

Where to Start to Keep the Telco's Disasters from Becoming Yours

By Leo A. Wrobel

ASK YOURSELF THIS QUESTION; IN THE GRAND SCHEME OF THINGS, DO YOU think that the total loss of your building is a worst-case disaster? Many very good recovery planners make that assumption in their plans. I submit to you however that the worst case is not the total loss of your building, but the total loss of a major telecommunications facility.

Think about it. If you lose your whole building, hundreds of vendors and employees will probably swoop in to help you recover. (I speak in terms of a disaster like a fire, which is confined only to your facility. If a hurricane destroys it and hundreds of others, all bets are off!) That's because even though your building is gone, hundreds of other unaffected locations and vendors can help you. When the telephone company (Telco) loses a building, exactly the opposite is often true. Hundreds of businesses are dead in the water, and only one of them is fixing the problem. Therefore, even though the loss of a major telecommunications hub is often considered to be a remote possibility, every company should have a plan on what to do if the Telco goes away.

There have in fact been dozens of cases of telephone central office disasters over the years. To cite just a few that I am aware of:

- ▼ Lightning hit an oak tree 75 yards from a central office in Granby, Massachusetts. It destroyed the central office.
- ▼ A broken levee caused a central office in Clinton, Mississippi to sustain 1 1/2 feet of water in its switch room—on the second floor.
- ▼ A disgruntled phone company employee in California (name of company withheld) came in and fired over 100 rounds of ammunition into a Class 5 switch. I guess he was having a bad day.
- ▼ An employee for a Competitive Local Exchange Carrier (CLEC) in Dallas and his switch vendor inadvertently turned the battery bank of a central office's switch into a 200-amp arc welder while changing connections that were still hot. This forced an evacuation when all of the wires fried and the building filled up with smoke.
- ▼ An improperly installed software upgrade in the AT&T SS7 network blocked 100 million long distance calls in a single day and cost businesses nationwide millions of dollars.
- ▼ The data center for a mortgage servicing company was isolated four times in a two-year period due to contractors cutting telephone cables.

This list goes on and on, but I think you get the idea. Also do not forget that telephone central offices are irresistible targets for terrorists. The World Trade Center had a central office inside it. People often forget however that September 11, 2001 was not the first time the Trade Center had a disaster. In 1993, someone set off a bomb in the Trade

Center that disrupted communications and knocked at least one large securities broker off the air for a few days. The effect was not as bad as it could have been however because that company had a plan. Others in the same building did not.

The causes of central office disasters over the years have run the gamut including fires, floods, lightning, tornadoes, hurricanes, switch failure, and human error. Consider that one of the most far-reaching central office disasters in U.S. history was on May 8, 1988, in Hinsdale Illinois. This fire in a suburban Chicago central office not only affected 49,000 local telephone subscribers, but also over *half a million other users* nationwide (due to disruption of "access" and "tandem" lines discussed later in this article). It happened on Mother's Day, the busiest calling day of the year. Tell me that Murphy is not alive in this business! There was even a major disruption in Dallas a few years ago when service was disrupted for four hours because Garth Brook tickets went on sale! The network became so congested that it nearly collapsed under the load.

Today, Central Office (CO) disasters can involve a large area and are not limited to dial tone only. Data and voice private lines circuits, wireless, Internet, special access, paging, long distance, 911 emergency trunks, and other services may also be involved.

WHAT CAN BE DONE CHEAPLY—AND NOW?

Even given the magnitude of such disasters however, a few items are still available at low cost to alert contingency planners who think ahead. One is the wireless phone. Wireless phones operate from MTSOs (Mobile Telephone Serving Offices) that are often diverse from an affected central office. The trouble is there is nowhere near enough wireless capacity at the present time to replace all the landlines that could be lost in a central office disaster. It's a lot better than it used to be in the days of cellular, but it's still not a complete replacement. Even given this limitation, wireless can be indispensable for command and control. Other technologies worthy of a second look are radiotelephones and two way radios, particularly in campus environments. Radiotelephones can often be used for phone patches back into the public network via repeaters, while two-way radios are useful for communications in the immediate area. Another useful item not often thought of is a roll of quarters. After police, fire and other emergency services, the next class of service restored after a major central office disaster is usually pay telephones. Watch out though, in case you have not noticed these are becoming increasingly difficult to find due to the proliferation of wireless. You should also consider the fact that ATMs and other banking operations may be down for a significantly longer

time. Having some spare cash on hand for incidentals, some of it in quarters, is prudent and inexpensive insurance. There could also be a problem using telephone credit cards since verification and billing systems could also be affected.

