THE STRUCTURED WIRING Quarterly Report

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Select Your Cable Contractors Carefully:

They're More Powerful Than You Realize

By Joe Mullich

Don't use the phrase "cable puller" around Frank Bisbee unless you want to see the veins on his neck start to bulge. "Cable puller denotes a dumb animal," said Bisbee, president of the Association for Cabling Professionals in Jacksonville, Florida. "Please call them cable contractors."

The difference isn't a case of politically correct semantics. A cable contractor, Bisbee noted, "has to deal with 1,000 different little changes no one anticipated. He is not a dumb animal." Cable contractors can provide guidance on infrastructure design, materials, and even surprising areas that can have a significant impact on future costs and network performance, such as the choice of office furniture.

A good cable contractor can be a watchdog over other workers during construction who might unknowingly damage the cable plant. "Our cable contractor was our eyes and ears," said Stuart Parker, senior network engineer for Blue Cross and Blue Shield of Utah. "They saved our butts a number of times."

A poorly chosen cable contractor, however, can put yours in a sling. Network performance

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varies widely depending on the quality of the installation.

"We can make the best product in the world, but if it's not installed right, it won't provide the expected performance," said Bill Burnet, global manager for contractor marketing for AMP, the cable systems provider based in Harrisburg, Pennsylvania.

Making sure you find a cable contractor who will be your Superman rather than your kryptonite is no simple task, though. Selecting and working with a cable contractor is a much more complicated process than most companies looking to simply hire "a cable puller" might imagine.

The first step to having a satisfactory relationship with a contractor is producing sound specifications and requests for proposals (RFP). "I've seen some pretty awful specifications," said Don Weiner, a consulting engineer in Churchville, Pennsylvania. Often, the RFPs will go into "extraordinary detail" about the areas the person preparing the document is familiar with, providing, say, a two-page specification on the wire itself. Often, though, the RFP will have gaping holes because the drafter of the document doesn't know what he needs to include.

Ruth Michalecki, director of telecommunications for the University of Nebraska in Lincoln, mandates the installation meet all EIA/TIA standards, national electrical codes, and local fire codes. A firm should be aware of local or regional requirements. Some states, for instance, require a licensed professional engineer to sign off on broad-band cable plants. Some cities have environmental wiring standards.

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>
> *—Ruth Michalecki, University of Nebraska*

"We mandate in our RFP that every time the contractor has to open between floors, he has to fire stop it," Michalecki said. "That's the kind of little stuff people overlook." The RFP should specify that any code violations will be fixed at the vendor's cost.

The specifications should also leave no doubt about what materials are acceptable. "When an RFP isn't definitive about specifications and performance levels of specific products, the contractor might believe an inferior product is substitutable," said Gary Conrad, Senior Vice President of structured cabling for Anixter in Skokie, Illinois. The plant might end up with "third lot" cable—old or marginal cable that was never certified on the reel.

Weiner, when preparing RFPs, prefers using technical shorthand. Instead of writing a two-page wiring specification, for instance, he'll often note Lucent Technology model 2061 or "equal as approved by the engineer." This puts the onus on the contractor to prove any technology he wants to substitute is equal to the existing Lucent specs. The RFP should require the contractor to provide printed tests after the installation, showing functionality and adherence to the metrics of the network's standards.

A contractor should provide a printed time-domain reflectometer reading for each run. Fiber testing is even more critical. "That doesn't mean you just slap on an analyzer and check for tone, which typically a lot of these bozos will do," said Bill Hancock, a principal with Network-1 Software and Technology Inc., a consulting firm in Dallas. "That's the testing you do for voice-grade lines, not data lines."

CONTRACTING tips

University of Nebraska
Ruth Michalecki, director of telecommunications

Who's In Charge?

"In your RFP, require the contractor to have a foreman—otherwise many will just drop off a crew in the morning who have no supervision"

Some contractors will scan RFPs for discrepancies they can use to their advantage. The RFP might call for, say, two-gang stainless steel plates. But if further along in an unrelated area, the spec inadvertently notes "single-gang plastic plate is acceptable," some contractors will seize on the ambiguity. They'll bid the project lower, anticipating they can substitute 10,000 plastic plates, which each cost a dime, for the stainless steel plates, which run $4 a pop.

