



Optus Hosting Centres Thrive with Proper Cable Management

CASE STUDY

Data centres that support both space-saving density and heavy reconfigurations without disrupting service or causing day-to-day operations nightmares offer advantages to service providers. From the main distribution frames to the active ports, a zone distribution design for the data centre improves network reliability while reducing operating costs. The performance of the overall data centre is therefore only as strong as the structured cabling design and managed density infrastructure components surrounding routers, multiplexers, servers, media gateways and other active equipment.

Optus is the second largest service provider in Australia, providing over six million consumer and business customers with services that include mobile, local, long distance, Internet, satellite and subscription television. An important value-added service for business customers is hosting solutions in Optus data centres in Sydney and Melbourne. These hosting centres allow customers to lease rack space from Optus to install and manage their own equipment. Geared for business customers in industries such as retail and banking, the hosting centres provide a valuable service for business customers who don't have a properly controlled data centre environment or just prefer to outsource hosting of business systems so that a vendor—in this case, Optus—is responsible for providing a data centre environment with 24/7 support.



Danny Vertouris, Optus and Adelle Ly, ADC KRONE inspect the OMX-600 fibre distribution frame

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The original build was designed to minimise initial costs. Five structured cabling vendors provided the category 5e copper, singlemode and multimode fibre, and connectivity solutions for the infrastructure. After several years of operation, Optus looked to improve the way it delivers services with the data centres, ensuring exceptional reliability for existing customers and grow the data centres business.

The tender for the new build proposed state-of-the-art components, including category 6 cabling, OM3 multimode fibre, and enhanced cable management that would allow increased density while providing a secure, flexible and manageable environment.

Same Design, More Advanced Solutions Required

The data centre design is a simple, logical cube set architecture with three building blocks—

the hosting rack, the switch rack and the infrastructure rack. The basis of the architecture is the customer cube that consists of 10 hosting racks for customer-owned equipment plus switch racks placed as bookends for each lineup. The hosting racks, leased space where customers come in, plug in and maintain their hardware, are not purpose-built cross-connects. Rather, depending upon the lineup, each hosting rack is terminated with live UTP, coax, singlemode, or multimode fibre that is pre-provisioned to the switch racks within the customer cube.

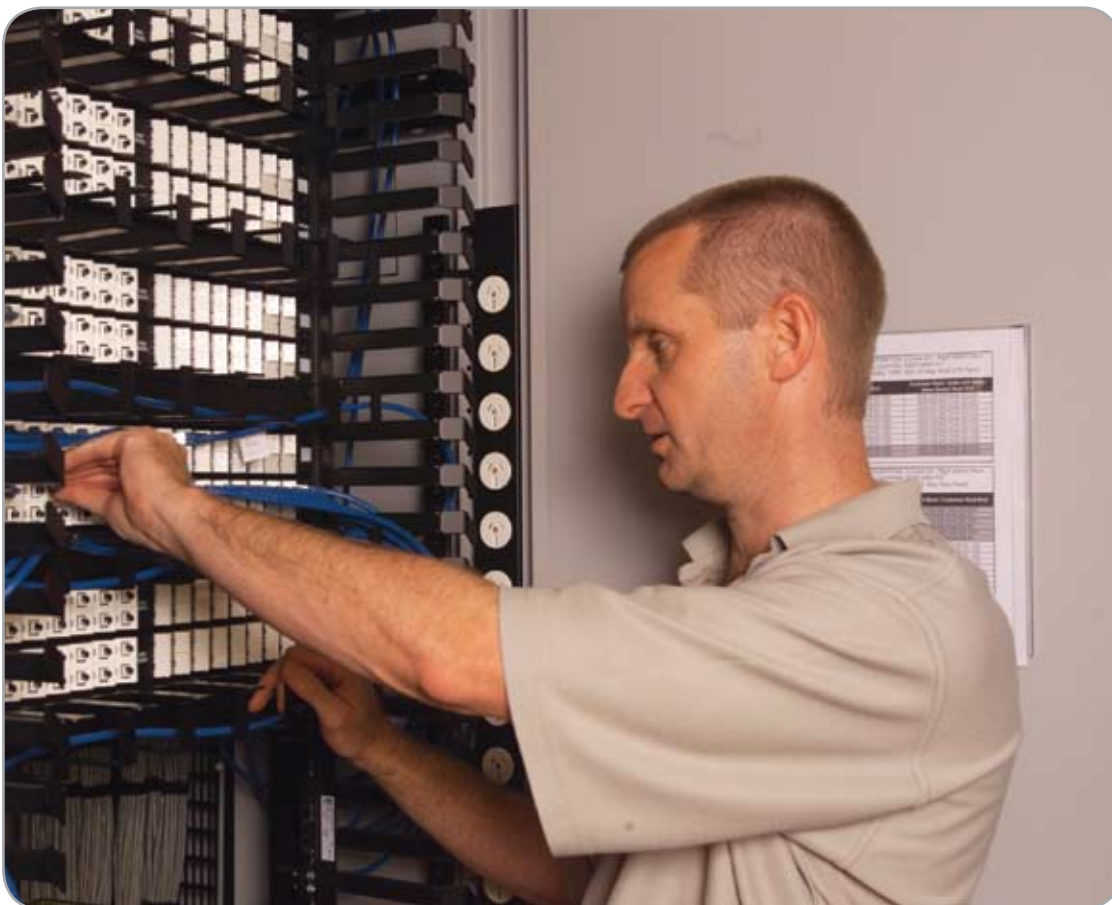
Within each customer cube, the two switch racks provide connections between the lineup of 10 hosting racks, enabling communications between racks through simple patching at cross-connects racks. Each customer cube lineup of 10 hosting racks and two switch racks becomes an island within the data centre and can cater to the requirements of a customer data centre.

