

# Backscatter Journal

July, 2011 — 6th<sup>th</sup> Issue

## HURRICANE SEASON IS NOW... ARE YOU READY?

The months of August and September are those having the highest potential hurricane activities at least for those located along the Gulf Coast, Florida and the southern Atlantic coastline. So, is your radio system up to the challenge...more importantly, would it survive a Cat 3-4 storm? Here are some suggestions to improve the odds for your radio network staying operational during and after a hurricane event.

### ANTENNAS AND TOWERS

Annually, prior to the state of hurricane season, it is recommended that each tower be fully inspected to ensure no hardware is loose and that guy wires are properly tensioned. Antennas and transmission lines should likewise be inspected for loose attachment hardware, defective cable attachments, poorly fitted connectors and obvious damage due to wind or lightning events.

Microwave antennas, due to their size, are extremely vulnerable to vibration damage. A sound practice learned through managing microwave systems for the offshore oil industry is to install dual stiff arms mounts on every microwave antenna. These limit vibration effects and help keep these critical antennas on-path. At 6GHz, a 6-degree path change due to a wind-skewed antenna generally equals no path. Make sure all microwave antenna mount attachment hardware is torqued down to recommended values.

ALWAYS have spare antennas on site so that emergency repairs can be made once storm conditions have abated. If a storm is of the Katrina category, stocks of available antennas quickly evaporate. Don't rely on anyone other than YOU to stock replacement antennas. Having them on site means your system could get back on



line far quicker than others...assuming you have a tower crew on retainer.

Antenna systems...cellular, commercial and public safety radio...are equally affected by hurricane force winds. And that is not in a kind or pleasant way. There are only so many tower crews to spread around and the rush is always on once the winds die down. It is imperative that you have an experienced crew on some sort of retainer during these critical months. This is the only way to ensure a seasoned repair crew comes heading out to you, once the dust settles, to assess potential damage and to effect repairs.

### STANDBY GENERATORS

It goes without saying that each public safety tower site must have, minimally, an automatic standby power generator. Ideally, every site should also have battery backup capability to maintain operations should commercial power fail and the standby generator refuse to start. I cannot begin to tell you how many times we have heard about standby generators starting like clockwork on their normal exercise periods only then to fail when "the moment of Truth" arrived. If the

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site in question must absolutely remain on-line, consider battery backup and dual standby generators. It is well worth the added peace of mind.

All generators should be inspected at least once a year. In addition to normal maintenance, for public safety systems we recommend the starting battery be replaced every 18 months and the equipment fully loaded tested at the start of hurricane season. What's the best way to load test a tower site? Do it like Nature would...kill the main power distribution to the site. If the generator stays cold, you know what to do!

Today's generators have complex control and ignition systems. We recommend that you stock critical spare parts (ignition module, water pump, fuel pump, belts, hoses, etc.) on-site since during a hurricane delivery of parts can be hugely disrupted. In fact your normal generator service provider may be affected as well

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and unable to provide services when needed. So, do yourself three favors:

- Standardize on one type/model of generator whenever possible as this minimizes the numbers and types of spares you must stock.
- Make emergency service arrangements with an out-of-area maintenance firm, just in case.
- Verify that all fuel sources are topped off well before landfall and make arrangements to have fuel delivered in the aftermath. Fuel tanks should be sized to support full operations for at least five days.

### USER RADIOS AND MUTUAL AID RESPONSE

Prior to the start of hurricane season, pull together a cache of emergency radios for use by key county and municipal leaders. Provide an abbreviated set of channels/talkgroups so that these inexperienced radio users don't get "lost," for lack of a better word.

If the storm affects a large geographic area, electrical power will be disrupted which means many radio users may be unable to recharge their battery packs. If dc-powered chargers are not available for your model radios then purchase inexpensive dc inverters for use in vehicles. A 75 watt automobile power inverter (far more power than needed to recharge a radio battery) can often be purchased for less than \$30. The radio user can then recharge batteries using their normal desk charger. Some radios are available with spare battery attachments that can be refilled with AA Alkaline batteries. I won't explain where AA batteries can be found in a disaster situation...that you can figure out as needed.

If it is obvious that a hurricane is likely to strike your area, in the aftermath it will be difficult to impossible for you to pass critical talk group or frequency set information to those providing a mutual aid/assistance response. So, proactively, provide that critical information to your radio system's manufacturer. Rest assured, your radio vendor will be coming to give aid. And they can provide a valuable service in streamlining on-the-fly radio coordination efforts as whoever is left on-site will be quickly overwhelmed by rapidly evolving needs.

