

# The *REACT*<sub>er</sub>

The Official Publication of *REACT* International, Inc.

December 2017



*Merry  
Christmas*

*Come to Fabulous Las Vegas*

**January 22nd, 2018**



**For *REACT* International's  
Annual Board Meeting**

**January 22, 2018**

All *REACT* members are invited to attend the meeting, see how your Board works, visit Fabulous Las Vegas, and see the sights!

(Who knows, maybe you'll even win some money at the tables or the slot machines!)

*RSVP to REACT International if you plan to attend. Call or email.*

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# A Word from the Editor

Will Stanley

Ah yes... the magic of Christmas!

Whether you celebrate Santa Claus or the birth of our Lord, Jesus Christ, the Christmas season is one that we all hold dear.

Last month, I recognized our President John Capodanno for all he does for us, the members and for the organization. This month I would like to call out to the others who help make this magazine the excellent publication that it is:

**Charles A. (Chuck) Thompson** - Associate Editor. Chuck makes sure that all the details are covered - the punctuation is correct, the spelling is right and grammar sounds like I really know what I am doing!

**Joe Zych** - Region 3 Director and author of "From The Corner of The Room" - Joe does a tremendous job in gaining new teams for us and also keeps us informed on the WW Net and about all things radio!


**Walter Green** - Training Specialist - Walter is the newest addition to our family here at The *REACT*er and is doing a great job in keeping all the training resources organized, updated and available to us!

And lastly, but certainly not least! **YOU**, the members! Without you reading the magazine and contributing to it in The News from the Front Lines section and others, we'd be just a bunch of words on an electronic page.

The *REACT*er staff wants to take this opportunity to wish you and yours a very Merry Christmas. May it be the best ever!

*REACT*ively,





*Seasons Greetings from the Board of Directors*

As 2017 draws to a close and another new year approaches, your Board of Directors would like to take this opportunity to thank you for all the hard work you've done this year!

We would also like to welcome aboard all the new teams who have joined our *REACT* family this year. Hopefully the coming years will find you active and helpful in your communities.

We have made great progress this year training wise, with more and more members taking the training necessary to be of value to their local law enforcement and city officials during times of disaster and emergency.

This year has seen many of both types of incidents; Hurricanes Harvey and Irma, not to mention the many wildfires in the West and, as always, *REACT* was there for all of them!

Here's wishing you and yours a Merry Christmas and a Happy New Year!

*Warren Dietz* - Region One

*Russell Dunn* - Region Six

*Thomas Currie* - Region Two

*Gerald Jones* - Region Seven

*Joseph Zych* - Region Three

*John Capodanno* - Region Eight

*Daniel Davidson* - Region Four

*Ravindranth Goswami* - Region Nine

*Lawrence Fry* - Region Five



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# From The Corner of the Room

Joe Zych  
REACT WW Net  
Coordinator

Well, here's hoping all have had a nice Thanksgiving. All that's left here is maybe some turkey soup. Christmas is just around the corner and it's time to get that list started. You know you want a new radio and there are so many choices!

The best choice for the money is the Baofeng hand held radio. With this, you have a radio that will act as a scanner and a transmitter plus a really nice flashlight and an FM commercial radio receiver. The built in emergency loud siren with light flashing is a good tool and when you activate the emergency siren it transmits that loud notification on the frequency that your radio is on.

Be careful and make sure you are not on a ham transmit frequency when you activate this emergency system!

The MURS is a good group of frequencies that your club can use for communication without a license and it's in the good M VHF range. Establish a "CLUB FREQUENCY OR CHANNEL" for your team and get each person in the habit of using this club frequency.

Weekly nets for your team is important so that each person knows that when there is a storm and the power is out, turn on that Baofeng where you have a flashlight and a radio all in one! Find that sweet spot in your house or outside property that gives you the optimum communication with your team members.

Our team constantly tests locations to find the best place for the best communication and it changes from summer to winter, when the leaves are off the trees which greatly enhances your communications.

Remember short and to the point communications, set up a weather net, set up a practice command center and have a drill. Have your team work a bicycle race and be stationed in your city for emergency communications.

Unit numbers - easy, simple and to the point, most teams issue R numbers for each team member so it's easy to remember. Tim R-1, Bob R-2, Cathy R-3 and so on; this makes your REACT TEAM net clear and understandable.

Remember a net is an organized, organized, organized, communications setup that will work with 5, 10 or 100 people at once. Only one person talks at a time and like a wheel on a bicycle, the hub is the net control operator. Then all the spokes out to the tire are the people on net. If R-1 is net control operator and R-6 wants to talk with R-15 then R-6 must ask permission from R-1 to talk to R-15 and when finished clear out and return control back to R-1 net control.

The ECOMM test that you can take online in the training section covers this in detail and as with all the training online material, it is very useful and puts all of the REACT members on the same page.

In closing, the best bang for your buck is the Baofeng hand held radio multi use....oh, did I mention VOX hands free operation? Clip it on your sun visor and your voice will activate the hand-free transmitter. And - - you can use it for security! It can bug a room, and you can even make a repeater for your team with two Baofeng radios.....tell Santa you want a Baofeng - better order two (they're small).

Until next time have a very REACTIFUL CHRISTMAS.....and tell Santa to upgrade that rubber duck on your Baofeng to the 16 inch one. He won't mind carrying the extras on his sled.

From the Corner of the Room, we wish Merry Christmas to all the REACT members and Directors and to our President, John.



Q Code! -Try It!



# NEWS

FROM THE

# FRONT LINES

## Star Mountain *REACT*

(Tennessee)

Submitted by Joe Zych

Star Mountain *REACT* Team always helps out the Humane Society with their fund-raiser dinners for the animal shelter. In the picture you see us all again in the kitchen as we were serving soup to around 200 people.



