"NICOLAE BĂLCESCU"
LAND FORCES ACADEMY

WORKSHOP:

**Integrated Communication Systems for the Management of Emergency
Situations: Technologies, Standards and Applications**

**SIBIU
24 April 2009**

Programme

Session I: 9.30 -10.30

1. Opening address

**2. European Standards for Emergency Communications Special
Telecommunications Systems Provided by the Service of Special**

Telecommunications to Ensure National Emergency Communications BG Eng. Sorin Vasilica, COL Eng. Sorin Bălan, Special Telecommunications Service

Abstract:
The paper overviews the standards for emergency communications, approved, defined and pending approval by the European Telecommunications Standardization Institute (E.T.S.I.):
- ✓ Emergency communications; Requirements for communications of citizens with authorities/organizations in case of distress (emergency call handling) – achieved - SR 002 180.
- ✓ Communications between authorities/organizations (public safety communications) – achieved - SR 002 181.
- ✓ Communications of authorities/organizations with citizens (warning systems) – project - SR 002 182.
- ✓ Communications between citizens – pending - SR 002 410.

The paper also introduces a national approach to the implementation of these standards in Romania and offers solutions to designing the communications architecture for the National System of Emergency Calls 112 and to tracking the caller.

The last part of the paper overviews the general tendencies and evolution of emergency communications.

3. A solution regarding the IT&C system for the management of local emergency situations Eng. Dr. Doru Bălan, Interactive SBC Bucureşti

Abstract:
INTERACTIVE SYSTEMS AND BUSINESS CONSULTING (ISBC) provides communications integrated systems to the ministries and governmental agencies involved in national defence and security activities. Our company's projects are primarily meant to cover the operative-tactical level, but we also have systems for strategic communications. In order to achieve its aims, ISBC has developed partnerships with important national and international companies, such as: Harris, AeroMaritime GmbH, General Dynamics, DRS, IBM, Microsoft and others. Our specialists, together with our clients and beneficiaries, participate in national and international activities where the concepts and systems produced by our company are put to the test.

Based on our experience and expertise in integrating communications systems into different mobile platforms and fixed installations, ISBC could easily identify the demand and design a CIS system for the tactical segment of interventions during emergency situations. Thus, we have designed an instrument available to the County Centre for Intervention Coordination, able

to approach the area of interest by projecting the informational capabilities and communication resources into the calamity area.

The system also includes other related activities such as monitoring the sensors from the risk areas, warning the exposed communities and notifying the persons authorized to take legal measures.

The IT system is specially designed to create a collaborative environment for all the factors involved in the intervention, from all the levels and during all the stages of crisis management.

Benefiting from the state-of-the-art technology available on the civil market, the system supports voice, data and video live on-site communications. Moreover, our systems manage to coordinate efforts and thus maximize results regardless of the variety of forces that might act to restore the state of normality.

The ISBC solution aims to facilitate the application of cooperation protocols between the institutions involved in managing emergency situations, regardless of their nature, and to provide support for planning, precluding, coordinating, and monitoring the intervention as well as for issuing reports, statistics and post-event summary reports.

Break: 10.30-11.30

Session II: 11.30-12.30

4. **Implementation of Wireless Networks in Hybrid Access Transmission Environments** Prof. Dr. Eng. Tudor Palade, TA Eng. Emanoil Puşchiţă, Technical University, Cluj-Napoca

Abstract:
Wide-band wireless networks ensure the transfer capacity of the system and the radio access for VoD, VoIP, Broadcast TV, Video Sharing, IP Radio services. Wireless hybrid access systems make it possible to interconnect and unify networks in heterogeneous architectures, to set up hybrid access networks connected through a core network and to use the so-called set of wireless systems.

These scenarios and topologies should account for the quality of services, an aspect thoroughly studied due to the critical importance of resource management in interdisciplinary scenarios. This is why we chose to draw a comparison between the distributed and centralized management, the former being an in-network management, a management mechanism of network parameters, independent of the individual mechanisms of component networks. The result is that end-to-end QoS is ensured.

