Frankfurt Airport

InfraStruXure® enables growth, high density and availability at once

In January 2007, a data centre was built for gedas operational services (gedas os) on the campus of the Fraport AG, owner and operator of Frankfurt Airport. The new data centre was built to reliably support the airport's ground services, freight processing, office communication and the flight information systems.

To maintain its competitive position as an international air-traffic hub, Frankfurt Airport must continue to grow. The new data centre represents a strategic pillar underpinning Fraport's growth, which at the same time will produce cost savings.

"The APC InfraStruXure solution, with its integrated high-density system, best matched our planning, and features modularity, scalability and good cost-effectiveness," said Falk Wieland, line manager, data centre at gedas os. "APC also provided us with many other services, impressing the project managers with their professionalism, commitment and expertise."

Perfectly integrated cooling

For its various service levels, gedas os provides various rack constellations: two open rack series or equipment with low current densities and cooling requirements, then two high-density HACS

(Hot Aisle Containment Systems) grouped into cubes from which rows of racks for blade server applications radiate.

"Demand on the market is definitely heading towards highly available blade technology," said APC's overall project owner Andreas Veltkamp. "In this regard, too, gedas os is ideally prepared for the future. With our high-density approach, the existing solution has room for several thousand blade servers running flat out, without the system lacking availablity."

Get more information on APC® by Schneider Electric solutions at *www.apc.com*

998-1604

by **Schneider** Electric

Solutions for High-Density Environments

High-density (HD) zones enable new technologies and unlock the doors to data centre efficiency. APC® by Schneider Electric lets you deploy an HD environment anytime, anywhere.

Monitor the environment

Maintain availability

Manage the cooling

APC®

by **Schneider** Electric

Name: Fred Clarke

Position: Head of Research IT

Company Name: University College Dublin

Industry: Education

Greatest Challenge: Incorporating new technologies, accounting for future growth

University College Dublin trusts InfraStruXure® to deliver high-density services

What obstacles did you face in planning and building your data centre?

"The construction of the Research IT Data Centre represented a challenge from a number of perspectives. Since the researchers are the clients for the new service and they define their own IT requirements, the facility needs to cater flexibly for expanding future needs."

What were you looking for in a data centre solution?

"We were looking for a solution that didn't need a raised floor for cooling, since there's a concrete floor in the room. But we also needed something that could incorporate high densities without creating the risk of hot spots."

So what initially led you to choose APC for your high-density data centre?

"We literally could not meet the capacity specifications required of that room without APC equipment, their power and cooling systems. The new service enables UCD to support the research community from entry level equipment up to high-density computing."

How does the InfraStruXure architecture take that necessary flexibility into account?

"Each group plans and buys their own IT equipment based on the requirements of their research. If during the coming year people buy very dense equipment, we may need to install more power and cooling equipment. On the other hand, if they buy less dense equipment, then we have the capability of deploying more IT equipment racks.

"It gives us the ability to say that this is where we're at now and in a year's time we need more cooling, more power, or more space. APC's InfraStruXure really is that flexible."

Read how APC® by Schneider Electric helped solve other customers' high-density challenges at *www.apc.com*

Now You Can
# Deploy High Density,
Anytime, Anywhere

Efficiency is easier than you think. High-density zones can be deployed anytime, anywhere, and enable the IT trends that are making today's data centres more manageable than ever before. With complete visibility into the physical infrastructure, IT managers can now eliminate hotspots, remove human error, and gain complete control over their data centres, no matter how often hardware changes occur.

It's that easy: InfraStruXure® high density solves problems. Say goodbye to unpredictable, inefficient cooling. Say goodbye to unpredictable power events and unplanned downtime. Say goodbye to cluttered enclosures and delayed server deployment.

With two ways to deploy high-density InfraStruXure architecture in your data centre, there's no reason your company can't start reaping the benefits of virtualisation right away:

InfraStruXure HD overlay.
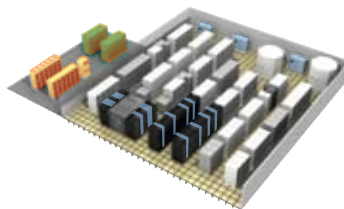
The flexible InfraStuXure architecture allows you to identify the specific areas of high-density computing in your large data centre and "overlay" the InfraStruXure zone—no matter the size or configuration. You'll be able to neutralise and manage these high-density zones in your existing facility and be rid of the erratic heating problems that come with perimeter-only solutions.