"The owner ends up getting single-gang plastic plates, which he really didn't want, or paying more for two-gang stainless steel plates," Weiner said. "It's sometimes to the contractor's advantage not to bring out ambiguity or errors in the specifications."

Many companies hire consultants to prepare the RFP and advise them during construction. According to Hancock of Network-1, a company probably needs a consultant at an early stage if it lacks the in-house expertise to realize that, say, elevator motors or secondary water relay pumps in the ceiling can hamper the cable plant.

"If you don't understand these things, you might want to bring an advisor in early in the process," he said. Company representatives should, at a minimum, know the basics of structured wiring installations and be able to look at a wiring closet and see any apparent problems, such as outlets being improperly terminated.

When Hartwick College in Oneonta, NY, was planning to build a tightly-budgeted cable plant, Ellen F. Falduto, chief information and planning officer, was nervous after hearing that enormous cost overruns were common for cabling projects. Falduto found a retired network specialist in the small community who helped guide her team through the trickier phases of the installation. The project came in at less than half of the original $4.3 million budget.

"A lot of people think they have the talent in-house," said Bisbee of the Association for Cabling Professionals. "They say, 'I know about fiber and copper,' but these people wouldn't know a picoferrite if it bit them on the butt."

Part of the problem, Bisbee said, is that many people are familiar with cable only using much slower applications, so they don't realize the cable requirements that will be necessary in the near future.

Despite Bisbee's disdain of the term, some contractors are, indeed, just cable pullers. Others provide turnkey solutions that package together everything including routers and hubs. A company should carefully screen the outfit it chooses to install its cable plant. Not every electrician understands data communications wiring, for instance.

"If you hire a guy who's working out of the back of his truck, you've hired a day laborer," Bisbee said. "If you've hired a real professional, he'll be talking about things like the spring tension on the jacks." It's important to match the contractor's skills with the job at hand. "Some firms might be great on horizontal cabling, but not have a clue on how to place big cables in riser systems," said Richard Dunfee, installation program manager for BICSI, the cabling industry's leading trade organization based in Tampa.

Hancock of Network-1 likes to quiz contractors to make sure they know their stuff. If the contractor is installing an IEEE-compliant network cable, he'll ask, "What color is the standard for the cable being installed?" If the contractor doesn't know, they're probably unqualified to install the cable to the standard, let alone test it.

Hancock asks if the contractor knows the difference between TIA/EIA standards 568A and 568B—one is the premises wiring standard for industrial use and the other is for offices. "I'm amazed how many contractors don't know this," Hancock said. "Most don't even have a copy of the standards. They read about it in a magazine or book and assume they know it."

References: Check, Check, Check. It's important to check a contractor's previous installations. Ideally, the references should be in the same vertical market as the project under consideration.

"A lot of schools use cinder blocks, for example, so there are different raceway considerations than for a hospital," said Burnet of AMP. When picking a contractor for a wiring job with a budget of $25,000 to $50,000, Dunfee normally visits one installation done by each contractor in contention for the job. For projects with price tags of $100,000 to the millions of dollars, Dunfee will visit as many as five installations done by each contractor.

Talking with a contractors' past customers is worthwhile. References can relate whether the contractor met deadlines and was easy to work with. "Talk to someone who has used the contractor's services in the last three months," said Pete Lockhart, director of technology for Anixter. "Typically, that's when most of the problems come up."

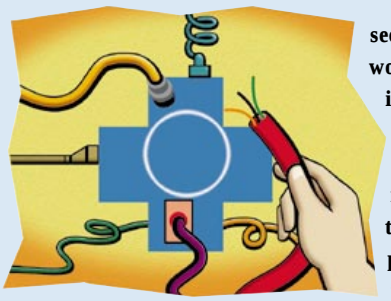
It's even more important, however, to evaluate the installations yourself. When Michalecki of the University of Nebraska went to see one site a contractor cited as his best work, she was shocked: Bend radiuses were wrong. When the contractor punched down to the data rack and outlets, the wire was stripped, violating category 5 standards.

