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The HazCollect Development Program

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1. INTRODUCTION

In the 2004 Fiscal Year Budget, the President requested funds to develop a system to collect and disseminate non-weather hazardous event information to the public on NOAA Weather Radio. The National Weather Service (NWS) is leading this development effort and is working with the Global Systems Division (GSD) (formerly, Forecast Systems Laboratory), Battelle Laboratories, and Northrop Grumman Corporation to develop this HazCollect capability. Seventeen different types of HazCollect messages, ranging from Earthquake and Avalanche Warnings, to Hazardous Materials and Radiological Hazard Warnings, to Amber Alert messages, will utilize this new system.

Emergency managers will generate HazCollect event messages using the Disaster Management Interoperability Services (DMIS) software interface. The messages will automatically be routed, formatted, and sent to the appropriate NWS Forecast offices. The messages will automatically be sent to the NOAA Weather Wire Service (NWS) for broadcast through the local media and NOAA Weather Radio All Hazards (NWR). This whole process will be designed to run in a matter of seconds, with no human intervention, once a message is composed. This

processing will be done in much the same way as severe weather watches and warnings are handled today. This paper discusses the design and development of this new capability.

2. HAZCOLLECT SYSTEM DESIGN

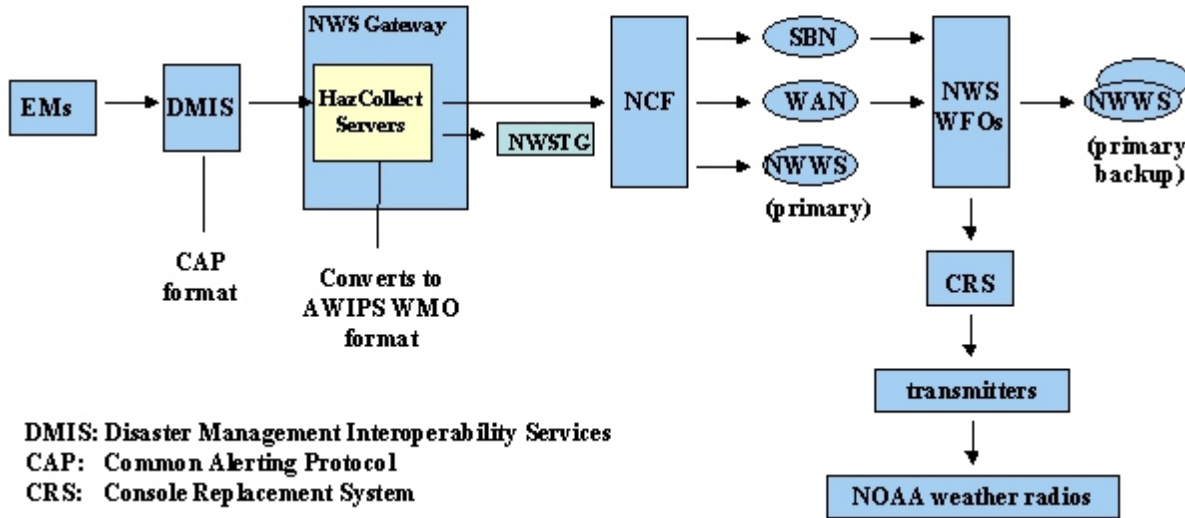
Figure 1 shows the primary components for the HazCollect system. Emergency Managers (EMs) will use the Disaster Management Interoperability Services (DMIS) system to locally generate emergency messages. The Hazcollect Server will concurrently route WMO messages to the NWS Telecommunications Gateway and the Network Control Facility (NCF). The NCF will uplink the WMO messages to the Satellite Broadcast Network (SBN), the NWS Wide Area Network (WAN), and the NOAA Weather Wire Service.

The AWIPS systems at local NWS Warning and Forecast Offices (WFOs) will receive the messages, via both the SBN and WAN, and determine whether the messages require local broadcast. If broadcast is required, the messages will be sent to the Console Replacement System (CRS) where the text will be converted into an audio (voice-ready) format then broadcast from the designated local NWR transmitter. The message will also be sent to subscribing news agencies via the local NOAA Weather Wire Service (NWS).