Joe Zych R-1, Barbara R-9, Tom R-24, Wilma R-30, Lee R-28, Judy R-29

We always get to sample all the food and deserts that are so good! Maybe that is why we have such a good team turn out, there is food! It is always fun to help in your community and make a difference and as always we put the event in the local newspaper for some good P & R for *REACT*. The bright orange shirts always stand out, and yes the 8 different soups were yummy!

November 4th was the day for our towns Veteran's



day parade and there were 35 floats and a good turnout, we had a float and our Star Mountain Team was proud to salute our veterans.

This picture is the group putting the final touches on the float and then in the picture below, you have Lee R-28 Barb R-9 and Judy R-29 holding the flag to salute the Marines. *REACT* was very proud to be part of the event and to show our support for the men and women that protect our country and put their lives on



the line so we are able to live in Peace.

Star Mountain *REACT* always tries to attend the ham-fests within hours of our location, lots of fun lots of good deals on CB radios and ham radio gear as well as computers.



If you do a Google search in your area for hamfest it will post dates usually on Saturdays and there is food and fun. You can bargain and make offers in the outdoor flea market usually called the bone yard its new and used mainly used. People want to sell their equipment and at the close of the day you would be surprised at all the free stuff they give away because they do not want to take it back home. I usually take back more then I brought but it is a good team event to share in your hobby of communication. If your team travels in a group it gives you a great chance to use your radios for communication.

## **Cleveland County *REACT***

(North Carolina)  
Submitted by Jay Flora

On Oct. 31, Shelby Police and the Zoar Baptist Church called Cleveland County *REACT* to help at their Church with a Halloween Event. Jay and Officer Gemes of the Shelby Police Dept. and 2 Shelby Police Explorers worked the crosswalk on South Lafayette St., stopping traffic to let people cross the street to get to Zoar Church for the Halloween Event with their kids.

This is not the first time Cleveland County *REACT* has worked with the Shelby Police Explorers. They have a lot at events. *REACT* and the Explorers and Shelby Police work very good together. The event

went from 6:00 p.m. until 8:00 p.m and Zoar Baptist Church gave our Team a \$75.00 donation for helping and thank us for coming out. They said they will call on us next year to help as well. The Shelby Police thanked us also and said if they have any other events they will call on Cleveland County *REACT* for help.

Cleveland County *REACT* works closely and is in Good standing with the following agencies.

Shelby Police Dept.  
Shelby Police Explores  
Cleveland County Sheriff Office  
North Carolina Highway Patrol  
Shelby City Fire Dept.  
Shelby Rescue.  
Cleveland Volunteer Fire Dept.  
Cleveland County EMS,  
Lawndale Volunteer Fire Dept.  
Number 7 Volunteer Fire Dept.  
Fallston Volunteer Fire Dept.  
Boiling Springs Volunteer Fire Dept.  
Waco Volunteer Fire Dept.  
Cleveland County Amateur Radio Service (CCARS)  
National Weather Service Greenville/Spartanburg, SC

*(Ed. Note: Congratulations, CCR! You're an example for Teams everywhere.)*

While working an accident with a Shelby Police officer, one of the persons involved started to get hostile with the officer. Chief Jay was assisting and was ready to back up the officer if the situation got out of hand. Fortunately, it did not. After it was over, the officer thanked Jay for stepping up to his aid. Jay told him anytime one of his brothers or sisters in blue needs help, he will be there for them.

Jay says, "I grew up in Florida and worked closely with several police and fire departments from 1985 until 1998. I miss those good ol' days!"

On November 3rd, the Team assisted Shelby Police with an accident where a car pulled out in front of a semi. We worked traffic on Charles Road in Shelby until the accident was cleared nearly two hours later.

**MERRY  
CHRISTMAS!**



## Dodge County REACT

(Nebraska)

Submitted from DCR's Facebook page

At a recent meeting, our Team honored a longtime member, John Nixon, who passed away a few months ago, with a plaque that was presented to his significant other, Kimberly Johnson, who was also a member until recently. John was a valuable member of our Team for many years and before that, was a member of



Kristen Beiermann, President-Elect of Dodge County REACT, presents a plaque of appreciation to Kimberly Johnson, widow of John Nixon, for his many years of service to the Team.

Kimberly had to drop her membership to the Team due in part to transportation issues but she is a part of our REACT family and so we try to include her as much as we can.

We say Thank You to Kimberly and to John for their invaluable service to our Team and our community.

## Flagler County Assist REACT

(Florida)

Submitted by Bob Pickering

Flagler County Assist REACT had members who attended the 2017 End of Hurricane Season celebration on November 29th.

Members were among those people who were saluted and celebrated by the local authorities for the efforts during this year's hurricane season, which was a little more intense than in previous years.

Flagler County Assist REACT has remained busy through the fall,



working with a few public service events

The first event was a traffic detail for a Puerto Rico fundraiser by the local Italian American Club in Palm Coast on September 30. However the event took place as a nor'easter slammed the area with squally rains and wind. But our team worked it regardless of the weather. We treat public service events as training sessions, in a real emergency; there is no control of the weather. The Team has had a long tradition of being an "all weather" operation. Members stood out in rains and winds to insure that traffic moved safely.

Next up was Pink Army 5K race taking place on October 16. Flagler County Assist has been a proud



partner in this event and it has grown over the years and has become one of the larger events we work.

REACT members arrive before the sun with some



help from a local CERT Team, assisting with traffic control, fortunately this time the weather was settled



and mild. Then as race time approached a 2nd group of *REACT* volunteers positioned themselves along the 5K race route to help monitor the event. *REACT* members then worked two separate operations, course marshaling the 5K and working the traffic. The 5K race was worked on a GMRS repeater while the traffic detail worked on simplex. Our coordination post..."Post 1" coordinated the



operation in conjunction with hospital officials and the Sheriff's Office.

