

Presentation of Real-Time Building Information for First Responders

William Davis
NIST

The rapid improvement in wireless communication and in computer power, displays and networks has made it possible to provide building information to first responders in real-time. This paper provides a status update of a project at NIST to develop methods and standards necessary to supply information from municipal databases and building systems to public safety officials/first responders in electronic formats during emergency response. The project was designed to answer the following four questions:

- What building information can emergency responders use and when do they need it?
- Where can they get it?
- How should it be displayed?
- What types of decision support systems are needed?

A review of fire department preplans, a May 2004 workshop on information needs of first responders, and input from participants at the May 2004 NFPA meeting provided a good start to the required information needed for first responders. The results of this work are published in "Workshop to Define Information Needed by Emergency Responders during Building Emergencies," NISTIR 7193 by Jones, Holmberg, Davis, Evans, Bushby, and Reed.

To transfer the building information to the emergency responder or public safety official, a publish/subscribe technology is being investigated. This type of system must satisfy the following features:

- forward alarms and status messages as they occur
- deliver building descriptive information that establishes context for the alarms and status messages and supports tactical planning and operations
- allow only authorized access to the server
- allow authentication of the server by the accessing system
- allow multiple, independent accessing connections
- allow asynchronous access to the server; that is, a first responder's system need not be connected to the server before an adverse event begins and may disconnect and reconnect without loss of tactical information
- provide the tactical information in a common format, independent of the specific originating building systems and their possibly proprietary messaging syntaxes
- provide the tactical information in a common format that allows for its use in a variety of first responder applications
- minimize the volume of transmitted information both to maximize the throughput of the server in the face of rapidly changing building conditions and to reduce the load on the communications channels used by first responders

- make maximum use of the layered communication-protocol approach so that tactical information can be delivered through a variety of communications channels including plug-in connections at the building, dial-up connections, Internet connections, cell-phone messaging systems, and digital radio connections
- fail gracefully, that is continue to deliver as much tactical information as possible even as some building systems fail or lose connectivity

Details of this research will be available in two publications:

- “Cybernetic Building Systems and Publish-Subscribe Technology: Informing First Responders,” Kent A. Reed, NISTIR, in preparation
- “Toward a Reduced Building Information Model (rBIM) for First Responders,” Kent A. Reed, NISTIR, in preparation.

A workshop was held at NIST in July 2005 for the purpose of evaluating tactical decision aid displays based on information sets developed in the earlier work. It also afforded an opportunity to test the validity of the information sets. The workshop participants consisted of members of Washington D. C. area fire departments and a representative from New York City. Information displays for fire emergencies associated with three different building types and one medical emergency were analyzed. The results of this analysis is published as “Workshop on the Evaluation of a Tactical Decision Aid Display,” NISTIR 7268 by Davis, Vettori, Reneke, Brassell, Holmberg, Kostecki and Kratchman.

A demonstration was conducted at Wilson N. C. in September 2005 to test the revised NIST displays in a response by the Wilson Fire/Rescue Services to a simulated fire at the Wilson Medical Center. A NIST display was available on the responding fire apparatus, in the fire house, at a fire command trailer and was analyzed for application at a 911 center. Andrew Berezowski and Michelle Raymond demonstrated Honeywell’s fire panel that displayed the newly developed NEMA standard icons on the hospital floor plan using the simulated fire data for sensor activation. The panel display was evaluated for use on a fire apparatus, in the command trailer, and in the building. The NIST and Honeywell displays provided real-time information about the spread of smoke in the building. A second NIST display provided information that was useful for arriving fire apparatus. The demonstration will be published as a NISTIR.

Additional information about the project will be available as a NISTIR “Building Tactical Information System for Public Safety Officials, Intelligent Building Response (iBR)” by Holmberg, Davis, Treado, and Reed. For further information, go to <http://www.bfrl.nist.gov/ibr/>.