

Using Satellite Communications for Disaster Recovery, Part 1



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In an era of mega-disasters such as Hurricane Katrina and the Christmas 2004 tsunamis, satellite communications might some day be your organization's only connection to a twenty-first century communications infrastructure. Learn what you need to know (and what others have discovered) about this versatile lifeline in this informative series by Leo Wrobel.

I recently finished a terrific science fiction series, titled *Weapons of Choice*, by an author named John Birmingham. The story begins in the year 2021, with a U.S.-led aircraft carrier task force in the Pacific that is instantly transported in its entirety to June 1942 through a botched scientific experiment. The technological, political, and social chaos that ensues in the book is riveting, but you will have to buy the book and read all about that yourself.

One thing struck me in the beginning of the book immediately following the "transition" to 1942. It was astounding to see how dependent the twenty-first century people (military and otherwise) had become on satellite communications. Everything the "up timers" did as far as voice communications, broadband, video link, email, weather forecasting, reconnaissance, global positioning, and a host of other applications suddenly turned into a blue screen with "NO SIGNAL." The world of instantaneous communications to which they had long since become accustomed and the secure feeling of being constantly bathed in wireless broadband on demand was suddenly gone; possibly for many years. Indeed a good portion of this book is devoted to how the up timers coped with the loss of everything from GPS-guided weapons and smart bombs to no longer having 600 channels of bad TV to watch. The time travelers did however, get some "21C" telecommunications online quickly by implementing one of their own Disaster Recovery solutions that came along with them to 1942. The solution was to bounce radio signals off the troposphere. Through a relay arrangement from Hawaii to an aircraft carrier, then from the carrier to an AWACS plane, then from the AWACS plane to a stealth cruiser, they were able to communicate from Hawaii to the USA (see Figure 1).



Figure 1 Relay system: Hawaii to San Francisco

They were even able to link up video conferences when all the relays lined up in the right spot. All the while, they lamented about what they would pay for "one lousy satellite" because none were in existence in 1942. Personally, I got a big kick out of this part of the book because Tropospheric Scatter, or "Tropo" is what we used 30 years ago when I was in the military, for "long haul" links before satellites became popular. Astoundingly, this technology is still in use in today's military as a backup for satellites. It was just funny to see them in this book and in that particular context.

There is nothing like viewing a particular technology from a perspective 70 or 80 years in the past to have an appreciation for what we have today and how easily we take such things for granted. That school of thought plays directly into disaster recovery. When today's companies lose critical communication links, they feel as lost as the hapless twenty-first century up timers, ripped from their secure world of instant communications and tossed into oblivion.

Therefore, today's companies and organizations must realize that when terrestrial communications is damaged due to a disaster, satellites provide a critical lifeline. Moreover, for getting communications to remote areas far from traditional landline communications, satellites may be the only link available to the "uptime" twenty-first century communications infrastructure.

Satellite Technology: Overview in 200 Words or Fewer

Satellite communications have taken leaps and bounds over the last few years. Satellite is essentially microwave radio aimed upward; it uses essentially the same frequencies as microwave radio. The technology has gone from elaborate teleports and 16-foot dishes in years past to pizza pan dishes that fit on the side of a building. In fact, in the case of Global Position Systems and freight tracking technologies, the units literally fit in your hand.

Notwithstanding timing delays (it takes a fraction of a second for the signal to go from the earth, 22,300 miles to a geosynchronous satellite, and the same distance back), satellite is a clean, reliable, and cost-effective disaster recovery solution. Even so, it is interesting to note (as in the twenty-first century military in my *Weapons of Choice* example above) that some corporate enterprise networks are virtually 100% satellite already. Network television is a prime example. It is therefore probably prudent in these cases to explore another technology for backup. Network television providers do the opposite of what your organization probably does. Your organization may back up terrestrial landlines with satellite. TV providers who already use satellite may back up the satellite with fiber and landlines. Granted, it is probably not practical for your company to license and install a Tropo system, but even so there are ways to back up satellite with other technology.