"Those are things that many people don't notice," she said. The company waxed

At Blue Cross, A Close Relationship Is the Right Prescription

When Blue Cross and Blue Shield of Utah planned a new headquarters in early 1997, the health organization knew a robust cable plant was paramount. Blue Cross wanted the building to meet future bandwidth needs for high-intensity applications such as streaming video.

Making that happen required a close relationship between Blue Cross' cable contractor, Cache Valley Electric of Salt Lake City, and its cabling systems provider, Anixter Inc. in Skokie, Illinois. The project used a little more than one million feet of cable, meeting Anixter's level 7 standards for unshielded twisted pair cable running high-bandwidth applications. The installation includes 975 workstations, three Belden MediaTwist cables, and a Siecor fiber optic pair running to each.



Blue Cross officials went to Anixter to see how applications ran over actual networking hardware. "They were very careful in their selection of vendors, VARs and the actual cable puller," said Dennis Tuel, Anixter's location manager. The HMO narrowed their choice to four cable contractors who were evaluated based on past projects, manpower and resources, and value-added services.

References were distressingly revealing. One contractor knocked themselves out of contention by being unable to even coordinate a site visit. "That was part of the test," said Stuart Parker, senior network engineer for Blue Cross and Blue Shield. Another contractor showed low-end projects, with a couple of hundred drops at most. A third contractor had followed the client's design precisely—but the design was awful.

"The contractor didn't have the guts to stand up to the customer and say, 'You're wrong. This is what you really need,'" Parker said. "The contractor let the customer determine what he thought he wanted, rather than educate the customer about what he needed."

When Parker visited one of Cache Valley's sites, he was taken by the cleanliness of work, especially the pencil weaving. "This is a technique where you take a bundle of cat 5 cable and you can trace the cable from the starting point to the end point," Parker said. "Instead of a bunch of wires bundled together, they go the extra mile and pencil weave."

"One of our concerns was that the architect didn't really talk to us about the size of the IDF closets," Parker said. "The contractor took the components we were going to use, mocked up a closet, and provided a couple of scenarios on how to map the cable. They were thinking ahead."

Problems with different vendors arose during the construction. A building contractor tried to toss some low-voltage wiring in a tray earmarked for data communications. Another contractor installed a power unit too close to a tray, violating TIA standards.

"Cache Valley was our eyes and ears about what was (being done) in the ceiling by other contractors," Parker said. "They saved our butts on some things." Cache Valley researched the relevant cabling standards for Blue Cross, using maximum requirements rather than minimum ones.

Blue Cross went so far as to seek Cache Valley's input about the office furniture. "People don't understand how important the selection of furniture is to the cable plant," Parker said. "We narrowed our furniture selection to four vendors and Cache Valley pointed out that one type of the furniture was the easiest and quickest to disassemble. That will save us labor costs for moves, adds and changes down the road."

enthusiastic about the contractor's work, though Michalecki calls it "the worst installation I've ever seen."

A thorough site visit should take about half a day. Before making a site visit, Dunfee always checks to make sure a ladder is available. If not, he brings his own. He lifts ceiling tiles in several locations.

"Anyone can take a bunch of cables into an equipment room and make them look pretty," Dunfee said. "The proof of the pudding is when you get up to the ceiling and see wires lying on top of ceiling grids and tied to electrical pipes. It's the hidden aspects. I've been to sites where the companies thought the contractor did a good job, but, when you get up to the ceiling, it's a disaster."

He also asks to see the testing and as-built documentation a contractor should provide the company. "A lot of times, I'll go to a site and ask for the diagrams and the company said they never got any," Dunfee said. "That tells me something I don't want to see in a contractor."

There are other indications that a contractor is dedicated. Burnet of AMP likes to see the contractor put its name, or even the technician's name, on its work. Several AMP contractors have requested stickers from AMP's certification program to put on the racks. "Those are people who take pride in their work," he said.

