



Data Centers Lowering the Cost of Ownership

CASE STUDY

CHALLENGE

A wireless service provider sought to minimize both capital and operating expenses by redesigning its data centers. Major network elements chosen for the data centers included Cisco 7500 routers, Cisco Catalyst 6509 Ethernet switches and other data servers—each with unique connection requirements. After initial installation, it was highly likely that servers would be added and changed while at some point in the near-future, software would require upgrades. Experience taught network planners that new routers, switches and servers alone presented only part of a sound design for data centers on the 10/100Base-T and Gigabit Ethernet network.

Network planners knew from experience that an infrastructure without proper connectivity and cable management would defeat the goal of creating highly efficient, reliable and cost-effective data centers. Specifically, network planners, following an across-the-company mandate to reduce operating costs and make smarter use of capital, determined that each data center must have the following characteristics:

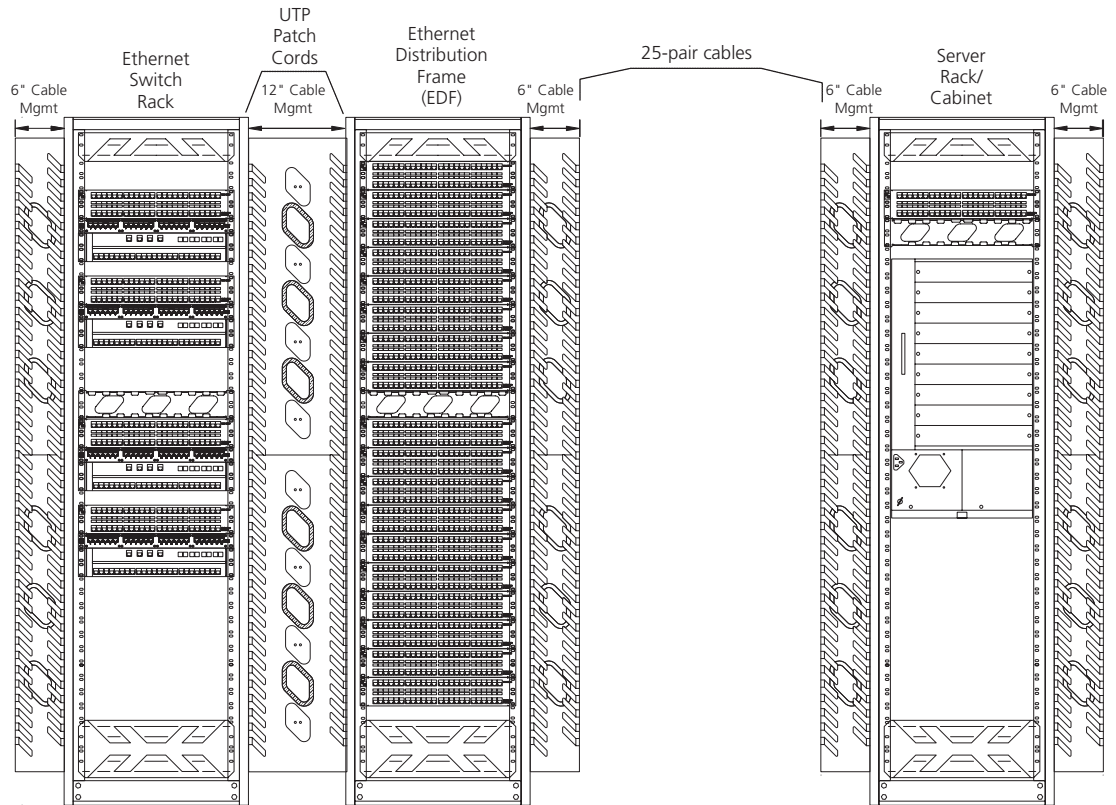
- Quick addition, upgrade, or rearrangement of any Ethernet switch or data server with minimal service disruption
- Better use of floor space, and
- Highest quality and reliability of services



