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HUNGARIAN TACTICAL OPERATIONAL COMMAND AND CONTROL INFORMATION SYSTEM (HUTOPCCIS)

MAGYAR FEJLESZTÉSŰ HARCÁSZATI - HADMŰVELETI VEZETÉSI ÉS IRÁNYÍTÁSI INFORMÁCIÓS RENDSZER

A korszerű hadseregek működéséhez elengedhetetlenül szükséges olyan információs rendszer alkalmazása, mely a vezetés és irányítás bonyolult folyamatát támogatja és bizonyos elemeit automatizálja. Ez a támogatás és automatizálás ki kell, hogy terjedjen a tervezés, a végrehajtás a vezetés és az ellenőrzés valamennyi szintjére. Egy ilyen rendszerrel szembeni alapelvárás, hogy képes legyen biztosítani a csapatok erőinek egymással, valamint NATO szövetséges csapataival való együttműködés képességét is.

To operate modern armies it is vital to introduce such an information technical system, which supports and automates certain elements of complicated course of command and control. This support and automation must cover all levels of planning, accomplishment, command-control and supervision. The basic requirement is against this system that it must be capable to assure the cooperation capability between troops and forces as well as NATO allied forces.

In every case an operational command must be realized at the area of operation and responsibility with elements of direction which have a direct influence on operations and combat activity and are capable to react quickly and operatively on actual changes of the situation, and in order to support operations and combat activity are capable to assure the necessary forces and means recognizing in due time the changes in the situation. Field command and control systems satisfy these requirements.

Taking into consideration the leadership requirements prominently the command requirements of army units - related to automated command and control -army forces of the upcoming years inevitably must have informatics system elements supporting operations, tactical planning, command and control which is equally employable in war and non war operations. A certain system can be a nationally developed " Tactical Operational Command and Control Information System" (TOPCCIS).

The "Tactical Operational Command and Control Information System" must be composed by such subsystems which cover, protect and serve - all in all support -army, brigade, battalion and company level units and subunits during planning and accomplishment of their activity during maneuver, combat support, combat supply and field systems operated by them.

"TOPCCIS" is a combined command system, which is composed of user software and hardware elements and tactical units providing information flow. Developers together, as a consort participated first time in and intend to continue jointly the development.

ELEMENTS OF "TOPCCIS" SYSTEM

1. User software developers:

— Dr. Attila Furjan Lieutenant Colonel, Senior lecturer, NDU ZM, Operational Support Department - field artillery specialist
— Special software development team.

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Function, application and capability of field command control and information system, field information database, hardware conditions of operation

FUNCTION OF COMPUTERIZED FIELD COMMAND AND CONTROL AND INFORMATION SYSTEM

At company, battalion, brigade and ground forces level planning and control of combat (tactical and operational), planning of intelligence forces and means combat employment, control of intelligence, intelligence information (data) supplied by intelligence sub-units transmission to command posts, data collection, analysis, processing and sorting, target assignment and transmission to forces participating in fire support via computer network or tactical radio network by standard messages. Continuous planning of fire support is required during preparation and conduct of combat activity.

ELEMENTS OF ELABORATED SOFTWARE OF COMBAT DIRECTION SYSTEM:
— Own (friendly) chart of organization;
— Intelligence data processing and command sub-system;
— All arms (maneuvering) sub-system;
— Fire support (field artillery support) sub-system.