A quality cable contractor will go through the project site measuring closets, pushing ceiling tiles, seeing what push-throughs are, and noting when firewalls are required when going between load-bearing walls. They'll show up with a tape measure and a ladder.

"If good old boy Ralph just walks around a bit and gives you a thumbs up, find someone else," said Network-1's Hancock. "Notice if the contractor is taking notes and drawing diagrams. Is he asking for building layouts during the walk-through?"

Walk-throughs can weed out contractors. The Philadelphia Art Museum is a spectacular 750,000 square foot facility with a world-class collection of art, though it is best known for its front stairs that Sylvester Stallone ran up during the film "Rocky." There are about 800 communi-

Questions To Ponder When Selecting A Contractor

How long has the contractor been in business?

Is structured cabling the contractor's core or major business?

What percentage of the contractor's business is from structured cabling?

Does the contractor have a vertical market expertise, such as hospitals or schools?

What are the contractor's total revenues from cabling?

What is the contractor's total number of personnel, including foremen, designers, estimators and installers?

Is the contractor's head office within reasonable distance of the customer's location?

Does the contractor have other installations within a reasonable distance?

Does the contractor have adequate insurance and bonding?

What geographic area does the contractor serve?

Does the contractor belong to professional organizations, such as BICSI?

Is the contractor certified or authorized by the manufacturers? Is that certification current?

Does the contractor have approvals and licenses from unions as well as safety and construction boards?

Which manufacturers does the contractor represent?

cations outlets in the building. The Art Museum wanted to avoid fly-by-night contractors when it installed a new cable plant. If a contractor wasn't able to provide $3 million in bonding, it wasn't permitted to bid.

Beyond the financial guarantees, Weiner, the consulting engineer for the project, wanted to make sure the contractor had the expertise and confidence to do the job. Nine cable contractors participated in the walk-through.

"We deliberately wanted to scare the hell out of people," Weiner said. During the walk-through, Weiner made it clear the Art Museum wasn't like an office building, where a worker who slipped in an antic and broke a hole in the ceiling could easily patch the damage.

"We pointed out that the gold-leaf ceiling in the Versailles room was itself a work of art taken from the Versailles Hotel in Paris," Weiner said. "We said, it can't be patched or repaired, so don't screw it up." Only three of the nine companies who went on the walk-through bid on the project.

Weiner suggested having stringent requirements for who is allowed to compete for the project. "Otherwise, you might have every plumber and house remodeler trying to bid on the cable," he said. A company putting a cabling project out to bid should have a reasonable idea of how many connector blocks and feet of cable will be required.

"Sometimes, a contractor will come in at a flat rate, overestimate the job and charge you a lot more than you need," said Network-1's Hancock. "When a guy says the job will take 10,000 meters of cable and you know it will take 5,000 meters, you can say—whoa, whoa—where did you come up with this 10,000?"

In Bisbee's view, the best ratio of quality to cost for installations is negotiated purchases. "Many start off as bids, but it's apparent many bidders don't know which end of the gun the bullet came out of," he said. Experts say bids from different contractors shouldn't vary more than 10 to 12 percent, depending on contractors' overhead. A tight cluster of bids indicates a well-written spec and adequate walk-throughs.

"If someone's way down, he probably forgot something," said Weiner, the consulting engineer in Churchville, Pennsylvania. "If someone is way up, he's busy or greedy." Weiner prefers to have bid reviews, conducting follow-up discussions with the three lowest bidders awarding the contract. Sometimes, the review will reveal insights the contractors didn't want to bring up in the pre-bid meeting, when that information would have been available to competitors. "You might find the contractor can do the job much cheaper with red wire than the blue wire you specified under the same technical specs," Weiner said. "Or you might learn that instead of coring through 36 inches of concrete, the contractor realized the cable could be moved five feet to another room where there's ready access." Of course, sometimes the contractor gets a wake up call after putting in an extremely low bid. "I've had some contractors who put in really low bids realize they left out something," Weiner said. "I've had contractors go back and redo their bid."