Entirely InfraStruXure HD.

If you're already feeling the heat from high density driven by virtualisation, the InfraStruXure HD-Ready System's row-based cooling and management will allow you to handle 20kW or more per enclosure and deliver system-wide visibility and control, with plenty of room to grow.

But even if you're not ready for a complete data centre buildout, it's never too early to start laying the basic HD framework in place, that way you can respond quickly to future change. Add enhanced monitoring, power and temperature control, software management, and high capacity air conditioning units, and you can quickly scale up to a higher density when the need requires.

APC High-Density Enclosure Solutions:
Take the Right-Sized Approach to True Efficiency

Now virtualisation has a high-speed lane. By implementing the 7 Principles of InfraStruXure® HD-Ready Architecture, you'll put your data centre on the fast track to optimal efficiency, making the best use of your available space and still allowing for future growth.

With a high-density solution, you'll be rid of the challenges typically associated with server consolidation—excessive heat, inefficient perimeter-only cooling, power events created by virtual loads.

Instead, you'll be reaping the benefits of virtualisation:

> Easier management of the environment as a whole

> Fewer devices to keep track of

> Increased CPU utilisation and efficiency

> Increased enclosure space and reduced "white space" requirements

> Reduced labor costs due to easier hardware provisioning and maintenance

InfraStruXure®
DATA CENTERS **ON DEMAND**

7 Principles of InfraStruXure® HD-Ready Architecture...

1 Enclosures that are HD-Ready
Start with vendor-neutral NetShelter® SX enclosures, engineered to handle the airflow, physical weight and power needs of power-hungry, high-density servers.

2 Metered PDUs at the rack level
Install metered rack PDUs to indicate which enclosures and outlets have capacity for new HD servers … and which ones don't.

3 Temperature monitoring in the racks
Add local or remote monitoring of temperature and humidity where it counts—in your enclosures.

4 Centralised monitoring software
Monitor all power, cooling, security, and environments from one management system using real-time data at the row, enclosure, and U level.

5 Software to manage capacity and change
Instead of guessing, know for sure where to place your next server within the enclosures based on available power and cooling capacity. Effectively eliminate downtime due to overloaded circuits or exceeded cooling capacity.

6 Efficient InRow® cooling products
Innovative, responsive, variable-speed fans optimise efficiency by closely matching performance to your variable cooling needs.

7 UPS power that is flexible and scaleable
Respond quickly and efficiently, without wasteful oversizing, as UPS power demands grow. Depending on your needs, choose a scaleable row, in-room, or backroom UPS solution.

The scaleable design of the **Symmetra® UPS** provides modular, fault-tolerant power protection that makes it easy to adapt to changing power requirements.

NetShelter® SX enclosures provide superior door ventilation and scaleable cooling options to address escalating heat densities.

The scaleable suite of **NetBotz® environmental sensors** and cameras protect your physical infrastructure from a host of environmental conditions, including heat, dust and moisture.

The modular design of the **InRow® cooling unit** allows close coupling of IT loads with air conditioning units, increasing predictability and agility.

With both local and remote visibility, **metered rack PDUs** provide active monitoring and alarms to warn of potential circuit overloads.

Change Manager lets you deploy new hardware quickly and confidently, while **Capacity Manager** helps align your IT needs with the capacity of your physical infrastructure.

InfraStruXure® Central is a scaleable management appliance to manage your APC devices and monitor networked third-party devices in real time.

High-Density Overlay:
The Solution for a Low-Density Data Centre

Running a large data centre is hard enough. But when you virtualise without the right physical infrastructure to back it up, you put additional pressure on your power, cooling, and management systems, leaving you worse off and less efficient than before.

Overlaying InfraStruXure® architecture into an existing large data centre gives you the best of both worlds: virtualisation, and power and cooling efficiency. The independence of this high-density "island" allows for predictable and reliable operation of your high-density equipment without a negative impact on the performance of the existing low-density infrastructure.

