



# RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

## Evaluating Data and Voice Signals in Pathway Survivable Cables for Life Safety Systems

Many life safety systems require pathway survivability. Pathway survivability is defined by NFPA 72, National Fire Alarm and Signaling Code® as the ability of any conductor, optic fiber, radio carrier, or other means for transmitting system information to remain operational during fire conditions.

An example of a life safety system that requires pathway survivability includes emergency voice/alarm communication systems (EVACS), which are one-way systems. In buildings with partial evacuation or relocation plans, EVACS are required to have a Level 2 or Level 3 survivability pathway.

Although cables including but not limited to co-ax, fiber, ethernet and fire alarm signaling circuits are required to be protected from heat and physical damage, there are questions related to the impact of elevated temperature on alarm/data signals, and voice messages utilizing radio frequency (RF) transmitted across these cables and circuits and if that results in less reliable communications.

### Project Goal & Approach

Determine if temperature impacts the transmission and the functional and operational quality of alarm/data signals and voice messages in a fire rated and non-fire rated environment. If temperature does have an impact, identify the critical temperature and time at which the transmission of alarm/data signals and voice messages are no longer understandable to provide technical basis for any changes to NFPA 72 and NFPA 1225.

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### Summary Observations

The purpose of this project is to determine if temperature impacts the transmission and the functional and operational quality of alarm/data signals and voice messages in a fire rated and non-fire rated environment. If temperature does have an impact, identify the critical temperature and time at which the transmission of alarm/data signals and voice messages are no longer understandable to provide technical basis for any changes to NFPA 72 and NFPA 1225.

The findings from the literature review identified that the potential for fire-related impacts exists, but evidence of impacts in EVACS or ERCES was not found and therefore it is unknown whether there is a serious potential problem. No scientific studies were found which illustrate that fire-rated enclosures or building fire sprinkler systems specifically mitigate thermal-induced data or voice signal degradation in cables. However, fire-rated enclosures and/or building fire sprinkler systems can reduce the temperature to which cables are exposed, which could be expected to help, but the extent to which is unknown.

The research plan outlined 5 research areas:

- 1) Testing series to investigate the potential for thermal effects on signal degradation.
- 2) Impact from other factors such as mechanical stress and water impact on communication systems
- 3) Evaluating different test method(s) for pathway protection and suggest improvements
- 4) Engineering models for performance-based approaches
- 5) Packaging research outcomes for standardization and dissemination.