

# 21ST CENTURY NWS WARNING COMMUNICATIONS: THE FUTURE OF WARNING DISSEMINATION IS HERE

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## **Abstract**

*The National Weather Service (NWS) forecast offices in Alabama have worked closely together to provide the newest technological advances to some of our most important customers, the emergency management community and local media. They are receiving exceptional service like never before, as a result of the combined use of 800-megahertz (MHz) communications with emergency managers, paging applications, Instant Messaging (IM) with the media, graphical product development on the local office web sites, and warnings and forecasts provided via wireless web applications such as Personal Data Assistants (PDAs). The authors hope that this study will provide the necessary motivation to develop better technologies that will further enhance the warning and forecast process. Our primary goal is the protection of life and property. The sharing of this information hopefully will improve and develop more partnerships that will better protect the United States from the effects of severe weather.*

## **1. Using Instant Messaging to Provide Enhanced Communications with Local Media**

The primary job of the NOAA/National Weather Service (NWS) is to issue severe weather warnings to protect lives and property. Since a majority of the public relies heavily on television or radio broadcasts to receive their weather information, the NWS Weather Forecast Offices (WFO) at Birmingham and Huntsville, Alabama, have formed a partnership with the local media in regards to severe weather related communications. This partnership involves the use of the Instant Messaging (IM) software application. This two-way communication between the NWS and local media has helped to bridge the gap in the severe weather warning process. This has proven to be a huge success during several significant severe weather events, which has undoubtedly resulted in lives being saved.

New initiatives like the IM partnership have helped bring the NWS into the forefront of severe weather communications and collaboration. Statements such as "I'm not sure what the Weather Service is thinking about this storm; I think it looks bad so take cover", are a thing of the past. Even without malicious intent, these statements hurt NWS credibility. With IM, the statement has changed to "The Weather Service says the rotation is aloft, so they are keeping a close eye on it in case a tornado warning is needed." A message of partnership and mission is clear in the second statement.

The NWS uses the IM chat in several ways to improve the communications link with the media. It is used to give the media an advance notification when a warning is about to be issued. As the warning is being typed up, the person working the IM chat is sending the information to the media. This increases the speed of the rebroadcast of the warning. If the public has more time to act on the warning, then more lives and property can be saved and protected. The information sent over the IM is abbreviated, basically containing the type of warning, the county or counties affected, and the expiration time. The media still gets a copy of the warning on their system, so any additional information is still available.

Besides "a heads up" for re-broadcasting the warnings, the IM chat is a great tool for discussing the meteorological situation on hand. The media can inquire as to why a warning was issued or not issued, and to discuss current interesting meteorological parameters. The media has also shared that, because of these dialogues, they are better able to inform their viewing audiences. They can focus on a particularly dangerous storm, or let them know if a particular storm is not quite severe.

Another advantage of using IM is the sharing of real-time damage reports. Television stations tend to receive a tremendous number of damage reports, and the local NWS office may not see them in real time. With IM, the TV stations are easily able to pass that information



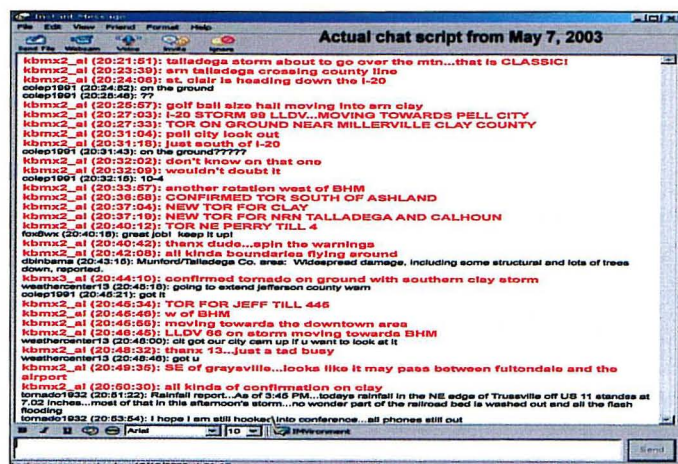


Fig. 1. Text of Instant Messaging chat session during 7 May 2003 severe weather event.



