## AFCEA 2025 | JOINT PRESENTATION | F14



Enabling Better and Faster Decision-Making in a Challenging Environment at All Levels from Tactical to Operational



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# **Preface**

Russia's war of aggression, with its regional and global repercussions, as well as the multiple global crises that exist in parallel, will determine the security policy environment in the coming years.

Systemic competition between major and regional powers is becoming increasingly important, also against the backdrop of differing value systems and lifestyles. The resulting weakening of the rules-based international order represents the most massive change in the global security order.

To avoid becoming a pawn or bargaining chip for major powers, Europe must take joint precautions to ensure an appropriate response should the worst happen.

Currently, conflicts are primarily instigated, and fought, in cyberspace, but it is to be expected that warfare with conventional means will return to the forefront.

#### "Interoperability in operations — a challenge for command support"

Given NATO's long history and numerous joint exercises, interoperability should no longer be an issue today, but it still is.

The military conflict between Ukraine and Russia has called into question previously assumed military certainties.

In this conflict, for example, localization and navigation, which were considered solved problems in the age of global satellite systems like GPS, suddenly become a major challenge again.

Massively deployed cheap drones pose a serious threat to soldiers as well as expensive, complex operational systems.

Technological progress has produced capabilities that few would have dared to imagine years ago.

The increasing speed between reconnaissance and effect has massive implications for CONOPS, camouflage, and mobility, which must be rethought.

This requires organizational structures and processes to be adapted. New concepts regarding the type and speed of procurement, as well as their implementation, are just as necessary as new approaches to training on increasingly complex systems and logistical adaptation to changing circumstances.

In Part 1 of our brochure, we briefly discuss the current and expected future challenges.

In Part 2, we present solutions that we have compiled together with partner companies and that can help address current and future challenges.

We hope that the information we have put together in this brochure will be useful to you in your work.

Norbert Frank griffity defense

## AFCEA 2024 Joint Presentation, Stand F14 by griffity defense

## 1. The world has changed and will continue to do so

## **1.1. Global Trends and Developments**

In recent years, crises and wars have continued to increase in both number and intensity. According to the NGO ACLED (Armed Conflict Location & Event Data), global conflicts have almost doubled in the past five years. The Heidelberg Institute for International Conflict Research (HIIK) also reports a persistently high number of violent conflicts and an increase in the number of victims.



As is to be feared, geopolitical tensions are rising worldwide, and rivalry between major powers continues to intensify. Even previously peaceful democratic societies are experiencing polarization, with the risk of violent conflict. Autocratic regimes are emerging and striving to expand their power, even beyond their borders.

Africa remains a continent with many conflicts; South Sudan is once again threatened by civil war, the armed conflict in eastern Congo has claimed many lives since the beginning of the year, and Ethiopia's northern province of Tigray was recently shaken by violence again.

Syria is not finding peace, and violence between the new rulers and the allies of former dictator Assad has escalated again.

Although a ceasefire was agreed between Israel and Hamas in January 2025, no agreement could be reached on an extension and the fighting continues.

With the election of the new US administration, a virtually tectonic shift in the US-Europe-Russia-China axes has taken place. Instead of a rules-based security architecture, the law of the strongest is increasingly taking center stage, and existing alliances are threatening to drift apart.

In addition, the threat from non-state actors remains. Germany and Europe remain the focus of Islamist groups. The planning of attacks against the Taylor Swift concerts in Vienna in 2024, the knife attacks in Solingen and Mannheim, and the use of vehicles as weapons, as in Magdeburg, further demonstrate that the radicalization of perpetrators continues to increase and is facilitated by social media platforms.

## 1.2. Complex Threat in Europe and Germany

The relationship between the EU and Russia has fundamentally changed since Russia's war of aggression against Ukraine. Implicit but unequivocal nuclear threats have also been made against Europe. As part of its power struggle, Russia will continue to threaten Europe not only militarily but also provoke and challenge Europe with various actions in a wide variety of fields, and attempt to destabilize the European Union and its environment. This includes attacks in cyberspace as well as attempts to disrupt or destroy infrastructure and supply chains.



This also means that the security situation in Germany has become more severe:

- The threat of cyberattacks on government institutions and companies has increased. According to the Federal Office for Information Security (BSI), there were over 180,000 reported cyberattacks in 2023; the financial sector, healthcare institutions, and the public sector were most affected (Wirtschaftsmagazin, January 16, 2025).
- Targeted disinformation fuels hate speech and polarization in society.
- Critical infrastructures are increasingly exposed to acts of sabotage (e.g. damaged submarine cables in the Baltic Sea).