CAPABILITIES AND APPLICATION OF COMPUTERIZED FIELD COMMAND AND CONTROL AND INFORMATION SYSTEM

Areas of application:

The system can be applied at company, battalion, brigade ground forces (division) level at command and observation posts or tactical command and control centers operating at unit command centers, at intelligence data processing and command posts, at fire support centers, at command centers directing the actual activity, at operational planning section for establishing work stations. Furthermore for displaying intelligence forces and data, fire support units and target data, fire planning and to display planned tactical situation and actual combat activity on digital maps and ortophotos.
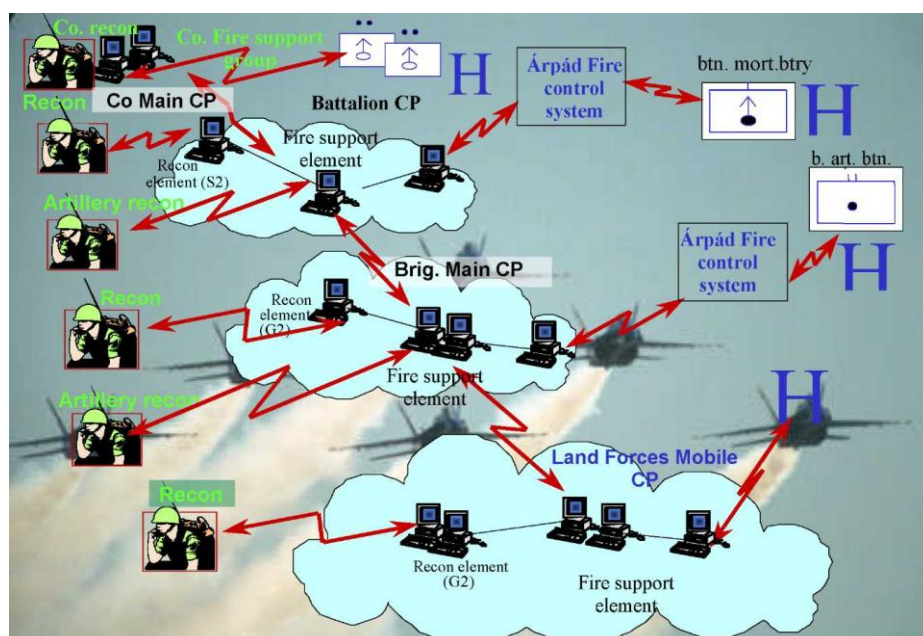

Fig.1. Computerized tactical operational command and control

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CAPABILITIES OF TACTICAL OPERATIONAL COMMAND CONTROL INFORMATION SYSTEM

The system supports to plan the combat-tactical employment of possible reconnaissance forces and means considering the analyses of reconnaissance requirements and capabilities and visibility possibilities, to plan the tactical employment of artillery units participating in fire support and to display their maximum effective range on digital maps. The software is capable to receive and process target data of stand alone and collective as well as stationary and mobile targets and to display them on digital maps. Data processing is done in 5-7 seconds following receiving data. Evaluated targets are listed and grouped according to NATO requirements and they can be printed. Target allocation between forces participating in fire support is solved during combat preparation and accomplishment phase. With the help of the system planning of combat, maneuver all arm forces can be professionally planned as well as their display using NATO standard symbols on digital maps and ortophotos. Command and control system is suitable to receive, process and transmit, forward text files and map information as well. Beyond that it is possible to display and run tactical map and text information between fixed operational dates.
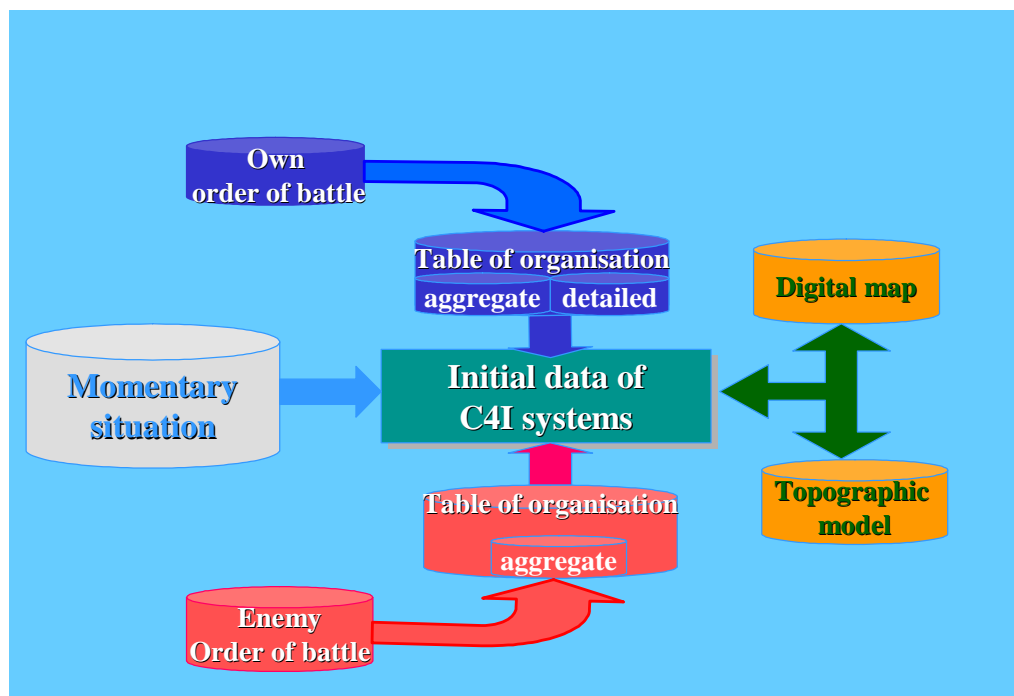

