The Roadmap to an Efficient Data Center

By Carol Everett Oliver, RCDD

AAA (American Automobile Association) "clubs" started in 1902 with 1,500 members. Over one hundred years and 51 million members later, AAA is North America's largest membership organization, to date. The AAA National Office provides support services to the AAA and CAA (Canadian Automobile Association) clubs serving members across North America.

Widely known for assisting members when their vehicles break down, AAA also is a leading travel agency, insurance provider, and financial services provider, as well as a trusted advocate for motorists' rights and transportation safety. The National Office provides voice and data systems to assist the local clubs to field some 30 million road service calls every year. They also house a massive proprietary GIS database for maps and travel guides. These are just a few mission-critical applications supported by AAA's data center located in its National Office in Heathrow, FL.

As one can imagine, the AAA National Office needs a state-of-the-art data center, necessitating a recent overhaul that increased the data center's capacity, enhanced redundancy, and doubled previous cooling capacity. As part of the redesign, AAA's National Office data center became the first in Central Florida to feature an Augmented Category 6 cabling system – a NetClear® GTX 10-Gigabit UTP copper solution that runs 10GBASE-T as the backbone.

Part of the building's original design, the data center components were 17 years old, and showing their age, according to Shon LeGette, manager of computer operations and systems management at the AAA National Office. "We started experiencing power issues due to UPS units that had become unreliable, and our HVAC system was maxed-out," LeGette states. "The power infrastructure redesign started us on the road to reviewing our entire Category 5 network layout. The data center originally was designed to support mainframe computers and a client server layout environment. We needed to be more

efficient to support new technologies as we move forward," he says.

The I.T. staff decided to take a closer look at all components of the data center and review industry standards and trends specifically related to reliability and capacity. Nothing escaped scrutiny, including old raised flooring that was found to be deteriorating, he said. "It was time to revamp to a more sensible rack-mount environment to prepare for tomorrow's virtualization," LeGette adds.

As a result, they designed their new data center utilizing the TIA-942 Telecommunications Infrastructure Standard for Data Centers, which recommends best installation practices. This influenced their decision to replace their entire cable plant from a Category 5 environment to a Category 6a, as well as installing all new network equipment. "We looked at Category 6 but decided that we didn't want to upgrade our cable in the next 10 years, so we focused upon the newest copper cable, the Augmented Category 6, to give us 10-Gigabit-over-copper capability in our data center," LeGette adds.

ONE WAY

After deciding upon a 10-Gigabit copper solution, the Information Resources team at AAA was faced with the arduous task of selecting a specific manufacturer and solution. Troy Jarvis, branch manager of Comm/Data for Graybar, a leading stocking distributor, proposed the NetClear GTX solution from Berk-Tek, a Nexans Company, and Ortronics/Legrand. "Since AAA was utilizing the existing area of 5,000 square feet, I recommended the solution as it offers the best suite of products for the space and budget, as well as a 25-year warranty. Although the Augmented Category 6 cable costs about 25 percent more than Category 6, it wasn't a huge difference considering the overall total cost of the network and the installation time and cost savings down the road. We were more concerned with making sure we allowed for the upsize, especially in regard to the bend radius and tray fill," explains Jarvis.

Pictured are two Ortronics' stacked overhead patch panels, offering a flexible solution and reducing valuable space within the racks and cabinets.

In addition to cable and connectivity, the NetClear alliance can offer ancillary products such as wire mesh cable tray from Cablofil/Legrand. Jarvis recommended the above-the-rack cable tray and cable management system throughout the data center for maximum space utilization. "The cable tray plays a critical role, and we created a super highway with stacked rows of Cablofil® wire mesh cable trays with larger widths," notes Jarvis.

Rob Simpson, outside sales for Graybar, provided the bill of materials and planned out the delivery schedule of inventory on an as-needed basis. The structured cabling components of the solution include LANmark™-10G cable, Clarity 10G patch panels, cords and overhead cable pathway rack system. The 91,000 feet of cable is routed above the rack in the tray to connect the new switches to the patching fields of the storage area networks.

