METHODOLOGY FOR CREATION OF THE COMPLEX EMERGENCY ALERTING SYSTEM

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REPORT ON THE RESULTS OBTAINED WITHIN THE COORDINATED PROJECTS FOR 2014

We developed a questionnaire which allowed gathering the information about existing practicing alerting systems of the municipal level. It was distributed within Russia, Ukraine, Georgia, Armenia and Azerbaijan. Probably because of the fact that this year the financing of the project to other than Russian participants was not provided we got responses only from Russia, Ukraine and Azerbaijan.

The analyses of the answers showed that alerting systems in these countries are more or less the same based on the former Soviet systems with the same problems and faults that need modernization and upgrading.

The proposals were developed for creating the complex emergency alerting system based on the results obtained. Consider it interesting and important to continue gathering best practices now in the West and South Europe, to make a comprehensive study, analyses with further recommendations and methodology.

1. ANALYSIS OF THE CURRENT PUBLIC ALERT AND NOTIFICATION SYSTEMS

1.1. Current Alert Systems Analysis

The public is alerted by the emergency response services by way of various systems and equipment established by the state executive authorities, regional executive authorities, local municipalities and organizations.

The regional public alert systems

Regional alert systems are primarily designed for delivering the information and alert signals to:

• Civil defense management in the region;

• Bodies responsible for protecting the public and territory from emergencies and/or civil defense forces in the municipalities;

• Public safety answering points (PSAP) in municipalities;

• Specially trained forces allocated (called) for emergency prevention and response and also civil defense forces in the region;

• Operations control desks (OCD) at the organizations managing potentially dangerous facilities;

• Population living in the respective region.

Municipal (local) public alert systems

The municipal (local) public alert systems are designed for delivering the information and alert signals to:

• Civil defense management in the municipality;

• Specially trained forces allocated (called) for emergency prevention and response and also civil defense forces in the municipality;

- Operations control desks (OCD) of the organizations managing potentially dangerous facilities;

- Population living in the respective municipality.

Facility alert systems

The facility alert systems are designed for delivering the information and alert signals to:

- Civil defense management of the organizations operating potentially dangerous facilities;

- Facility rescue units, including specialized ones;

- The employees of the organization operating a dangerous production facility;

- Management and operations control desks of the organizations located in the facility alert system coverage area;

- Population living in the facility alert system coverage area.

The systems mentioned are to be established and maintained by the agencies and organizations responsible for the potentially dangerous facilities.

1.2 . Current Public Notification Systems Analysis

The public notification is done to inform the population on the forecasted or actual natural and technogenic emergencies, measures taken to protect the population and the territory, protective methods and means, and also for raising public awareness of civil defense and protection of the population and territory from emergencies.

Unlike public alert, public notification does not require immediate public protection action and is to be performed by all the state authorities, regional executive authorities, municipal authorities and organizations.

Mobile telephone networks

The mobile telephone networks have shown the most dynamic development in the past few years. The amount of devices connected to the mobile telephone networks is much more than the number of fixed- line telephone service subscribers.

The 2G technology is the major one in the mobile telephone networks, while the 3G technology is demonstrating the most dynamic growth.

Major population and territory coverage makes the mobile telephone networks an attractive instrument to notify the population about the threats coming from natural and technogenic emergencies.

The following actions are currently being taken to improve the use of mobile telephone networks:

- Regulatory action for operators' performance in an emergency and ensuring hardware and software integration between their equipment and the automated information platform of the emergency response services;

- Introduction of mechanisms for standard mobile telephone networks technology application like Cell Broadcast/Interactive Cell Broadcast into the comprehensive public notification and alert system.

Telephone and Radio Broadcasting Networks

Telephone and radio broadcasting are the most spread information systems covering almost all population, which makes them a major public notification and alert channel.

The on-the-ground segment of the state television and radio broadcasting network is comprised by the regional, republican, territorial and provincial radio and television broadcasting centers, which are part of the single state television and radio broadcasting operator responsible for on-the-ground broadcasting of all mandatory public television and radio channels throughout all the country's territory and also for deployment of digital on-the-ground networks for broadcasting mandatory television and radio channels.

Television and radio broadcasting networks are optimized for public alert needs the following way:

•	Reliable digital television and radio broadcasting networks are built for guaranteed and targeted alert and also public notification;

•	VHF radio broadcasting networks are developed in the rural areas;

•	Current wire broadcasting networks are preserved and maintained for public alert system application;

•	The private (municipal) television and radio broadcasting companies are used for the public alert and notification, for instance, through cooperation agreements in case of emergency threat or occurrence.