Is Satellite Right for All Applications?

As I stated earlier, a geosynchronous satellite orbits 23,500 miles above the earth on about a 50,000-mile round trip for a conversation. Light travels at 186,000 miles per second. On paper, at least, that equates to a little more than one-quarter second of delay. That's enough to become noticeable before one even considers other things that can "slow a circuit down" such as latency in I/P and other protocols, as well as capacitive and reactive components in circuits. The effect of this becomes apparent in the example below, in what I consider to be my all-time favorite telecommunications practical joke: listening to someone in the shop talk to themselves. It goes like this:

While at a U.S. Air Force AUTOVON hub in Japan in the late 1970s, we had access to Model 490L Autovon switch. (Boy, now some of you really know I am dating myself). The switch was connected by inter-switch trunks to other switches worldwide. We would begin by jacking in directly to a satellite trunk from Japan to one of the international gateway hubs in Hawaii or California. From there, the call would progress via the commercial AT&T network across the United States, adding additional delay, to one of the international gateway hubs on the east coast. There was nothing in the network to prevent its picking up a second (or sometimes a third) satellite hop at this point that terminated in the U.K., Germany, Turkey, Italy, or anywhere else we had another switch.

We dialed up a loop back.

The call had by then traversed two or three satellite hops from Turkey, all the way back to Japan. By the time it got there, there was often a delay of two seconds or more. We would then patch the line to the home phone of any supervisor, which at that particular moment was not held in high esteem. At 3 AM. picture the scenario:

Hello? (Silence)

Hello? (Silence)

Hello?

About to hang up, but then HIS "hello" comes back at him on a 1970s vintage analog circuit going 100,000 miles; he could not tell it was his voice; only that it sounded like an international call. The next two or three minutes were invariably hilarious as the poor victim tried to establish contact with himself.

Victim: Hello? Response: Hello?

Victim: Who is this? Response: Hello?

Victim: Who is this? Response: Hello?

Victim: Who is this? Response: Who is this? (Now the "who is this" is coming back!)

After a few minutes of this, they eventually figured it out and went back to bed. During the time we would usually have it on a speaker in the shop for everyone to enjoy. It was funnier than the Abbot and Costello's "Who's On First."

routine.

The point that I am trying to make is that delays in satellite transmission can obviously affect voice communications. How much delays affect data that previously used a landline should be a topic of discussion between you and the satellite vendor. If your equipment sends out short "blocks" of data before expecting an acknowledgment from the far end, however, it affects performance more over a satellite than long blocks will. Asent these kinds of concerns, which can be addressed by the satellite vendor, satellite can be a remarkable disaster recovery vehicle. Hereoes w

- **Ubiquitous coverage.** A group of satellites can cover virtually the entire surface of the earth
- **Instant infrastructure.** Satellite service can be quickly provisioned to in areas in which there is no terrestrial infrastructure.
- **Independent of terrestrial infrastructure.** Satellite service can provide additional bandwidth on a diverse path to provide redundancy as well as overflow capability during peak usage periods
- **Temporary networks.** As stated above, people like the military and Department of Homeland Security find satellite to be the only practical, short-term solution for getting critical information into and out of an area
- **Rapid provisioning of services.** Satellite services can be deployed quickly anywhere within the "footprint" of a satellite.
- **Disaster recovery.** In times of widespread disaster such as hurricanes, earthquakes, or tsunamis, solutions provided via satellite may be more available and more reliable than land-based connections.

If you are looking for a great reference and "easy read" on this topic, download or order the First Responder's Guide to Satellite Communications, published by the [Satellite Industry Association \(SIA\)](#).

I'll be back again soon with more tips on how satellite communications can add immeasurably to your organization's capability to recover after a disaster, including some actual examples of successful configurations. In the meantime good luck in your planning and your pursuits