Devoted to each 15 customer cubes is an infrastructure cube with eight cross-connect racks. This next layer of cross-connect functionality provides connections between different customer cubes within the highly modular hosting centre. Simple patching allows a device in hosting rack 3 in customer cube 1 to access equipment in rack 9 of customer cube 14. This aggregation of 15 customer cubes and the infrastructure cube is defined as a cube set, supporting 150 customer-hosting racks. One benefit of this design is the ability to allow customers to easily grow their leased rack space when adjacent rack space is unavailable.

At the next level of the architecture, each cube set is cabled to fibre and copper main distribution frames that provide cross-connects for access to outside services.

This hierarchical cube set architecture has been a significant factor in attracting hosting customers. In practice, a lot of customers run a lean business and don't invest to support an in-house data centre. Even larger customers have migrated their own data centres to the Optus hosting centres based upon the simple and cost effective cube set architecture.

When it was time to upgrade the existing copper and fibre infrastructure, Optus identified key issues that needed to be addressed. The cube set architecture was proven, yet there was room to transform a good hosting centre into a great one. Reaching this goal was to be accomplished by marrying higher bandwidth cabling and connectors with a superior structured cabling system.



Optus' Simon Desmond patching a Multimedia Patch Panel

CASE STUDY

Objectives

For Optus, the new build presented an opportunity to add an additional level of security in the hosting centres. At one level, the new build should improve data security for hosting centre customers. At another level the new build reduces errors from individuals moving the wrong cable, breaking a jumper at a cross-connect, or committing other errors that could interrupt service.

With hundreds of customer applications hosted, the scope of change in an Optus hosting centre is enormous, especially as compared to any one-company data centre. Software upgrades, new installations, new servers, maintenance, additional capacity for existing customers—these are daily occurrences when you have many customers operating under one roof. The new build presented the chance to extend service life and reduce life cycle costs for the infrastructure. At the same time, the new build was projected to create an environment that

was easy to reconfigure and add customers and services, even in the midst of an extreme number of changes imposed on the structured cabling system. In short, it was important for Optus to make the hosting centre both flexible and easy to manage.

In the end, Optus' criteria for the project were simple. They wanted a more secure, highly manageable and extensively flexible infrastructure to improve internal operations, increase rack space, and improve the way Optus delivers services to hosting centre customers.