Just choose a specific area of high-density computing and "overlay" the InfraStruXure zone—no matter the size or configuration. The result? A mini data centre within your data centre, thermally invisible to the rest of the room.

This easily installed InfraStruXure solution enables the benefits of a virtualised, consolidated IT environment at a lower relative cost than other solutions, and will offer you greater efficiency than virtualising alone:

> Immediately eliminates hot spots by putting all the high density in one place.

> Heat from this zone has no impact on existing data centre cooling system.

> Can be powered with existing UPS and power distribution systems, or as a dedicated system.

SCHEMATIC LEGEND:

■	CRAC UNITS
■ ■	STANDARD-DENSITY ENCLOSURES
■	CENTRALISED UPS
■ ■	INFRASTRUXURE HD-READY ZONES
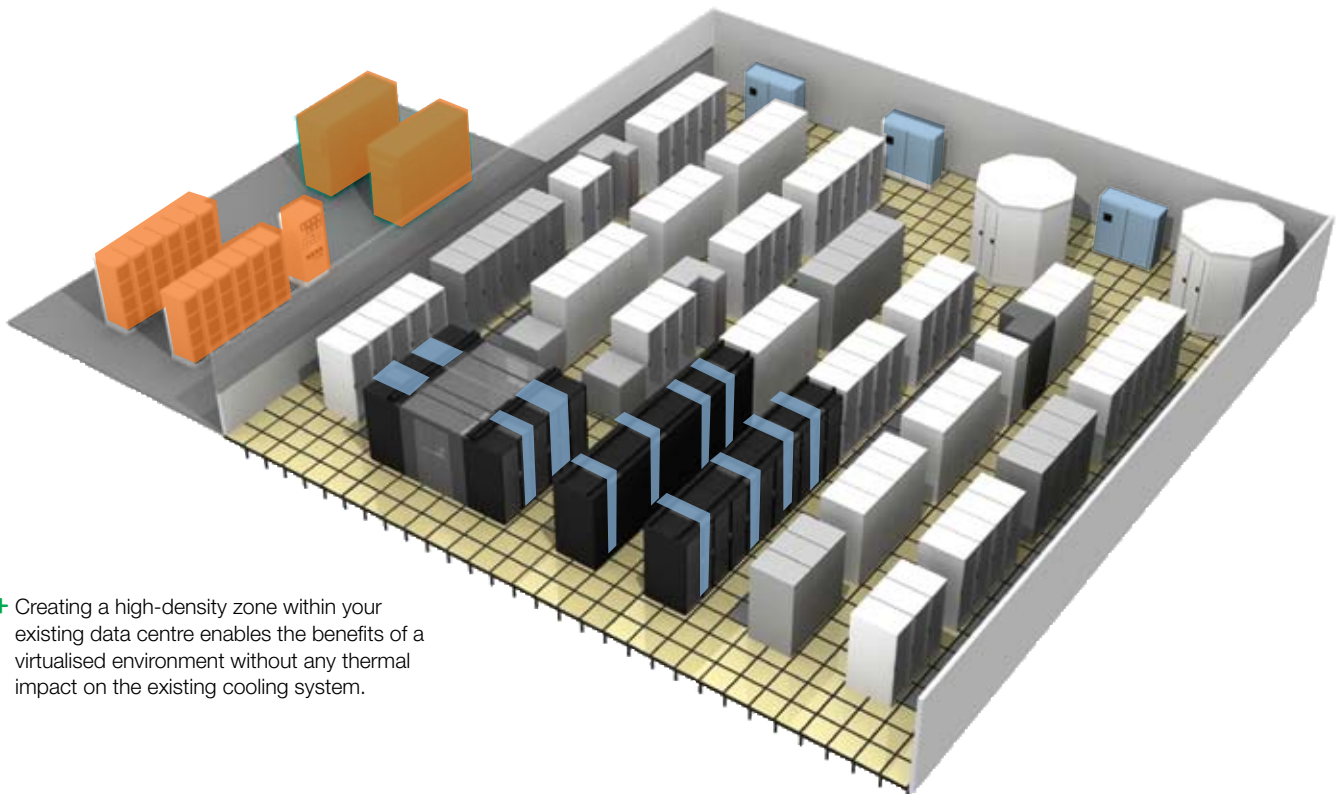
+ Creating a high-density zone within your existing data centre enables the benefits of a virtualised environment without any thermal impact on the existing cooling system.