Following that came three small events over

the Halloween weekend, working traffic details for the City of Palm Coast and Bunnell as well as back to the Italian American Club for separate events, making for a busy weekend.

Then as November got underway there was one more event, the annual Spoonbills and Sprockets bike a thon. *REACT* members met early on November 6th at Marineland to help launch the



cyclists as they began the route.

Flagler County Assist *REACT* Team 4800 has a few more events on the books in December including the Flagler Beach Holiday Parade on December 2nd where Santa actually , parachutes onto the beach as

well as holiday celebration a few weeks later in Bunnell.

## Porterville *REACT*

(California)

Submitted by Anthony Robison

Porterville *REACT* of Porterville, CA recently purchased new uniform shirts for Team members.

Anthony Robison of the Team said the Team hopes



Members of Porterville *REACT* show off their new Team shirts

they will have better visibility when working in and around traffic and other crowd events.



## Radio Emergency Associated Communications Team (REACT)

REACT is another national emcomm group, whose members include Citizen's Band (CB) radio operators, hams, and others. In addition to CB and Amateur Radio, they may use General Mobile Radio Service (GMRS), Family Radio, and the Multiple Use Radio Service (MURS).

REACT has an organizational structure similar to ARRL/ARES, with local teams who directly serve many of the same agencies served by ARES and other ham radio emcomm groups. REACT has MOUs with many of these agencies, as well as with ARRL.

REACT's mission is somewhat broader than that of ARES. They offer crowd and traffic control, logistics, public education, and other services that usually (but not always) include a need for radio communication.

# INTERNATIONAL

# REACT's

# Zello Mall Jamboree

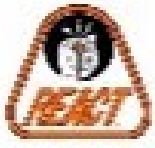
## December 16TH

3PM TO 6PM | FREE ADMISSION

Gulf City Lowlands Mall,  
Lowlands, Tobago

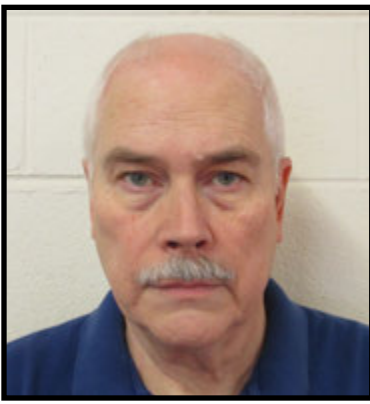
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# Training for the Future

Walter Green  
Lt. Col, USAF, ret

**CONGRATULATIONS:** To the following member for completing a *REACT* International training course:

**Stan Latta (6247) – Protecting Personal and Sensitive Information**

**Stan Latta (6247) - Monitoring**

**DO I HAVE TO DO TRAINING?** Recently we were asked that question. The answer is no, you do not have to train to be a better emergency communicator. You do not have to develop skills and knowledge and earn recognized credentials that will make your Team more valuable to the organizations we support. Likewise, you do not have to attract new members, you do not have to build a better team, you do not have to keep up with a communications world that is changing technologies at a breakneck pace. You don't have to do anything at all.

We have to face facts. The day when showing up with a CB radio and a desire to help made you valuable is long gone. This is not an attack on Citizens Band; a CB radio is a communications tool that still has significant utility. What has changed is the environment post the attacks on the World Trade Center and the Pentagon. Today we are in a world where emergency managers and response organizations want resources credentialed to National Incident Management System standards, organized and equipped as teams under trained leadership, and able to be self-supporting for days in the disaster impact area. To operate in that environment you have to be trained and credentialed as individuals and as Teams. *REACT* has the framework to do that - we have a resource typing system approved by the Board in 2012, a growing national training program, and the start of a drill and exercise program.

The question for you as a member of *REACT* is whether or not you want to have a role in helping

your fellow citizens in times of crisis. If the answer is yes, then yes, you have to train for the future. The choice is yours.

**ALERTEX 2017:** We ran the first ever *REACT*-wide disaster alerting and warning exercise. Teams were alerted of a magnitude 9.1 earthquake in Yellowstone, Wyoming on the evening of Friday, 17 November. This was followed on Saturday morning by the eruption of the Yellowstone supervolcano, spreading volcanic ash blanketing North America. Teams were asked to report their available resources using an ICS 213 Message format online. A total of 11 teams responded with availability reports, including:

**Southeastern Massachusetts *REACT* Inc. (Region 1)**

**Northern Rhode Island *REACT* (Region 1)**

**York County *REACT* (Region 1)**

**Louisville Metro *REACT* (Region 2)**

**Howard County *REACT* (Region 2)**

**Prince George's County *REACT* (Region 2)**

***REACT* Warning Team (Region 2)**

**Dallas County *REACT* (Region 7)**

**Los Angeles County *REACT* (Region 8)**

**Southwestern *REACT* of San Diego (Region 8)**

**Trinidad and Tobago *REACT* (Region 9)**

Teams reported 109 members available for disaster duty, 44 Type IV teams capable of deploying for 12 hours within 25 miles of their home station; of the 44, 34 were capable of 72 hour deployment. In addition, 6 other teams reported receipt of the alerting and warning messages:

**Nassau County *REACT* – Region 1**

**Punxutawney *REACT* – Region 1**

**Frostburg *REACT* Team – Region 2**

**Alert *REACT* Response Team – Region 4**

***REACT* Don Valley – Region 9**

***REACT* County Caroni – Region 9**

Work is underway to prepare a second exercise in February. Details will be out in the January issue of *The REACTer*.

**NEW COURSE:** We are happy to announce publication of a new *REACT* course, Introduction to Net Operations, available online at:

The course text is 37 pages long, and should take approximately 2 hours to complete; testing is conducted online. The course awards 0.2 Continuing Education Units.