Michalecki of the University of Nebraska insists the cable contractor provide an on-site foreman. That requirement—which many companies might not even think to request—is included in her RFP.

"Many contractors will drop a crew off in the morning without supervision and come back for them at the end of the day," Michalecki said. "I wouldn't want a bunch of installers working on a large project who didn't have guidance."

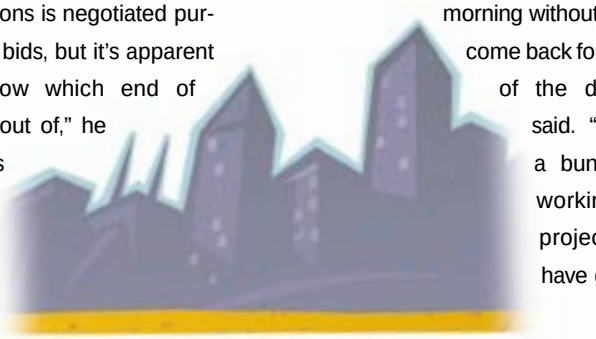
CONTRACTING tips

Network-1

Bill Hancock, principal

Better To Ask Now Than Pay Later

"Ask the contractor if they know the difference between TIA/EIA standards 568A and 568B. One is the premises wiring standard for industrial, the other for offices. I'm amazed how many don't know this stuff"



Michalecki has biweekly meetings with the foreman and her counterpart in the university's data communications facilities management.

She walks through the facility as often as possible, keeping close tabs on all phases of installation. One time, she found workers for the university's facilities department using hanger straps instead of cable trays for the conduit. "We had too many pairs of cable for cable straps—the ones on the bottom would have been impacted by the ones on top," she said. "By walking through, I was able to put a stop to that and make sure they did it right."

She also checks work after the installers finish. Michalecki hired three graduate students from the university's electrical engineering department to certify all the work. "The installers don't certify their own work—we bought machines and certified it ourselves," she said. If she didn't have that luxury, Michalecki said she would at least spot check 15 out of every 100 buildings.

If serious problems develop during installation, Dunfee of BICSI has sometimes rescinded part of the job and given it to another contractor. On occasion, Dunfee has also brought in an expert to oversee the contractor's crew. "This can get a negative response from the owner of the construction firm," Dunfee said. "But often the crew itself appreciates it. A good supervisor commands respect and teaches people things they've probably wanted to know for a long time."

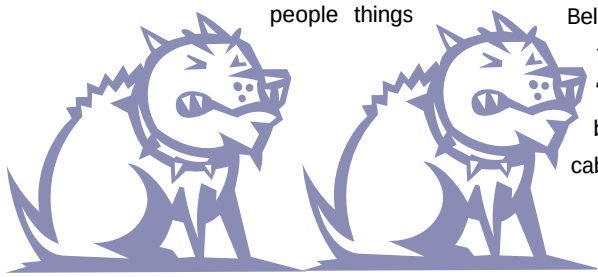
CONTRACTING tips

BICSI

Richard Dunfee, installation program manager

When Doing Site Walk-Throughs, Look For The Hiding Spots

"When you check references, look up in the ceiling yourself—that's where the real, hidden work takes place"



One mark of a competent cable contractor is using correct equipment. Fiber cable, for instance, should be installed with a pull meter. This device has a gauge that is set based on the tensile pull strength of the cable itself. If the cord is pulled too hard, the pull meter will literally snap the connection to keep the fiber from stressing. "Most people don't even know what that is,"said Network-1's Hancock.

Fiber cable has a coating that will crack and split under stress, like cellophane. This problem—normally caused by careless installation—will result in photonic loss. Over time, performance will degrade until the cable fails.

"Yet I've been to places where I've seen cable pullers wrap the fiber around their forearms, give it an old heave-ho, and pull it through overheads," Hancock said. "I've been to other places where they tied the fiber to a remote control car to pull it down the cable tray."