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Figure 1. HazCollect System Design

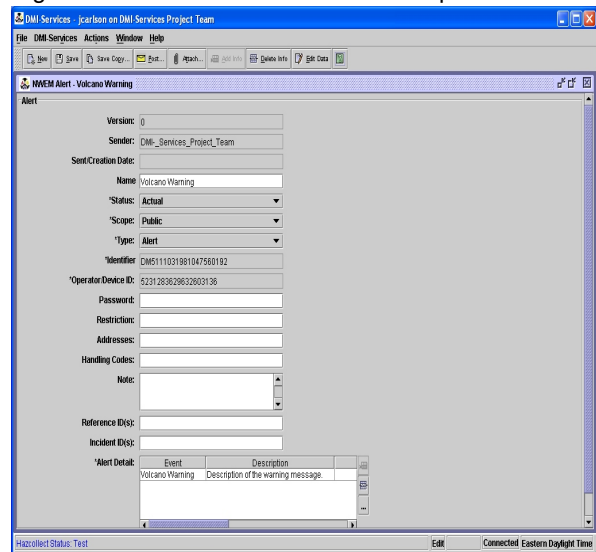


2.1 DMIS Interface

DMIS, sponsored by the Federal Emergency Management Agency (FEMA), provides two mechanisms for authorized Emergency Managers to create and submit Non-weather Emergency Messages (NWEM) to the HazCollect Server located in the NWS Telecommunications Gateway (TG). Those two mechanisms are EM creation and submission of emergency message in the DMIS PC-based EM tool set, or EM creation and submission of emergency message in an interoperable vendor system that implements the DMIS standard Web-Services interface. The messages are initially created using the DMIS interface using the Common Alerting Protocol (CAP) standard.

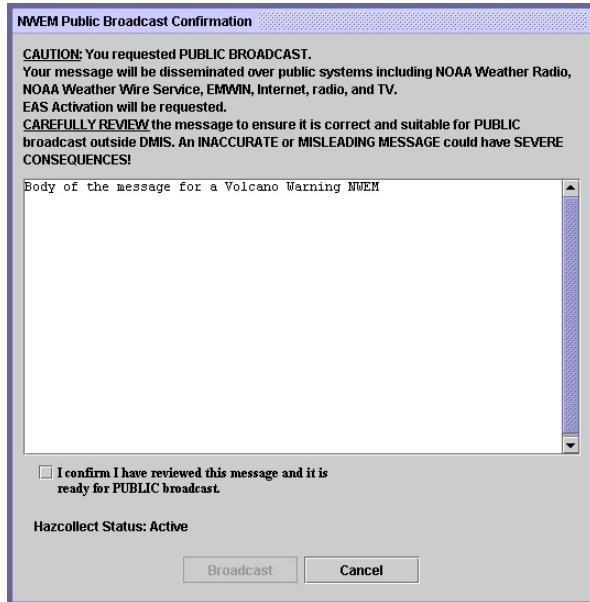
The DMIS user interface is designed to provide users with an intuitive and efficient mechanism to input the necessary information for generating a NWEM. Figure 2 shows an example of the DMIS user interface. Whenever possible, pull-down menus are used to select from predetermined lists of options. Space is provided for additional plain language alert detail.

Figure 2. DMIS user interface example



Once a message is generated, a window appears and alerts the EM that this message will be broadcast to the public and allows the user to review text before it is transmitted (Figure 3).

Figure 3. Example of DMIS Public Broadcast Confirmation Window



Note that prior to the HazCollect development activity, the DMIS was primarily used for interaction and coordination within the Emergency management community and not for broadcasting messages to the public. Thus, it was important to put safeguards in place so users would not inadvertently transmit messages not intended for public distribution.

