

# D-LBO: DIGITALISATION OF GERMAN'S GROUND FORCES' OPERATIONS

## AND WHY IT MATTERS FOR THE NETHERLANDS

Mr. Theo Sierksma (Rohde & Schwarz Benelux  
– RSBNL) and Mr. Michael Rother (Rohde &  
Schwarz GmbH)

On May 17, 2018 the Defense Ministers of the Netherlands and Germany met in Lohheide in Lower Saxony (Germany), the base of the mixed Tank Battalion 414. Both Ministers of Defense signed a Letter of Intent to join efforts in digitalization of their land forces for gapless communication and interoperability. Over the last few months, there is a lot of attention in the Dutch Ministry of Defense organization for the program FOXTROT. Recently the program proposal has been approved (see INTERCOM 46.3-2017) and the organization is currently working on the composition of the program team. This team will also include a liaison officer with the German program D-LBO, before known as MoTaKo (Mobile Taktische Kommunikation). Although the digitization of mobile tactical communication is a huge program in Germany, in terms of material and financial size, there are still lots of decisions pending. This article will inform about the program MoTaKo and also indicate the coherence and similarities with the Netherlands program FOXTROT. →

### Why is an update needed?

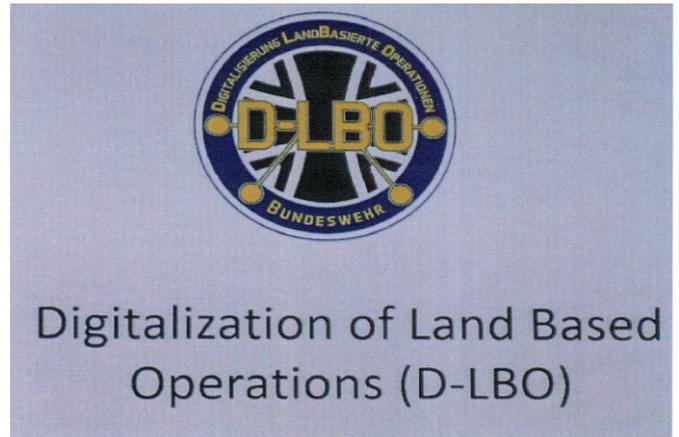
Most tactical radio's in the German Bundeswehr are from early 90s (mostly unencrypted and analog). The current means are obsolete and no longer suited to enable modern communication on the tactical mobile battlefield: difficult to maintain, no simultaneously voice and data, limited bandwidth, no IP capabilities, not multi-national interoperable, etc.

In addition, various German military units have been integrated into multinational forces commands in the recent years, but not backed by adequate procurements/solutions to enable robust military operations in this joint and combined way. Below are some Dutch/German examples:

- GE Sea battalion to cooperate with NL Corps Marines on JSS Karel Doorman
- NL 11 Air Mobile Brigade (without their helicopters) directly assigned to GE Division Schnelle Kräfte (DSK)
- Deep crossover integration of one NL armor company in the GE Tank Battalion 414 under command of NL 43 Mech-Brig under GE 1st Pz Division
- GE SAM-Group 61 subordinated to NL DGLC (Project APOLLO)

### What does the project include?

The German Armed Forces (= Bundeswehr) made two interconnected concepts and capability requirements for two major procurement projects: MoTaKo and MoTIV, nowadays combined as joint project D-LBO (Digitalization - Land Based Operations).



**MoTaKo:** Mobile Taktische Kommunikation = all-IP tactical secure and trusted communication layer with tailored routing based on modern HF/VHF/UHF Software Defined Radios including hybrid channels like Satcom OTM or Tetra/LTE.

**MoTIV:** Mobile Taktische Informationsversorgung = tactical service layer (e.g. applications and services like Blue Force Tracking, GIS, Messaging, BMS, special military services) running on the MoTaKo managed and connected transport layer, robust but also connected to the IT-system of Bundeswehr on higher levels.

Both programs aim at providing all users from the command post to the soldier with the necessary information and services and to shape the future digital command of the German



Figure 1: The Roadmap of D-LBO

Armed Forces with interoperability to allied partners.

Digitalization of the tactical capabilities of German Armed Forces has now top priority in the overall change agenda. The roadmap to enable the Bundeswehr to sustain in a digital conflict consists of over (currently) 10 elements, but this article focusses only on D-LBO including Services for Mobile Elements and the Security and Management services (see figure 1).

MoTaKo will be procured out of market-ready respective available products (MOTS/COTS) and solutions under a defined overarching architecture not yet finally approved.