"The overhead pathway rack, angled patch panels, and tray system were the biggest contributors to efficient space utilization, which was key for this data center," states Jarvis. "These overhead pathway racks were a unique solution as they do not take valuable rack space because they are mounted above the racks and attached to the tray," adds Allan Sheldon, supervisor of computer operations for AAA. "With all the data cable now located above the racks in trays, this overhead patch panel solution gives us flexibility to move or add racks or cabinets by simply unplugging the patch cable and power and moving it or adding another rack," Sheldon further explains.

There are also dual (stacked) patch panels for high-density areas that are fastened to the tray with rack extenders.

To provide the 25-year warranty, Ortronics/Legrand trained the AAA installers for installation and testing. "This was the first installation in the area tested for 10-Gigabit over Augmented Category 6 cable. The cable was tested through a Fluke DTX1800 10-Gigabit testing system, which controls the procedures through a laptop instead of a handheld unit," states Mike Berkman, manufacturer's rep with Cabling Technologies, Inc., who was instrumental in training the installers and aiding the certified test procedures.

ROAD WORK AHEAD

The previous data center, which was located in the same space, was set up with rows of racks, cabinets and freestanding servers. The cooling, power and data cables had been all located under the floor. In the new data center layout, AAA followed the specifications for an efficient data center, according to TIA-942 standards, which recommends a parallel cold aisle/hot aisle rack and cabinet layout to keep the temperature consistent and airflow steady to assure network equipment uptime. AAA invested in computer room air conditioning units, as recommended by the manufacturer, Liebert, to sufficiently keep the temperature and humidity at a consistent level, as well as aiding in a dust-free environment, which is required for optimal uptime.

The new design includes a raised floor that houses only the power cables, there-

The rows of cabinets and racks are aligned in a hot/aisle cold/aisle scenario, connected with overhead Augmented Category 6 cable in the wire mesh basket. This layout is considered as one of the best practices in the TIA-942 data center standard.

fore minimizing activity and access. With data cables now located in trays above the racks, heat is pushed up into vented ceiling tiles, so the whole ceiling is the hot-air return, minimizing any hot spots.

To further ensure against outages, AAA's power plant is totally redundant, which includes back-up PDUs, UPS and generators. The two PDUs (power distribution units) each have two expansion cabinets that contain a total of 336 additional slots for breakers, which provide plenty of space for expansion. Each time they add another rack, they only need to run two additional circuits under the floor to the three-phase power strips located in the rack.

If there is an outage, equipment can run on one UPS for up to 30 minutes before the generators kick in, if necessary, and the generators only take a couple of minutes to get up to speed from a cold start. Two static switches are set to pick up the load

of power between the UPS. "Everything in this data center is network monitored – from power, security and even fire suppression. In fact, one module monitors the three-phase power strips within the racks," notes Sheldon.

"After Liebert reviewed our data center, they said that if it were to be certified through the Uptime Institute, it would likely be defined as a Tier 3 or 4," explains Sheldon. The Uptime Institute Inc. (www.uptimeinstitute.com) classifies data centers in four tiers. Tier 4, the most stringent level, is designed to host mission-critical computer systems, with fully redundant subsystems. Tier 4 is composed of multiple active power and cooling distribution paths, has redundant components and is fault tolerant, providing 99.995 percent availability, which only allows .4 hours of downtime per year.

"Prior to the redesign, we didn't have room for expansion, but with the new

rack layout, we expanded our growth capabilities in a reduced footprint," adds LeGette. "We are only at 50 percent capacity now and with the NetClear warranty, we know that our infrastructure is positioned to accommodate applications and expansion that will be added to our data center in the future." ■

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Berk-Tek's LANmark-10G Augmented Category 6 cable is neatly managed, dressed and terminated in the Ortronics' patch panels in the rack.

Berk-Tek's Augmented Category 6 cable runs neatly overhead in the Cablofil wire mesh tray and is neatly terminated into the switch patching fields in the Ortronics' Mighty Mo racks.