ With dcTrack we have an up-to-minute picture of capacities in all our data centers in terms of power, space, networking and cooling. As a result, we are able to track our data center capacity more accurately and assess our infrastructure needs for the future.”



Joseph Keena
Manager of Data Center Operations,
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The Simple Truth

As we have discussed, Data Center Infrastructure Management software solutions offer data center managers and related colleagues and management with a powerful new tool for dealing with their facilities, IT and network challenges today and in the future. As a data center manager deploying a DCIM solution you can position yourself and your organization to drive significant operational and cost-saving benefits to your company. Now is the time to take advantage of a total DCIM solution offered by Raritan, Inc., that is easy to use, fully supported, and that has the flexibility to be implemented and adapted to your environment based on your particular challenges and needs. Raritan offers a simple rack-based licensing model that includes all modules and allows for unlimited users with participation from outside of the data center.

The simple truth of Raritan's DCIM solution is that it will help you find the space and capacity you have in your data center and will tell you how all your assets are physically connected so you can know where you have power and if you have enough power. The Raritan DCIM solution will help you organize all of your assets to achieve new levels in your data center planning, management, and optimization. It will simply make you and your organization more valuable to your company.

About Raritan

Raritan is a proven innovator of power management, infrastructure management, KVM and serial solutions for data centers of all sizes. In more than 50,000 locations worldwide, Raritan's award-winning hardware and software solutions – including intelligent rack PDUs; energy management software; DCIM software solutions to effectively manage data center capacity, assets and change; KVM-over-IP and Serial-over-IP access products – provide IT and facility directors, managers and administrators with the control they need to increase power management efficiency, improve data center productivity and enhance branch office operations. Raritan's products have always distinguished themselves as easy-to-use and best-in-class performers. As your organization begins to explore DCIM tools, we invite you to consider Raritan's dcTrack as your solution. For more information, please visit Raritan.com

Raritan is an active member of the Green Grid, Climate Savers Computing Initiative and the Leadership in Energy and Environmental Design associations. The company was recognized by the EPA for its contribution to the agency's data center initiative.