Fig. 2. Example of an 800-MHz base station.

along. The NWS can then take that information and place it in a severe weather statement (SVS), utilizing this "ground truth" information as a basis for additional warnings for counties downstream that may soon be impacted. Conversely, as the NWS gets damage reports from the spotters in the field and amateur radio operators, we can pass that information on to the media. In the past, the media outlets had to monitor scanners to have access to this information.

IM is just one innovative tool being used to improve warning communications. For a sample chat transcript from an actual event see Fig. 1. This is from a major flooding and severe weather event that occurred across north and central Alabama on 7 May 2003. The chat demonstrates the "heads-up" that is routinely given (TOR FOR JEFF TILL 445), an example of a meteorological discussion that occurred between the NWS and the media (talking about Low Level Delta Velocity [LLDV]), and the sharing of storm reports (golf ball size hail). Despite widespread strong tornadic storms and one-hundred-year flooding across the forecast area, no loss of life occurred that day. This can be attributed to the excellent communication and partnership between the NWS and the media.

## 2. Enhanced Communications with Local EMAs via the 800-Megahertz Radio System

In Alabama and southern middle Tennessee, all NWS offices routinely communicate with local county emergency management agencies (EMAs) via the 800-megahertz (MHz) radio system (Fig. 2). This constant communications link has been used as a briefing and warning dissemination tool between the NWS and the EMAs in the Tennessee Valley region since the late 1990s, and is a critical communication tool between the NWS and EMAs during developing winter weather or severe weather events. Each of the four NWS forecast offices in Alabama and northwest Florida that provide forecasts and warnings for Alabama counties use this radio system to communication with the Alabama and southern middle Tennessee EMAs.

The 800-MHz system is vital due to the fact that each NWS office can speak to a member of emergency management from a particular county 24 hours a day, seven days a week, to disseminate weather warnings and receive severe weather reports. The EMAs rely on the 800-MHz system as another important way to receive warning information directly from the NWS offices to assist them in warning local residents within their counties. The 800-MHz system is also used as a weather briefing tool to provide the EMAs with the most updated forecast information within 24 to 36 hours of an impending significant weather event.

An example of the vital importance of this primary communication link between Alabama WFO offices and the Alabama EMAs was the 10 November 2002 tornado outbreak across central and northern Alabama (NOAA 2003). Through this 800-MHz system, WFO Birmingham provided nearly 300 individual briefings to local county EMAs as well as large briefings for all Alabama EMAs. The 800-MHz system was utilized to give updates on tornado locations, fatality and injury reports, damage reports, and pathcast information. The system was used by WFO Birmingham to issue the rare "Tornado Emergency" warning for a tornado that eventually produced a damage path over 70 miles in length.

EMAs utilized the 800-MHz radio system on many occasions during the event to inform WFO Birmingham of specific damage or to ask questions. Teresa Willcutt, Director of the Fayette County Emergency Management Agency, stated, "I felt like I was one-on-one with the NWS that night," because of briefings on 800 MHz (2002, personal communication). Art Faulkner, 911 coordinator for the Alabama Emergency Management Agency stated, "I don't know anything they [WFO Birmingham] could have done better. I was very proud of them." (2002, personal communication). Johnny Burnette, director of the Walker County Emergency Management Agency, stated, "The warnings saved a lot of lives. The National Weather Service did a great job. There could have been many more fatalities" (2002, personal communication).