SOLUTION—ETHERNET DISTRIBUTION FRAME

Network planners met these challenges by incorporating a central patching location called an Ethernet Distribution Frame (EDF). By creating a centralized, familiar craft interface between Ethernet switching bays and data servers, network planners ensured that adding servers, upgrading switches and making other changes in the data center could be done quickly and with minimal service disruptions. The EDF provides a logical and easy-to-manage infrastructure through two design characteristics:

- All network elements have permanent equipment cable connections that are, once terminated, never handled again.
- All changes, circuit rerouting, upgrades, maintenance and other activities are accomplished using semi-permanent patch cords on the front of the EDF cross-connect bay.



CASE STUDY

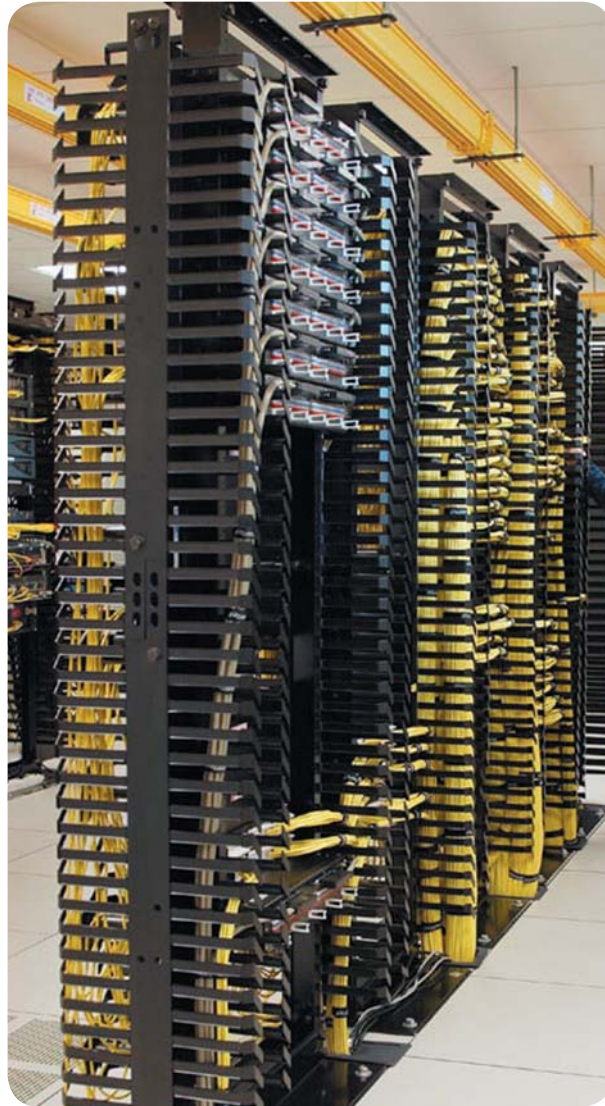
The centralized EDF cross-connect consists of 5800 Series panels with RJ45 front connectors and 25-pair RJ21x rear connectors. Server racks are equipped with one or more 5800 Series panels that integrate data servers into the network with permanent, factory tested, pre-terminated RJ21x cable assemblies. Switches in the Ethernet switch rack are integrated into the network through permanent connections on RJ45 coupler panels using standard RJ45 patch cords.



MANAGING CAPITAL THROUGH SPACE SAVINGS

At the heart of the EDF is ADC's Glide Cable Management system. These cable management troughs bolt onto the side of standard frames and provide integrated front, rear, horizontal and vertical cable management. This eliminates horizontal cable managers, frees valuable rack space, and effectively doubles rack density. EDFs equipped with competitive cable management systems could only manage up to 456 Ethernet terminations for this application. However, network planners could accommodate up to 912 Ethernet terminations on EDFs using ADC's Glide Cable Management system—saving valuable floor space and reducing or delaying new construction.

