Károly FEKETE
fekete.karoly@uni-nke.hu

SEVERAL CONSIDERATIONS OF DISASTER RECOVERY COMMUNICATIONS

Absztrakt

In the 21st century the mankind has a lot of different kind of wired and wireless communication network, but only few of them suitable to satisfy the special demands of communications networks of disaster recovery. From point of view of command and control on system level important factors are synergy, information concentration, support of structured information flow, support of permanent operability and operative intervention into the critical positions. On the level of elements of the communications systems of disaster recovery the points of gravity are a bit different: availability, robustness, throughput, EMI resistance, support of different kind of services, such as voice, data, sensor, video and virtualization in context-sensitive social networks and environment.

A 21. században az emberiségnek jónéhánykülönböző típusú kommunikációs hálózat áll rendelkezésre, de ezek közül csak néhány alkalmas a katasztrófavédelem kommunikációs hálózatainak speciális igényeit kielégíteni. A vezetés és irányítás szempontjából rendszer szinten fontos tényezők a szinergia, az informácikoncentrálás, a struktúrált információfolyam biztosítása, az állandó működőképesség és az operatív beavatkozási lehetőség támogatása a kritikus helyzetekben.A katasztrófavédelem kommunikációs rendszerének elem szintjén a súlypont egy kicsit más: rendelkezésre állás, robusztusság, áteresztőképesség, EMI ellenállóképesség, olyan különböző típusú híranyagok támogatása mint például hang, adat, szenzor, video információ és virtualizáció kontextus érzékeny társadalmi hálózatokban és környezetben.

Keywords: C4I in disaster recovery, interoperability, specific characters of the emergency communications networks and elements ~ C4I a katasztrófavédelemben, interoperabilitás, a vészhelyzeti kommunikációs hálózatok és elemek specifikus jellemzői.

INTRODUCTION

In the event of a disaster the effective communication can be critical to a disaster recovery. The establishing command and control is crucial. The C4I is not a new terminology, as the military has used for many years too. Beside of computer and intelligence the first three terms are essential: "command", "control" and "communications".

In practice the cooperation between the parts of organizations of disaster recovery of same and different levels, the interoperability, the cross-border teamwork and the liaison communications are determining from the point of view of recovery chairperson, who is establishes a transparent chain of command and who is responsible for coordinating and directing the actions on strategic levels.

In every emergency situations raises its head the persistent question: what happened? So there is an indispensable demand for instant and reliable access to the highly organized communication networks or to the direct communication as a minimum requirement in the disaster recovery.

REQURIEMENTS

There is a need to:

– synergy between measures of official and professional organizations of disaster recovery such as police, fire departments, border guard, public health, and military (pic. 1);
– concentration of information on highest level disaster management;
– well prepared and reliable system of assessment and the project evaluation of catastrophe (pic. 2);
– compatible information and communications systems for fast and structured information flow for professionals;
– support of operative interference and intervention into the critical positions;
– control of permanent operability and adequate work of communications systems [1].

Figure 1. The practice of disaster calling based on county level (Source: Zoltan Turanyi, 2013. [2])

Figure 2. The DWDM (Dense Wave Division Multiplexing) high speed optical ring communication topology in Hungary, in common with emergency networks

Disaster recovery strategies should be developed for Information technology (IT) systems, applications and data. This includes networks, servers, desktops, laptops, wireless devices, data, connectivity, physical medium for transmitting of signal and so on.

Analyzing on state of the art in information and communication management the major requirements in front of systems regarding to the relevancy are:

- fast data access and real time control of rapid changes of emergency situations;
- timeliness of information and updating of events;
- data integration and linkage;
- structured redundancy of links;
- availability of communications;
- standardization and systematization of information.

CHARACTERICTICS AND VITAL PARAMETERS OF DISASTER RECOVERY COMMUNICATION SYSTEMS

Within a disaster site with a high probability there are multiple separate or uninterrupted disaster areas. Between them and between the main management HQs usually there are a vast amount of stored and renewed data. Consequently in case of multiple separate emergency areas the communications networks should be wide area communication (WAC) linked with a robust backbone connections between them and a lot of powerful hot spot communications covered in situ [3].

Thanks to the Gordon Edwin Moore's law, the available computing power in hand is more than enough after 2kY and we generally have a good bunch of communication access to the different wide and local area networks.