APC's 7 Principles of HD Architecture:
Individually Awarded for Excellence

Awards

- Winner of the 2007 Frost & Sullivan Award
  for Best Global Data Centre Solutions

- 2005 Innovation Award Finalist for InfraStruXure® with
  Integrated Fuel Cells by *Electrical Contracting Products*

Vendor-neutral enclosures that are HD-Ready:
NetShelter® SX enclosures

- Winner of the 2007 Product of the Year for Racks & Enclosures by *EC&M*

Temperature monitoring in the enclosures:
NetBotz® sensors, cameras, and accessories

- One of the 2006 Editors' Choice Top Products Picks by *Buildings Magazine*

Centralised monitoring software:
InfraStruXure Central

- Winner of the 2007 Best of FOSE for Data Management Software by
  Government Computing News

Software to manage capacity and change:
**Capacity Manager and Change Manager**

- Winner of the 2006 Product of the Year by *Searchdatacentre.com*

Precision cooling at the enclosure level:
InRow® cooling units

- Winner of the 2006 Product of the Year Award by *Searchdatacentre.com*
- Winner of the 2005 Product of the Year Award by *Communications Solutions*

Modular UPS power that is flexible and scaleable:
Symmetra®

- Winner of the 2002 Reader's Choice Award for Best UPS by *Windows &
  .NET Magazine*

- Winner of the 2002 Reader's Choice Award for Energy Management by
  Today's Facility Manager
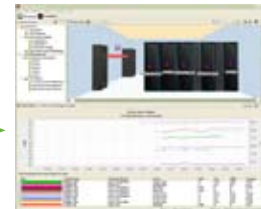
In-Row Cooling:
The Building Block for High Density

InRow® cooling units put your data centre on the path to high density. By tackling hot exhaust air at its source, you'll restore predictability, improve availability, and completely eliminate the variability introduced by raised flooring.

It's a solution that achieves more by doing less. When you reduce the distance between the cooling source and the heat load, air mixing is minimised and availability is improved. Meanwhile, fan energy is typically 50% lower than legacy systems, and you're now able to target density where needed, unlike room-level designs.

Additionally, row-based cooling affords you several advantages not offered by perimeter-based cooling systems:

> Well-defined and predictable airflow paths, making the capacity and redundancy known at any enclosure.

> Improved energy efficiency and right-sizing of the cooling system, which reduces total cost of ownership.

> Restored cooling redundancy to a previously overloaded perimeter cooling system.

+ Row-based cooling can lower the total cost of deploying high-density servers by maximising floor space.

Efficiency & Virtualisation
Your servers are efficient,
but is your power and cooling?

COOLING
USAGE/CAPACITY

SERVERS

POWER
USAGE/CAPACITY
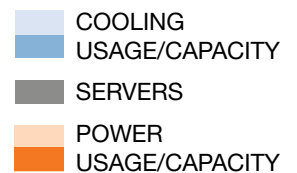
Pre-Server Virtualisation

Big gains could be made with both server and power and cooling.

☐ Correct Server Utilisation

☐ Correct-sized Power

☐ Correct-sized Cooling

29%* **Efficiency**
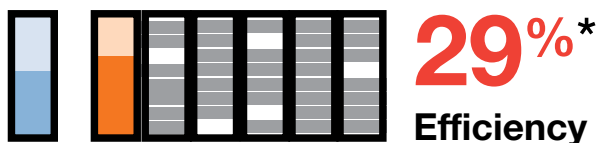
Post-Server Virtualisation

Grossly oversized power and cooling cancels out potential gains made by virtualising.