Enable Flexibility at Hosting Racks

By pre-provisioning a reasonable number and type of data cables between hosting racks and switch racks within each customer cube, Optus provides a self-service, easy and quick way for customers to bolt in servers, plug in, power up, and commence operations. To provide a plug-



Rear cable management of Optus' Ethernet Distribution Frame (EDF)

and-play environment that maximises rack space, Optus equipped each hosting rack with ADC KRONE Multimedia Patch Panels. These empty patch panels accept any mix of single circuits for UTP, coax and fibre applications using ADC KRONE 6000 series modular jacks and media adaptors. Basically, each customer can have their own mix of cable terminations without wasting space in hosting racks. For example, the average Optus hosting rack is designed for 60 category 6 unshielded twisted pair (UTP) ports and four coax ports for E3 service. Deploying a 12-port, one rack unit (1.75 inch, 44.45mm) coax panel would mean an average of eight unused ports per hosting rack—a problem eliminated by using the ADC KRONE Multimedia Patch Panel. Multiplied over hundreds of hosting racks, efficient use of space translates into increased space available for leasing by customers.

Where singlemode and multimode fibre terminations are required in a hosting rack, Optus used ADC KRONE's fibre bulkhead panels that provide termination and splice capabilities in a one rack unit panel.

By offering a standard build of pre-provisioned services at each hosting rack, Optus is able to support customer requirements without re-cabling and without wasting valuable rack space. The flexible system of pre-provisioned hosting racks using the single-circuit Multimedia Patch Panels created a hosting environment that instantly suits customer needs.

Best Practices for Installation and Re-configurations

With so many different customers and contractors working on hosting racks, creating an intuitive cabling system was another important criteria for the hosting centre. The challenge was making the hosting racks easy to use for anyone, even users, more comfortable with software than with cabling hardware. The reward would be a rack environment that is highly reliable, durable and easy for customers to use.

The angled connectors available for the Multimedia Panels were instantly appealing. Angled connectors naturally direct patch cords to the right or the left of the panel and into the vertical cable managers, helping customers to route cables properly and improve physical protection. The natural sweep of angled connectors provides a subliminal instruction sheet for routing cable into the vertical cable managers bolted on each side of each rack. By establishing a flow of patch cords into vertical managers with integrated slack managers, users create a more orderly and protected environment that improves reliability.

As opposed to the flat panel with angled connectors proposed by ADC KRONE, other vendor solutions could only achieve an angled connector profile with a deep, V-shaped panel. This was not viable for Optus because these solutions required too much depth on the rack. Optus maximised floor space in the data centre by allowing installation of customer equipment in the front and back of cabinets with door access on the front and back. The V-shaped panels required too much cabinet depth, compromising the front to back mounting channels and reducing density in hosting racks.

To further improve manageability of the infrastructure, horizontal crossovers and vertical cable managers were required on the hosting, switch and infrastructure racks.

ADC KRONE's Glide Cable Management System, with integrated front, rear, vertical and horizontal cable management, was chosen for the hosting centres. For hosting racks, this would allow customers to bring just about any length of patch cable to the job and still have a built-in plan to route and store excess cable lengths using the integrated slack managers. This reduces the chance that extra cable lengths would lay on the floor or be wrapped and tied off in unusual positions, either of which risk degradation of customer hosting applications.



Front Patching area of Optus' EDF

For the higher density switch and infrastructure racks, Glide crossovers and vertical managers were required to elevate those racks from being just dense to a higher level of carrier-class requirements called managed density. Yet ADC KRONE understands how to preserve technician access for reconfigurations and other changes by creating cabling environments that are highly dense yet conducive to managing cables. Any rack system can look good on commissioning day. However, with an average of 396 UTP ports on each switch rack and 1,056 UTP ports on each infrastructure rack, the Optus managed density racks show their strength long

after initial installation when reconfigurations are underway, leading to more reliable services and longer service life of the infrastructure.

There are many fine distinctions that make the managed density solution superior. Without the angled connectors of a managed density solution, patch cords drop straight down like a waterfall, requiring one rack unit of rack space for cable management jumper rings for each patch panel. By fanning connectors to the right or to the left from the patch panel, over the "fingers" of the vertical cable manager, jumper rings are eliminated, nearly doubling the number of patch panels per rack. Even with this density, the entire rack remains orderly and manageable through many iterations of moves, adds and changes.