All of these are characteristics of hybrid warfare. The attacker not only wants to cause damage, but also to influence/manipulate public opinion and destabilize societies. The attacks are not carried out openly, but anonymously and, if necessary, denied. Defending against them is difficult because there is no clear attack or attacker. So, are we still at peace or are we already at war?

This complex threat situation raises many acute questions for Western states, and there will be no easy answers. They are struggling particularly because a large part of the Western community has long struggled to perceive Russia as a genuine security problem for the entire Euro-Atlantic region. As a result, the European states and their most important defense alliance, NATO, have found themselves in a situation in which they have been virtually driven by events since the start of the Russian war of aggression on Ukraine, which violates international law.

The gaps in Western defense capabilities have become obvious, especially the lack of equipment, strategic thinking and a basic understanding of Russian objectives in Europe. The Euro-Atlantic community cannot escape the logic of the new Cold War; Russia and the European states share a continent, and their fates were closely linked even in the days of the Iron Curtain. Russia remains a threat despite – or rather because of – its economic and political weakening.

Especially at the international level, it is difficult to make Russia a true pariah. The coalition of those who condemn Russia's behavior comprises approximately 61 percent of the global economy, but only 16 percent of the global population, with China and India accounting for a large portion of the remaining 84 percent. The relationship between Western states and the Global South will therefore play a prominent role in the new "Cold War." And the West's narrative of being on the side of democracy and the rule of law will not be enough to win over the Global South to its point of view.

## 1.3. Changes – Meeting New Challenges

The ongoing disintegration of the US-European alliance presents the EU with difficult decisions. Compensating for a potential US withdrawal from the existing security architecture requires significant investments and a redefinition of EU defense.



The Ukraine war has challenged many previously held notions of successful military tactics and leadership. New technologies must be followed by new tactics. Drones, AI, and big data have also entered the battlefield, and the cost-to-kill ratio must be reassessed. Factors such as detectability, stealth, speed, and precision have reached new dimensions.

Electronic warfare is also experiencing a renaissance. GPS signal disruptions over the Baltic Sea occur repeatedly. For example, it took only 48 hours for German radio communications to collapse during the Quadriga exercise in Lithuania last year. The Russian and Belarusian armed forces have tested the effectiveness of their jamming measures. In Ukraine, for instance, the Russians cannot deploy 60 to 70 percent of their so-called first-person killer drones because their own jamming measures are so powerful.

What is certain is that we must learn to operate in environments with limited or no GPS connection. In eastern Ukraine, GPS is virtually non-existent, so we have to rely on other navigation methods.

#### 1.3.1. Automation of War / New CONOPS

The speed from reconnaissance to attacking targets has increased rapidly, now in the order of minutes. It has been demonstrated that locally distributed, light, mobile units are more survivable than large, stationary and slow-moving units. Well-trained, small units can stop heavier armored brigades and, in concert, contribute to their destruction.



#### **Example Ukraine:**

As a first step, the Ukrainian military focused on adapting its command and control systems and integrating unmanned systems with conventional weapons systems into a single kill chain. Artillery, for example: instead of completely replacing conventional artillery, smaller attack UAVs are used to carry out precise attacks on smaller targets previously identified and tracked by reconnaissance drones. These small attacks exhaust the defenses of larger and more important targets, leaving them vulnerable to another, decisive artillery strike.

The second step involves experimenting with and conducting operations using exclusively unmanned platforms. In December 2024, the Ukrainian Armed Forces took this step by conducting the first fully unmanned operation near Lyptsi, a village north of Kharkiv. Dozens of unmanned ground vehicles (UGVs) and first-person-view drones (FPVs) participated in the attack, but no infantry. UGVs equipped with machine guns and ammunition performed tasks such as mine clearance and direct fire. FPV drones provided aerial support, enabling a coordinated attack on multiple targets. After the attack, the surviving systems returned behind the Ukrainian positions.

This tactical air and ground operation successfully destroyed Russian positions and demonstrated Ukraine's innovative approach to addressing manpower shortages through the use of technology. Although described as a "groundbreaking moment," the robotic systems were still manually (albeit remotely) controlled. Nevertheless, such operations can be seen as a step closer to a future battlefield increasingly employing Al-assisted autonomous capabilities.