**FEMA FOCUS:** This month we are highlighting IS-200.b - ICS for Single Resources and Initial Action, available for free at:

This course focuses on the initial actions to control an incident, including leadership and management, delegation of authority, functional positions, briefings, organizational flexibility, and transfer of command. The course is equivalent to ICs 200 as a field delivered course. This is the second course in the sequence IS-100, IS-200, IS-700, and IS-800 that *REACT* requires for designation as a typed resource, a sequence that meets national standard requirements for emergency responders.

# WHY ? ?

**THAT is the question! WHY are 7 Teams out of this list of 11 NOT sending in reports to us here at The *REACT*er? You are training. This list is proof of that! You are participating. Why aren't you telling the rest of the *REACT* world what you are doing??**

**It's really, really easy. Write up something about what you are doing or have done or are about to do and send it (with pictures!) to [editor@thereacter.com](mailto:editor@thereacter.com). Or send the pictures and the details (just the facts, ma'am...) to [editor@thereacter.com](mailto:editor@thereacter.com) and I will write it for you!**

**Do It NOW while you're thinking about it!**

**Southeastern Massachusetts *REACT* Inc. (Region 1)**

**Northern Rhode Island *REACT* (Region 1)**

**York County *REACT* (Region 1)**

**Louisville Metro *REACT* (Region 2)**

**Howard County *REACT* (Region 2)**

**Prince George's County *REACT* (Region 2)**

***REACT* Warning Team (Region 2)**

**Dallas County *REACT* (Region 7)**

**Los Angeles County *REACT* (Region 8)**

**Southwestern *REACT* of San Diego (Region 8)**

**Trinidad and Tobago *REACT* (Region 9)**

***Congratulations to these 6 Teams for REACTing!***

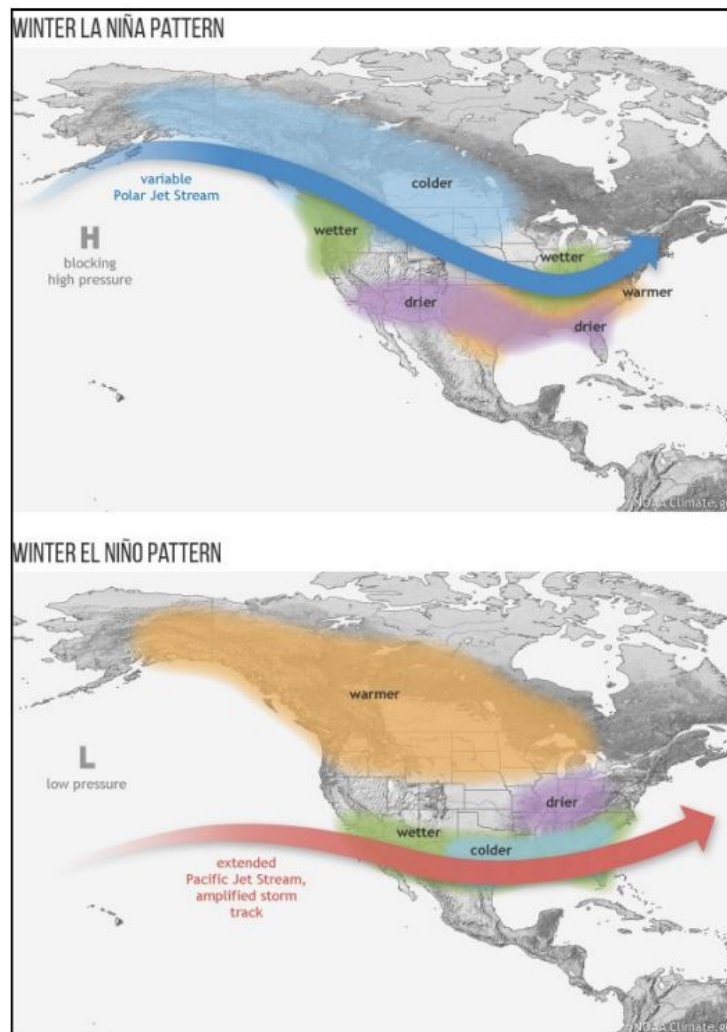
# How El Niño and La Niña affect the winter jet stream and U.S. climate

By Rebecca Lindsey (Climate.gov)

Courtesy of climate.gov ©2017

The arrival of El Niño or La Niña in the tropical Pacific Ocean triggers a cascade of changes in tropical rainfall and wind patterns that echo around the globe. For the United States, the most significant impact is a shift in the path of the mid-latitude jet streams. These swift, high-level winds play a major role in separating warm and cool air masses and steering storms from the Pacific across the U.S. These maps illustrate the typical impacts of El Niño and La Niña on U.S. winter weather. During La Niña, the Pacific jet stream often meanders high into the North Pacific and is less reliable across the southern tier of the United States. Southern and interior Alaska and the Pacific Northwest tend to be cooler and wetter than average, and the southern tier of U.S. states—from California to the Carolinas—tends to be warmer and drier than average. Farther north, the Ohio and Upper Mississippi River Valleys may be wetter than usual. During El Niño, these deviations from the average are approximately (but not exactly) reversed. One or more of these climate patterns have occurred during

many El Niño and La Niña events in the past. That doesn't mean that all of these impacts happen during every episode. Every event is somewhat different. In other words, the influence of El Niño on U.S. winter climate is a matter of probability, not certainty. El Niño and La Niña are opposite phases of a natural climate pattern across the tropical Pacific Ocean that swings back and forth every 3-7 years on average. El Niño and La Niña alternately warm and cool large areas of the tropical Pacific—the world's largest ocean—which significantly influences where and how much it rains there. Like a boulder dropped into a stream, this shift in the location of tropical rainfall disrupts the atmospheric circulation patterns that connect the tropics with the middle latitudes, which in turn modifies the mid-latitude jet streams. By modifying the jet streams, El Niño and La Niña can affect temperature and precipitation across the United States and other parts of the world. The influence on the U.S. is strongest during the winter (December-February), but it may linger into early spring.



