

**National University of Public Service
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**The support aspects of command and control
in special operations forces**

Authorial description of PhD dissertation

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Exposition of the scientific challenge

Loosing the two-pole rule of the world, new type threats and challenges, hybrid warfare' tactic, technics and procedures appeared. The NATO¹ and EU's² nations recognized the importance and topicality of national special operations forces' (SOF) development.

Hungary has significant challenges with regards of own special operations forces' development. The international examples for command and control (C2) systems of SOF are not fully applicable for national systems so Hungary needs to define its own way to find a viable model of the SOF C2 and SOF strategy for development.

The primary goal of my scientific research is to create a viable hungarian SOF (HUNSOF) C2 system explaining the international and national doctrinal background, analysing the NATO nations' examples, define the communications and information systems' main operational requirements and provide solutions for seamless connectivity in radio communications and information systems supporting NATO and EU doctrines.

Hypotheses

Through the scientific researches I provided an overall picture of the HUNSOF C2's applicability and defined the perspective commanding system's basic requirements associated with technical assumptions. To reach my goals here are my hypotheses for verifications:

¹ NATO – North Atlantic Treaty Organizations

² EU – European Union

1. The development of HUNSOF C2 integrated into conventional forces C2 system can support reaching the goals of national defence policy and military decision making processes.
2. There is a need to concentration of SOF capability panels in tactical and operational level. This goal can be reachable by creating a new military organization and in the same timewindow, restructuring the HUNSOF C2 as framework system.
3. The technological support of HUNSOF C2 can be provided by the conventional forces' communications and information system (CIS) but with novel developments.
4. The HUNSOF CIS can be feasible by the basis of conventional forces technical devices.
5. Designing the information system, planners can utilise both radio-based communications and wire-based networks using data streams. The addressing, datasharing and data distribution of the complex system based on internet protocol (IP) can be extended into electronical devices used by conventional forces.
6. The civilian infocommunications systems' developments are to turn up into military CIS as well with a little time delay so a special type of outlook can be reachable in the short term future military developments.

Aims of scientific research

After extended scientific researchs I draw up my aims as follows:

1. Value and verify national SOF' reasons for existence, principals of organization and the opportunity of development through the NATO and national doctrines found in open sources
2. Specify the national SOF's processes for restructuring and developments and elaborate the HUN-SOF C2.
3. Specify the CIS requirements supporting HUN-SOF restructuring and developments, create the specific communications system for HUNSOOF, elaborate the minimum military requirements (MMR) tiering HUNSOOF CIS and define particular elements of those.
4. Examine the data sharing possibility and adaptation via the high frequency (HF) band particularly in using communications channels based internet protocols. Define the current and future technical applications which support the HUNSOOF operations, the restructuring processes and the developments.
5. Create a regiment-size unit's core information system specifying the roles and responsibilities of the active elements in network.

Methods for scientific research

During my scientific research I utilise primary and secondary research methods as follows:

1. Based on NATO and national doctrines, evaluate the international and national armies' roles in general, which the countries conducted in creation of their own SOF command and control systems.
2. Scrutinize some particular C2 systems with regards of special operations forces.
3. Compose the elements of C2 system in HUNSOF.
4. Examine the available CIS devices' processes with regards of core connectivity. Analyze the freshly built-up system's expected parameters, define the procedures of the CIS and specify the planned technical parameters.
5. Process the available technical documentations with regards of high frequency (HF) radiowave spreading and examine the IP-networks' technical parameters in HF data nets.
6. Examine the technical documentations for local area and wide area networks. Compose the roles and responsibilities of the active information domain elements shaping the HUNSOF local area core network as a whole and complete system.

The short description of the completed scientific researches and its conclusions

This PhD dissertation, which was created during my scientific researches, consists of 4 chapters.

In the first chapter, I processed the NATO Special Operations Headquarters guidances for shaping and designing command and control in SOF community. I

examined the NATO AJP 3.5 and the Hungarian Special Operations Forces doctrine, defined the dissimilarity and identity with regards of basic role of NATO SOF. I evaluated the USA³ and the particular leading European nations (Poland, Lithuania and Romania) SOF command and control system by historical outlook and compared them with the HUNSOFC2.

Conclusions:

1. The particular NATO and national doctrine show some differences by core tasks for SOF.
2. Examining the Hungarian, the USA and East-European SOFC2, Hungarian SOFC2 is slightly different from Poland, Lithuania and Romania and totally different from USA SOFC2.
3. The HUNSOFC2 needs to be fine-tuning all of the three (tactical, operational and strategic) levels. The restructuring needs to be commence in the tactical and operational level.

In the second chapter, processing the congruency theory I created the new version of HUNSOFC2 and defined its integration into the HUN conventional forces C2 system. I created the basic structure of the HUNSOFTactical level unit and defined the three-level-model of HUNSOFC2. I composed an intelligence, surveillance and reconnaissance unit's basic structure with definitions of its elements' role and responsibilities, which is vital in case of any SOF operations. I defined the HUNSOFC2 in state of emergency declared by Hungarian government

³ USA – United States of America

and constitution as well as NATO or EU-led foreign missions.