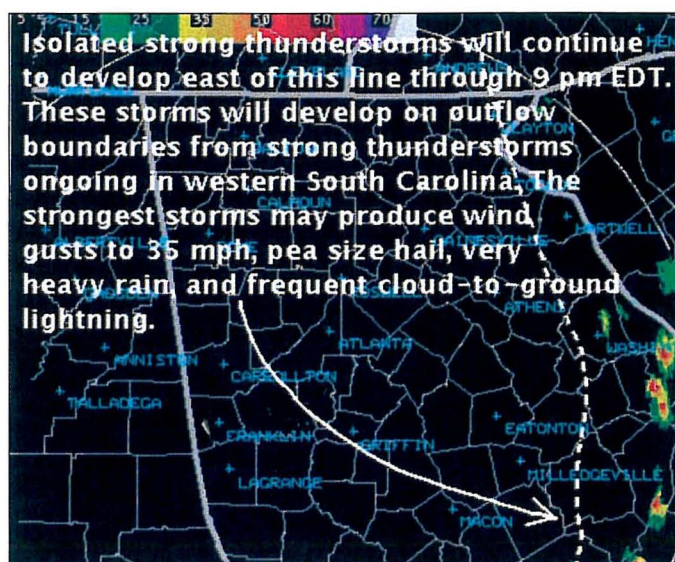


Fig. 3. Example of NWS WFO Atlanta's graphicast product.

Another example of the enhanced service that has been provided to EMAs via the 800-MHz system was the 6 May 2003 severe weather event across northern Alabama. During the 100-year rainfall event and F1 (80-90 mph winds) tornado event across northern Alabama, WFO Huntsville provided at least 95 coordination and warning dissemination calls to EMAs across north Alabama via the 800-MHz system. Due to the close communications with the local EMAs, effective local county coordination resulted in no loss of life during a high profile and dangerous flooding and tornado threat across northern Alabama. WFOs Birmingham and Huntsville now provide the EMAs with heads-up paging to notify them of upcoming 800-MHz briefings. The 800-MHz briefings allow the EMAs to effectively place severe storm spotters in key locations and to make emergency contingency plans.

### 3. Communicating Watch and Warning Information to EMAs via Paging Systems

WFOs Huntsville and Birmingham also use a paging program known as "page gate" to relay watch and warning information to emergency management agencies in the Tennessee Valley region and throughout the state of Alabama. The ability to page EMA offices has allowed the local NWS offices extra time to alert their counties within their warning and forecast areas that a severe weather watch is imminent. Depending upon when the watch is issued, the EMAs can get as much as a 20-30 minute advance notice that either a severe thunderstorm or tornado watch is forthcoming. This heads up has given the EMAs the opportunity to be better equipped to prepare for the upcoming severe weather event. Also, this has allowed for a more efficient activation of county-based storm spotter networks, and provided them additional time to be placed in optimal locations to view the onset of severe weather.

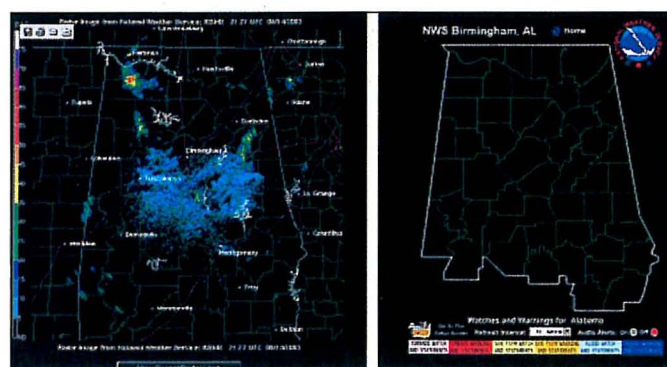


Fig. 4. Example of NWS WFO Birmingham, Alabama weather watch graphic.

Warnings have been paged to central and northern Alabama EMAs for nearly five years. Besides watch and warning information, pages are sent to EMAs informing them of upcoming 800-MHz briefings. This allows the EMAs to be in a place to take notes or receive the best signal possible. During the Veteran's Day Tornado Outbreak in 2002, it was a pager message that prompted an EMA official to return to duty from Tennessee. The Winston County EMA director, Tom Grubbs, said, "Glad you paged me. I would have been a [hundred] miles from my office when the tornadoes struck" (2002, personal communication). Severe weather warnings are now specifically paged to the local EMA offices across Alabama and southern middle Tennessee via the use of the Internet EMWIN program WXMESG (Lloyd 2004). The WXMESG program has a paging feature within the software program that has allowed the EMA offices to be set up to receive warning pages directly from the NWS as severe weather warnings are being disseminated. This customer service initiative has provided the EMAs with another redundant way to receive watch and warning information directly from the NWS.