The MIMO channel and the transmission algorithms used by this technology are other important elements to be considered if QoS conditions are to be met. Different channel models are studied in order to determine the matrix of the

channel and to compare BER, SNR and the capacity for different propagation conditions. The channel matrix uses the Kronecker correlation by taking into account the distance between the elements of the antenna and the angle scattering. The analyzed transmission algorithms require that the emission channel is known either totally or partially. If the emission channel is known it is also possible to adapt the signal to the propagation conditions, to maximize capacity, to minimize PEP, to adapt the power, to use adaptive modulations, and thus to increase the transmission rate, reduce BER and improve SNR.

5. The TETRA RadioCommunications System – the Common Radiocommunications Platform Used by all the Institutions Involved in Emergency Situations at a National Level, Robert Helbet, Special Telecommunications Service

Abstract:
The TETRA standard emerged as a solution to voice and data communications meant to cover critical sectors in order to meet the demand for a radiocommunications standard that could offer multiple services. This standard aimed to provide diversified voice and data services (call group, individual call, AVL GPS tracking), by communicating either in Direct Mode or by using Trunked Infrastructure, to improve spectral efficiency and to achieve an integrated management the IP support network.
Since a unitary communications system to be used by all the emergency institutions and services is an absolute necessity "DIMETRA IP", an implementation of the TETRA standard manages to cover a very wide range of services, from accurate and rapid voice communications, to interrogation capabilities, file transfers and GPS tracking. In this respect, the Special Telecommunications Service aims to implement the DIMETRA IP system at a national level, to adapt it to the communication needs of as many institutions as possible and to achieve an optimum radio-electronic coverage of the national territory. Taking into account that most of the European countries have been developing TETRA digital radio communication systems and that an efficient inter-institutional cooperation during crises is vital, the implementation of the TETRA standard in Romania is seen as a necessity and is considered by many central and local institutions.

Break: 12.30-12.40

Session III 12.40-14.00

6. **Security of Communications Systems** – LTC Prof. Dr. Eng. Ciprian Răcuciu, Technical Military Academy

Abstract:
Information security, a relatively new field of technology, tries to find technical solutions to eliminate communication networks' vulnerability arising from the gap between the rapid developments in communications networks, the huge amount of information that has to be processed and the advancements made in terms of finding appropriate solutions to securing data.

In order to protect modern digital networks, several specific mechanisms have to be implemented, starting from the physical protection of transmission lines and going to procedures that block the access to the network, and even to data encryption techniques, as methods specific for the protection of information exchanges.

The need to protect information is emphasized by the fact that secured links have become commonplace, being extensively used in: Military communications, special communications, governmental communications, diplomatic communications, communications of the financial—banking environment, of economic agents and of private television companies.

7. **Software Defined Radio Wave Forms –** LTC Assoc.Prof.Dr.Eng. Paul Bechet, LT Radu Mitran, PhD std, Land Forces Academy

Abstract:
Contemporary specialists suggest that the problem of information dominance typical for military environments and complex systems should be modeled by decomposing the system from a system of systems perspective, and by introducing new organizational structures the performances of which are superior to the traditional architectures from environments characterized by a heavy flow of information, limited resources and restrictions in terms of communication and knowledge. JTRS will represent an essential component of the effort invested in acquiring information superiority at a tactical level. JTRS will combine the functionality of the numerous radio stations available to military branches, into a single family of radio stations interoperable in joint environments.

Or, more specifically, JTRS will enable combatants to connect both horizontally and vertically by providing them with the necessary instruments for information superiority – a prerequisite for success in the operations of the future.

JTRS is defined as a family of mobile, modular, multiband, multimode radio stations able to set up ad hoc interconnected communication systems and to ensure the connectivity of combatants especially at a tactical level. JTRS capabilities will be evolutionarily developed and integrated, so that the JTRS capacity could be gradually increased depending on the technological

progress and necessary availability.   This evolution will include upgrades of six main domains: use of bandwidth and frequency spectrum, use of power, aerial technology, processing capacity, networking and modularity.

