

# Using Wireless Technology to Augment Network Availability and Disaster Recovery



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Imagine having *four* safety nets in place and actually using three of them in a disaster. That's reportedly what happened to one hospital during Hurricane Katrina: (1) Primary phones: out (central office under water). (2) Wireless phones: out (only 12 hours of power at cell phone towers). (3) Satellite phones: commandeered by the government. So what still worked? Fixed location wireless access to the Internet allowed the hospital to turn up VoIP phones and stay in business! Leo Wrobel shows you how to leverage your own "safety nets" with available wireless technology and give your organization the maximum chance to survive in a disaster.

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A few months ago I wrote about not letting the phone company's disasters become yours and about ways to protect against the all-too-prevalent cable cut. Many wireless technologies offer a solution to this problem since it is exceedingly difficult to dig up air the way one can dig up a cable. Wireless technology not only increases network availability but it can also help you recover in a disaster.

This month, I provide a few "tricks of the trade" to bolster both benefits to your organization.

Wireless technologies that are useful to the enterprise user for network diversity and disaster recovery include the following:

- Infrared
- Microwave
- Satellite
- Unlicensed point-to-multipoint systems

Each has its own inherent strengths and weaknesses and the application for the technology you choose to back up (voice, bursty data, Internet, and so on) will also play a role in which wireless technology is best.

Following is a brief summary of some common wireless alternatives.

## Infrared (Point-to-Point) Links

Point-to-point infrared links are not radio: they are invisible light. You can think of them like the infrared remote for your TV. Infrared is inexpensive, it does not need to be licensed, and infrared equipment comes with a variety of interfaces including T1 and Ethernet. All pretty good advantages to start with.

Infrared requires line of sight; that is, one end must be physically visible to the other end of the link. And because it is actually light and not radio, infrared is much more easily affected by fog, rain, snow, birds, and (practically speaking) anything that will interfere with propagation of light.

Despite its limitations, infrared is widely used. The equipment can easily be mounted in a building, it does not require any special power or "environment," and its transmitter/receiver can operate through window glass with few problems. If you have an application that requires you to get a T1 across the street or across a small campus, infrared may be your least expensive solution.

Infrared links are also often used for LAN interconnection in buildings that are in close proximity but separated by public rights of way (such as streets) where cabling between buildings is impractical. If you consider the use of an infrared link yourself, be sure you don't exceed a mile or so (less if you are prone to periodic fog or heavy rain), and that you have clear line of sight.

## Microwave Radio

Microwave has broad applicability, high reliability and availability, relatively good ease of use, and relatively low cost. You do need a license to operate most microwave systems, and the more popular frequencies are congested and difficult to get licensed, especially in the major cities.

Like infrared, microwave requires line of sight, which is problematic within majorities. If you are lucky enough to get a frequency licensed, all your work could be undone because someone builds a building between the two points or your microwave link. This occurs more often than you might think.

Microwave enjoyed most of its popularity in the 1980s as a "bypass" alternative to go around the local telephone companies when long distance got cheap but the phone links to connect to the long distance providers got expensive. The logical response of enterprise users was to dump the local telephone company and use microwave to connect directly with long distance carriers of the time such as MCI and Sprint.

While the financial motive was the primary driver, it took the enterprise user until the next cable cut to realize that microwave also had use as a disaster recovery technology. Microwave provided the ultimate diverse route because one cannot dig up air.

In the 20 years since its use as a "bypass" technology, the feature richness and reliability of microwave has increased, and the cost of these systems has dropped significantly. For example, for many systems there is a greater choice of interfaces with Ethernet and T1 interfaces being commonplace.

But as stated earlier, you have to secure an FCC license to operate a microwave system. The manufacturer can help you do this, and there are also numerous consultants who can literally be found in the Yellow Pages to help with the same issue. If you are looking for true diversity at reasonable cost and at higher reliability than infrared, microwave may be the ticket.

## Satellite Communications

This discussion would not be complete without a brief overview of satellite communications. Since Katrina, the satellite industry has looked in a big way at disaster recovery. When a widespread disaster occurs, as with Katrina, a major earthquake, or the Christmas 2004 tsunami in the Indian Ocean, satellite might be the only show going on in the immediate aftermath.

It really pays to check out the advantage if you live in a region prone to such disasters. Also, like the previous technologies discussed above, satellite communications have taken leaps and bounds over the last few years in terms of feature richness.