THE ALL-TOO-COMMON CABLE CUT

Closer to home, the CABLE CUT is the most common cause of telecommunications disruption today. In my 30 years in this business, I have yet to find another telecommunications user who has not experienced one. Since planning for something that WILL happen (rather than what might happen) should be high on the list of any contingency planner, here are a few things you should know about why cable cuts happen and how you can prevent them.

First, consider where everyone lays cable. Virtually all cables, whether fiber optic or copper, utilize public rights of way. Unfortunately, in many cities this same right of way has been in use for many, many years. When someone starts digging, they never really know what they are going to hit on the way down. Also, due to cost constraints and difficulty in securing right of way (permission to cross private property) many companies use rights of way like railroads or along the sides of streets, highways and other thoroughfares. Invariably, construction activity is common in these areas. The issue is even more complicated when one considers that gas, electric and sewer lines traverse the same rights of way. Gas lines get cut, so do electric lines. Somehow I don't see a lot of sewer lines getting cut. I wonder why?

Everyone has his or her favorite cable cut story. Years ago when I was at AT&T, thousands of people in Dallas lost service for most of a business day. It was a farmer that dug up the main AT&T fiber optic route while burying a dead cow. Or consider the supervisor in New York City who told his technician "There are two fibers down there in the manhole. Cut the **BAD** one...." New York was isolated for most of the day.

There are things you can do to mitigate your exposure to cable cuts. The first step might be a meeting with your local telephone company. I know, they are going to try to sell you something. They can also provide you with helpful information if they take the time to do a little homework on your behalf. If you have an account manager that is not all that knowledgeable, have that person seek out a SME (Subject Matter Expert) with experience in