Fig.2. Basic data sources of "HUTOPCCIS"

BASIC PROGRAMS, TERRAIN DATABASE AND HARDWARE CONDITIONS TO OPERATE OF HUTOPCCIS

Tactical Operational Command and Control InformationSystem basic programs and terrain database:

— ArcView 3.2 + Spatial Analyst complemented

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—   Delphi5,

—   MapObjects 2.0

—   MS SQL 2000 database operator

—   3D informatics database provided by HDF Mapping Service NPC:

     —   DTED Level2 Terrain Elevation Configuration Model;

     —   JOG (Air & Ground), GEOTIFFs;

     —   Vectorial database;

     —   Topographic GEOTIFFs.

During the development of command and control systems it was always a great problem how to depict in information systems the tree dimensions of space of different objects. The recently published graphic databases complementing the traditional ones and 3D informatics equipments changed this situation. Nowadays digital basic maps and the terrain elevation configuration model became an effective tool and creates basis for command control systems. Digital basic maps DTA50 and the terrain elevation configuration model is the product of HDF Mapping Service nonprofit company.
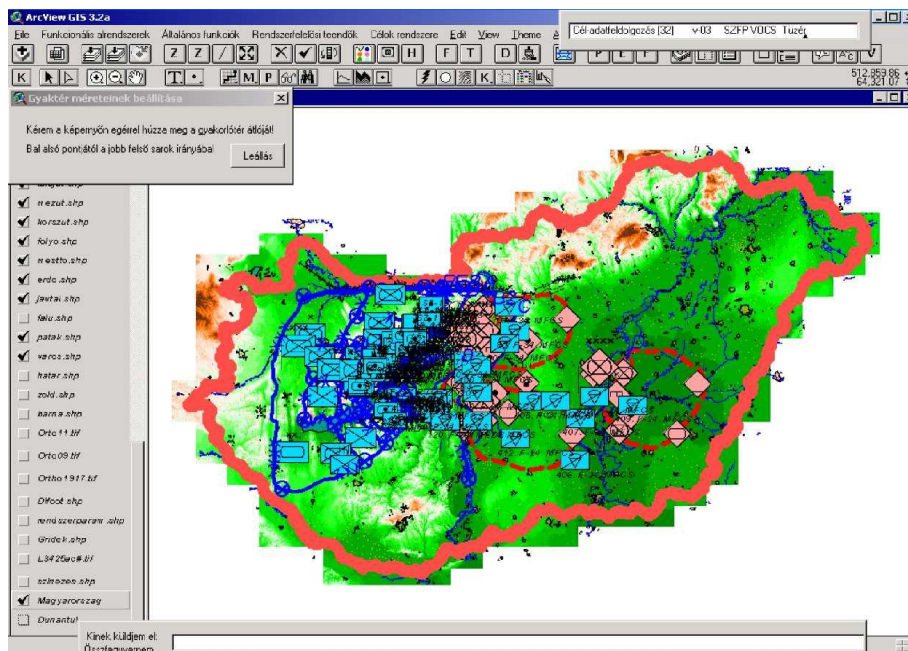