# National SKYWARN® Recognition Day

On December 3rd, 2017, REACT Members and ARRL Members are invited to take part in National SKYWARN® Day at their local National Weather Service offices.

SKYWARN® Recognition Day was developed in 1999 by the National Weather Service and the American Radio Relay League. It celebrates the contributions that volunteer SKYWARN® radio operators make to the National Weather Service. During the day SKYWARN® operators visit NWS offices and contact other radio operators across the world.

For information and contact person at your local National Weather Service office:

<https://www.weather.gov/stormready/contact>



## R.I President Visits Southwestern REACT

REACT International President John Capodanno paid a visit to Southwestern REACT in San Diego, California.



Front Row: Jim Patterson, Jason Pistolas Roger McCollough, McKenzie Jackson, Marilyn Jensen, John C, June McCollough Back Row: Alan Dyer, John Wright, Carl Jensen, Daniel Willan  
(Photo by Matt Misetich)

President Capodanno and R.I. Secretary Matt Misetich discussed numerous things with Southwestern members and brought them 'some

The REACTer

goodies', according to Capodanno.

The Southern California team and the organization's president spent approximately 2 hours together.



## Correction to our October editorial

In the editorial that ran in the October issue, it has been pointed out to us that there were several items in error.

Upon researching the issue, I determined that I had received an incorrect summary of the changes to Part 95 rules and would like to correct the idea that under the revised Part 95 Rules, Citizens Band radio will NOT be allowed higher power or the utilization of repeaters.

I apologize for the error. Sometimes, while putting together a publication such as this, in accurate information slips through.

It is due to the eagle eyes of our readers, however, that corrections can be made when such information makes it into print. Thanks go to Dennis Bietry - KE7EJF, ARES Section Emergency Coordinator / Arizona for calling this issue to our attention. See his letter in the Letters column elsewhere in this issue.



## and one more...

One of the submissions in News from the Front Lines last issue contained an error. Drake Robinson from Dallas County REACT (Texas) called to our attention that DMR and ham are not interchangeable terms.

That error was mine, as I had heard the terms used interchangeably in the past and made the assumption they meant the same.

Thank You Drake for calling that to my attention. Learn something new every day!

(Add to that the old saying about 'you know what happens when you assume'...)

# U.S. Winter Outlook: NOAA forecasters predict cooler, wetter North and warmer, drier South

Courtesy of noaa.gov ©2017

Forecasters at NOAA's Climate Prediction Center released the U.S. Winter Outlook on October 19th, 2017, with La Nina potentially emerging for the second year in a row as the biggest wildcard in how this year's winter will shape up. La Nina has a 55- to 65-percent chance of developing before



winter sets in.

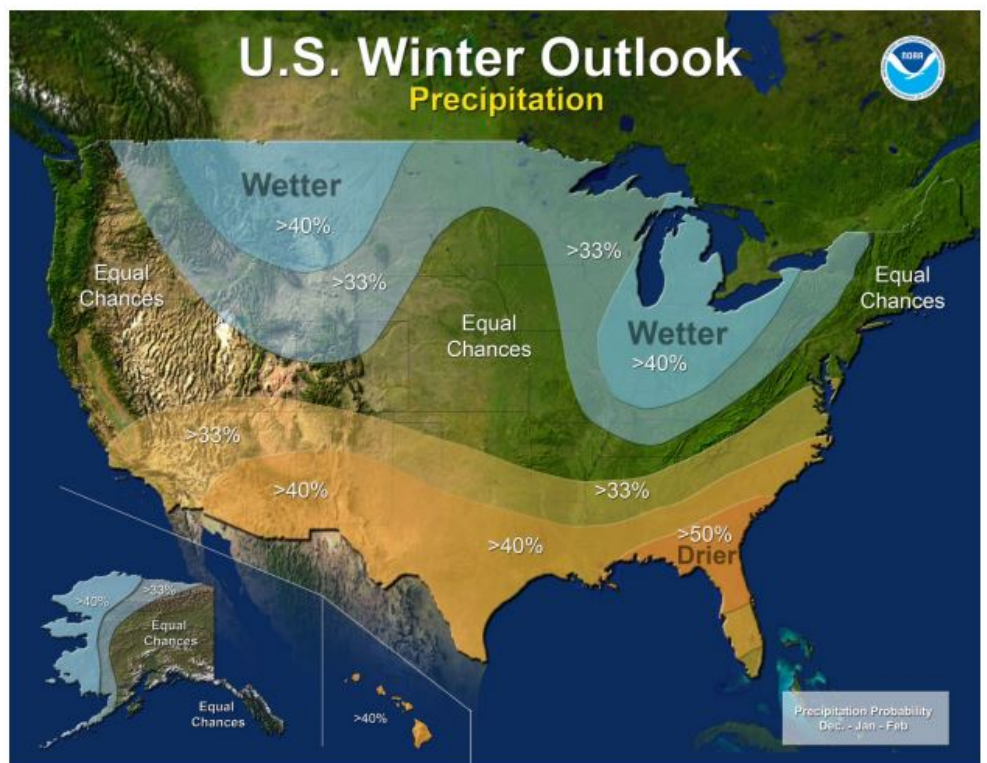
NOAA produces seasonal outlooks to help communities prepare for what's likely to come in the next few months and minimize weather's impacts on lives and livelihoods. Empowering people with actionable forecasts and winter weather tips is key to NOAA's effort to build a Weather-Ready Nation. "If La Nina conditions develop, we predict it will be weak and potentially short-lived, but it could still shape the character of the upcoming winter," said Mike Halpert, deputy director of NOAA's Climate Prediction Center. "Typical La Nina patterns during winter include above average precipitation and

colder than average temperatures along the Northern Tier of the U.S. and below normal precipitation and drier conditions across the South." Other factors that influence winter weather include the Arctic Oscillation, which influences the number of arctic air masses that penetrate into the South and is difficult to predict more than one to two weeks in advance, and the Madden-Julian Oscillation, which can affect the number of heavy rain events along the West Coast.