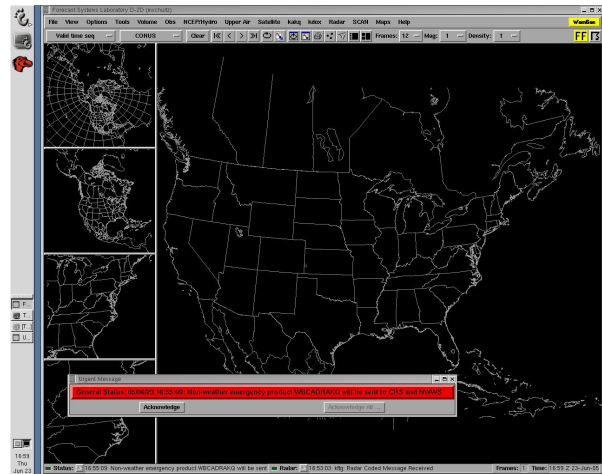
The CAP messages are sent to the HazCollect servers where the messages are converted to WMO-formatted (World Meteorological Organization-format) messages. This conversion capability represents an important functionality that allows the transmission of CAP messages generated on DMIS or vendor systems to be disseminated via NOAA/NWS systems. CAP is the emerging emergency management and public warning format and WMO is the meteorological industry format.

2.2 AWIPS Interface

Once the NWEM is transmitted to AWIPS, the message header is checked to determine whether the message needs to be broadcast from the local office. If it is a valid message, AWIPS will automatically process and transmit the message, analogous to how weather warnings are transmitted. The text screens can be configured to notify the forecaster that an NWEM message has been received using the “Bell” notification box. A “Red Banner” box on the graphics screen

(Figure 4.) and an audible alarm notifies the forecaster that the product is being sent to the CRS and NWS. No manual interaction with the system is necessary during the message processing. Automation of this process will significantly reduce the amount of time necessary to relay this information to the public.

Figure 4. Red Banner box on the AWIPS screen.



3. END-TO-END HAZCOLLECT TESTING

Along with component testing, the HazCollect System has gone through extensive end-to-end testing during the development process. Phase One of the testing successfully determined that one NWEM product could be generated on the DMIS client and sent through AWIPS using DMIS and AWIPS test equipment.

Phase Two of the testing was more extensive and required all of the different NWEM messages types to be successfully transmitted on the test platforms. Table 1 lists all of the message types that the DMIS is currently designed to handle.

TABLE 1. NWEM Events

- 911 Telephone Outage Emergency
- Avalanche Warning
- Avalanche Watch
- Child Abduction Emergency
- Civil Danger Warning
- Civil Emergency Warning
- Earthquake Warning

Fire Warning
Hazardous Material Warning
Evacuation Immediate Warning
Law Enforcement Warning
Local Area Emergency
National Information Center
National Periodic Test
Nuclear Power Plant Warning
Radiological Hazard Warning
Shelter in Place Warning
Volcano Warning
Practice/Demo Warning
Administrative Message/Follow-up Statement

Additional procedural functions and operational scenarios were tested including message updates, cancellations, and corrections. Further, tests were performed to assure that messages were successfully sent to multiple sites and that messages would not trigger at sites not intended for broadcast. During all the testing, great care was taken to assure that no messages would be inadvertently sent out on operational systems and that messages had "test" language in the message headline and event description.

During the course of testing, several problems have been identified and corrected. Additional capabilities were added to handle Spanish language messages for sites with large Spanish speaking populations. End-to-end message throughput timing was tracked in order to assure that messages are sent through the system within specified limits.

Once Phase Two testing is completed, the system will go through Operational Acceptance Testing (OAT) before the system is deemed operational. OAT should be completed by March, 2006.

4. CONCLUSION

The HazCollect system will provide a new and efficient capability to quickly broadcast critical non-weather event messages to the public using enhancements to current operational systems. This development activity has successfully brought together talented development organizations, both inside and outside the government, to successfully

complete this tasks. Rather than building a new system, this development has taken advantage of existing systems that could be enhanced to perform this important function. Once deployment and training are completed, critical non-weather messages should be as quickly available to the public as critical weather messages are available today.

5. ACKNOWLEDGEMENTS

The authors gratefully acknowledge the contributions of Bernie Schmidt and the rest of the Battelle team who developed the HazCollect DMIS applications and HazCollect servers. Information from their design documents and test plans were used in this report.