Fixed line telephone communication networks

Despite the rapid development of the mobile communication networks in the past years, the fixed line telephone communication networks are still well-spread, but are in limited use for notification and alert, that is largely for autoinformer-based alert of the response forces management. The potential of this communication type will be significantly increased when new software-based switching systems (like soft- switch) are introduced there.

The Internet

The Internet is clearly a promising channel for public urgent notification and alert, but is currently in extremely limited use.

Thus, the analysis performed shows that:

•	The capacity of the modern digital information and communication technologies, development of multi-service communication networks, establishment of digital television and radio broadcasting networks require the organizational and technical solutions previously used to create the current alert and notification systems at all managerial levels should be revised.

•	Comprehensive approach is needed to perform the emergency public alert and notification tasks by using all available equipment, including the communication and broadcasting means, which are supposed to complement each other.

**2.	PROPOSALS FOR THE COMPREHENSIVE PUBLIC EMERGENCY ALERT SYSTEM (CPEAS)**

**2.1.	Goals**

The CPEAS is to be designed for timely and guaranteed public alert in the emergency alert areas with the use of up-to-date information and communication technology, software and hardware suites (equipment and end devices), which type and kind are determined depending on the emergency alert area features (certificate), dangerous natural and technogenic processes the area is prone to, and also the population groups that can be in the area.

2.2. Tasks

The CPEAS is to perform the following tasks:

•   To guarantee timely delivery of the information on an emergency threat or occurrence, rules of behavior and protection ways in conditions like that to every person in the area under the emergency threat, or in the emergency area; rules of behavior and protection measures in such situations;

•   To alert the disabled people and persons with reduced mobility differentiated by the types of their disability;

•   To transfer the required information and alert signals (audio, video, characters and figures, and other) on an automatic and automated basis for adequate perception by the public in case of emergency threat or occurrence;

•   To have integration capacity for the equipment receiving, processing and transmitting the audio and

/or audiovisual, as well as other messages on an emergency threat or occurrence, rules of behavior and protection ways in situations like that;

•   To have an automatic and/or automated integration capacity with software and hardware suites for decision-making used by the emergency response services;

•   To have an automatic and/or automated integration capacity between the public alert systems and the systems for monitoring potentially dangerous facilities, natural and technogenic emergencies;

•   To apply up-to-date information technology, electronic and printed mass media for the timely and guaranteed public alert on an emergency threat or occurrence, rules of behavior and protection ways in situations like that;

•   To timely transfer information to the emergency response services of respective level to take necessary action for public protection;

•   To control the end alert and notification means from the respective emergency response service desks;

•   To transfer information in preset modes (personal, selective, circular and by groups according to preset programs);

•   To protect information from unauthorized access and provide information integrity in case of system failures.

3.   COMPREHENSIVE PUBLIC EMERGENCY ALERT SYSTEM REQUIREMENTS

3.1.   Requirements to defining public emergency alert areas

When the public emergency alert areas are defined the risks present on a given territory of the country and the possible scale of their development need to be taken into consideration.

The natural threats include:

•   Geophysical dangerous phenomena;

•   Volcanic eruptions;

•   Geological dangerous phenomena;

•   Weather and agrometeorological dangerous phenomena;

•   Sea hydrologic dangerous phenomena;

•   Hydrologic dangerous phenomena;

•   Natural (landscape) fires: forest fires, steppe and grain area fires, peat fires;

The technogenic threats include:

•   Chemically hazardous facility accidents;

•   Radiation hazardous facility accidents;

•   Fire and explosion hazardous facility accidents;

•   Hydrodynamically hazardous facility accidents;

•   Transportation accidents (railway, motorcar, aerial, water, metro);

•   Utility and power grid accidents.

3.2.   Control levels

•   Federal (on the territory of the country);

•   Regional (in the constituent entities);

•   Local (in municipalities);

•   Facility/on-site (on the territory of potentially dangerous facilities).

3.3.   Operating requirements

The CPEAS is to be round-the-clock operational and ready for use. The CPEAS is to provide timely, guaranteed and accurate alert signals and emergency information delivery to the public in the emergency alert areas. The time required for the alert signals and emergency information delivery to the public from the moment the reliable data on a natural or technogenic emergency threat or occurrence is received, should be enough to ensure the necessary action for public protection (engineer, radiation, chemical and biological protection, evacuation, and other action). The CPEAS is to have 100% population coverage for those on the territory of an emergency threat or occurrence.