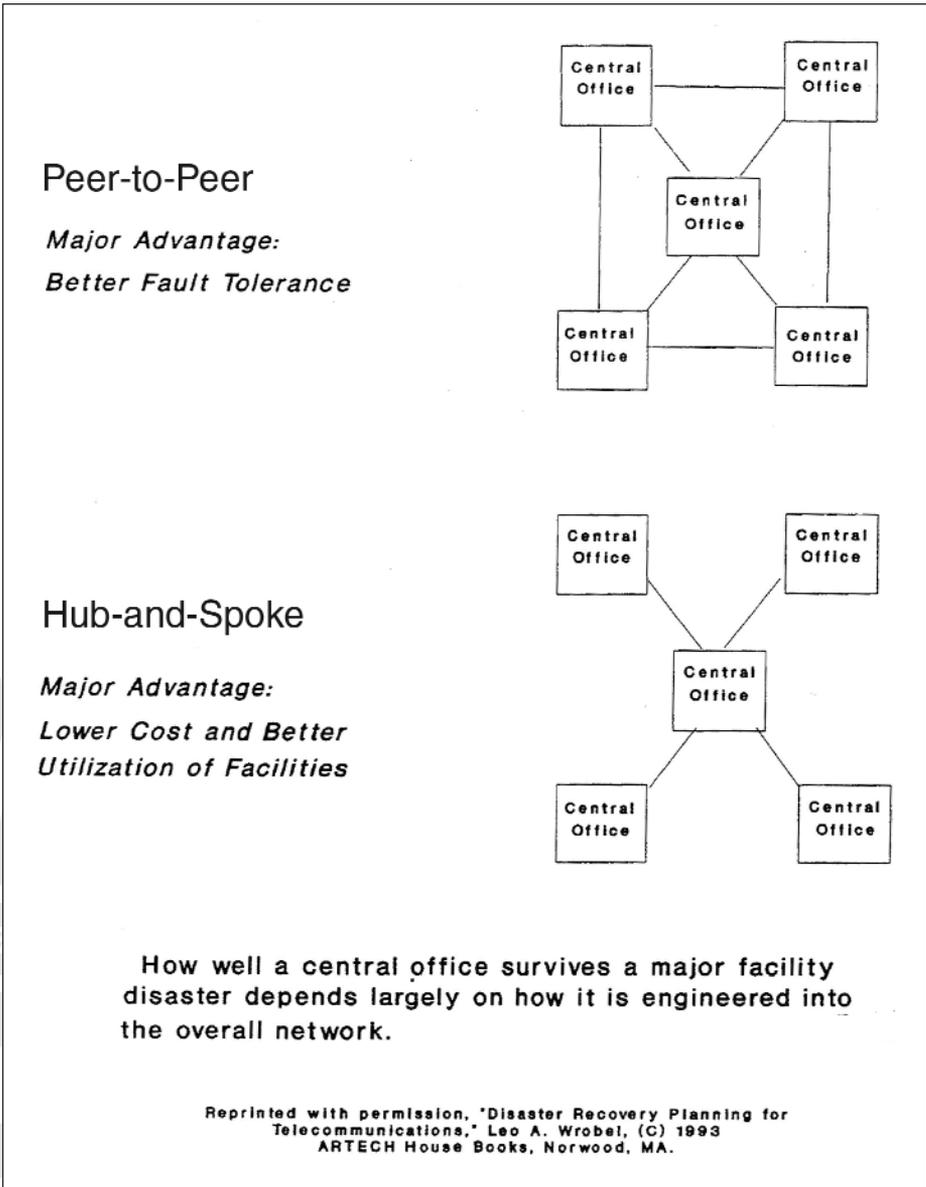


Figure 1: Central Office Hubbing Configurations

network engineering and protection. The local telcos really do have these people although you sometimes have to seek them out.

Many times *alternate* or diverse cable routing is available in your company's service area for little or no cost. Be careful though, because a lot of people use the terms ALTERNATE and DIVERSE interchangeably. They are not the same thing! "Alternate" is anything other than what you have now. "Diverse" implies a totally separate path. Alternate might mean a different "100-count" in the exact same cable. Diverse should mean at a minimum a completely different cable, and if the engineer knows what he or she is doing, a completely different right of way too. Other technical terms you can use to converse with these folks include "count" diversity. Count diversity is, as I mentioned above,

where different 100 counts in an existing cable are utilized. So what good is that you might ask? The answer is, not much, except for one case. Have you ever had a circuit or number of circuits disconnected in error? Count diversity in some situations could reduce the possibility that disconnection will happen since the cable appearance will be on two separate physical connection blocks in two different locations on the distribution frame in the CO. Another common term is "Sheath" diversity. Sheath diversity uses separate cables, but still in the same conduct and manhole. Other types of diversity can include things like non-adjacent ducts. This is premised on the idea that a backhoe operator will have the brain to stop digging when the backhoe hits the first cable—presumably near the surface. If some of your service is in

“deeper” or non-adjacent cable ducts, you might not lose everything.

WHO IS AT THE OTHER END OF YOUR CABLE?

For most companies, the first point of physical vulnerability other than the cable itself is the local telephone serving office for their area. In most cases, all data and voice traffic must pass through this location as the first leg to wherever it is going. The physical capabilities and configurations of these local offices vary greatly.

Physically, most local serving offices are sound structures constructed of reinforced concrete. Because designs vary, you should drive by the serving office. Look for the obvious. Does the structure have a large portion of the surface area covered by windows? Does it appear to be in an area prone to flooding? Is there major construction activity planned or occurring in the immediate area around the CO? Ask some questions of your telephone company’s account representative. Is the CO manned 24 hours a day? What type of fire prevention systems does it employ? How old is the structure?

INTERESTING WAYS TO PICK THE TELCO’S BRAIN

One item most operating companies are quite willing to provide is a CO tour. They do still provide these if you request one and oftentimes it includes free lunch from your vendor. Now there’s a great reason to call. In addition to eating for free, here are other benefits. One benefit is the ability to meet the people who install or work on your circuits face to face rather than just on the phone. This helps smooth out day-to-day operations and establishes an atmosphere of trust where you can learn more about what the Telco does for disaster recovery. Some good questions to ask might include:

1. Is the Central Office (CO) a tandem or end office? End offices serve only end customers. Tandems switch traffic from one end office to another. Many CO’s today perform both functions. This could have a bearing on which systems get recovered first in a disaster as well as how many people might be affected in a metropolitan area. For example, loss of a Tandem all the way across town could still affect you by

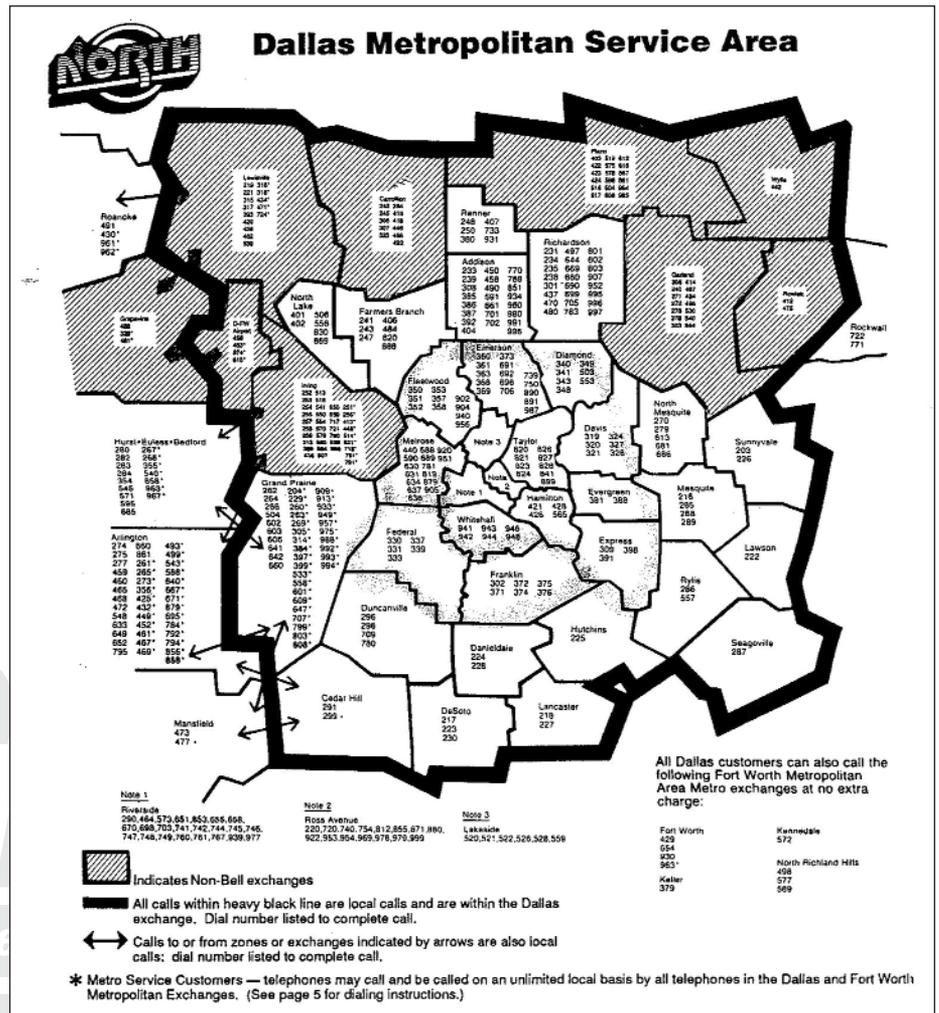


Figure 2:

contributing to network congestion and blocking your calls.

2. What plans exist for restoration in the event of fire and flood? What services would be affected?
3. How difficult or expensive would it be for facilities to be brought in from another CO? Occasionally bringing in alternative facilities is reasonably straightforward, but often it is prohibitively expensive, if not impossible.
4. Try to get an idea of the topology of the entire city’s telephone network. Is it a hub and spoke or peer-to-peer configuration? Hub and spoke is more economical for the telephone company because facilities are better utilized. It is not as reliable however as peer-to-peer, where alternate routes for switching are more likely to exist. (See Figure 1)
5. Ask about the location of the regional serving offices and access tandems. You may find that many Competitive Local Exchange Carriers (CLECs) and

long distance companies are congregated in just a few “carrier hotels” or that they derive all of their connections to the Bell network in the same access tandem downtown. This is not always the competitor’s fault. Oftentimes the monopoly incumbent makes it difficult for competitors by making switch diversity, “ROTN” (Route Other Than Normal) cable routing, fiber optic ring technology or “dark” fiber cost prohibitive or difficult to get. You will obviously get two different stories on this issue depending on whether you are speaking to the incumbent monopoly or competitor.