They can be wired or wireless WANs and LANs:

- public access switched telephone networks;
- integrated services digital networks;
- voice over Internet Protocol;
- internet protocol telephony;
- copper wired local networks;
- fiber networks;
- coaxial cable networks;
- group system mobile networks (GSM);
- terrestrial trunked radio networks (TETRA – pic. 3);
- direct radio lines (HF and VHF);
- WI-FI, WI-Max, Bluetooth networks (WPAN);
- satellite communication lines and networks;
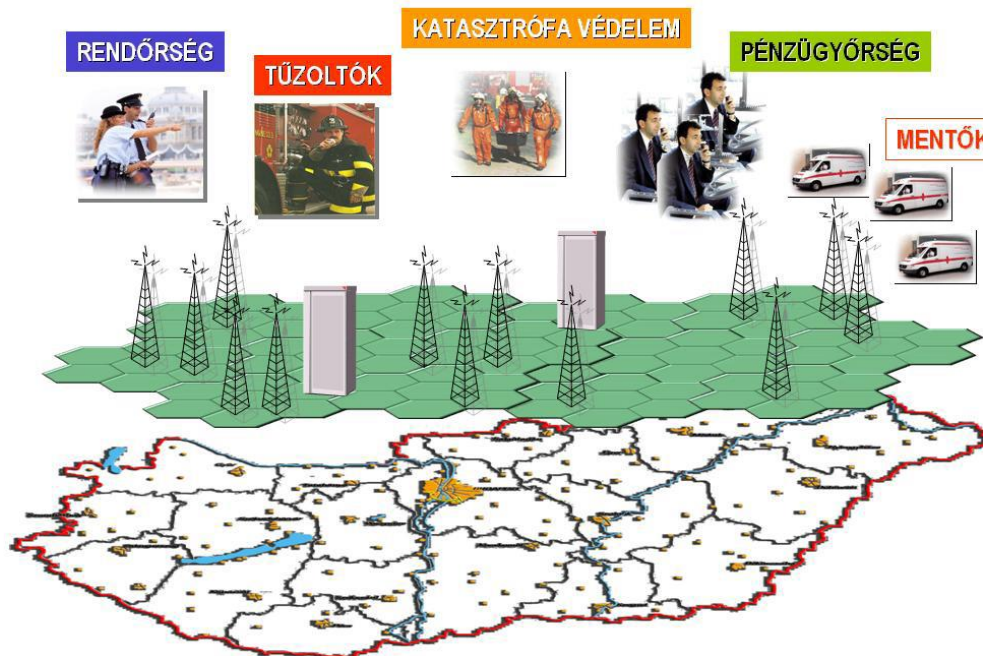- radio line of sight connections.

Figure 3. EDR - terrestrial trunked radio network for emergency in Hungary

From point of view of the appropriate communications systems of disaster recovery the most important characteristics and the vital parameters of them are:

- availability;
- performance and throughput of information;
- robustness and reliability;
- continuity;
- up-to-date information inflow (pic. 4, pic. 5);
- symmetry of down and upstream;
- communication overload resistance;
- response time, low jitter, wandering and latency of transmissions;
- electromagnetic interference (EMI) and noise resistance.

Figure 4. Virtualization of data in Emergency HQ, Budapest

Figure 5. Mobile communication HQ in county Somogy, Hungary, 2011

The next considerations of communications networks are mainly responsible for the quality of services:

- large number of services, support of voice, data, video, and sensor information (pic. 6, pic. 7);
- support of media, social networks [4] and different types of visualization;
- encryption capability;
- point to point, point to multipoint and multicast communication;
- peer to peer and ad-hoc mode communication;
- network in network, sub-network support;
- opportunity of group call schemes and prioritization;
- area coverage (pic. 4);
- long distance of communication lines;
- stand-alone operation;
- portability and mobility;
- high level of technical compatibility and interoperability with different kind of communications networks and communications protocols;
- dynamic and automatic configuration management.

Figure 6. Special car of disaster recovery for deploying and collecting data of chemical probes

The survivability is essential for 24 hours-7 days operations:

- longevity of working conditions;
- tolerance against of extreme climatic conditions;
- simple operation;
- low power consumption;
- possibility of different kind of electric power feeding (pic. 8) [5].

Figure 7. Deployed meteorological station with weather sensors

Figure 8. Disaster recovery infocommunication car in action

SUMMARY

In the beginning of the 21st century, the human race has a good possibilities to exploit a lot of available communication networks. But only a few of them acceptable and suitable from point of view of high demands of communications and information networks of emergency situations. In this paper, we collected and identified main characters of adequate disaster communications for disaster response and recovery, with special regard to the possible communications networks. The main point of gravity was dedicated to the assignment of vital parameters, important specifications of system elements of appropriate communication systems, quality of services and survivability.

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