In August 2023, Ukraine became the first country in the world to establish a separate unmanned unit, the 14th Separate Unmanned Aerial Vehicle Regiment. Instead of tanks and machine guns, the unit will fight with drones, satellite technology, and laptops.

#### 1.3.2. Mastering Complexity / Software Defined Defence

Military conflicts are subject to a high pace of innovation and rapid implementation, characterized by evolutionary change.



The battlefield has become more transparent. Thanks to technological advances, information about enemy forces as well as one's own capabilities and resources can be aggregated more effectively and quickly. A mission-relevant, up-to-date situational awareness is essential for achieving information superiority and thus ensures protection and survival in combat.

The time it takes to develop new technologies and techniques is increasing rapidly, and the adaptation of systems to new realities is also happening ever faster. One example of this is the use of drones. They provide reconnaissance information and, equipped with weapons, are used directly to engage targets. At the same time, counter-drone capabilities have been and continue to be developed and refined, resulting in a kind of "cat and mouse game." The one who has the edge is the one who will prevail.

It is therefore important to implement new developments swiftly, and to adapt further developments quickly in line with the situation, because here too, "whoever is ahead is the winner."

Alongside the Multi-Domain Operations (MDO) approach, Software-Defined Defense (SDD) is therefore becoming increasingly important, and with it the use of digital twins.

**Digital twins** represent systems in virtual space, allowing simulations and quickly answering "what if" questions. Automated configuration servers create the latest software versions, and additive manufacturing technologies provide new hardware, if necessary.

Digital twins can thus form the basis for efficiently planning complex systems and adapting them to changing conditions, implementing user-specific functionalities in the best possible way, and ensuring high operational readiness by minimizing downtime caused by repairs and updates.



From digital model to deployment

#### 1.3.3. Economics of War

Military systems are increasingly becoming more powerful, but also more expensive. For example, the prototype of the Leopard 2 tank cost 2.3 million German marks (i.e. 1.2 million euros) in 1973, the model 2 A6 (supplied by Germany to Ukraine) costs between 3 and 9 million marks (1.5 and 4.5 million euros), and the model A7 (a supplement to the Bundeswehr's inventory) costs approximately 15 million euros. HE ammunition (against area targets and infantry) costs 9,000 euros each. An FPV drone can be purchased starting at 400 to 500 USD.

Impressive images and videos keep appearing in the media showing how drones (ranging from small FPV to large sea drones) are destroying Russian tanks, helicopters or ships.

According to the Ukrainian Intelligence Service (HUR), the Russian corvette "Sergei Kotov" (construction cost estimated at 60 million USD) was destroyed by several Magura kamikaze drone boats (cost approximately 250,000 USD) in March 2024.

On the other hand, it makes no economic sense to combat inexpensive and therefore mass-deployable devices like drones using expensive high-tech munitions. New approaches must be considered and pursued.



#### 1.3.4. Increasing Influence from the Civil/Private Sector

A kind of "privatization" can be observed in Ukraine: companies and private individuals play an important role in and for military conflicts through their support of new technologies. Examples of this include crowdfunding to procure drones and other military equipment, as well as Starlink terminals donated by SpaceX or purchased by private individuals at the beginning of the war, to maintain communications in the country.

In the past, technological breakthroughs often occurred in government or military settings. The development of GPS, like that of the internet, can be traced back to developments by the American military.

Today, high-tech development and commercialization are increasingly taking place in the private sector. One example is OpenAI with ChatGPT, which is firmly in private hands. States therefore have less control and influence over what and how it is developed, and who can use it.

It remains to be seen to what extent these "privatizations" will impact future geopolitical and military conflicts and thus also our societies around the world.

## 1.4. Demo Szenario

#### Enabling Better and Faster Decision-Making in a Challenging Environment at All Levels from Tactical to Operational

To illustrate this guiding principle, a scenario-based backdrop will be described to demonstrate the integration of proposed solutions within a complex operational environment. The focus is placed on **Brigade 45 "Lithuania**," which will constitute the German contribution to NATO forces in the region beginning in 2027.