## The 2017 U.S. Winter Outlook (December through February):

### Precipitation

Wetter-than-average conditions are favored across most of the northern United States, extending from the



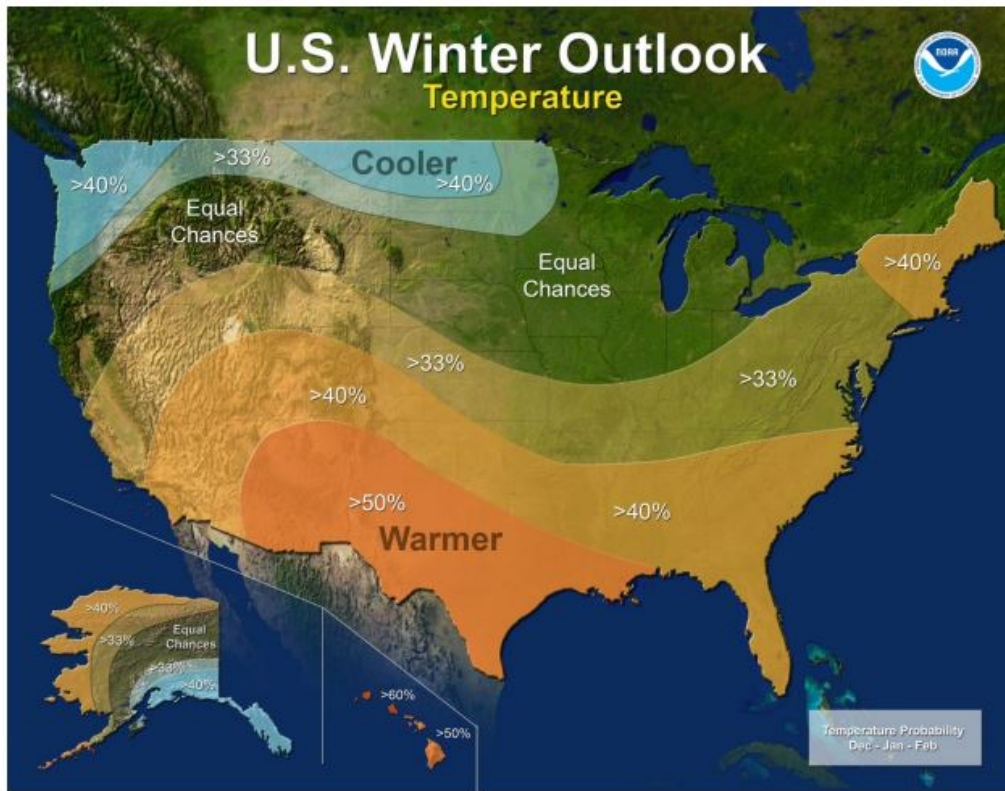
northern Rockies, to the eastern Great

Lakes, the Ohio Valley, in Hawaii and in western and northern Alaska.

(con't next page)

Drier-than-normal conditions are most likely across the entire southern U.S.

## Temperature



Warmer-than-normal conditions are most likely across the southern two-thirds of the continental U.S., along the East Coast, across Hawaii and in western and northern Alaska.

Below-average temperatures are favored along the Northern Tier of the country from Minnesota to the Pacific Northwest and in southeastern Alaska.

The rest of the country falls into the equal chance category, which means they have an equal chance for above-, near-, or below-normal temperatures and/or precipitation because there is not a strong enough climate signal in these areas to shift the odds.

## Drought

Despite the outlook favoring above-average precipitation this winter, drought is likely to persist in parts of the northern Plains, although improvement is anticipated farther West.

Elsewhere, drought could develop across scattered areas of the South, mainly in regions that missed the rainfall associated with the active 2017 hurricane season. NOAA's seasonal outlooks give the likelihood that temperature and precipitation will be above-, near-, or below-average, and also how drought is expected to change, but do not project seasonal snowfall accumulations. While the last two winters featured above-average temperatures over much of

the nation, significant snowstorms still impacted different parts of the country. Snow forecasts are generally not predictable more than a week in advance because they depend upon the strength and track of winter storms. The U.S. Winter Outlook was updated on November 16.

(This article was reprinted with permission of climate.gov from "Weather or Not", Vol. 11, Issue 1)







# Amateur Radio



**CQ the Active Ham's Magazine**

**CQ is the magazine for active hams, with a focus on the practical. Every article is clearly written and aimed at involving you, the reader... whether it's a story of operating from some exotic location, an article to deepen your understanding of ham radio science and technology, or a fun-to-build project that will have practical use in your ham shack.**



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# Everything You Need to Know About 5G, the Mobile Network of the Future

Eric Olson

21 October 2017

Movie downloads measured in seconds, live streaming VR experiences, self-driving cars and delivery drones seamlessly communicating with each other to navigate the three-dimensional complexities of urban environments. The fifth generation of mobile networks is on the way.

5G networks are still in the planning phase and precise definitions are not yet available, but the broad goals of 5G service are clear. 5G networks will offer higher bandwidth with speeds on the order of 10 Gbps, 10 times faster than last generation 4G LTE (long-term evolution). Communications will be carried out with lower latency, on the order of a few milliseconds or less.

Improved spectral efficiency will increase the amount of data transmitted within each frequency band of the spectrum. And the network will support massive concurrency for hundreds of thousands of simultaneous connections. Capabilities 5G will provide a connection for much more than just mobile phones.