ADC introduced further space savings for data centers by incorporating its RJ45 to RJ45 Feed Through Panels into the design. Ordinarily, connecting an Ethernet switch to the network requires two separate patch panels to create a cross-connect patching field to reduce wear and tear on expensive switch ports by eliminating direct connections to the switch. The ADC solution for the service provider's Ethernet switch racks saves space by enabling switch connections using a common RJ45 patch cord with just one patch panel because each panel has RJ45 connectors on the front and rear of the panel. Added benefits included the ability to quickly connect Ethernet switches to the network, improved designation labeling on each panel and more secure connections for Ethernet switching equipment.



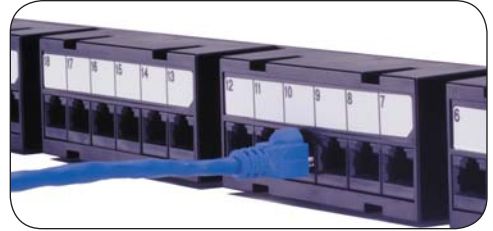
REDUCING OPERATING EXPENSES FOR THE LONG TERM

To reduce installation time and errors, the EDF includes 5800 Series patch panels for handling permanent Ethernet cable connections and creating the patch field for managing moves, adds and changes. Each 5800 panel features RJ45 connectors on the front and 25-pair RJ21x connectors on the rear. Experience showed that RJ21x rear terminations shaved cable installation time to about 2 minutes for each 24-port panel—compared to nearly one hour for each 24-port panel with 110 punch-down terminations. As the Ethernet service offering grows, installation savings would be significant.

In addition, RJ21x connectors reduced installation errors common with 110 punch-down terminations such as crossed wires and pairs untwisted too far that often disables valuable ports on Ethernet equipment. Use of pre-terminated, 100% factory tested RJ21x Category 5e cable assemblies to connect 5800 distribution panels in active Ethernet bays with 5800 panels in the EDF ensured high quality terminations and less rework in the CO.

ENSURING YEARS OF RELIABILITY

Using a cross-connect with proper cable management is, in itself, a standard practice for the service provider. Migrating this practice across all data centers would be a natural evolution for the operations staff. The ability to make additions and changes without handling active equipment cables not only saves technician time but also protects equipment cables and sensitive ports on active equipment. The Glide Cable system actually enforces logical routing of both jumpers and equipment cables so that the frame remains organized and easy-to-manage even after many changes have occurred. Built-in bend radius protection and generous cable storage ensure that the high-density EDF frame allows easy access for moves, adds and changes without service disruptions.



Protecting fiber cables was also an important consideration. ADC showed the service provider how to create a fiber termination and storage system using the FL2000 fiber management system. The FL2000 system provides a central place for aggregation and management of fiber cables from Cisco Catalyst 6509 switches for connection to Cisco 7500 routers in the data center. The solution included 24-port fiber termination panels with SC connectors on angled retainers and integrated slack storage for full protection of fiber cables. In addition, the solution included inner bay management panels, spools, and lower trough areas for proper storage of excess cable and patch cord lengths.

Across the EDF, the details of cable management make all the difference in extending service life of cables and Ethernet ports while creating higher quality service for customers.

CONCLUSION

Spending just 1% to 2% additional capital to implement a cable management and connectivity system for Ethernet distribution and server management in data centers is a small investment that yields big returns—decreases in both capital and operating expenses. The EDF eliminates handling of active equipment cables on Ethernet switches and servers, reducing downtime and speeding installation and troubleshooting. By implementing a centralized patching infrastructure for data centers, the service provider is able to manage each data center at a lower cost while maintaining a high level of service integrity.

Ethernet Distribution Frame

- Glide Cable Management with Slack Management Spools – ADCCMS-12
- 5800 Series Patch Panels – ADCPP245800BTEL
- RJ45 to RJ45 Feed Through Panels – ADCPP24505
- FL2000 System – FL2-RB70024A0-0A00, FL2-HZSTORE-B, FL2-INIMP-22RU-B, FL2-ACC011-B
- PowerWorx Power Distribution Products – PWX-001RGCS10PSDB



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