#### 1. Contextual Background: Scenario Overview

Russian forces, supported by Belarusian units, have launched an attack on the Baltic region. In Russian state media, this is portrayed as a humanitarian and defensive operation aimed at sustaining the Kaliningrad exclave. Images disseminated show civilians celebrating. While Estonia and Latvia come under widespread assault, a Russian division is advancing through Lithuania with the objective of isolating Vilnius and capturing the Suwałki Corridor. The Russian offensive is accompanied by extensive V/UHF jamming (30 MHz-3 GHz), aimed at disrupting NATO communications. The approximately 100-kilometer-wide **Suwałki Gap**, located on the Polish–Lithuanian border, represents the sole land corridor between the Baltic States and the rest of NATO territory, and is thus of critical strategic importance.



Fictitious attack on Baltic states

#### 2. Sub-Scenarios

In the early morning hours, two Russian airborne regiments from Pskov land in the Lithuanian–Polish border region (1). Simultaneously, Russian forces cross into Lithuania from Kaliningrad in the west (**2a**, **2b**) and from Belarus in the south and southeast (**3a**, **3b**), with the aim of establishing a land corridor between Kaliningrad and Belarus. The airborne forces seek to seize control of the two primary highways connecting Poland and Lithuania (E67 and 135/132). Russian troops advance from Kaliningrad near Sovetsk into Lithuanian territory. The 275th Motor Rifle Regiment moves towards Šilutė (**4a**), while the 10th Motor Rifle Regiment, along with the 18th Tank Battalion, is tasked with blocking the A1 highway near Kryžkalnis (**4b**) to isolate the port city of Klaipėda. In response, German airborne troops of the 31st Regiment conduct air assault operations near Klaipėda and Kryžkalnis. Satellite surveillance and long-range reconnaissance drones detect Russian artillery positions near Chernyakhovsk, the potential threat of which necessitates further reconnaissance and possible neutralization (**5**). The 45th Armored Brigade secures the northern sector of the Suwałki Gap. An ASOC<sup>1</sup> near Malbork, attached to the Multinational Division North East (MND - NE), coordinates joint air and naval fire support in accordance with NATO's Multi-Domain Operations (MDO) concept (**6**). A NATO naval task force, which includes guided missile cruisers, is securing the international sea lanes of communication to and from Klaipéda and is blocking the maritime supply routes to Kaliningrad.



Overview of fictitious military operations in Lithuania

#### 3. Scope and Limitations

In analyzing this scenario through the lens of NATO's Multi-Domain Operations doctrine, the focus is placed on the military domains of land, air, and maritime. Excluded from the analysis are the domains of cyber, space, and A2/AD<sup>2</sup>, as well as data links with the civilian sphere (e.g. ERCC<sup>3</sup>).

The primary operational emphasis lies on the Close Air Support (CAS) mission type, in the context of joint fire support across service branches (air-land integration within NATO).

As a rearward Command and Control platform, a NATO AWACS is assumed to contribute to support for situational awareness (contributing to a recognized air and recognized electromagnetic picture).

#### 4. Presented Solution Concepts

System demonstration aimed at enabling enhanced collaboration and significantly reducing the OODA<sup>4</sup> loop (Observe-Orient-Decide-Act) for faster and more effective decision-making at all command levels:

- A deployable command post demonstrator (Army at various echelons and/or Air Force ASOC), contextualized within this operational scenario. The ASOC serves as a tactical air command and control unit capable of managing airspace within the Corps' area of operations, integrating effects across air, land, and maritime domains to achieve operational objectives.
- A visualization of a high-mobility Army command post, either mounted in a vehicle cabin or integrated within an armored vehicle, designed for forward deployment.
- A networked soldier visualization in the role of sniper and/or JTAC<sup>5</sup>.
- A planning support example for this and other mission elements based on Digital Twin technology.
- Various solutions for situational awareness and communications tailored to the operational context.

- 4 Observe-Orient-Decide-Act
- 5 Joint Terminal Attack Controller (JTAC)

<sup>3</sup> Emergency Response Coordination Centre, ERCC

# 2. Solutions and Products

The joint presentation of griffity defense and its partners at the AFCEA 2025 is under the motto

# "Enabling Better and Faster Decision-Making in a Challenging Environment at All Levels from Tactical to Operational"

and shows contributions to the following topics:

- Reconnaissance and Command Support
- Platform Integration/Equipment Kits/Mission Modules
- Communication Systems
- Networking & Integration of Dismounted Forces
- Transport and Packaging Solutions



Overview of solutions and products in context

## 2.1. System Engineering according to MOSA (Modular Open Systems Approach) (Dassault Systèmes Deutschland)

Dassault Systèmes delivers advanced Model-Based Systems Engineering (MBSE) solutions tailored to defense applications. The 3DEXPERIENCE platform integrates design, engineering, simulation, and lifecycle management, enabling seamless collaboration, interoperability, and compliance with MOSA principles.