For MoTIV, the defining requirements document is not yet approved. But it is known from public statements that all this will be connected to the IT security and management & control services (see figure 1), designed bottom-up to create a robust performant tactical network, supported by commercial communication means like Tetra and LTE in a hybrid approach.

These two programs will form the digital lifelines of the Bundeswehr. Secure, up-to-date communications solutions

play a crucial role in assuring effective command and control in combat operations. Seamless data transfer within the physical boundaries of civil broadband standards on one end and robust EW hardened heavy encrypted radio waveforms at the other end of the capability spectrum.

In addition to the MoTaKo program for the transmission of information, a synchronized system architecture and tailored design of MoTIV is absolutely necessary, in order to tackle the platforms only once to retrofit and integrate the hardware and to make the management systems compatible.

It is essential to see D-LBO elements as systems for the future - vehicles, aircrafts, command posts, infantrymen as subsystems or components of a 'system of systems' - or otherwise the whole system for the digitization of the land forces.

To fill the most urgent gaps, some preliminary procurements are planned to overcome obsolescence like with the vintage SEM V/UHF radios and the old TETRAPOL networks. There is also a need to equip the most modern battle platforms like the IFV Puma and the APC Boxer and the dismounted infantry with new Software Defined Radios

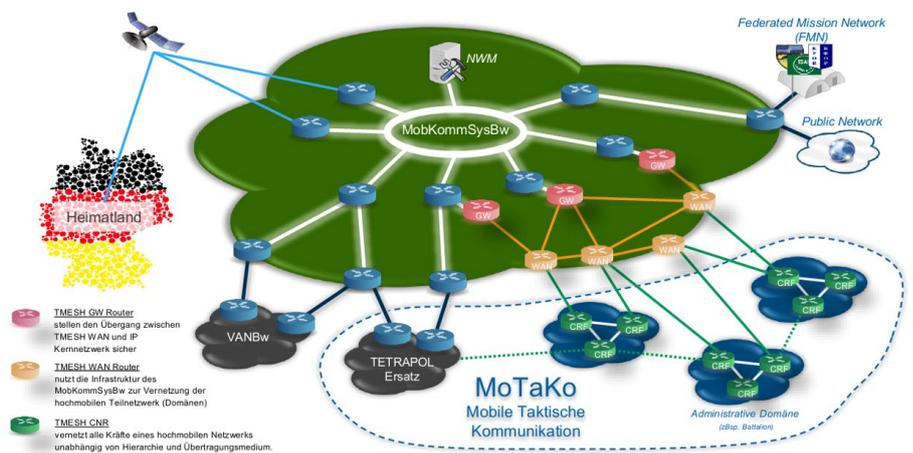


Figure 3: MKK MoTaKo

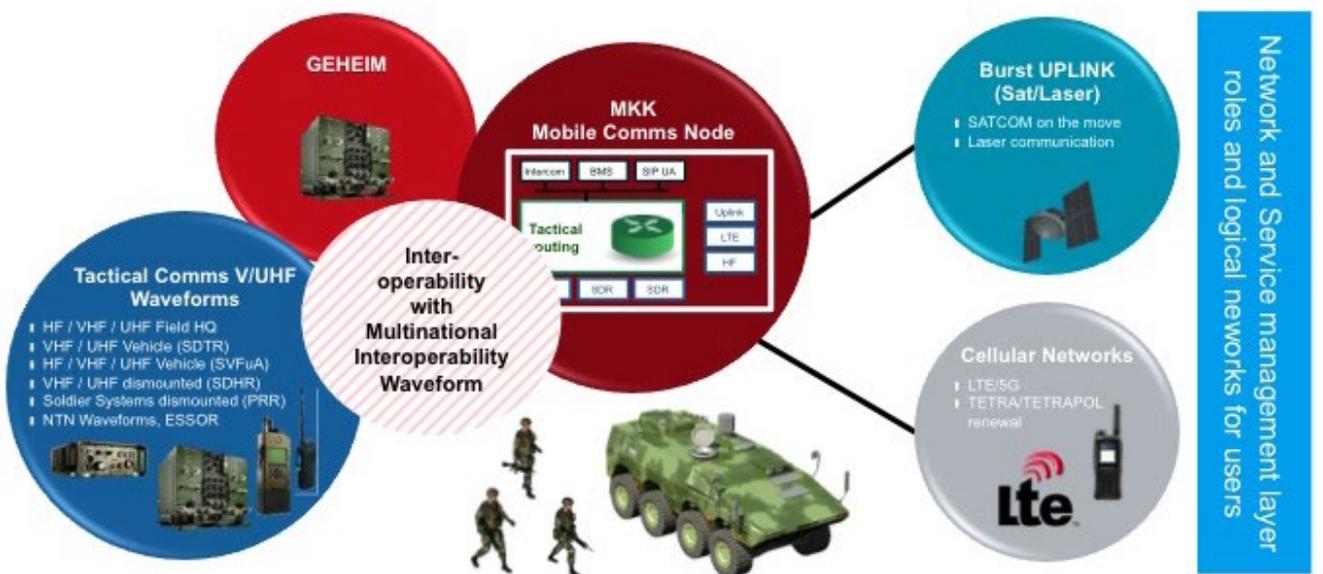


Figure 2: The five pillars of MoTaKo

ahead of a comprehensive D-LBO procurement in brigade-sized scale.

Digitalization is much more than hardware and integration. This is why German Army Command wishes a parallel concept development/experimentation setup together with some industrial players to find out how to integrate these new capabilities in the military command process. To refine this approach, international government-to-government cooperation are also considered.

### MoTaKo in a nutshell

The MoTaKo program probably includes around 90.000 wireless devices into 350 different vehicle types. Due to this huge amount of different platforms and unit structures, MoTaKo approach envisions for a stepwise approach for definition, procurement, integration of MoTaKo equipment, called 'Kräfte-dispositiv', but based on existing platforms. This makes it quite different from other European programs like the French Contact.

A Kräftedispositiv is a Task Force/Brigade-like contingent with all organic elements plus pre-planned logistic and support elements with all troops/platforms to be upgraded in one 'run'.