### LONG DISTANCE COMMUNICATIONS RESOURCES

Hurricane Katrina showed where normal communications means... cellular telephony, wired telephony,

the Internet, etc...are highly vulnerable to wind events and prolonged, widespread flooding. Typical VHF, UHF and 700/800MHz radio systems have limited services areas. Many so-called wide area radio networks become quite pedestrian when their leased telephone company facilities (copper as well as fiber) fail.

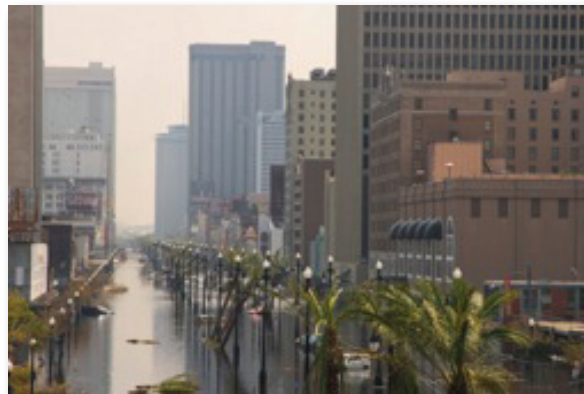
Every E-911, hospital and emergency operations center should be equipped with both satellite and High Frequency (HF) radio backup capabilities. Most know of the advantages of satellite communications, however, the bandwidth is limited and always congested in the aftermath of a major storm. Having an HF backup provides an effective long distance capability whose voice characteristics are much like a typical telephone call. A previous issue of the Backscatter Journal describes HF radio in depth and you are encouraged to review those articles.

Finally, in the case of linking numerous EOCs together in a cohesive way but absent of repeaters, consider utilization of the "old fashioned" VHF Low Band. In the 1950s, 60s and 70s, Low Band VHF (35-50MHz) was a principal means of statewide radio communications. Low Band offered great coverage (sometimes too great to where one could communicate with other police operations many hundreds of miles away!), but had limited channel capacity. As communication needs expanded, many migrated away from Low Band and considered new technologies such as UHF/800MHz trunking.

In terms of communications between fixed EOC facilities, VHF Low Band is extremely well suited. It covers large distances with simply-constructed antenna systems and has sufficient capacity to meet EOC needs. Furthermore, the equipment and antenna systems needed are generally inexpensive and, since no repeater stations are required, highly reliable. So, when considering long distance communication contingencies, minimally one should implement satellite and HF radio systems. If there is sufficient local area interest, a VHF Low Band solution may prove advantageous as well.

### TECHNICAL SUPPORT

So, if a hurricane threatens your location, how bad can it be for you and your radio system? Well, think of it like this. Picture yourself surrounded by seventeen wheels of fortune...all spinning merrily away. Suddenly they all stop (landfall) and only on every potential vulnerability: loss of electrical services; loss of telephone services; towers that collapse; antennas that blow down; microwave antennas



New Orleans Flooded

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off course; dispatch centers uninhabitable; flooded streets; no prospect of vehicular rescue; generators that fail to start; loss of command/control structure; people trapped in buildings and houses but no way to effect rescues; fuel shortages; spoiled/damaged food; water running out; pharmaceutical supplies cut short; no abil-

ity to combat fires; 911 telephony gone....that's how bad it was in Katrina. And it could happen anywhere again.

Those in a storm's affected area are initially overwhelmed by the enormity of the event and the near-simultaneous sets of radio network failures. Through this fog of uncertainty, persons try to make order out of chaos and the unimaginable. If you find yourself stuck in that boat, you need strong technical support that is "all in," all the time.

Make certain emergency restoration plans are established with key radio service providers...and that they have sufficient out-of-area backup and support. If that support is local-only, unfortunately they could find themselves just as ineffective and overwhelmed as you...particularly if long distance communications is lacking (that's why backup satellite and HF radio communications is so terribly important).

If your department has on-staff technical resources, be sure to position someone well outside of the likely affected area. If not, rely on your radio consultant and their body of resources. This staff person or firm must be fully knowledgeable of your radio system, its configuration and vulnerabilities. This person/firm will become your restoration response advocate during the

critical 48 hours after the storm has made landfall. Choose wisely!