3.4.   Technical requirements

The CPEAS is to support the following alert signals and information transfer modes:

•   Circular;

•   Circular by preset programs;

•   Selective within one CPEAS level;

•   Selective (over one or two levels) by preset programs.

The CPEAS systems of all management levels are to be integrated in terms of software and hardware. The CPEAS is to have a throughout centralized and decentralized operation capability. The CPEAS is to support information exchange between the automatic, automated, manual and dialogue levels. The CPEAS is to support transfer and reception of confirmations on the transferred alert signals and emergency information at all levels.

The CPEAS is to provide:

-        Automatic display and registration of the transferred alert information, data and acknowledge receipt;

-        Registration of actions taken by the on-duty officer managing the alert system;

-        Possibility to 'intercept' the alert network by a higher level management in the country operating on a daily basis;

-        Remote control for public and authorities alert means;

-        Information input into the alert system from an industrial computer;

-        Transmission of pre-recorded voice messages or microphone messages;

-        Transmission of voice and video information from broadcasting studios of the broadcasting operators.

3.5.   Integration requirements for monitoring software and hardware suites, forecasting, surveillance and laboratory control systems.

The CPEAS is to support input and processing of the emergency information coming from the monitoring, forecasting, surveillance and laboratory control systems which receive and process the formalized messages on the emergency threat or occurrence (further to be referred to as control systems).

The CPEAS is to be software and hardware integrated with the automated information gathering, processing, and presentation suites of the control systems at all levels.

The alarm systems are to be automatically launched when the sensors of the monitoring systems for dangerous natural and technogenic processes are actuated.

The CPEAS control systems' information output is to be done through standard data communications protocols processed by the integration modules and command generation for actuating different levels of the CPEAS.

The CPEAS integration with the control systems is to provide both an automatic (no operator participation) and an automated operation mode.

3.6. General requirements to communication networks

The public is to be alarmed of an emergency threat or occurrence by the fixed-line telephone, mobile telephone (cellular) networks, television and radio broadcasting networks, the Internet, the electrical and electronic acoustic horn networks, street public address systems, mobile alert means and other means.

Mobile telephone (cellular) communication

The Cell Broadcast technology and short messages delivery are to be used for the mobile telephone (cellular) communication alert. When the short messages are sent to the public for the mobile telephone (cellular) communication alert, the following capabilities of the federal and regional mobile operators are to be taken into consideration:

- The number of mobile operators servicing a given region and the number of their subscribers;

- Operator coverage areas in a given region with the indication of installed satellite communication basic stations addresses;

- The technical capacity of the regional communication operator representative offices to circulate short messages.

The message text is to be not more than 140 symbols (the message size is subject to change based on technical capabilities and approval) to be delivered by the mobile radio and telephone communication network and within 15 minutes. The cell network public alert via the Cell Broadcast technology is to be performed using pre-prepared and pre-approved texts. The communication operators are banned from introducing changes to the message texts.

TV and radio broadcasting

TV and radio broadcasting based public alert is to be performed under applicable law.

Public alarms

The electrical and electronic acoustic horn networks, street public address systems are to be used up on the basis of the fixed-line telephone communication network, the dedicated digital IP VPN communication network of the executive authorities of the regions and municipal authorities, as well as the communication networks of the potentially hazardous facilities. The Internet public alarm is to be performed by placing emergency information on the official specialized websites, as well as the major news and search sites.

3.7. Requirements for CPEAS sustainability

- CPEAS hardware suites are to be located in the facilities which are protected from the emergency hazards;

- Several geographically distributed communication systems (channels, lines) are to be jointly used for one alert direction;

- CPEAS hardware suites and communication lines are to be backed up;

- The mobile alert means are to be kept and used in store;

- Power supply is to be guaranteed;

-       An industrial computer is to be used as part of the alert systems.

-       If the devices, blocks, cabinets, etc. are opened, a signal is to be transferred to a control desk for a corresponding level of the alert system;

-       Component parts are to be checked for proper functioning and a signal is to be transferred to a control desk of the corresponding level of the alert system;

-       The equipment is to be protected from unauthorized launch, as well as mistaken actions of the on-duty officer and maintenance staff;

-       The alert equipment suites used for the CPEAS are to be software and hardware integrated.

3.8.   Public

The CPEAS is to alert and notify all public groups, including the disabled people and other people with limited health capabilities considering the different limitations and by using various communication, broadcasting and alert equipment.