The design, realization and equipment of MoTaKo is planned from 2018 till 2035 and is divided into:

- from 2018: Procurement and integration of SVFuA in command vehicles of the type PUMA and BOXER and the other preliminary actions as stated above.
- until 2023 and after experimentation phase: Realization of 1st 'Kräftedispositiv', to be extended to a full digital division until 2027 as committed to the NATO.

Currently, Bundeswehr plans to define eight (8) Task Forces to be equipped between 2023 - 2035.

MoTaKo shall offer an all IP-based hybrid communication layer for the 'last mile/first mile' in the tactical domain (on foot, dismounted, vehicles, semi-static and static command posts) with access to own and worldwide communication means. The new infrastructure, created by MoTaKo, consists of a mix of means/resources, because there is not one solution for all operational requirements.

Looking down on the tactical level, there are five conceptual pillars of MoTaKo (see figure 2). The technical bearers of communication in MoTaKo are SFVuA (with Deutsches GEHEIM as classification) for V/UHF and HF, tactical radio (HF, V/UHF), COTS trunked radio (TETRA, 3G/4G/LTE) and Satcom – all connected with tailored and tactical smart routing capabilities plus an integrated role and network management.

MoTaKo initially planned to use a generic vehicle concept with routers to interconnect all kinds of connections. GE MoD and industry found out that front-level smart routing systems will not

need specific vehicles and could instead act as nodes on all levels with their radios and interconnections (see figure 3):

- Tactical military radios in fighting vehicles including plug-ins with hybrid communication devices
- Trunked and cellular radios in non-tactical fighting vehicles and non-armored vehicles, to be extended with tactical handhelds in docking stations with amplifiers/boosters



### SVFuA is a corner stone

Already under contract and defined as important pillar for the MoTaKo project is the software defined radio (SDR) SVFuA. The radio is the result of cooperation of industry, consultants and procurement office BAaINBw since the last decade (see figure 4). SVFuA is the first European SCA based SDR system to successfully port own national or old legacy as well as third-party waveforms. It is also the first radio system worldwide able to port non-native waveforms while protecting the intellectual property rights and the overall sovereignty of both the platform and the waveform suppliers.

In 2009, the German company Rohde & Schwarz was given responsibility for the overall design as well as for developing a prototype base unit and proving that it could be series produced. Rohde & Schwarz drew on its in-house cryptology development of R&S SIT as a trusted key national technology supplier and with its waveform development environment.