Additionally, most cable manager systems space ribs or fingers too close together, making it difficult to insert and remove cables from the manager. Logic suggests that a system that is hard to use won't get used, which leads to unmanageable racks. However, Glide Cable Managers include fingers spaced with enough room to retain cables, yet allow easy access to the manager. Years of leadership in design of cable management solutions are evident in the details. For ADC KRONE, paying attention to spacing of the fingers makes all the difference in making hosting racks easy to use—an important requirement for the high-touch customer hosting racks.

Improved Security and Physical Protection

With over 80 percent of data centre floor space leased to hosting centre customers, security remains an important criterion in product selection for the cabling infrastructure. On one hand, customers and contractors require access to their racks. On the other, distribution frames for cross-connects to outside services required a solution that was less generally accessible. For any solution, patch cords, jumpers, equipment cables, and power cables all required a

minimum level of physical protection from day-to-day activities.

One solution would have been to build a secure room for the main distribution frames accessible only to Optus personnel. While this presented a secure solution, it would cost more in construction and ongoing expenses such as HVAC. More important, a secure room for distribution frames would easily consume two customer cubes on the floor, which translates into 20 hosting racks that could not be leased to customers. There was a high cost of reduced leasing revenue by building a secure room.

Instead, ADC KRONE proposed an alternative solution to provide the appropriate level of security and physical protection for the distribution frames. One solution was the OMX™ 600 optical distribution frame. This frame system offered Optus many unique features. First was density—up to 576 terminations and splices within a 600 mm x 300 mm footprint. Second

was optimal use of floor space because the all-front access OMX 600 could be installed back-to-back or against a wall. Third was not just density, but managed density through superior cable management. ADC KRONE's patented angled retainers and integrated slack managers ensure bend radius protection. In addition, splice wheels provide the ability to unroll the splice and storage device into a proper location so that splicing is performed without adding unnecessary optical loss.

While front access and managed density were enough to earn the fibre frame business, Optus was able to avoid building a separate secure room because each OMX 600 is a completely enclosed termination, splice and storage optical fibre frame with lockable doors. Optical distribution frames could therefore be deployed in the customer area with complete physical security.

Limiting public access to the UTP cross-connects was an issue, too. ADC KRONE offered physical



Dynamic Angled Patch Panels

CASE STUDY





Wall mounted HighBand® 25 Solution

security for the large capacity copper distribution frames by providing a custom solution of front and back doors to enclose UTP rack configurations. At first it seemed that a standard cabinet was required to enclose RJ45 distribution panels. However, proposed cabinet solutions offered limited technician access in dense configurations and less space for cable routing, as compared to the Glide Cable system that bolts onto the sides of racks. The custom solution preserved the superior access and managed density of the RJ45 distribution frames using the ADC KRONE system while restricting access to racks.

Most data centre projects become fixated on the electronics, with designers focused mostly on routers, switches, multiplexers and other active equipment. The enormous investment in active equipment is exactly why designers should create an environment that can maximise the value and service life of the electronics.

In the hosting centres project, Optus had an advantage. Their focus was to build world-class hosting centres in a self-service, plug and play environment where customers manage their own equipment. Without the limited view presented by “electronic blinkers,” Optus was able to focus on making the infrastructure more reliable, easy to use and manage, and secure.

Optus hosting centres are successful because designers approached the project with an engineering mindset. Too often, data centre projects wait until the last minute to specify cable, pathways and spaces for the infrastructure—resulting in deficient riser, floor space and capacity. Worse, the last minute designers disregards the operational staff that must manage the infrastructure going forward.

The end result for Optus was data centres that could accommodate density and heavy reconfigurations without disrupting service and without causing day-to-day operations nightmares. From the MDF to the port level, the cube set architecture presented a simple and logical infrastructure design. Yet the design was only as strong as the structured and managed density cabling system surrounding the active equipment.

ADC KRONE provides all UTP, coax and fibre cable and connectivity solutions for Optus Hosting Centres. These solutions include DSX1, DSX3, Ethernet Distribution Frame, 6000 Series category 6 modular jacks, Multimedia Patch Panels, Glide Cable Management System, category 6 UTP cable and patch cords, FibreGuide fibre management system and the OMX Optical Distribution Frame.

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