

use by all occupants. NIST has found that the physiological impacts on emergency responders of climbing numerous (e.g., 20 or more) stories makes it difficult to conduct effective and timely firefighting and rescue operations in building emergencies without functioning elevators. The use of elevators for these purposes will require additional operating procedures and protocols, as well as a requirement for release of elevator door restrictors by emergency response personnel.

Affected Standards: ASME A 17, ANSI 117.1, NFPA 70, NFPA 101, NFPA 1221, NFPA 1500, NFPA 1561, NFPA 1620, and NFPA 1710. *Model Building and Fire Codes:* The standards should be adopted in model building and fire codes by mandatory reference to, or incorporation of, the latest edition of the standard.

Recommendation 22. NIST recommends the installation, inspection, and testing of emergency communications systems, radio communications, and associated operating protocols to ensure that the systems and protocols: (1) are effective for large-scale emergencies in buildings with challenging radio frequency propagation environments; and (2) can be used to identify, locate, and track emergency responders within indoor building environments and in the field. The federal government should coordinate its efforts that address this need within the framework provided by the SAFECOM program of the Department of Homeland Security.

- a. Rigorous procedures, including pre-emergency inspection and testing, should be developed and implemented for ensuring the operation of emergency communications systems and radio communications in tall buildings and other large structures (including tunnels and subways), or at locations where communications are difficult.
- b. Performance requirements should be developed for emergency communications systems and radio communications that are used within buildings or in built-up urban environments, including standards for design, testing, certification, maintenance, and inspection of such systems.
- c. An interoperable architecture for emergency communications networks—and associated operating protocols—should be developed for unit operations within and across agencies in large-scale emergencies. The overall network architecture should cover local networking at incident sites, dispatching, and area-wide networks, considering: (a) the scale of needed communications in terms of the number of emergency responders using the system in a large-scale emergency and the organizational hierarchy; (b) challenges associated with radio frequency propagation especially in buildings; (c) interoperability with existing legacy emergency communications systems (i.e., between conventional two-way systems and newer wireless network systems); and (d) the need to identify, locate, and track emergency responders at an incident site.

Affected Standards: FCC, SAFECOM, NFPA Standards on Electronic Safety Equipment, NFPA 70, NFPA 297, and NFPA 1221. *Model Building Codes:* The standards should be adopted in model building codes by mandatory reference to, or incorporation of, the latest edition of the standard.

Recommendation 23. NIST recommends the establishment and implementation of detailed procedures and methods for gathering, processing, and delivering critical information through integration of relevant voice, video, graphical, and written data to enhance the situational awareness of all emergency responders. An information intelligence sector⁴⁵ should be established to coordinate the effort for each incident. *Affected Standards:* National Incident

impact on the emergency responders of climbing more than 10 to 12 floors in a tall building makes it difficult for them to immediately begin aggressive firefighting and rescue operations.

⁴⁵ A group of individuals that is knowledgeable, experienced, and specifically trained in gathering, processing, and delivering information critical for emergency response operations and is ready for activation in large and/or dangerous events.