Conclusions:

1. The restructure of HUNSOF needs to be subordinated to the short and middle term ambition level in NATO/EU and the national defence planning with regards of the threats in our age (russian-ukrainen crisis, migration, Islamic State etc.)
2. The reasonable grouping of forces and resources can increase the operability of HUNSOF in all of the three levels of command. The effective HUNSOF C2 is depositary for Hungarian missions' successes.
3. Organizing the HUNSOF C2 elements into identical command facilitates the seamless information sharing between operation planners and decision makers for succesful operational activity.

In the third chapter, I planned and designed the HUNSOF CIS defining their roles and responsibilities on national and international trainings, NATO/EU missions and in the state of emergency declared by government. I composed the CIS MMR of HUNSOF C2.

Conclusions:

1. The need of specifying the MMR for the CIS' manpowers and resources is have to be integrated into conventional forces' identical systems. The mutually matched and fitted systems support the common success of the Hungarian interconnected core communications systems.

2. Core services are to provide common operational picture, targeting and own force tracking for SOF through radiofrequency channels.
3. The technical subsystem needs to be contained the surveillance/reconnaissance and the C2 systems, forces, resources and services.
4. In case of state of emergency, international trainings and operations, is obligatory to provide the convertibility of CIS by planning operational redundancy of electronical devices.

In the fourth chapter I composed the most important technical requirements for military radiocommunications systems. I confirmed the importance of high frequency communications in long range connectivity specifying the military alternate digital communications systems. I defined the automatic link establishment (ALE) and the near vertical incident skywave (NVIS) high frequency data connections' military applications by IP-based communications networks. I draw up the cognitive radios, the orthogonal frequency division multiplexing (OFDM) and adaptive antenna systems' applications in SOF operations. I appointed the directions of future developments for stationary wired networks, the very small aperture terminal (VSAT) usages by installing IPv4 and IPv6 networks. I composed the HUNSOF IP-network in both classified and unclassified relations.

Conclusions:

1. The adaptive processes in civilian infocommunications' applications need to be examined by the

- NATO and EU nations' standards in the frame of coherent radiocommunications systems' planning.
2. The need of military information systems' applications in both stationary and field manners requires innovative approach and the evolving of communications systems.
 3. The high frequency communications provide an alternate or substitute manner of satellite communications, with some constraints.
 4. The parallel connections in civilian transmission connections can be used in military applications as well as in military IP-based networks.
 5. The military IP-based information systems can be designed as model of civilian systems holding up the same functions. This military network designed for IPv4 is quite enough for addressing of the active elements of the HUNSOF information system.

Summary of scientific research

The present doctrinal background permits the developments of alliance's standards referred to Hungary. They provide principals for common approach even in legal aspects to special operations forces againsts terrorist and rebel forces. It also provides the possibility of quick reaction for special purpose units.

The HUNSOF C2 shaped and designed in this scientific research can be a milestone for improving capability in Hungarian Defence Forces. The HUNSOF capability improvement needs to be accelerated in frame of multinational training and operations.

The HUNSOF CIS is based on conventional forces core information system but due to faster operational tempo and high availability in SOF operations, it has pronounced differences as well. The basic requirements are validity-temporality-concielity so they direct us to utilise the newest technical solutions and a multi echelon operational dispersion with high redundancy, even in core system level as well.

The high level in organising the core information systems, multiechelon redundancy supports the national SOF units' C2.

The high frequency radiocommunications systems need to utilize IP-based network elements with enhanced modulations by optimizing the data channel bandwidth available.

The civilian developing processes in information systems must be appeared even in military communications core networks.

New scientific results

1. I defined the requirements of HUNSOF command and control system and created its viable model.
2. I defined the obligatory steps of HUNSOF capability development creating the task organization for a regiment-level organization.
3. I composed the MMR for HUNSOF information system and specify the network and subnetwork's core elements.
4. I defined the technical implementations of HUNSOF CIS elements by specifying the utilisation of ALE and NVIS in HF data channels.

5. I proved the development of IP-based data streams in HUNSOF core information system and defined the future role of OFDM in HUNSOF radiocommunications networks.
6. I composed the directions of near-future developments in military information system by addressing information sharing devices in data networks. I planned and designed the HUNSOF information system's subelements creating IPv4 and IPv6 addressing templates for higher command, command posts and subelements in the HUNSOF C2 network

Recommendations

1. I propose the BSc and MSc students to examine the planned and designed core information network described in my thesis, in frame of communications and information system exercises. The experiences need to be integrated into the system per sé.
2. I propose that the technical solutions be dedicated as a basis for future researches and developments. My thesis can be served as basis for new innovative researches.

Adaptability of the scientific researches

The results of my scientific researches can be adaptable by:

1. The Military Faculty (BSc, MSc and PhD levels) of National University of Public Service.
2. For the new scientific researches in network analysis for management and organization studies.
3. The system-wide comprehensive development of communications and information technology supporting the tactical operational and strategic levels of command and control.
4. The military and disaster management's high frequency radiocommunications procedures and operating modes in perspective planning, modeling and designing of the information systems.

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