Billions of devices in the internet of

things (IoT) will gain a constant, reliable link to the internet. Spanning a wide range of sensors, devices and machines, the IoT will include health monitors, parking meters, wearables, asset trackers, vending machines, utility meters and lighting controllers, all communicating statuses and receiving commands wirelessly. Embedded sensors with long battery life and continuous connections will enable new use cases not seen

before. Sensors embedded in highways will intelligently route traffic, keep track of the state of repair of the road, and alert emergency services

when accidents occur.

5G will facilitate safer maneuvering of self-driving cars. With secure, low latency communications between vehicles, accurate position, speed and heading can be shared to enable safer driver-assisted and fully-autonomous vehicle operation. Situational awareness can be improved in a variety of circumstances, for example, with left turn assistance, do not pass warnings, intersection movement assistance at blind



intersections and local hazard warnings around blind curves.

5G will also enable wide-scale deployment of unmanned aerial vehicles by providing the cellular connectivity necessary for safe drone operation beyond the operator's line-of-sight as well as autonomous operation. There are a wide range of drone use cases. Inspection of critical infrastructure such as bridges, automated planting of crops, and search and rescue missions are all made easier by continuously connected drones with intelligent navigation.

5G's massive bandwidth will support virtual reality (VR) and augmented reality (AR) applications. VR headsets will transport you to live-streamed virtual recreations of real and imagined environments, while AR heads-up displays will overlay information and facts delivered from the cloud about the people and objects in your field of vision.

## Technology

5G is being developed by the mobile industry standards body known as 3GPP (3rd Generation Partnership Project) to meet the requirements of the International Telecommunications Union's (ITU) International Mobile Telecommunications 2020 (IMT-2020) standard. 5G technology is being designed to operate over a wide spectrum, from below 1 GHz to above 24 GHz.

The high frequency portion of the spectrum above 24 GHz is known as the millimeter wave (mmWave) band. Large amounts of data can be transmitted on this band, but the range of transmissions is limited. High frequency millimeter waves have difficulty passing through obstacles like walls and buildings. Due to this limitation, 5G networks will be organized in smaller cells, with many more access

nodes spread across the landscape compared to 4G LTE, which uses large antennas on widely-spaced towers.

Multi-mode devices capable of communicating over both 5G and older 4G networks will be important during the rollout phase so that devices maintain connections between short range mmWave islands. 5G, however, will not be limited to high frequency bands. The standard will be capable of operating at lower frequencies as well. T-Mobile's 5G service will run in the 600 MHz band, avoiding the range



5G will serve as the backbone of the IoT, providing a constant reliable link to the internet for billions of devices around the world.

limitations of mmWave 5G. 5G will feature a number of advanced technologies.

The standard will encode signals with orthogonal frequency-division multiplexing (OFDM), similar to the encoding 4G LTE uses, although 5G will have more efficient channel coding than 4G. In addition, 5G will make use of MIMO (multiple input, multiple output) technology with multiple antennas capable of 3D beamforming to increase coverage and capacity. 5G will also have optimizations for IoT connectivity, including resource spread multiple access (RSMA) technology that accommodates

the sporadic uplink traffic common in IoT communications.

*(con't next page)*

## **LTE Advanced Pro**

Even before the full 5G standard arrives, new technologies are being developed for 4G under the LTE-Advanced and LTEAdvanced Pro labels. Licensed Assisted Access (LAA) and LTE-U are technologies that combine unlicensed frequencies in the 5 GHz band with LTE in licensed bands through a technique known as carrier aggregation. This method opens up more bandwidth for communications, resulting in higher speeds. Another technology, C-2VX, is a standard for vehicle communications that will help enable increasingly autonomous operation of cars. LTE-Advanced Pro also contains two new technologies to support the internet of things. eMTC (enhanced machine-type communication) and NB-IoT (narrowband Internet of Things) include optimizations that will improve battery life and coverage such as more efficient signaling, enhanced power save modes and better link power budget. LTE-Advanced Pro will continue to gain technology additions that will improve existing service and serve as foundational features of 5G.

## **Rollout**

Mobile wireless carriers are targeting a wide scale rollout of 5G in 2020 in line with the 3GPP standardization timeline and the full release of the IMT-2020 standard. Widespread coverage and handset availability likely won't happen until the early 2020s. One of the first major players to venture into the 5G market is Verizon, which is testing a 5G fixed wireless broadband service in 11

U.S. cities this year. Fixed wireless broadband delivered over 5G will have the high capacity necessary to compete with cable and DSL broadband services. It's also less costly to deploy a wireless solution than to run cable to consumer's homes. Verizon expects commercial offerings of the service to hit the market in 2018. AT&T is running trials of 5G fixed wireless broadband service this year in preparation for commercial deployment in late 2018. AT&T is also launching a mobile service it calls "5G Evolution" in 20 cities by the end of the year, although this offering is not true 5G, but is instead comprised of technologies from 4G LTE Advanced and LTE Advanced Pro. T-Mobile plans to begin deploying mobile 5G service in 2019 and is targeting 2020 for full nationwide coverage. Sprint will begin to provide 5G services and devices in late 2019.



The 5G specification is building on the work done for LTE, LTE-Advanced, and LTE-Advanced Pro.

Credit: 3GPP

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## Letters to the Editor

Will,

While I am not a *REACT* Member I read your publication monthly to stay up on what's going on with other types of communication organizations. I also listen to your weekly net a couple times a month.

I read your Editorial in the October edition of *The Reactor[sic]* and I'm quite shocked at all the incorrect information you state. In your article you mention that the new revisions to Part 95 allow higher power levels and repeaters. Where did you get that information? The new Part 95 rules, which took effect September 28th 2017, and covers what is now called the CB Radio Service (CBRS) still maintains the same power levels as before, still prohibits amplifiers, does not authorize repeaters but does remove the distance limitation and the use of hands free devices. That is far from what you stated and doesn't give your publication much credibility.

