



DIGITAL WIRELESS INFORMATION SYSTEM FOR PUBLIC WARNING



On the market one can find several classical public-address and warning systems. Some are the individual electronic acoustic sirens in the Unified Public Warning and Information system (UPWI), also coexisting with it are wired and wireless analog public-address systems for communities. Also there are many local information systems installed in buildings, building groups and communities. Next there are numerous emergency announcing systems to alert the public in cases of fires, floods, releases of dangerous chemicals, etc.

The common disadvantage of all is the system incompatibility; also one of the problems is that the targeted public group rarely gets detailed instructions in a running emergency. Individual sirens only alert the public to the alarm start and type of danger. The people involved, however, do not receive instructions on what to do.

Analog wireless community public-address systems (WCPAS) bring the option to inform the public about the details of the emergency, but almost always requires a human interaction with the system. In many real emergencies this causes a critical delay in response. The follow-up warning is then relatively inefficient. For the best warning efficiency it is required that the



first alert is initiated immediately when the monitoring system senses the crisis situation. Like with fires, floods and other disasters, every second counts.

Contrary to these well-known facts, time required to initiate alert, with important detailed information to organize a timely evacuation, is exceedingly long in existing systems. One of the principal facts is that most existing subsystems comprise separate centers without a good mutual communication.

The actual problem of the aging analog wireless emergency-reporting systems so far available on the market is that all such systems do not offer the necessary complementary services which can be, however, easily integrated into fully digital systems. In plain words, the necessity of deployment of the fully digital wireless local information system (DWLIS) is as important as the fully digitized television broadcasting over Europe.

In this sense we should point out that some manufacturers and dealers of communication systems approved for UPWI, label such systems for commercial reasons as “fully digital”. Not so! On the Czech market, for instance, there is no fully digital system available. In reality, the UPWI communication systems labeled falsely as “digital”, utilize the digital coding only for control and signaling, while to transmit the voice information, all only use the standard narrow-band frequency modulation, NBFM.

This means the voice modulation is a classic analog mode. This “error” of UPWI system dealers caused that several attempts to use the frequency bands assigned by the Czech Communication Authority (CTU) for exclusively digital operation of DWLIS, have been disqualified and referred to another spectrum assigned for NBFM using systems.

The actual state of affairs is that the technically obsolete analog modulation complicates any new BMIS installations (due to that CTU refers all such cases into the already occupied “analog frequency” band). Technically, most used frequencies assigned to analog NBFM have problems with coverage and interference. Reassigning a free frequency is a complex and often impossible task. The type of modulation and the maximum allowed power do not allow, (under the General Permission) to cover reliably by the transmitted signal the buildings and building complexes and to deploy the systems with an acceptable reliability. The restrictions of technical problems some dealers of DWLIS systems can only resolve by a “moderate” increase of transmitted power. Such approach is quite childish and creates a potential problem for the operator, given the instrumentation available to the State Telecommunication Inspection Office.

Using the experience with the problems caused by the poor availability of frequencies for the analog BMIS systems, two fully digital DBOR-D and DBOR-T systems were developed and patented. (DBOR stands for Digital WCPAS). Both fully digital information systems were by chance developed in the same company which stood at the very beginning of unique wireless technology for community information : it was the Wireless Community Public Address System. Back then this novel system was awarded with the Main Prize of the Golden Urbis magazine, at the URBIS 1998 Fair.

The new digital systems have been developed for several years in a cooperation with the Safety Engineering Faculty of the Technical University Ostrava (Mining University). Also the experience of the Fire and Rescue brigades and Czech Police has been utilized.

Both systems , DBOR-D and DBOR-T are functionally identical, they only use different signal-distribution systems.

The first one, DBOR-D, utilizes a narrow-band digital modulation, DRM, on frequencies assigned for digital wireless public-address systems. Such system requires small local transmitters to be built for each community or for the covered building complex. Individual transmitters can be inter-connected, to ensure a wider coverage of the emergency broadcasting over more communities or districts.



The system is fully centralized; its core is made of a server receiving, processing and sending messages to receiving points. Transmission passes through safe websites accessible by any computer, tablet or a smart phone with the Internet connection, or into the same network as the server has. This option cancels the need for installations of special dispatch operation boards; also the cost of

system reservation is greatly reduced as such option is needed in one point only. The transmitted reports and alerts can be received by outdoor receivers, home receivers, and large LED panels. Also, these messages can control wireless modules like sirens, light beacons, openers of emergency exits, and many others.

The outdoor receivers with a speaker power amplifier are mounted in a weatherproof metal case, and allow to connect up to four outdoor pressure speakers. Optionally, more speaker connections are available. The receiver is powered by a rechargeable battery, charged continually from the public lighting AC network. The receiver can therefore operate also during a long power outage. Where no AC power is available, a solar panel can be used as the primary power source, making the receiver independent on any power line.



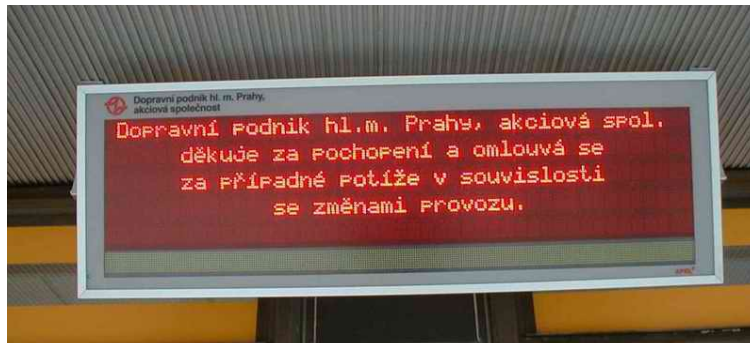
The wireless home receiver is a multimedia player allowing to play many formats: MP3, AAC, WAV, OGG and FLAC from a pluggable SD card, or from a memory device connected to the USB interface. The receiver also allows to listen to FM or AM transmissions. Once the DBOR-D transmits a message, the receiver automatically wakes up and transmits the message even if the



receiver was off. In an integrated recorder, such message is recorded for a later use by the operator. The receiver also has a digital display, indicating the message repeatedly till another message arrives. This solution allows the receiver be used by deaf operators. This wireless receiver is operated from the AC power line, optionally from a rechargeable battery.

The DBOR-D system also allows, in addition to transmitting voice messages to outdoor and home receivers, also text messages to be transmitted and displayed on various LED panels. Such option offers to run text messages transmitted wirelessly to public spaces, like “running-light newspaper”, on community information panels, factory messaging or navigation information panels in large complexes and fair grounds. Their simple control and reliable fully digital transmission allows in an emergency to immediately advise evacuation paths and other commands to prevent panic.

The DBOR-T system utilizes for its transmission the existing terrestrial digital television channel under DVB-T standard. As radio broadcasting, the messaging audio channel is added to the stream. The technology could, if MUX 1 signal distribution is included (used also by the Czech Public Television), achieve the 100% coverage of the Czech Republic, and all communities provided with DBOR-T receivers can receive the emergency messages. In addition to the automatic messaging to special receivers, the messages can be received by digital TV receivers. No special systems have to be added.



The application of DBOR-T system can become (historical experience indicates) the most reliable way to ensure an uninterrupted signal transmission during large-scale emergencies and disasters. Most TV transmitters are built on hills and mountains and have an independent power source. For the emergency messaging purpose, the DBOR-T represents the most reliable infrastructure.



The home receivers for DBOR-T are only designed to receive messages sent via the DBOR-T system. Outdoor DBR-T receivers operate like those designed for DBOR-D.