Whoever is chosen must have sufficient knowledge to make clear-headed decisions based on their understanding of local conditions and the radio network, itself. Make sure the necessary long distance communications vehicle...between them and you...is at a state of full readiness. Our emergency communications facility is high frequency radio via ShipCom WLO. TCS consultants in Missouri, Georgia, Florida, Mississippi and Louisiana can easily communicate with each other using WLO's exclusive HF channels. WLO is staffed 24/7/365 and therefore can provide both email and voice (telephone interconnect) services as necessary.

## CLOSING THOUGHTS

A disaster can occur at any day/any time. Fortunately, hurricanes are slowly evolving events so sound planning and decision making can occur up to about 8 hours before landfall. But, once landfall occurs, Nature calls the shots and we can only react. If the steps outlined above are considered, your system will be operating at a state of highest readiness and availability. Should failures occur, the odds for restoring communication services safely and expeditiously have been materially improved.

Although radio vendors will surely respond to these sorts of emergency events, the best approach is to design your system such that it fails in predictable layers and in a way that maintains effectiveness for the longest possible term. With proper planning, even a badly damaged radio system should be made operational in hours, never days.

## Tower Maintenance — What You Can't See Could Sink You

**H**ollow tube towers are common to the land mobile radio landscape. They offer an economic solution to the construction of radio systems, particularly in rural areas where land is plentiful and inexpensive. Yet, hollow tube towers do not last forever and those located along the Gulf of Mexico are particularly short lived. The failure mode: internal corrosion. Obviously, such corrosion cannot be examined visually, but if the galvanized finish is failing on the outer surface, expect that the inner one isn't much better.

Taken to the extreme, here is an example of the sort of corrosion that could result in catastrophic failure, coupled with injury or death.

Don't take chances with old hollow tube towers. The gold standard of testing for corrosion is the ultrasonic ping test that measures the thickness of the various tower members. Of course such as test is expensive but should be done at least every five years. A far simpler and less costly test (but nowhere near as accurate) is the gentle tap with a hammer...but be careful!! That's how this "metal termite" damage was found.

The best long term solution for coastal tower sites is, of course, a solid rod tower.



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## VHF/UHF Refarming: The FCC Gets Tough

It is no shock to those in the Industry that many have chosen to ignore the FCC's-Ordered VHF/UHF Refarming, commonly referred to as Narrowbanding. In fact, nearly 60% of affected licensees have done little to nothing to meet this looming January 1st 2013 deadline.

The FCC has recognized this apparent lack of urgency on the part of licensees and released written notifications to those who have not added the narrowband designator to existing licenses. But, merely adding the new designator to a license but not actually narrowbanding the system, itself, comes with grave consequences.

On July 13th, the Commission spelled out in plain language what lies in store for those who choose to ignore the narrowbanding order: "Operation in violation of the Commission's rules may subject licensees to appropriate enforcement

action, including admonishments, license revocation, and/or monetary forfeitures of up to \$16,000 for each such violation or each day of a continuing violation and up to \$112,500 for any single act or failure to act."

Playing chicken with the FCC is not a particularly brilliant move. They have the time and resources to grind down the hardest of opponents. Make sure your narrowbanding efforts are funded and underway. Although it may be possible to secure a rule waiver if a funded narrowbanding project has been delayed due to valid circumstance, doing nothing or trying to play a smoke-and-mirrors game with the FCC is certain to result in major pain and cost.

The FCC will certainly be handing out fines quickly after the 2013 deadline passes....make sure that isn't you!

## TCS Continues to Grow

Within the last six months a number of consulting personnel changes have occurred within Tusa Consulting Services. Earlier this summer TCS was pleased to have Mr. Peter Ungar join the operation Peter is located in Fort Worth, TX and will play a key role in extending our business presence into Texas.

Jack Hart, a four-year TCS member, has accepted a Project Manager promotion and now is responsible for TCS business activities throughout the Midwest. In April, Mr. Jack (Tripp) Forrest joined TCS. Tripp is based in Tallahassee and in June received word he had passed his Professional Engineer's examination. Lastly, in terms of technical support, Mr. Carl Rader (a consultant based in Coral Springs, FL) joined us. Carl has an extensive radio and dispatch center work history and will likewise play a key role in our desire to grow services supportive of E-911, CAD and related technologies.

In April, we were pleased to announce the addition of Ms. Wendy Bradford. Wendy is responsible for TCS sales and marketing in the southern states (Louisiana, Mississippi, Alabama, Florida and Georgia).

We thank our many clients for their continued support and look forward to further expansion of TCS products and services supportive of the public safety community. Hope to see you at APCO-PA as we have a unique set of TCS beads newly minted, just for the occasion!



*Time is Growing Short*



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## The 700MHz D-Block

The US House and Senate both have different but similar Bills being considered that involve the potential reallocation of the 700MHz D-Block of spectrum to public safety. Both Bills likewise involve the construction and maintenance of a nationwide LTE broadband network specific to public safety operations.

A key aspect of the funding for construction of this new LTE network is tied to downstream auctions of other television broadcast spectrum and microwave allocations now associated with federal services. In the immediate term, Congress would be looking at an envisioned \$12B capital investment, to be repaid through auctions. And that's why what should be a sure-thing spectrum allocation is anything but.

In reality, the design, construction and maintenance of a true nationwide public safety LTE network...one with no prospect of self-generated revenue production...will cost far more than the initial \$12B estimate. The technology is still in an evolutionary state so there are many "unknown" unknowns at this point in Time. One has to only look at recent military aircraft and ship development contracts to see where federal budget project estimates have little basis in fiscal reality. Actual construction costs always soar whenever the path deviates from the "tried and true." This ambitious undertaking will be no different. Nor will it likely be completed within

either Bill's proposed time frame.... remember 800MHz Rebanding was to be completed in three years!

Public safety does indeed need a broadband data solution. Public safety LTE will surely roll out in some highly populated areas where there are sufficient numbers (tax payers) to support the goals. If ever there was a national infrastructure project that could serve the public good, this is it. Its timing, however, could not be any worse.

The climate in Congress with respect to new spending is not just chilly...it is downright arctic. If Congress works toward a successful debt ceiling boost before a triggered default occurs, then one of these Bills could work its way to passage. Conversely, if Congress fails to act in a fiscally responsible manner on the looming debt matter, the D-Block spectrum will could be auctioned to the highest bidder and with it the goal for a contiguous swath of same-band public safety spectrum.

At the time of this writing, Congress has wrestled with getting government spending and costs under control for months and now has less than seven days to resolve a default-triggered calamity.

That's not the change we need.



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# Important HF Emergency Communications Info

ShipCom has been granted a FCC rule waiver allowing public safety agencies to utilize its capabilities during emergencies. Contact ShipCom at 1-800-633-1312 to secure your agency's authorization to operate on WLO (Mobile, AL) and KLB (Seattle, WA) channels. If your EOC is equipped with a dedicated HF single-sideband radio consider pre-programming the following frequencies for emergency use. All channels use the upper sideband mode.

WLO – Mobile, AL:

ITU Channel # 405	4077.0KHz TX;	4369.0KHz RX
ITU Channel # 607	6218.0KHz TX;	6519.0KHz RX
ITU Channel # 824	8264.0KHz TX;	6519.0KHz RX
ITU Channel # 1212	12263.0KHzTX;	13110.0KHz RX

KLB – Seattle, WA:

ITU Channel # 805	8207.0KHz TX;	8788.0KHz RX
ITU Channel #1209	12254.0KHz TX;	13101.0KHz RX

For public safety agencies located in Louisiana, Mississippi, Alabama, Georgia and the Florida panhandle the best frequencies for daytime use would be Channels 607 and 824. At night, try using Channel 405. For agencies located in south Florida the best frequencies to use would include Channels 1212, 824 and 607. Should WLO be unavailable, contact ShipCom's west coast shore station, KLB, using either Channel 805 or 1209. HF transceiver equipment that is FCC type-accepted for use in the Maritime Service (FCC Part 80) is required for agencies to participate in non-emergency training exercises. During an actual emergency, however, it is permissible to use amateur radio equipment (FCC Part 97) that is operable on the listed frequencies and upper sideband mode.

To call for a radio test, simply state on the selected channel: "WLO, WLO, WLO this is Agency XXXXX calling for a radio test." Repeat this message three times and then standby for a response. Of course, if you are unsure of the use of the various channels, in this testing stage, contact ShipCom at 800-633-1312 for on-air assistance.



## TCS Hall of Shame – Can Somebody Spare a Broom?

We get to see the handiwork of many radio service companies in our travels. Far too often, we find life-critical public safety base stations and repeaters wallowing in absolute filth. Of course, the cost of Project-25 test equipment, software, service monitors and repair parts has sky rocketed in recent years...but the cost of a broom and dust pan has held pretty steady. Often less than \$12, on sale. Get the hint?