With CATIA Magic, defense teams can model complex systems using UAF, ensuring full traceability from requirements to validation. This reduces errors, fosters a model-driven approach, and enhances cross-disciplinary collaboration. Engineers can simulate and analyze systems before physical prototyping, improving efficiency and decision-making.

Aligned with MOSA, our solutions support modularity and standardized interfaces. The 3DEXPERIENCE platform ensures seamless integration across platforms, accelerating upgrades and innovation – critical for modern defense.



MBSE: Example: combat vehicle

## 2.2. Reconnaissance Support



Interaction between sensors, analysis, processing and distribution of information

#### Recognize – Evaluate – Visualize

The integration of sensor fusion, air-assisted target acquisition, and rapid response chains is already a reality in Ukraine. Commercial satellite imagery, drone data, and civilian-provided information – such as photos on Telegram – are compiled, analysed, and converted into concrete attack orders within minutes. This data-driven warfare allows for responses within a fraction of the time required by conventional military structures.

#### 2.2.1. Automated Image Exploitation for Unmanned Aircraft (Fraunhofer IOSB)

ABUL is a full-motion video exploitation system for reconnaissance and surveillance, developed in cooperation with aerial image evaluators.

The advantages of video-equipped unmanned aerial vehicles (UAVs) for reconnaissance, search, and rescue missions are obvious. Due to the image and video data recorded by the UAVs being radio transmitted to the ground station, the evaluator can analyze data in real time. In this context, Fraunhofer IOSB has developed the ABUL system, which was designed as a supporting tool in the evaluation process, and to relieve the operator during critical missions.

ABUL provides optimized real-time functions for online reconnaissance and tactical exploration as well as valuable functionalities for offline exploration missions.



ABUL Multiresolution

## 2.2.2. RecceMan® (Fraunhofer IOSB)

It is not only in the field of military intelligence that necessary information about objects and infrastructures must be derived from imagery data. This also includes imaging reconnaissance, which is obtained by recording and analyzing aerial and satellite images.

Key issues in this regard are the detection and identification as well as analysis of land vehicles, troop movements and accumulations, ships and infrastructures of all kinds. To ensure and improve evaluation and analysis results, Fraunhofer IOSB developed the RecceMan® recognition assistant on behalf of the BAAINBw (German Procurement Office) which has, for several years, been deployed as an operational system in the German Bundeswehr. The object recognition and identification assistant supports the image analyst in describing objects on the basis of characteristic features.

The software provides comprehensive assistance, for example by providing an overview of existing objects in the form of a list.

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RecceMan<sup>®</sup> Reconnaissance Component for Land Vehicles

#### 2.2.3. Spectrum Management (ATDI)

ICS Monitoring SDRN Control RT, designed with vendor-neutral architecture, provides real-time spectrum monitoring, signal analysis, and geolocation (AoA, TDoA, hybrid) for enhanced EMS situational awareness. It enables precise RF signal detection across terrestrial, airborne, and marine environments, ensuring accurate EMS threat identification. The system offers advanced signal monitoring, alarming, and direction finding using an intuitive GIS platform. With an open, interoperable design, it integrates seamlessly with existing BMS systems while supporting standalone operation. Optimised for high-performance environments, it maintains accuracy in complex RF conditions, strengthening operational awareness and electromagnetic dominance in tactical and strategic missions.



Parameters of a classified target

#### Measurement devices (yellow), estimated location points of measured signals and identified targets

Signal clusterisation and classification

#### 2.2.4. Radio Surveillance and Reconnaissance (Narda)

Tactical radio surveillance and reconnaissance including passive drone detection or own troops emission control on the battlefield, in border control scenarios and for intelligence applications require reliable, easy-to-use radio direction finders. This also enables covert operations, if required. The SignalShark provides efficient support in monitoring, analyzing and protecting the corresponding frequency spectra as a COTS (commercial off-the-shelf system). Due to its open platform architecture, SignalShark is very flexible to adapt to changing use scenarios.