☑ Correct Server Utilisation

☐ Correct-sized Power

☐ Correct-sized Cooling

16%* **Efficiency**

Containing the Heat:
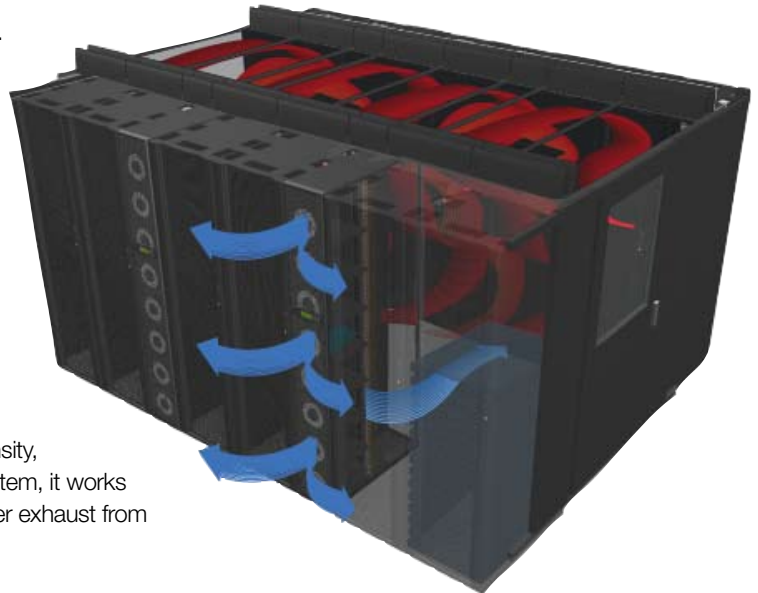# For Enhanced Predictability at the Enclosure and Row Level

Hot Aisle Containment

Delivering cold air is not the problem—getting rid of the hot air is.

For data centres with more than one row of HD enclosures, Hot Aisle Containment (HAC) can improve cooling efficiency and predictability more than row-based cooling alone.

The system contains the heat by sealing off the hot aisle, so the hot exhaust is captured at its source, before it ever has a chance to mix with the cooler ambient air. Catching all this hot air effectively makes cool air distribution a secondary issue.

Rack Air Containment

For data centres with just a few enclosures or one row of high density, Rack Air Containment (RAC) may be a better fit. As a modular system, it works in conjunction with NetShelter® SX enclosures to prevent hot server exhaust from escaping into the room.

The system attaches to the rear of the enclosure, forcing the hot air to pass through the InRow® cooling unit, while front containment can also be added to provide additional isolation of airflow.

+ Hot Aisle Containment captures the hot air at its source, effectively making cooling a secondary issue.

Server Virtualisation with Power and Cooling

Right-sized power and cooling tip the balance back in your favor.

☑ Correct Server Utilisation

☑ Correct-sized Power

☑ Correct-sized Cooling
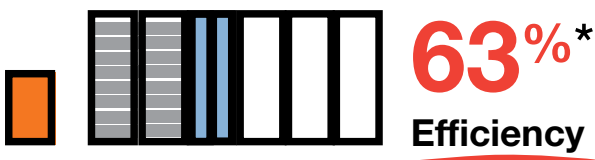
63%* Efficiency

Cooling with InRow units leads to highest efficiency...

Gain thermal efficiency with our InRow cooling products. Closely coupling the air conditioning with the heat source reduces the distance cold air must travel (from 15 meters down to 2 meters), prevents hot exhaust air from mixing with cool air in the room, and allows more targeted precision cooling.

*Efficiency Index: According to the Green Grid, efficiency is based on the relative relationship between server utilisation and the overall power and cooling efficiency. If you right-size one without the other, you won't realise true efficiency gains.

the green grid™

Schneider Electric Critical Power and Cooling Services:
Partners in Optimised Availability

Services enable your high-density solution to hit the ground running, ensuring an optimised facility plan, streamlined project management, and a speedy deployment.

Need help making the transition from your current setup to an HD-ready data centre? Our service engineers handle that, too—from server migration and cable management to software integration.

With Schneider Electric Critical Power and Cooling Services, you can concentrate on your business demands while we handle the rest. Remote monitoring and preventive maintenance options help prevent problems before they occur—and when they do, on-site service engineers minimise downtime by correcting the situation as quickly as possible.

Visit *www.apc.com* and click on the Services tab to find the global service representative nearest you.