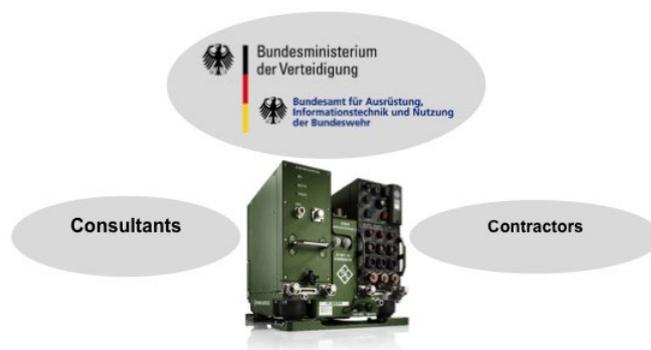


Figure 4: Consortium of industry SVFuA

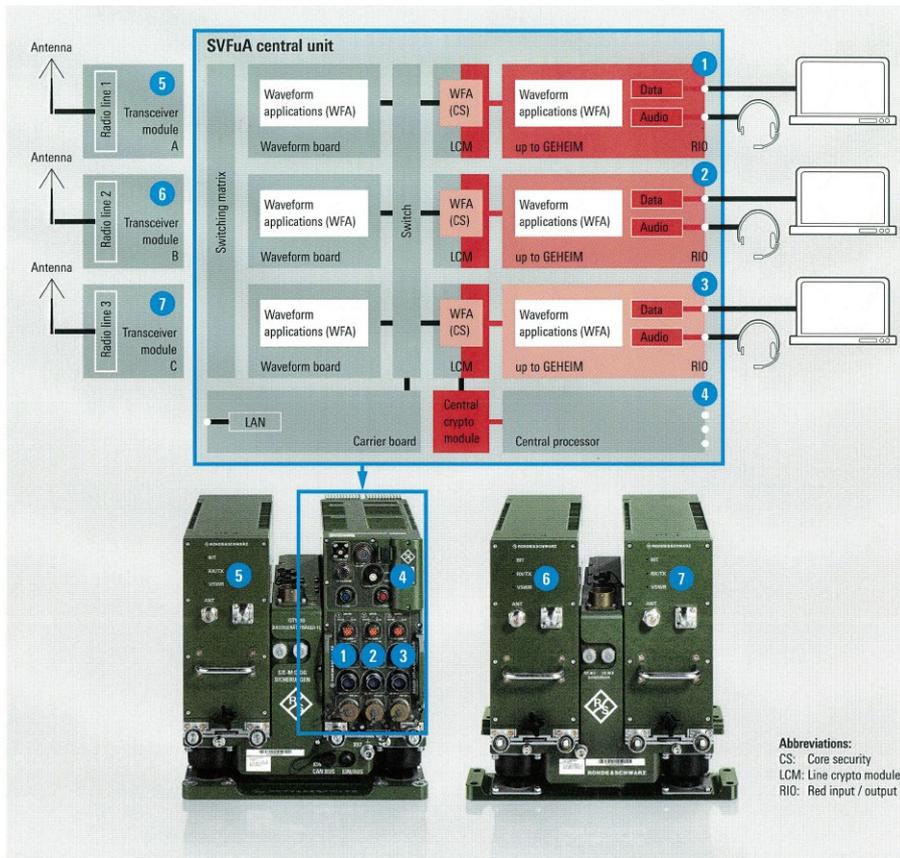


Figure 5: Security and SVFuA

In 2016, the Federal Office for Information Security (BSI) confirmed that the requirements for certification at the classification level of German SECRET had been met. Certification in line with the internationally recognized Software Communications Architecture (SCA) standard for SDR radio systems was a prerequisite for customer acceptance and also an essential precondition for certification up to the NATO classification level NATO SECRET.

As a radio system from two (or three) physical to up to four (or six) logical radio channels, SVFuA is able to support multiple independent levels of security (MILS), see figure 5. Mid-2017 Rohde & Schwarz has been awarded a contract from the German Federal Ministry of Defense (BMVg) to equip initially 50 command vehicles with SVFuA. Initially 23x SPz PUMA infantry fighting vehicles (IFV) and 27x GTK BOXER armored transport vehicles (ATV) – will be equipped including all test and training ecosystem and

the waveform application development kit. Rohde & Schwarz will produce and deliver the overall SVFuA system by 2020.

As explained above, D-LBO requires the integration into the whole installed base of platforms of the Bundeswehr with all specific requirements and capabilities. Therefore the German companies Rheinmetall and Rohde & Schwarz decided to join their capabilities and competences and signed an agreement for a joint venture company. In this, Rheinmetall will be responsible for the command systems, the cross-functional operator interface and the complete vehicle integration process. Rohde & Schwarz is in charge of the complete architecture, including IT and cyber security as well as the IP-based system solution for robust, military voice and data transmission, including incorporation of components and solutions from other contractors. The contracted waveforms in the SVFuA-series contract are:

- Selected legacy waveforms from the installed base/obsolete radios (SEM, HF MAHRS/TIGER, HQ I/II, Fixed

Frequency Standards)

- National Tactical Network waveform (NTN) with narrow and wideband modes to be further elaborated in the future.
- German SECRET and Restricted

In the near future the following waveforms are foreseen: UHF Satcom, BGAN, Multinational Interoperability Waveform and SATURN.