Fig.3. Hungarian Republic coverage by 3D informatics

HARDWARE CONDITIONS OF TOPCCIS SOFTWARE OPERATIONS:

In order to operate computerized command control system the equipment to be fielded have to be good quality computers and software, that can be fitted easily to HDF information technological system, operable for long time and could be flexibly improved. Both hardware and software elements must fit to the information technical system of user military organizations, in case of existing local network it should constitute a new segment, in lack of local network it has to create initial base for it.

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Depending on the users place command control system should or have to operate the information technical system with normal - commercial - computers or special field computers.

All arms functional subsystem

PURPOSE, CAPABILITIES, APPLICATION AND EMPLOYMENT

Purpose of all arms functional subsystem:

As a part (element) of the computerized tactical operational command control and information system the purpose is to display and plan composition, combat order elements of combat (maneuver) units, tactical employment of combat order elements, units, forces and means taking into consideration capabilities, rules of combat, employment standards (STANAG and doctrines), visibility analyses as well as to display them on digital maps and ortophotos. Support transmission of command and control operations and combat activity, register situations and combat value, composition of operational and other reports and their distribution.

With accurate registration and display of the operations and combat situation supports the accomplishment, prescribes daily rhythm of different level commands and command posts in sufficient briefings, hand-over between shifts, preparation of conferences, evaluations of different combat situations during the planning phase.

It assures conducting planning procedure during commanding combat activities and operations, preparation of decisions, especially the so-called dynamic decisions.

Major capabilities of TOPCCIS:

TOPCCIS is capable to support employment planning of ground forces maneuver, combat support and combat supply units, subunits, to model elaborated operation and employment plans.

Areas of employment and application:

Combat planning and command system can be used at ground forces, at force, brigade (regiment, independent battalion) headquarters, at subordinate battalion (artillery battalion) and company (battery) level command posts, and more prominently at maneuver and combat control centers established within headquarters and command posts.

The system assures networking of different role headquarters and command elements (command posts) deployed according to command levels, continuous connection and correspondence between workplaces, workgroups and sections.

Beyond that the system is suitable for the following tasks:

— It is applicable in tactical and operational situations as well as in crisis management;
— During planning of maneuver forces employment it takes into consideration prescriptions of NATO STANAGs;
— Different combat elements could be displayed on digital maps using NATO standard symbols and marks (APP-6A) - (areas, positions, phase lines, etc.);
— During combat activity modification of tactical position and forward lines is professionally solved on digital maps;
— Any kind of combat order element (e.g. Areas, positions, sites) modification possibility is given;
— Planning all forms of maneuver forces activity (attack, defense) is assured and the command of ongoing combat activity is assured;
— To indicate incoming information from other command posts and workplaces is given;
— Display and delete processed or non processed information from other command posts is assured;
— Information flow between combat, tactical and operational levels is given, data procession and accurate display on digital maps is guaranteed;

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— The system is capable to display movements, marches and maneuvers of subunits on digital maps, to conduct movement, march and maneuver computations;

    — Display of NATO standard symbols on digital maps is given;

    — It is possible to send and receive all kinds of text information (orders, combat orders);

— It is possible to save and store completed exercises entirely or in parts;

— It is possible to open new exercises as well.