" They genuinely expressed an interest to solve our problems, with no pressure. Support was always professional, knowledgeable and responsive. That is a true business partner. "

—Danny Baca,
Telecom Admin/Operations
AltaOne Federal Credit Union
Ridgecrest, California

Partnering for a Greener Data Centre

A quick look at our list of partner companies is enough to show any customer how devoted we are to providing a complete data centre solution. But to help carve out a model for future data centre efficiency, APC also partners with the Green Grid, a global network of companies dedicated to advancing energy efficiency in data centres and business computing ecosystems.

As a member of the Green Grid board of directors, APC is helping develop the standards, measurement methods, processes, and new technologies that will make tomorrow's data centres more efficient. So by choosing APC, you ensure that you, too, are on the cutting edge of tomorrow's most efficient data centre technology.

For more information, visit *www.thegreengrid.org*

The following have been tested and work best with InfraStruXure® Solutions…

Tested and Approved for InfraStruXure®

SQUARE D

Square D® is a market-leading global brand of Schneider Electric for NEMA-type electrical distribution and industrial control products, systems, and services.

t.a.c

TAC provides building environment services for indoor climate, security, and energy use, via advanced technology to end users and property.

DELL

Dell is a global systems and services company offering a broad range of product categories, including desktop computer systems, servers and networking products, mobility products, software and peripherals, and enhanced services.

CISCO PARTNER — Technology Developer

Cisco, the leading supplier of networking equipment and network management for the Internet, recognises APC as a Cisco Technology Developer Programme partner for its InfraStruXure architecture.

Microsoft®

APC is proud to be recognised as a supporter of the Microsoft Technology Centres throughout the U.S. with our InfraStruXure solution.

PELCO

*Pelco is a worldwide leader in the design, development, and manufacturing of video security systems.*

EMC² SELECT

APC is a member of the EMC Select programme, which offers the InfraStruXure product line to complete your EMC Storage Solution.

IBM® ALLIANCE PARTNER

The largest computer company in the world, IBM manufactures and sells hardware and software and offers infrastructure services, hosting services, and consulting services in areas ranging from mainframe computers to nanotechnology.

vmware® technology alliance PARTNER

VMware is the global leader in virtualisation solutions from the desktop to the data centre.

the green grid ℠
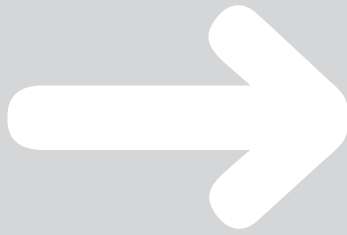
Your Next Steps

Looking for more information about one of our products? Curious to see how our solutions work in a real-world environment? Want to see a NetBotz® device in action?

APC online tools, research guides, and online courses give you all the background you need to make informed decisions and smart investments.

CHECK OUT… APC online resources
APC has developed a wealth of online tools to help you clarify your requirements and explore your options:

- TradeOff Tools™
  These easy-to-use, Web-based applications enable data centre professionals to experiment with various design scenarios, including virtualisation, efficiency, and capital costs.

  tools.apc.com

- Online Selectors
  The APC Online Selector Tools cut right to the chase to recommend the products that best meet your needs, saving you time and hassle.

  All the Selector tools are accessed via the "Selectors" tab in the top menu bar at *www.apc.com*

- Test Drive
  See products like InfraStruXure® Central and NetBotz® 500 in action, with live images sent right to your desktop to show you the functions you can expect from our products.

  http://testdrive.apc.com/

READ … APC Data Centre Science Centre research
APC has spent more than €60 million researching solutions to the most pressing customer problems. Take advantage of more than 100 "must-read" white papers, practical how-to guides, and other thought-leadership publications from the world's leading R&D centre on power, cooling, and physical infrastructure issues.

- Implementing Energy Efficient Data Centres (#114)
- Ten Cooling Solutions to Support High-Density Server Deployment (#42)
- Rack Powering Options for High Density (#29)

  Browse through the entire APC library of research by going to our Information Centre at *www.apc.com*

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Get answers, help others, or simply explore the blog posts of our virtual community members.

www.apc-forums.com/index.jspa

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