Since the radio system was developed in line with the SCA standard, it is possible to port current and future national and international waveforms onto the radio system as long as these waveforms also meet the requirements set out in the SCA standard.

Non-SCA waveforms can also be ported to the SVFuA platform (for example SEM93), depending on the original platform. With this unique feature, using a mixed equipment is possible where a full new procurement of platforms and radios is not possible or intended.

The SVFuA gives the German Armed Forces all the tools needed to create and especially protect information superiority. It also ensures interfaces with allies during joint missions and for collective defense.

With the acquisition of the SVFuA, the German Armed Forces is taking the first step in modernizing its tactical communications within the framework of the



Figure 6: SVFuA (2-channel)

MoTaKo program and acts as an enabling element to bring D-LBO into operational mode.

**Is FOXTROT a similar program?**

Germany is not unique with a program like D-LBO/MoTaKo, because similar programs will start or have been started in several western European countries:

- United Kingdom - Morpheus
- Norway – MiMe
- France – Contact
- Netherlands - FOXTROT



In the Netherlands Armed Forces many budget cuts over the last 10 – 15 years also led to aging of the IT-infrastructure and many issues with (inter-)national interoperability.

In the Netherlands, for many years the tactical radios are marked for replacement. Originally there was one program for replacing the current VHF and HF tactical radio systems. These radios are mainly used in the Operational Command Land For-

ces (CLAS) and have been operational since the early 1990s. Until 2010 this project was called Replacement VHF/HF Radio, but the project name was changed in 2012 into Replacement Radio, this time with a defense wide scope.

Over the last months the Netherlands MoD has been working on the program called FOXTROT, which will be responsible for the renewal of the IT-infrastructure in the mobile domain, both communication and information systems.

FOXTROT is the ‘bridge’ between the programs GrIT (deployed domain) and VOSS (dismounted on foot domain), see figure 7.

The program FOXTROT will provide an architecture and a roadmap and aims to develop and realize the IT infrastructure for use in the entire mobile and parts of the dismounted domain. The program will comprise a mix of civil and military means and is divided in subprojects, which include:

- Tactical Wireless Connectivity (TWC)
- Satellite capacity
- Encryption
- Platform integration

(More information on this program see: INTERCOM 46.3/2017)

**Cohesion Bundeswehr and NL Armed Forces**

There is a large degree of similarity between the German program D-LBO and the Netherlands program FOXTROT.

The biggest difference - except for size and budget- is the



Figure 7: FOXTROT as bridge



**“The key to success will be a technical and tactical collaboration with open architecture and interfaces.”**

scope of the programs. The German program D-LBO contains the domains deployed up to and including dismounted on foot, while the scope of FOXTROT only includes the mobile domain. Within this domain both nations strive for an IT infrastructure that is capable of processing current and future information and foresees in interoperability (joint and coalition) and they apply more or less the same project approach.

The political stated Letter of Intent for cooperation between the two nations/ programs might boost amongst others the interoperability issue, especially in the situation of integrated military units, e.g. 1st Pz Division/43 MechBrig.

In this integrated military organization the SVFuA (as SDR) offers simultaneously use of multiple waveforms with a different (international) classification, e.g. German GEHEIM, NATO Secret, and for example an European

interoperability waveform. The key to success will be a technical and tactical collaboration with open architecture and interfaces, because a pure product monoculture will not lead to the desired effects. Collaboration is also possible in the area of innovation. The NL MoD aims to stimulate innovation and interoperable solutions for wireless connectivity in the mobile domain.

Within the D-LBO project the GE Army / BAANBw together with industry, is also looking for concept development and could use the experiences and the application skills already existing in the Dutch Forces. The results of each (or combined) approach could align materiel development and procurement for both countries. In times where interoperability is key, exchange between partners begins at the roots.

### Finally

This article has taken the reader ‘across the border’ where the Bundeswehr program MoTaKo under the new umbrella of D-LBO started in Germany. This program is - albeit on a larger scale and budget – in many ways comparable to the FOXTROT program in the Netherlands.

There are several parallels to draw between the two programs, in particular the renewal of the IT-infrastructure in the mobile tactical domain and mix of transmission means, all connected by joint waveforms within the physical possibilities.

GE/NL military units integrated into multinational forces commands should benefit from this and be enabled to conduct robust military operations in a joint and combined way. 