Command levels of TOPCCIS employment:

Tactical Command and Control Information System embrace all command levels from the ground forces leadership down to the organic company (battery) level. It assures the unity in conducting planning and command from highest to lowest level having independent accomplishment elements and command.
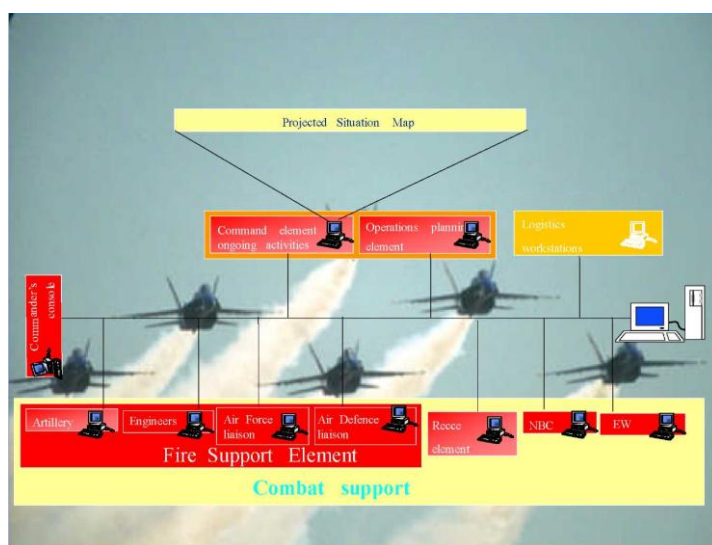

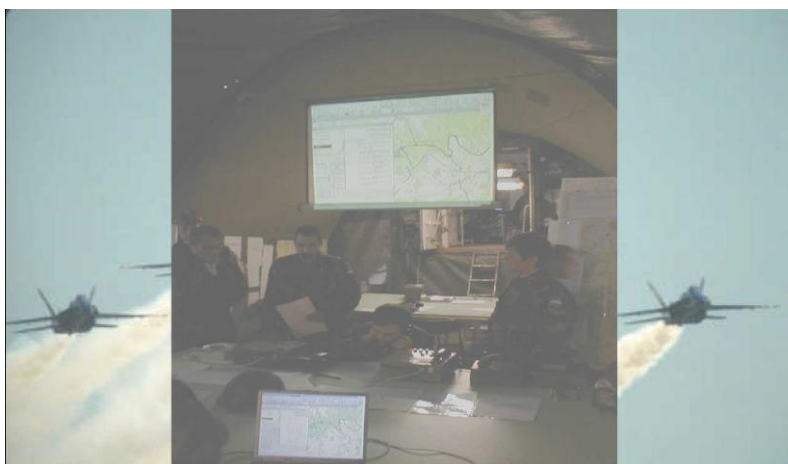**Fig.4. TOPCCIS computer network at Ground Forces Mobile Command Post**

Fig.5. TOPCCIS in operation during "Bakony Strike 2003" excercise at brigade main

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Fig. 6. TOPCCIS in operation at "Bakony Strike 2003" exercise in a company command post (BTR-80)

Fig.7. TOPCCIS in operation at "Bakony Strike 2003" exercise in a company

COMBAT SUPPORT SUBSYSTEMS - INTELLIGENCE FUNCTIONAL SUBSYSTEM ROLE OF INTELLIGENCE FUNCTIONAL SUBSYSTEM

During operations and combat activity, maneuvers, employment of units and subunits, combat support, combat supply, intelligence data processing subsystem grants planning, division, prescription of reconnaissance tasks, creates database on expected enemy and non friendly forces, plans group arrangement, deployment of intelligence organizations and elements, and plans the order of conduct. With support of all activity it assures elaboration of plans, orders, measures, drafts, documents, registers necessary for combat command and control.

Subsystem makes possible information and data collection gathered and reported by unified intelligence system (field reconnaissance, special forces, artillery, engineering, ABC, etc.) elements, accurately records, processes and arranges them in different documents and displays on charts and digital maps. Using databases and plans created during

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preparation of maneuvers and combat it develops full information and distributes them for different command posts, workgroups and sections.