Vendors have different rules on how to handle specific cables, even different category 5 cables. There are unique rules for handling PVC versus Teflon cable, for example. Some cables wear out faster than others in certain temperatures. Bisbee recalls a contractor who bought two million feet of PVC cable for an installation in Chicago. The contractor stored the cable in a warehouse over the weekend. The problem was the PVC absorbed moisture in the warehouse and froze. "The contractor didn't understand he had bought the wrong kind of cable for the job," Bisbee said.

Despite the need to oversee installers, companies should be careful not to set up adversarial relationships with their contractor. Weiner supervised an installation for Rohr Pharmaceutical in Collegeville, Pa., which required millions of feet of a specific type of Belden cable. "At the end of the project, the contractor was running out of cable," Weiner said. "He wasn't sure if he could keep on schedule because there was none of that brand of cable to be had in the entire country."

Because Weiner had maintained a close relationship with the contractor, the foreman

alerted him of the possible shortage. "Depending on the rapport and how much the engineer is watching, some contractors would have tried to put in another cable and hope they didn't get caught," Weiner said. "In one project, we caught a contractor trying to put riser-rated cable in an outdoor environment. It cost him $10,000 to pull it out and put in the right cable." For the Rohr project, the schedule was flexible enough to be delayed while cable was secured.

Cincinnati Bell Information Systems (CBIS) knows what a close relationship with a cable contractor can mean to the quality of the installation. The firm recently built a 60,000-square-foot data warehouse in Orlando. The facility included 10 central cabinets, four zones with 2,520 ports, and nearly 40 miles of fiber.

"We wanted the most robust structure of any data center," said Thomas Brosnan, director of data center planning for CBIS. CBIS, of course, had a design configuration in place when it put the project out to bid with several contractors. "But we didn't have any real-life experience because the building was from scratch," Brosnan said. "Some contractors had been there and done that. We used their brains to fine tune our configuration."

Many of the contractors' suggestions dealt with the actual conveyance under the floor, especially conveyances crossing one another or going through walls. CBIS eventually selected General Signal Network in New Jersey.

"The guys who installed the cable became part of the actual design process," Brosnan said. "They know the tricks of the trade. They can provide input into the design to make support easier." A key point, in Brosnan's view, is to select contractors with experienced designers on staff—not theoretical designers, but ones who have been through the physical design.

"There is a lot to be gained from working with someone who's put one of these into production, especially in a new building," Brosnan said. "We came in one day and found the builders had popped a water pipe in our way. The cable contractors were able to work around things that were not in the blueprint."

Warren Davies, manager of strategic marketing for Nordx/CDT, a cabling systems provider in Montreal, suggests companies make sure the cable contractor also services other firms nearby. "Ideally, they should have an office in your geographic location," he said. "You want to know they're in your area regularly if you need moves, adds and changes. You don't want them going out of their way to service you."

One of CBIS's requirements was the contractor have a presence in both Orlando and Cincinnati—Brosnan knew elements of the new design in Florida would be incorporated into an existing data center in Ohio.

"We want continuity through the years," Brosnan said. "We don't want company A installing the cable plant, company B doing modifications, and company C adding something else. We still use competition to leverage pricing, but we want continuity in the approach."

CBIS allowed four contractors to bid on the project. Brosnan did site visits of their previous work, which provided additional design ideas, though none of the projects was as large and sophisticated as what CBIS planned. Brosnan went with a firm he had dealt with in the past, General Signal Network.

"We want a long-term partner," Brosnan said. "You can call 1-800-BUY-CABLE and find a lot of contractors. But we wanted someone we trusted who we could integrate into the process."

Brosnan said he expects a contractor to keep in touch. "I might not have something for them one quarter, but I will the next quarter, and I want to know they're thinking long term, too," he said.

A lot of effort? "This is no different than hiring someone to watch your children," Hancock said. "There are certain things you want to make sure are meticulously done, because you will be stuck with this for a long, long time." ◇

CONTRACTING tips

AMP

Bill Burnet, global manager for contractor marketing

Specialization Good, Ignorance Bad

"Choose a contractor who specializes in your vertical marketing—cabling a school can be a lot different than cabling a hospital"