### 4. Other Warning Dissemination Methods Provided to EMAs

Both WFO Birmingham and Huntsville also provide daily graphical hazardous weather outlooks that are tailored for the local EMAs and media. The graphical hazardous weather outlooks are located on the web sites for WFO Birmingham (<http://www.srh.weather.gov/bmx/hwo/hwo.html>) and WFO Huntsville ([http://www.srh.weather.gov/hun/graphical\\_hwo/](http://www.srh.weather.gov/hun/graphical_hwo/)). In an effort to improve the short-term forecast information provided to the media, EMAs, and the public, the graphical nowcast will soon be implemented at both WFOs Birmingham and Huntsville. An example of the graphical nowcast product that WFO Atlanta produces and displays on their web site can be found at <http://www.srh.weather.gov/ffc/html/spclnow.shtml>.

WFOs Birmingham and Huntsville will soon be implementing a "graphicast" product that will be a short-term graphical forecast tool. With technology continually changing, it is vital to develop new communication avenues and partnerships to provide the best possible watch and warning information to the public.



When EMAs requested a way to monitor watches and warnings from around the state on a single webpage, the NWS responded with the development of the Weather Watch graphical webpage (Fig. 4). This webpage was created to monitor active watches and warnings across every Alabama county. The counties light up different colors depending on the action taken by the WFO. For the sight impaired, the page contains audio that states any watches and warnings that are in effect. The web page is currently being used by Alabama county EMAs and state EMA for an overview during severe weather events.

Another new technological advance that NWS offices in Alabama are working to improve for EMAs is the development of forecast products for use on personal data assistants (PDAs) via the wireless web. Since the 11 September 2001 terrorist attacks on our nation, EMAs have a greater burden of responsibility than ever before. Responding to terrorist attacks or chemical spills takes the local and state EMAs into the field more than ever. After receiving requests from local EMAs for help to provide more NWS products via a wireless web format, the WFOs Birmingham and Huntsville are working with NWS Southern Region Headquarters to provide radar, satellite, forecast and gridded data to EMAs via wireless telephone or PDA devices. For example, if the threat of an airborne agent is the focus of a concerted effort to save lives, the wind shift accompanying the passage of a cold front could injure or kill first responders. In this case, precise forecasts of wind directions and speeds would be essential to EMA officials in the field. The future is unlimited involving how our offices can service EMAs and the Department of Homeland Security in the future via wireless web service is unlimited.

## 5. Conclusions

The WFOs in Birmingham and Huntsville, Alabama, continue to work toward improving the various methods of providing watch and warning information for EMA officials and other partners in the Tennessee Valley region. Instant Messaging has proven to be a very effective way to communicate fast-breaking weather information to the media for immediate broadcast to millions of residents in Alabama and Tennessee. The feedback from the media outlets, EMA officials, and the public has been overwhelmingly positive. Lifesaving weather information is now flowing to our customers faster than ever before due to the utilization of a host of communication tools. The increased lead times for warning information will undoubtedly pay dividends by saving lives, which is the core mission of the NWS.

The enhanced communications that the NWS enjoys with local EMA directors via the 800-MHz and paging systems also pays dividends with the local media and coincides with the IM initiatives. Once a storm report is relayed from a county spotter to an EMA official, the EMA can then relay the report to the NWS via the 800-MHz system. Almost immediately, the NWS can in turn, pass along the information to the local media via the IM system. In addition, we are utilizing new methods such as graphical hazardous weather outlooks, graphical short term forecasts, web based "weather watch" programs, and

wireless web data to provide information and enhanced services to our local customers and partners in a format that virtually no other part of the country enjoys.

The goal of the NWS offices in Alabama is to bring an unsurpassed level of customer service and specificity of weather information to our partners in the region. Our ability to use the newest technologies available will provide more ways for users to receive watch and warning information, which will undoubtedly lead to better and more successful warnings for the public as a whole. Enhancing our warning lead times and making sure that the public is adequately warned, will also lead to fewer lives lost, which is the ultimate goal of the National Weather Service.

## Acknowledgments

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