There are a few disadvantages. Satellite is essentially microwave radio aimed upward; it uses essentially the same frequencies. As such, the same rules hold true regarding the tendency to wash out in heavy rains.

There are also two times every year when the satellite receiver will be aimed directly at the sun right around the spring or fall equinox. At that time there will be a brief outage. These outages can be planned for, however, because the service provider will know precisely when they will occur.

With regard to equipment, satellite has metamorphosed from 16-foot dishes in years past to pizza pan dishes that fit on the side of a building. In fact, the case of global position systems (GPS) and freight-tracking technologies equipment often fits in your hand. (Consider how handy it might be to have GPS in the aftermath of a tsunami or hurricane when all the street signs and landmarks have literally been washed away.)

Before using satellite, consult with the vendor on propagation delays. It still takes about a quarter of a second to get to a satellite and back because of the limitation of the speed of light. This might have a noticeable performance delay depending on the data protocol you are using.

If these delays exist, however, they can often be compensated for by the satellite provider or through the use of various outboard technologies. Nobody can increase the speed of light, but it is possible, for instance, to send more data before expecting a response, thereby increasing performance.

Companies such as Direct PC (I think they are called HughesNet now) actually use satellite for Internet access, so

obviously the performance issue some of the latency issue, have been addressed

## Point-to-Multipoint Systems

Up until now, the challenges of setting up an effective wireless primary and disaster recovery system have always involved trade-offs between cost, complexity, reliability, and time (such as in licensing). This makes the newest entrants of the technologies discussed in this article, point-to-multipoint (P-MP) radio systems, not only an exciting new development but also Leontes technology of choice.

P-MP marries microwave radio technology to enterprise and makes delivering technologies of all types faster and easier than ever before. This technology is also becoming widely used as a disaster recovery technology. Indeed, two users we are familiar with, both of which are county governments, have scrapped their AT&T T1s altogether and now use P-MP as the primary technology, with a few T1s held back as the backup path.

Here is how the technology works. P-MP products operate in the 900 MHz; 2.4, 5.1, 5.2, 5.4, and 5.7 GHz frequency bands. Since these frequencies are lower than many microwave frequencies, "wash out" and restrictions on range are not as much of an issue.

Like the other technologies, a variety of interfaces are available, including T1 and Ethernet. Start-up costs are low. We have seen central unit costs as low as \$2500 and "per rooftop" costs in the \$500 range. Typically a small antenna is installed on the roof (about a foot long and 4 inches wide); or in cases where the range is greater, a small dish about the size of a satellite TV antenna.

Furthermore, the equipment does not require a FCC license and is streamlined, with the radio built into the antenna in the same 12" x 4" x 2" unit on the roof. It's incredibly easy to get up and run. Most P-MP platforms also include the most common interfaces that enable them to easily integrate with standard network management tools and systems.

Obviously any system that traverses an airwave should be encrypted. Look for a system that provides security with over-the-air DES (data encryption standard) encryption or AES (advanced encryption standard) encryption capabilities. Take a good look at security when using any wireless solution!

### NOTE

Most systems are available out of the box with security, including over-the-air DES or AES capabilities, providing 128-bit encryption. One vendor claims that with AES, it would take approximately 14 trillion years to crack a code older than the earth itself.

P-MP systems serve numerous enterprise locations of virtually any size and can be used for distances up to 15 miles (24 kilometers). Point-to-point links can traverse over greater distances by augmenting the antennas at both ends (a dish similar to a microwave dish is used in these cases) and in fact approximate the "mountain top to mountain top" links described previously.

Most P-MP systems require line of sight, although some of the ones that use the lower frequencies (such as 900 MHz) do not. The lower frequencies however generally limit throughput to T1 speeds (1.544 Mbps)... if you are lucky.

To summarize, P-MP systems, in the opinion of this humble writer, represent the best trade-off of cost, performance, ease of use, and variety of interfaces available to the enterprise user seeking disaster recovery and network availability.

## Summary

I like the P-MP systems. First, I have never cared for monopolies like the phone company and I like to have the widest diversity of choice possible.

From a disaster recovery perspective, these systems rock. Imagine a unit you can have shipped in overnight that can reestablish a T1, nail up an Ethernet link, or provide you upward of 10 times the capacity of a point-to-point T1. All without a license, or the need to go to a school, or the need to add yet another black box to interface with your network.

Check them out. You can get more info at [AirCanopy.net](http://AirCanopy.net) and myriad other sources. Until next time, have a super day!

disaster-resilient year!

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