As far as the platform of the JTRS family of stations is concerned, one of the options considered is to develop both a new set of wave forms to enable adaptation to older systems and a new family of wave forms to provide multiple bandwidth access, specially designed for JTRS applications. Wave forms are defined as software applications determining the entire functionality of a radio station, from the perspective of the end-users. In JTRS terms, the notion of wave form is used to describe the entire set of radio function forms from user input to RF output and vice versa. Such a definition includes the main characteristics of the signal: the modulation method, the data transmission rate, the codes used to achieve frequency hopping or to secure the information. The characterization of a wave form is said to rely heavily on four requirements:

- ✓ Data transmission rate. The rate of data transmission should be high enough to allow complete immediate connection.
- ✓ Coverage. Mobile radio stations should cover a wide area so as to allow permanent access to the radio service, including during mobile operations.
- ✓ Robustness.   The wave form should be specially designed to resist the perturbations arising both from information processing and from the propagation environment.
- ✓ Protection against jamming and detection. Some of the measures to secure broadcast communications and information are as follows: Encrypting the information, optimizing the output power depending on the minimum signal/perturbation ratio so as to broadcast within the coverage area of friendly forces, using directive antennas or other spectrum spreading techniques such as frequency hopping.

8. Software and Hardware Applications in Military Communication Systems at a Tactical Level – Eng Laurenţiu Nica, Eng Laurenţiu Simion, Interactive SBC Bucharest

Abstract:
The paper presents the main applications of the Integrated System of Communications and Informatics for Battalions (SICIB)
BC2A Cinetic® is a command and control application empowering leaders and commanders at battalion level and below with the tools required to support the decisions and manage the battle on the move as action unfolds.
Voiajor Workfow provides text messaging services based on roles and flows of documents; it is a next-generation plug-in superior to Microsoft Outlook 2003 and Microsoft Exchange 2003 Server integrated with the BC2A and Nexor series.

Voiajor AdatP-3 is an application performing Baseline 12 and 12.2 AdatP-3, plug-in above Microsoft Outlook 2003 and integrated with the BC2A and Nexor series.

Voiajor MEM provides text messaging services based on roles and flows of documents at battalion level; it is a plug-in above Microsoft Outlook 2003 and Microsoft Exchange 2003 Server and i tis integrated with the BC2A and Nexor series.

BC2A Staff is the application that ensures a collaborative environment for battalion command and provides separate mission-based work stations for operational documents, COP, RGP, JC3IEDM - ADATP-3 – NFFI being integrated into the BC2A and Voiajor systems, based on a SOA concept.

By using the MIP and DEM mechanism, BC2A *Connector* makes the Battalion Command and Control Information System compatible with other C2ISs and is integrated into the BC2A and Voiajor systems.

BC2A Portal is an application developed on a Microsoft Sharepoint Server 2007 platform that ensures a collaborative environment for the battalion command level, provides separate mission-based work stations/workbenches for documents other than operational, and manages the workflow of documents and the RBAC capabilities.

BMS Cinetic

This combat management system ensures the integration of C4ISTAR at the level of combat vehicles.

This command and control software ensures the transmission of data outside the vehicle with the radio devices it is equipped with. The command and control software can also ensure other services of use to the vehicle commander:

- ✓ SMTP messaging services above radio or LAN
- ✓ Instant messaging services – tactical chat
- ✓ Displays of the tactical situation on the computer screen, with APP-6A system of symbols
- ✓ Data storage/reading services in/from a database of the mobile platform that uses the JC3IEDM data model.
- ✓ Data exchange services which allow tracking down friendly forces using the NFFI standard and which ensure interoperability with the coalition in terms of the tactical situation of friendly and coalition forces
- ✓ AdatP-3 messaging services (baseline 12 and 12.2) that ensure report/request form exchange between friendly forces and the coalition Adat-P3 formats should be filled out automatically, with the application taking up the existing information from the database, at least for ADatP-3: OWNSITREP, ENSITREP, CASEVACREQ-Provider, INCREP, INTSUM - Consumer, INTREP messages.
- ✓ GIS services

9. Closing address