THE PROBLEM

In the last decade, audibility in sleeping areas has become a major concern. This has been primarily due to:
- Demographics – an aging population with hearing impairments
- Greater use of insulation and sound absorbing finishing materials
- Monthly testing of fire alarm systems highlighting audibility problems to tenants
- Enforcement by the AHJ’s regarding audibility requirements in sleeping rooms

Thus, with the advent of changes in the 1995 National Building Code requirements for in-suite signaling, in-suite mini-horns have become a very common and integral part of many new fire alarm installations in multi-unit residential buildings. This new requirement, however, has brought new challenges to the industry. In some early installations, mini-horns were installed far from the sleeping rooms, and did not provide the required audibility levels within the bedrooms with all intervening doors closed. Often they were wired in with the common hallway bells thus creating major problems when tenants chose to disable their in-suite device. Also, testing became a major headache.

Trying to resolve the issue of tampering, the NBC incorporated the “10 minute silenceable feature” into the in-suite devices. This brought about the problem of how to test the timer, re-activation and other fail-safe features. With disconnection and even shorting of the circuits still occurring, “isolation modules”, both supervised and unsupervised, came into use. These unsupervised isolator modules could become a real issue in the future. With buildings experiencing constant tenant turnover, how does each new occupant know that their device has not been disconnected by the prior occupant? The yearly inspection, assuming that the mini-horn is tested at this time, is far too long a wait to determine this!

What of older buildings? Some jurisdictions have mandated up-grades to bedroom audibility. Other building owners and condominium groups are doing so on a voluntary basis out of concern. Other owners are doing so out of fears of potential liability.

Presently, the fire protection industry offers only a hardwired, (mostly) surface raceway, solution for these older buildings, requiring drilling of walls etc. What is needed is a quick, reliable, code-compliant and cost-effective solution to the audibility problems. One that will also be aesthetically pleasing to all concerned.

TECHNOLOGY TO THE RESCUE

Power Line Carrier (PLC) Technology has been in use for decades, primarily in Asia and Europe. It is a method whereby information is super-imposed upon the 120 volt power wiring within a building. System components in various parts of the building can communicate with one and other over the common power wiring. In commercial buildings, PLC Technology has been used for the monitoring and control of HVAC systems and has even been used for music distribution throughout buildings. The
Technology has been well proven. However, the acceptance of the concept in the fire protection industry lies in the marriage of Addressable-Device Technology with the PLC Technology.

The System approach begins with addressable audible signaling devices which are connected into the 120 volt electrical distribution system within each suite. They would usually be located in the in-suite bedroom corridor close to the bedroom door(s). Inside the moulded plastic housing is an 85-dB mini-horn with the required 10-minute silencing switch feature. Each device would of course be set (by the installer) with a unique address such as a suite number. It would contain a supervised non-rechargeable Lithium battery or perhaps a rechargeable battery for standby power.

In a typical Fire Alarm System application, a new PLC Controller would be installed beside (and interconnected to) the existing Fire Alarm Control Unit. The Controller would receive an ‘alarm’ trigger from the FACU and would also send a ‘trouble’ signal to the FACU when necessary. The Controller constantly monitors the presence of each in-suite device through a combination of both sequential polling and routing methods. If an in-suite device is removed (disconnected from the wiring) the Controller would automatically identify the missing device, display the suite number on its’ LCD screen, and would immediately trigger a ‘trouble’ signal to the FACU. This would occur, for example, if the suite occupant tampered with the device, or if the fuse or breaker feeding the circuit to which the in-suite device is connected, blows or trips. Under building power-failure conditions, the standby batteries in each of the signaling devices and the Controller would ensure total system operation.

Under building alarm conditions, the FACU would trigger into the Controller (using a simple normally-open, supervised alarm contact) and the Controller would instruct all in-suite devices to begin the audible sequencing.

A separate Phase Coupler assembly would be needed to couple the output signal of the controller onto the other two building phases. Typically, the Phase Coupler would be installed beside the 3 phase “House” Panel in the Main Electrical Room.

The benefits of this new Technology can be summed up as follows:

- No new wiring in finished areas - no visual impact and cheaper to install
- Connects into any AC outlet – has portability, flexibility and expandability
- Addressability of audible devices - provides ‘placement supervision’
- Supervised battery back-up – functions during total power outages
- Meets signaling requirements of both ULC-S525 and UL464

A sketch of a typical PLC audible solution would be as follows: