NOWA Technika Wojskowa

SPECIAL ISSUE

Future Soldier®
EXHIBITION & CONFERENCE

The purpose of this article is to present the concept and a practical solution for a single soldier in the modern digitalized battlefield. Dismounted Soldier System Jasmine is a Teldat solution designed for teams of soldiers cooperating and fighting together in order to fulfil mission objectives. System delivers complete integration of solider, combat suit, equipment and command support system. Furthermore, it provides for a single soldier capabilities of exchanging operational information about location of friendly units, sending and receiving orders, reporting events, facilities, obstacles and so on. In summary, DSS Jasmine system raises safety of soldiers and allows commanders to gather information and react immediately when situation change during a mission progress.

PRACTICAL SOLUTION

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FOR INTEGRATION OF SINGLE SOLDIER EQUIPMENT WITH INFORMATION SYSTEM AT THE BATTLEFIELD

INTRODUCTION

Jasmine System is a network centric platform designed to build networks in IP (Internet Protocol) technology for mobile environment utilized at all levels of command chain. System secures all necessary capabilities for information technology required at stationary command posts, command vehicles, combat vehicles and even single soldiers. Jasmine system is produced in three versions:

- Shelter version – deployed in an electromagnetic proof container transported on a vehicle, dedicated for headquarters;
- Portable version – dedicated for field stationary command posts located in tents, or trenches, developed temporary for the duration of a mission;
- Onboard version – deployed in mobile command vehicles and single soldiers fighting at the tactical level.

Jasmine system architecture is modeled on the concept of NATO Network Enabled Capability (NNEC) NNEC imposed that Jasmine structure and information processing is based on nodes that provide services. These services are consistent with the concept of SOA (Services Oriented Architecture), reside inside software modules and render many functionalities at a user level. As a result, Jasmine system is very flexible, scalable and can be easily adjusted to user needs and requirements regardless of level of command, providing diversity of services at the same time.

Command Support System C3IS Jasmine consist of three dedicated products based on a C3IS Jasmine framework:

- Headquarter Management System C3IS Jasmine – designed to support planning and control of army actions and exchanging information on operational - brigade and upper level.
- Battlefield Management System C3IS Jasmine – designed to support planning and control of army actions and exchanging information on tactical level particularly on the combat vehicles.
- Dismounted Soldier System C3IS Jasmine – dedicated for a single soldier. This product allows sharing information from the top to bottom and ensures situation awareness on each command level. DSS gives opportunity to
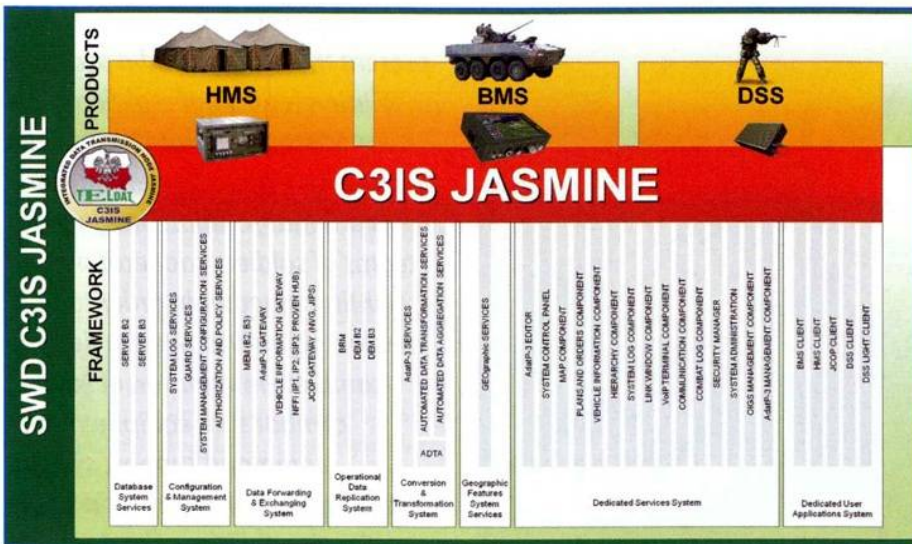
t C3IS *Jasmine* services and dedicated products.

take information from reconnaissance direct to commanders.

C3IS *Jasmine* is based on MIP (Multilateral Interoperability Program) database models such as C2IEDM (Command and Control Information Exchange Data Model) and JC3IEDM (Joint Consultation Command and Control Information Exchange Data Model). Other services can store and retrieve data from that database which acts as a common interfaces and increases interoperability between different standards and protocols. C3IS *Jasmine* supports automated transformation between MIP Block 2 and Block 3, operational data exchange via international standards such as NFFI (NATO Friendly Force Information), ADatP-3 (Allied Data Publication Number 3), NVG (NATO Vector Graphic), and DEM (MIP Data Exchange Mechanism). Furthermore, Battlefield Replication Mechanism (BRM) is a company protocol capable of replication of MIP compliant data over various means of communication like HF and VHF radios or satellite terminal, copper cable, optic fiber and others.

Jasmine system provides complete solution consisting of hardware and software specially adjusted for every command level.

SINGLE SOLDIER COMBAT SUIT COMPOSITION

The Combat Suit of DSS *Jasmine* system is divided into six subsystems:

- Data Processing Subsystem (DPS) – a main device of DPS is a Tactical Terminal which is used by DSS C3IS Jasmine to make decision on battlefield is accordance with NNEC concept.
- Data Manipulation Subsystem (IMS) – allows data input to system by a single soldier. IMS consists of HID manipulator, LCD touch screen and laser aiming device. This subsystem provides easy way for the soldier to manipulate operational information in a hard battlefield environment.
- Sensors Management Subsystem (SMS) – dedicated to connect various sensors such as LCD (Light Chemical Detector), GPS (Global Position-

ing System), inertial navigation and video camera. SMS controls sensors which automatically provide information for soldier system and after processing in DPS disseminates to other soldiers and commanders.

- Power Management Subsystem (PMS) – supplies power to soldier equipment and provides constant working over six hours on each battery. Soldier can plug two batteries at the same time and exchange battery without need of turning off any devices.
- Information Presentation Subsystem – (IPS) shows information on various displays such as HMD (Helmed Mounted Display) or LCD 6" panel. Soldier uses mainly HMD during an action because this view does not involve his hands and it very easily gives access to manipulate operational data. However, with more comfortable view a soldier can be provided on the LCD panel that usually is used after a mission.
- Data Distribution Subsystem (DDS) – this is a significant subsystem which allows soldier communicate with commanders and other soldiers. Equipment that is used in SDS is a personal radio with IP (Internet Protocol) capabilities.

All equipments from six subsystems are deployed on one soldier and weight is below two kilograms. Moreover, not every subsystem is necessary to be used at the same time. DSS *Jasmine* system can be deployed in three variants:

t Example of soldier's combat suit.

- First variant is when we get Tactic Terminal version 4, two manipulators, GPS, power supply, two displays and personal radio like Spearnet from ITT.
- Second variant consist of a Tactical Terminal PDA and a personal radio with GPS included.
- Third variant is when soldier carries only a personal radio with GPS included.

These variants can work together and can be mixed in one squad. That approach gives opportunity to reduce cost of equipment and training efforts.

Normally on a battlefield a compliance a dismounted soldier leader carries version 1 while other member of his section are equipped with version 3 and optionally version 2. All soldiers can maintain voice communication during combat mission. Moreover soldiers' leader can monitor subordinates movement, receive orders and report back to superior unit about current mission progress and events. Section members equipped with PDA have similar capabilities but with some limitations.

DSS *Jasmine* is well prepared to integrate new devices with equipment that already is carried by a soldier. Nowadays main focus is to improve collaboration between combat identification devices in Polish Armed Forces.

SINGLE SOLDIER COMMAND SUPPORT SYSTEM

DSS C3IS *Jasmine* System is a set of software services selected from C3IS *Jasmine* framework. Main services are listed below:

- Application server SRV.B3 implementing MIP B3 JC3IEDM database model for operational data storage;
- Battlefield Replication Mechanism (BRM) for operational data exchange between data distribution points (command posts, vehicles, soldiers);
- NFFI gateway providing information to and from Friendly Force Tracking Systems;
- DSS Client application dedicated for combat suit tactical terminal;
- DSS Light Client application dedicated for PDA tactical terminal.

Soldier is equipped with a personal radio which provides voice and data communication between crew members.

In order to replicate data using unstable radio means of communication a specialized replication mechanism was invented by Teldat company. BRM is able to effectively and efficiently exchange JC3IEDM compliant data over a radio communication media. Moreover it provides integration with BMS *Jasmine* system. Therefore operational data can be shared between combat vehicles and sections.

DSS C3IS *Jasmine* software system currently supports interoperability with NFFI IP1, IP2 and SIP3 standards. DSS *Jasmine* system can directly receive FFT tracks from force tracking systems of other nations as long as IP connection is provided. Alternatively, on BMS level data can be transformed
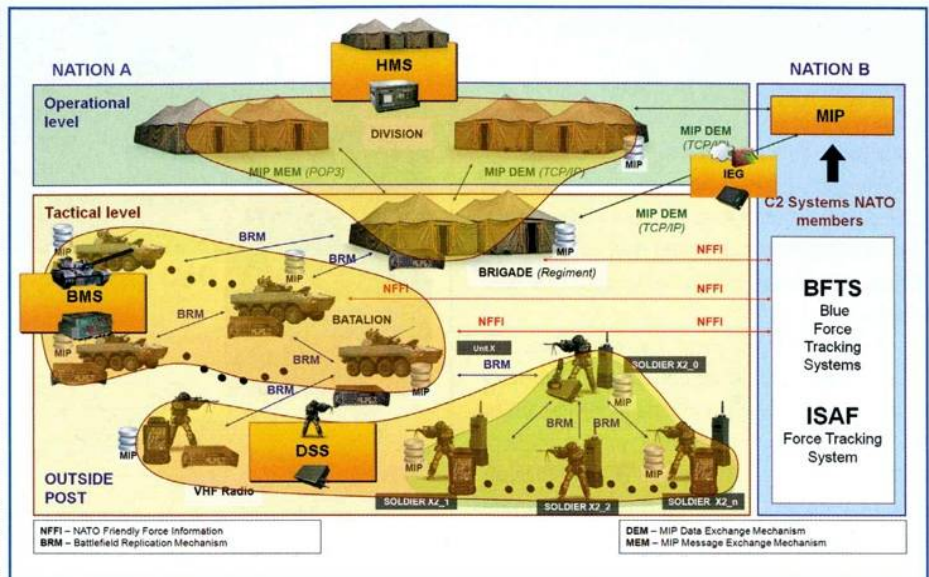
t C3IS *Jasmine* data flow, interoperability and product scopes.
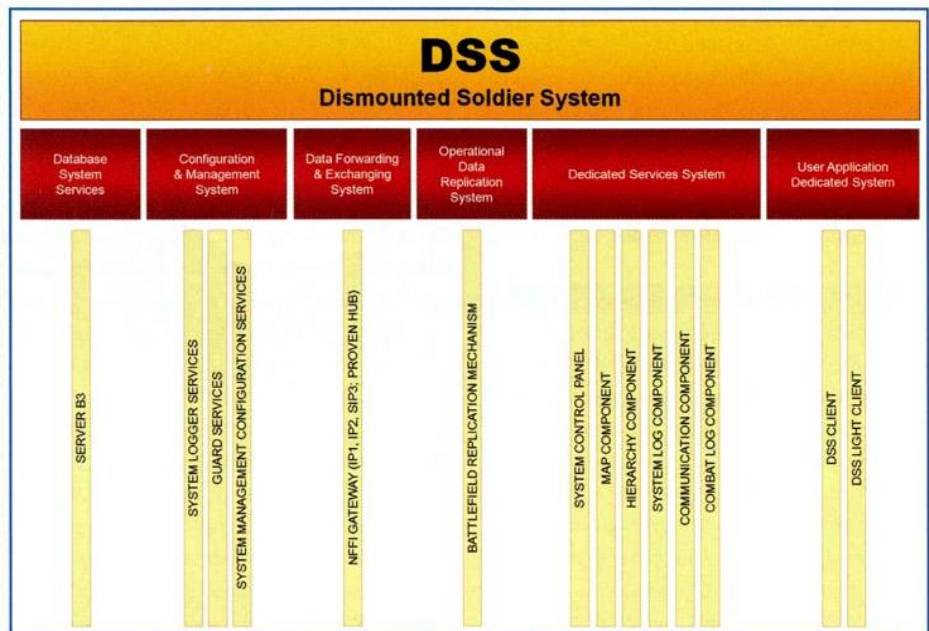
t DSS C3IS *Jasmine* services.
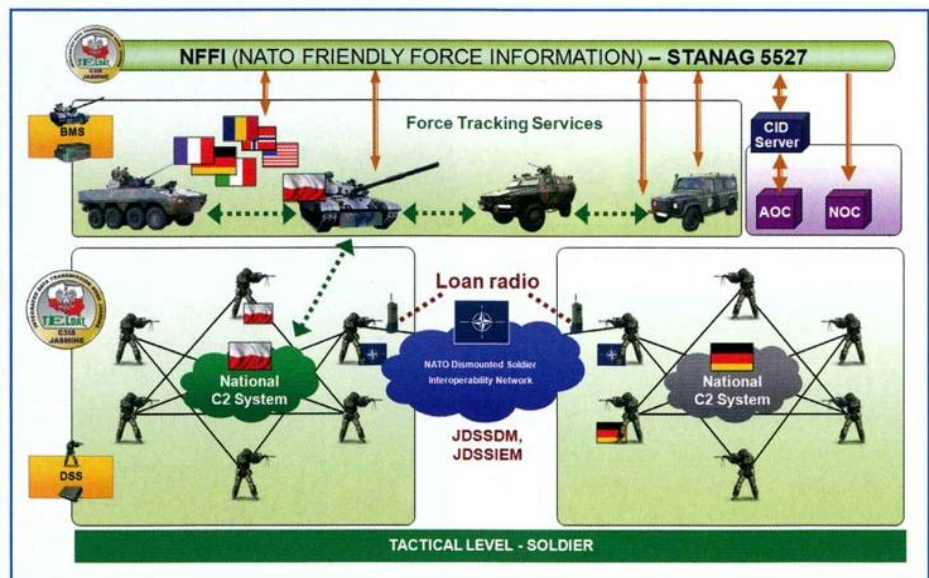
t Diagram of DSS system interoperability.

from NFFI to JC3IEDM and send to DSS *Jasmine* via BRM protocol.

Because C3IS *Jasmine* framework has a modular construction it is both flexible and extensible at the same time. As a result, once new interoperability standard is developed a new service in C3IS *Jasmine* framework can be implemented. Therefore, Teldat is monitoring national and international enterprises in order to support up to date interoperability.

Nowadays, NATO Land Capability Group 1 – Dismounted Soldier introduced JDSSDM (Joint Dismounted Soldier System Data Model) as a subset of JC3IEDM and is currently working on Data Distribution Service. As soon as DDS mechanism is agreed and specified Teldat is going to provide a service that is able to exchange operational data with NATO DSS systems.

Dismounted soldier can be equipped with PDA or combat suit tactical terminal. Because of specific terminal technical capabilities two different client application were developed (DSS Client, DSS Light Client) in order to satisfy user needs. Above is presented a screenshot showing current position of friendly units on a battlefield and text messaging between two individuals. On the left side of the picture one can notice information from Soldier Information Service about state of soldier's equipment.

SOLUTION CAPABILITIES AND FUNCTIONS

DSS *Jasmine* system was designed to provide following capabilities and functions that are inevitable to secure safety and increase effectiveness of soldiers:
■ Ensuring common operational picture on a level of a single soldier;

System is able to provide dismounted soldier leader with operational data from higher command level, and present them on the map. Therefore leader is aware of friendly forces such as armored vehicle, own squad members and other squads current locations.
■ Automated aggregation of subordinate dismounted soldiers;

Location reports regarding all soldiers within a section can be automatically gathered and aggregated at the dismounted soldier leader or superior vehicle level. Afterwards, that information can be send to other units at the adjusted time period making the best usage of radio bandwidth.
■ Combat suit constant monitoring;

All equipment included in combat suit is constantly being monitored and all information about current state and capabilities are displayed in client application. As a result soldier has all information about its equipment gathered in one place without need to check it manually.
■ Providing voice communication;

Personal radio provides VoIP communication for section members. They can communicate with each other during combat mission all the time.
■ Video transfer;

Soldier that are equipped with video camera mounted on their helmet can transfer life video to

other soldiers or commanders in armoured vehicles. This service is performed on demand by a receiver.
■ Mission planning;

A deployment version number 1 of DSS *Jasmine* system allows soldier to receive mission plans and orders prepared in accordance with STANAG 2014. Situation is displayed on the screen where, for example, mission objectives, planed actions or location of medical and extraction points are presented.
■ Instant messaging;

Dismounted soldier leaders and soldiers equipped with PDA can send and receive text messages. Soldiers can type messages themselves or use predefined ones. Moreover, text reports can be sent to an armored vehicle and automatically synthesised by onboard communication system on VoIP terminals.
■ Battlefield situation reporting;

During combat action soldier carrying tactical terminal can instantly report spotted enemies, obstacles, events etc., that are automatically disseminated to superior commanders for analysis and allows them to perform a suitable action.

t Dedicated client applications.

SUMMARY

Dismounted Soldier System *Jasmine* is a company solution for a single soldier. This solution is integrated with *Jasmine* platform (hardware) as well as C3IS *Jasmine* system (software). Furthermore, DSS *Jasmine* allows to exchange operational information with other systems such as BMS *Jasmine* and NATO nation tactical systems. Therefore it is not a separate product but a supplement of a Teldat's vision of a digitalized battlefield operations.

Our solution was successfully tested during Coalition Warrior Interoperability Exercises 2010 in the operational scenario. DSS C3IS Jasmine interoperability and adjustment of client application was our main priority to test during the exercise. ■

Photos: Teldat, Michał Sitarski.

t DSS Client application screenshot.