PHYSICAL VULNERABILITY TO TELCO DISASTERS—WHERE DOES ONE START?

The size and density of the serving area for the office varies substantially from serving area to serving area. So where does one start and how does one prepare? First, you might consider taking a drive to find the site of the

SUMMARY AND FOR MORE INFORMATION

local central office for your area. It should be no more than a few miles away, with very few exceptions. In the center cities it may be only blocks away. Out in the country it could be miles away. Suffice it to say however that probably 90% of them are within 18,000 cable feet or less of a subscriber, or less than 3.4 miles. Once you have located it, drive the route between it and your company location. Look for construction, digging, or other activity in the right of ways along the street. After a while, if you are so inclined, you will even learn which boxes and pedestals contain fiber optic equipment, xDSL equipment, T1 repeaters and other components. It is not like any of this is going to help you DO anything about potential disasters, but if you spot a big construction crew working adjacent to your company's fiber terminal, you can at least have some possible warning that something may happen. Another easy way to become familiar with the service area of a particular local CO is to pick up a local telephone directory and look at the first few pages. Sometimes, but not always, there is a diagram that illustrates the local calling area and exchanges served in the immediate area (See Figure 2) The scale may not be exact, but it gives a good indication of the *relative size* of the service area. It might even list the telephone prefixes (NXX codes) for the area. For example, by looking at Figure 2, (specifically at the "6:00 position") notice that a telephone subscriber with a 223 telephone prefix is served out of the DeSoto Central Office (CO). By comparing this diagram to a regular city map it is possible to get an idea of how many other companies are served out of your area's local telephone office. This could have a bearing on recovery time in the event of a severe CO outage. You can also get an idea of how far you would have to drive to find a working phone if the CO is destroyed or incapacitated.

While this diagram is a good starting point and serves as a general overview there are other better and more detailed references available. One such source in the United States is the Public Service Commission (PSC) for each state. The PSC is repository of a wealth of information on this subject for those willing to some "digging"—in the sense of research that is, not backhoes.

Local exchange companies are required to file detailed maps, diagrams, and other information regarding their franchise areas on file with the individual state's PSCs.

Useful data on file can include the following.

1. Definition of the serving area for every central office in the state, down to the particular street.
2. Distances to other serving offices can often be approximated through the use of available documents, which could be important for companies considering diversity through "special construction" of facilities at another serving office. Quite naturally, the cost of such a project will vary with the distance and availability of existing cable or fiber.
3. Distance, however, is not the only consideration. The closest CO, for instance, may not contain the technology needed by the customer. A different local operating company—a difficult prospect in both the construction phase and in future circuit coordination, may even operate it.

Information can be secured from the Public Service or Public Utility Commission for the cost of making copies of it. For the address of your Commission, take a look at <http://www.naruc.org> (National Association of Regulatory Utility Commissioners) and click the button at lower left that says "State Commissions."

There are many more issues to consider in recovery planning for the Telephone Company, but this article should give you a good start. I have published several books on the topic, which are available on <http://www.Amazon.com> or may even be in your local bookstore. Also, watch for my new book to be released this fall. It will have a lot of exhaustive information on this topic as well. You can also feel free to call me here in Dallas. My number is (214) CALL-LEO and barring a cable cut I will be delighted to hear from you. Good luck in your pursuits! 📞

NaSPA member Leo A. Wrobel has over 25 years of experience with a host of firms engaged in banking, manufacturing, telecommunications services and government. An active author and technical futurist, he has published ten books and over 400 trade articles on a wide variety of technical subjects. Leo served ten years as an elected Mayor and City Councilman (but says he is "better now"). A sought-after speaker, he has lectured throughout the United States and overseas and has appeared on several television news programs. Leo is presently CEO of Dallas-based TellAWCom Labs Inc, <http://www.tellawcomlabs.com> He welcomes your comments by calling (214) CALL-LEO or email at leoprivate@tellawcomlabs.com.

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