The subsystem supports and promotes development of "Intelligence Records" and continuously maintains it in digital and print out forms.

Capabilities and application of intelligence subsystem

— Applicable in tactical and operational situations and in crisis management as well;
— For operation professional knowledge and intermediate level computer user skill is necessary;
— Processing intelligence information takes into consideration NATO STANAG prescriptions;
— Uses as basic surface DTA-50 digital map surface and digital terrain elevation configuration model produced by Mapping Service;
— On digital maps it is solved to use different scales as well as to adapt Gauss Kruger or UTM grids;
— Both MGRS coordinates used in NATO and Gauss Kruger coordinates can equally be inputs and outputs of digital maps;
— Coordinates conversion from UTM grids to Gauss Kruger grids and back is completely solved;
— Distance measurements on digital map is solved;
— Elevation data reading (with help of digital terrain elevation configuration) is assured;
— Autotype (scanned) maps can be used as basic surface;
— As a basic surface digital ortophotos can be used as well;
— It is solved to input stationary and mobile target reconnaissance data, to collect and process intelligence data and to display them on digital maps using (APP-6A) NATO unified symbols;
— Intelligence information evaluation according to NATO STANAG is assured;
— Trough recognized target symbol displayed on digital maps possibility to read intelligence information is given;
— It is solved to plan stations and points for intelligence forces and means on digital maps;
— Reconnaissance capabilities and display, evaluation of visibility is elaborated;
— All intelligence sources reconnaissance capabilities and summarized visibility analyses are possible;
— Target zones display on digital maps are solved (A, B1, B2, C, D zones);
— It is possible to group recognized targets according to their importance, to produce lists and print outs on recognized targets;
— Handling maneuvers, marches and moves of intelligence forces and means, to do maneuver calculations and to display them are possible.

EMPLOYMENT AND CAPABILITIES OF FIRE SUPPORT SUBSYSTEM

It is a definite fact in the era of modern warfare that on the battlefield the suitable information must get in due time to the suitable command organization. Artillery war capability and effective employment is greatly influenced by modern command system, handling of tactical information flow, data procession, display on maps and encouragement of decision preparation.

Characteristics of fire support subsystem employment and capabilities:

— It can be employed in tactical operational situations as well as during crisis management;
— To operate it is necessary to have expert skills and intermediate user
— skill;
— Branch symbols are displayed on digital maps according to NATO requirements;
— Firing positions and sites, alternate sites and positions planning is possible;
— Program is capable to display maximum artillery effective range on digital maps;

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— With the help of computerized system it is possible to plan movements and maneuvers, to make calculations, display movements on digital maps;

— To make target planning is solved;

Display of planned and recognized stationary and mobile targets is possible and their distribution among artillery units participating in fire support is elaborated;

With the help of the program it is possible to select reconnaissance source for target acquisition and fire observation, to display reconnaissance capability and visibility;

Program prepares fire strike matrix, which can be printed out.

AIM OF DEVELOPMENT AND EMPLOYMENT:

Develop further present elements of command control system; Linking the command control system with "ARPAD" fie control system; Fitting command control system with GPS system; Enlarging command control system with developing new elements (engineering, NBC, air defense, air support, Electronic Warfare, logistics, MET. Service) and attach them to the system;

