CONTROL ENGINEERING

The Phone Man Becomes an RCDD

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02/01/2005

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Back then, coordination was not a major concern. BICs would work with architects and engineers in the planning phases and continue throughout construction by working with the contractors.

But all of this changed with industry deregulation in 1984. Not only did it break up the phone company into the *regulated bell operating companies* for local service, with AT&T continuing to provide long distance, but it also shifted the ownership of the cabling in a facility to the customer.

With the design and installation of the cable plant now the responsibility of the facility owner, the need arose for the independent telecommunications design professional. One result was the creation of a new organization from the original BICs group. This association, the Building Industry Consulting Service International (or more commonly, BICSI) implemented the *registered communications distribution designer* (RCDD) program. This became the industry standard for certifying a telecommunications design professional. (For a description of major organizations involved in setting telecommunication standards, see "Standardized Cabling," p.40.)

So what does a telecom engineer do? In a nutshell, the RCDD designs the horizontal and vertical cabling required to support the bandwidth needs of end users. The RCDD is also responsible for coordinating the pathways and spaces to support these cables. Pathways might include cable trays and conduits for cabling distribution. Spaces include the layout of telecommunications and equipment rooms to house the equipment.

As with any discipline, coordination is key to a successful installation. With the addition of sophisticated computer networks, the need for coordinated telecom systems has grown, and so have the responsibilities of the RCDD.

RCDD's pathways and spaces

The telecommunications designer's coordination with the architect begins in the earliest stages of planning to establish room sizes and locations. Early collaboration with owners is also required to determine their needs—today and in the future.

The standard developed to assist with this design is ANSI/TIA/EIA-569-A, *Commercial Building Standard for Telecommunications Pathways and Spaces,* issued in Oct. 1990. (A new 569-B standard has recently been issued.) The intended purpose is to standardize specific design and construction practices for buildings to support telecommunications media and equipment. The standard states that a "properly designed and constructed facility is adaptable to change over the life of the facility." So much for how a telecommunications designer works. But what is included in the paths and spaces?

The main distribution frame (MDF) room is the central location for distributing the backbone cabling in the facility. In a typical design, this will be the location of the telephone and data switching systems. The backbone cabling will feed the intermediate distribution frames (IDF) rooms. One of the most obtrusive coordination efforts with other disciplines is routing the pathway that serves the IDF rooms from the MDF. This is typically a large conduit bank. The standard design practice is to have the IDF rooms stacked on multiple floors. This eliminates the need for continuing this coordination effort on multiple floors by having the backbone rise in the IDF spaces.

For horizontal distribution, the IDF room will distribute the cabling that feeds the workstations and all telecommunications devices. The amount of floor space the IDF serves and the density of telecommunications devices in that space determine the room size. The location and number of IDF rooms per floor depends on the size of the floor and the distance of the cable pathway. The maximum distance for horizontal cabling is 90 meters of cable length between the termination in the IDF and the termination in the workstation.

Horizontal distribution is also a major coordination effort. Typically, a large amount of cabling is needed for distribution in an already congested plenum space. The cable tray design has been the method of choice for most facility types. This allows many cables to travel to the telecommunications room in a neat and managed arrangement while offering the flexibility of easily removing or adding cabling in the future.

Another recent, popular design alternative is zone cabling, which allows the continuation of backbone cabling into the workspace area to a consolidation point (CP). The horizontal cabling will then distribute from the CP. With many CP locations, the congestion of horizontal cabling at the IDF is reduced.

Finally, it is important to remember that in addition to designing pathways and spaces, the RCDD is responsible for the physical cabling topology and choice of media. And with new technologies constantly evolving, choice of cabling options requires the expertise of a specialized telecommunications designer.

Telecom and Datacom Cabling Media

The RCDD is responsible for the physical cabling topology and choice of media. ANSI/TIA/EIA 568B, issued in May 2001, is the standard for this work.

There are three standard recognized media for backbone cabling: 100-ohm twisted-pair, multimode optical fiber and single-mode optical fiber. The two primary factors for choosing media are distance and bandwidth.

For copper cabling, 100-ohm twisted-pair is capable of carrying voice traffic up to 800 meters. However, because of bandwidth limitations, the distance is only 90 meters when serving as a data backbone.

Fiber is the most common choice for data backbone cabling. Multimode optical fiber cabling is capable of serving distances up to 2,000 meters, while single-mode is rated at 3,000 meters. The bandwidths of optical fiber cable also have a considerable advantage over copper. The use of expensive lasers was required to achieve the higher bandwidths until the development of the VCSEL laser. VCSELs have brought about the need for a laser-optimized fiber, and the popularity of 50-micon fiber has become the norm.

However, fiber has yet to become a popular medium for horizontal cabling. The expense of fiber transceivers in switches prohibits optical fiber cabling from being the cable of choice. However, multimode optical fiber cable is the only media currently capable of supporting 10-Gb Ethernet. Fiber will continue to be used for this application until the 10Gb-over-copper standard is released.

Finally, one must also consider wireless. High-speed wireless access points are becoming a normal part of the telecom infrastructure. Interestingly enough, this has not been seen as a way to get rid of the horizontal cabling. On the contrary, it has been a source of additional cabling in the facility. Wireless Ethernet is becoming popular as an overlay to enable network access for laptops and personal wireless devices throughout the facility. The telecommunications engineer is responsible for laying out a grid of wireless access points used to cover an area. This grid will need to be field-adjusted to optimize the wireless network, making use of overlapping channels and preventing dead zones. This is one reason that Power-over-Ethernet is typically used to power these devices. It prevents the problem of having the power receptacle end up in the wrong place for the access point.

While it's still preferable to have a wired cable to workstations for high-speed data and telephone, as speeds increase, use of wireless devices will continue to grow.
