DRISI
Caltrans Division of Research, Innovation and System Information

Research Results

Responder Study Phase III: Enhancements and Specifications

Responder System - A communication tool for traffic incident management and first responders

Rural

JUNE 2020

Project Title:
Responder System - A Communication Tool for First Responders

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WHAT WAS THE NEED?

Caltrans maintenance staff is a first responder to incidents on the state roadways. They must collect information, determine the appropriate response, and access and manage resources at-scene. Caltrans currently does not have an efficient means to collect at-scene incident information and share this information with their transportation management center (TMC) and other emergency responders. In most districts, emergency responders rely on voice communications to exchange information. However, Caltrans rural districts lack the ability to distribute incident support information to and from responders via data networks. Such information could better prepare responders for incident support, provide assistance for incident management, and guide responders in making safe and sound decisions. Getting information from the responder to the TMC will enable optimal allocation and dispatch of resources to the scene. These rural districts have areas with no communication availability including no two-way radio communication and/or cellular coverage. Caltrans needs a communication tool for first responders to allow photos, drawings, weather information, and maps to be shared between responders and a TMC during an incident—via cellular, satellite, or other forms of communications—that will work anywhere in the State.

WHAT WAS OUR GOAL?

The main objective of this project was to get the Responder System updated to current technological standards and prepare a prototype system that is ready so the customer can begin the deployment process enterprise-wide.

WHAT DID WE DO?

The researchers at the UC Davis Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center have developed he third generation of the Responder

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system. This is a prototype communication tool that integrates hardware, software, and communications to provide incident responders, particularly those in rural areas with sparse communication coverage, with an easy to use means to accurately collect and communicate at-scene information with their managers and the TMC. The incident responder will use a smart device such as a tablet or smartphone to operate the Responder system.

Unique features of Responder include the ability for users to capture, annotate, and transmit images. Using Global Positioning System (GPS) readings, the system automatically downloads local weather data, retrieves maps and aerial photos, and pinpoints the responder's location on the maps. The system also provides the responder with a broad range of important information including current weather and forecasts, roadway information including cameras and changeable message signs, projected stream flows, wild land fire status, and California Highway Patrol (CHP) incident reports. By entering the incident report details and then simply clicking on the "Send Email" button, the Responder system automatically composes an email message and sends it to the TMC operator and/or other parties. The system connects to the most efficient and available service (cellular, satellite, or other) on its own. The system will use cellular service where it can and satellite service in areas with no other communication coverage. The system allows responders to concentrate on work at the scene without burdening them with data input and reporting.

WHAT WAS THE OUTCOME?

Two prototypes with the exact same components were developed: a fixed version that is installed in a Caltrans Maintenance truck, and a mobile version that can is integrated into and transported via a suitcase.

The system was designed to minimize data transfer and is not reliant on a continuous connection to central infrastructure. With an emphasis on ease of use, the system allows responders to concentrate on work at the scene without burdening them with data input and reporting. Responders will send a more informative incident packet back to the TMC so Caltrans can make more educated decisions and send the most appropriate resources.

The researchers recommend enterprise-wide deployment of the Responder system, following successful field testing. The system is expected to provide significant benefits, as previously noted. Commercial hardware is now readily available to support wide deployment without a need for customized hardware.

WHAT IS THE BENEFIT?

The Responder system allows first responders to collect and share at-scene information quickly and efficiently. It is especially valuable in:

- Major incidents such as landslides, floods and earthquakes, where the damage could be extensive.
- Remote rural areas where communication is often limited to voice, and coverage is sparse.
- When the first responder is new or inexperienced in responding to certain situations.

Responder will effectively utilize resources by:

- Supporting the ability for a maintenance station or TMC to evaluate what is happening at the scene without extended delay.
- Sending correct employees and equipment to the incident based on initial information that can be seen in the photo(s) and/or report(s) submitted by staff at the incident scene.
- Providing real-time information to other staff, such as Public Information Office (PIO), who may have to answer to outside agencies regarding what is happening at the incident.
- Providing essential information to the responder at-scene, including weather, roadway, fire, and incident information.

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Final Report
http://ahmct.ucdavis.edu/pdf/UCD-ARR-15-09-30-05.pdf

Websites

AHMCT – Responder
http://ahmct.ucdavis.edu/projects/responder/

Caltrans Active Research - Responder: Interim Phase
https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/research-notes/task3756-rns-3-20-a11y.pdf

IMAGES

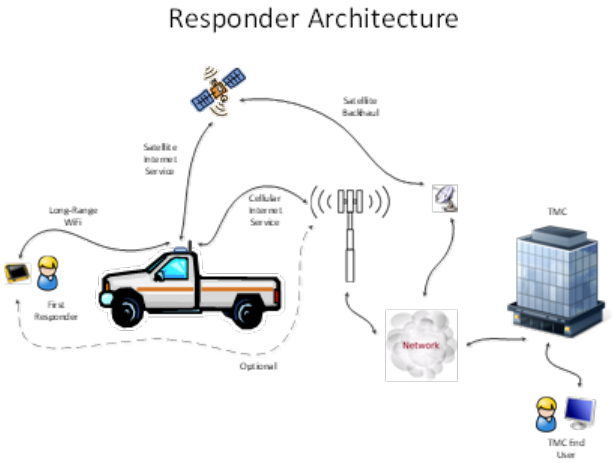

Image 1: Responder System Overview

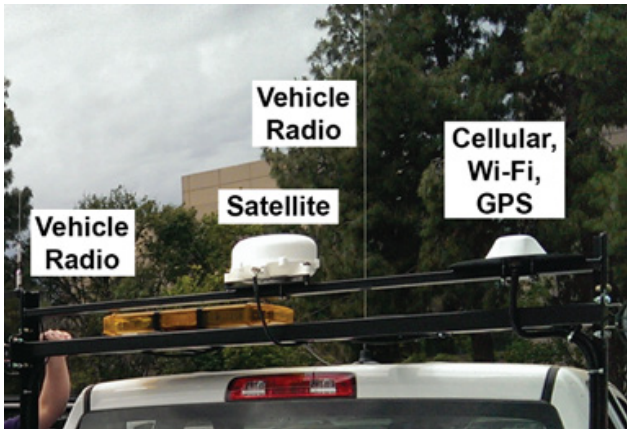

Image 2: Responder System Installed on Caltrans Vehicle

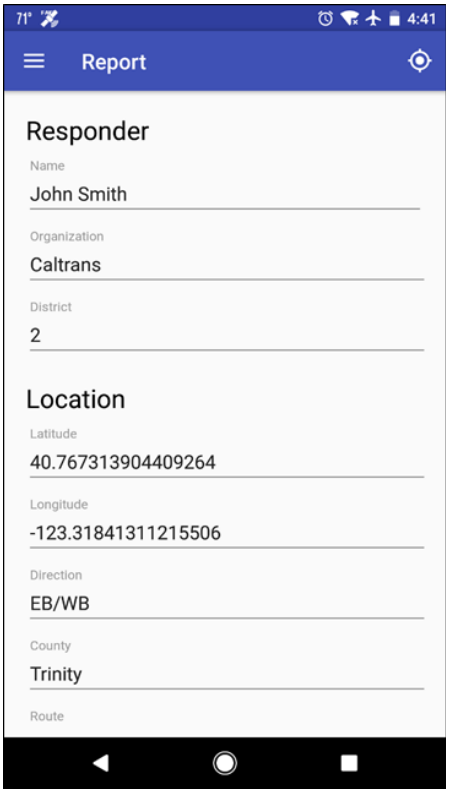

Image 3: Sample Responder Report Screen

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