To establish hardware conditions for unit trial, accomplish unit trial with already finished computerized combat command and control elements.
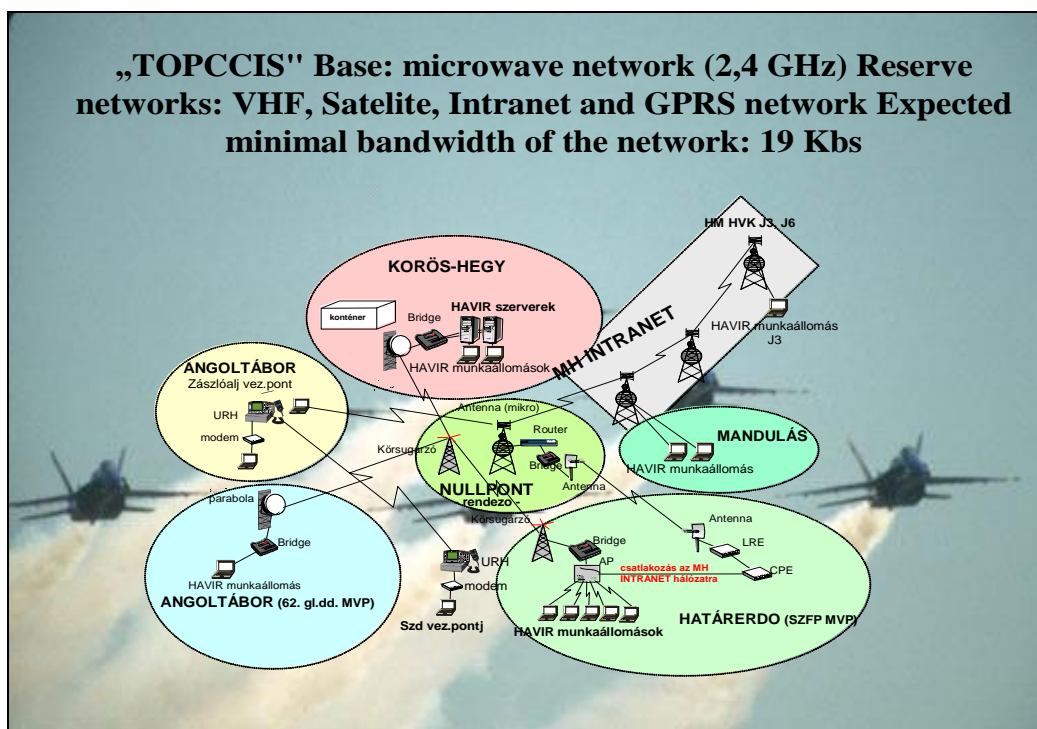

Fig.9. Information flow of TOPCCIS system deployed at "Bakony Srike 2003"
Exercise

XXI. Century operation planning and command control can only be attained with the assistance of modern "Computerized Tactical Command Control Information Systems". In armed forces of developed countries command control system development, testing, use in war and non-war situations have an important role. To plan and command

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tactical situations on 3D basis, quick transmit and processing map and text information, target data precise and timely procession, ranking of targets according to importance and their distribution among existing fire support sources transmission of fire requests and granting it in due time can be provided consolidated and reliably only with assistance of computerized network.

Experiences gained on exercises conducted already with TOPCCIS are encouraging and prove that beyond traditional planning and command of actual combat computerized tactical command is capable to provide quicker and more reliable information for the commander and staff. Traditional signal communication and information flow through tactical command control information system greatly augment and strengthen each other and make command and control more reliable.

Beyond education inside Hungarian Defense Forces it is necessary the sooner the better to train units and formations planned for out of country missions on use of command system and units planned for deployment have to be provided with necessary amount of satisfactory quality workstations integrated into "HAVIR" system.

Kulcsszavak: Vezetés és Irányítás, információs rendszer, képességek, összfegyvernemi (manőver) alrendszer, harc tervezés, vezetési elem, felderítő alrendszer, tűztámogató alrendszer, tűztámogatás, felderítő erők, század, zászlóalj, dandár és szárazföldi haderő szintű tervezés

Keywords: Command and Control, information system, capabilities, all arms (maneuvering) sub system, combat planning, intelligence subsystem, fire support subsystem, fire support, intelligens forces, company, battalion, brigade and ground forces level planning

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AZ NKE HHK TUDOMÁNYOS FOLYÓIRATA

HADMŰVÉSZET

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