You mention that "GMRS and ham radio repeaters do not work without electrical power!" Maybe you aren't aware that both GMRS and ham radio can work on simplex just as CB does. Repeater extend coverage but they aren't required. Many ham radio repeaters that support Emergency Communications (emcomm) have either battery back up, generators or both and can stay on the air long after power is down. In fact, many ham emcomm groups practice operating without repeaters or support public service events and drills in areas where there are no repeaters. Ham radio operators have hand held radios, mobile radios, base station radios and antennas that have significantly more gain than CB has any chance of having. Further, ham radios are manufactured to operate at significantly more power without external amplifiers.

One advantage of FM on VHF and UHF used by GMRS and ham is it is not susceptible to Skywave Propagation like CB is at 27 MHz. VHF and UHF is seldom effected while 27 MHz will sometimes will not allow you to talk to someone a mile away but you can talk to people 500 or more miles away.

CB does have a place in emergency communications. It allows people with CBs another place to reach out and ask for help and help with equipment movement during emergencies. I'm not really sure how many CBs are installed in vehicles here in Arizona other than the long haul truckers. I even have 2 on the shelf in the closet and antennas for them just in case. There aren't CBs installed in any Emergency Operation Center in the state but there is plenty of ham radio.

I don't want you to think that I am just some ham scoffing at CB. I started with radios on 11 meters over 40 years ago and was pretty active until the CB craze ruined the band. My family one of those who used call signs and didn't have CB handles.

Needs are different for communications all over the country and even varies within a state. In some areas *REACT* seems to provide a needed service while I see other areas, like Phoenix, that years ago had a strong presence now has none. But my point is, if you are going to give people of your organization information, they deserve correct information so they can act accordingly. Incorrect information will turn people away not bring them in.

Regards,

Dennis Bietry - KE7EJF  
ARES Section Emergency Coordinator / Arizona  
All Hazards Communications Leader - COML  
DHS-OEC Auxcomm & FEMA COML Instructor  
Maricopa County Emergency Communications  
Group - Lead Event Coordinator

**Hello Dennis!**

**Thank you for pointing this out to us. As I explained in my correction piece, the summary info I received was apparently in error.**

**It is with the help of readers like yourself who contact us when something is wrong, that we can make an even better magazine. I do not claim to be an expert in many of the communication devices we use today, so I rely on our readers to 'keep us honest', you might say.**

**Needless to say, I will be double vetting information sources from now on to make sure that only the most accurate info gets into The REACTer.**

**Thanks again!**

**(PS: If you're interested in a *REACT* team, there**

## *REACT International Event Calendar*

### **DECEMBER**

1 .....REACTer Published  
2 .....ZELLO Worldwide Net (9 p.m. ET)  
5 .....REACT World Wide Net (9 p.m. ET)  
9 .....ZELLO Worldwide Net (p.m. ET)  
12 .....REACT World Wide Net (9 p.m. ET)  
15 .....Deadline for January REACTer  
16 .....ZELLO Worldwide Net (9 p.m. ET)  
19 .....REACT World Wide Net 9 p.m. ET)  
23 .....ZELLO Worldwide Net (9 p.m. ET)  
25 .....Christmas Day  
26 .....REACT World Wide Net (9 p.m. ET)  
30 .....ZELLO Worldwide Net (9 p.m. ET)  
31 .....New Year's Eve

### **JANUARY 2018**

1 .....REACTer Published  
2 .....REACT World Wide Net (9 p.m. ET)  
6 .....ZELLO Worldwide Net (9 p.m. ET)  
9 .....REACT World Wide Net (9 p.m. ET)  
13 .....ZELLO Worldwide Net (p.m. ET)  
15.....Deadline for February REACTer  
16 .....REACT World Wide Net (9 p.m. ET)  
20 .....ZELLO Worldwide Net (9 p.m. ET)  
22 .....REACT Int'l ABM( Las Vegas)  
23 .....REACT World Wide Net 9 p.m. ET)  
27 .....ZELLO Worldwide Net (9 p.m. ET)  
30 .....REACT World Wide Net (9 p.m. ET)

### **FEBRUARY 2018**

1.....REACTer Published  
3.....ZELLO Worldwide Net (9 p.m. ET)  
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10.....ZELLO Worldwide Net (9 p.m. ET)  
13 .....REACT Worldwide Net (9 p.m. ET)  
15.....Deadline for March REACTer  
17 .....ZELLO Worldwide Net (9 p.m. ET)  
20 .....REACT Worldwide Net (9 p.m. ET)  
24 .....ZELLO Worldwide Net (9 p.m.E T)  
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13 .....REACT Worldwide Net (9 p.m. ET)  
15.....Deadline for April REACTer  
17 .....ZELLO Worldwide Net (9 p.m. ET)  
20 .....REACT Worldwide Net (9 p.m. ET)  
24 .....ZELLO Worldwide Net (9 p.m.E T)  
27 .....REACT Worldwide Net (9 p.m. ET)  
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10.....REACT Worldwide Net (9 p.m. ET)  
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15.....Deadline for May REACTer  
17 .....REACT Worldwide Net (9 p.m. ET)  
21 .....ZELLO Worldwide Net (9 p.m. ET)  
24 .....REACT Worldwide Net (9 p.m.E T)  
28 .....ZELLO Worldwide Net (9 p.m. ET)

*To add items to this calendar, contact REACT International: 301-316-2900 or  
Editor direct - 336-897-0641 (office/home) - 480-758-7722 (cell)*

*editor@thereacter.com*

*Items on the calendar are as accurate as we can make them but are subject to change.*

*Any questions ... contact the person in charge of the event*



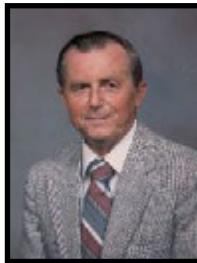
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