From the extensive portfolio of NARDA Safety Test Solutions we are presenting the following at AFCEA 2025:



**SignalShark®** – Real-Time Remote Analyzer for detecting, analyzing, classifying and localizing RF signals between 8 kHz and 8 GHz. Supports automatic bearing AoA (Angle of Arrival), TDoA (Time Difference of Arrival) and hybrid bearing, with a

Windows 10-based open platform for third-party applications, available in various designs (desktop, 19" rack mount), optimal for remote control applications.



SignalShark® – Handheld for mobile and stationary use, touch screen, real-time spectrum analysis on the move, integrated Python for creating your own individual applications. Battery life of 3 hours (nominal), battery pack can be changed during operation (hot swap). Weight: 4.4 kg, dimensions: 231 x 333 x 85 mm.



**SignalShark® ADFA 2** – Automatic antenna in the frequency range 10 Hz to 8 GHz, fully automatic DF system, translates signals from multiple antenna elements into a DF signal with a single channel, can be attached to a tripod, to an antenna mast or to the vehicle roof using a magnetic adapter.

Today's conflict and warfare landscape is characterized by Multi-Domain Operations (MDO).

According to NATO, At its core, Multi-Domain Operations refers to the push for NATO to orchestrate military activities across all operating domains and environments. These actions are synchronized with non-

military activities and enable the Alliance to create desired outcomes at the right time and place."

(www.act.nato.int/activities/multi-domain-operations/)

## 2.3.1. Information Superiority in Munti-Domain Operations (MDO) (Thinklogical)

The dissemination of information across multiple domains for intelligence, surveillance, and reconnaissance (ISR) is radically transforming the landscape of national defense. Asymmetric threats, competition among peers and nearpeers, dynamic operational environments, and rapidly evolving mission requirements make information acquisition and analysis a critical asset for the modern soldier.

Thinklogical has developed a highly secure end-to-end signal management infrastructure that enhances data accessibility and delivers information without latency to where it is needed Our commercial off-the-shelf (COTS) video distribution (VDS) and KVM matrix solutions enable the creation of an efficient and flexible command-and-control architecture, allowing all security domains to be displayed simultaneously at a single workstation. With Thinklogical, any

enterprise-level KVM architecture

information source can be instantly distributed and displayed at any endpoint for real-time collaboration and analysis. At the same time, system administrators can restrict access and display capabilities based on roles and permissions to meet operational or security requirements.

## **Multiple Domains. Multiple Classifications. One Solution**

Thinklogical offers a comprehensive product line of highly scalable fiber-optic video and KVM matrix switches that are IA-certified to manage and distribute multiple networks across various classification levels using a single matrix switch. This significantly reduces infrastructure costs and complexity, enhances cybersecurity, and minimizes the need for air-gapped networks at the desktop level. Standardized IT infrastructure further reduces administrative costs. Thinklogical's unique Multi-Level Security (MLS) model enables new collaboration workflows and enhanced data analysis across all domains, resulting in immediate situational awareness.

Already implemented in several NATO nations for headquarters and weapons systems, the deployable "Client Hotel" option, housed in a NATO-standardized TEMPEST container, includes:

- Server container
- Operations container
- Extendable operations container







#### 2.3.2. Situation Visualization – DigLT (Digital Map Table) (Fraunhofer IOSB)

The Digital Map Table (DigLT) is a software system for shared situation visualization and analysis. Any number of users can work independently of each other on the same situation, using personal computers and tablets alongside shared digital tables or large screens.

The underlying software is modular and can easily be custom-tailored towards specific needs and extended depending on the requirements. Its uses range from educational use to mission preparation, mission execution, and review. A diverse range of data sources and geodata can be integrated to provide the right information for each use case. This provides the basis to correctly judge the situation and make the relevant decisions.

Stationary, deployable, and mobile systems (existing and new technologies to be introduced) can be merged in such a way that national and international interoperability is realized, and the information required for command & control is available on time and as required.

The core of the Digital Map Table is the server, the DigLT<sup>Core</sup>, which, in addition to geodata, also provides all layers, configurations, and functions. The server can be accessed by the web-based DigLT<sup>Web</sup> client and the DigLT<sup>VR</sup> virtual reality client. Due to the flexibility of a web application, this client can be used on almost all end devices, especially the high-resolution DigLT<sup>4k</sup>.



DigLT is shown as a deployable table version and in a case version, each with virtual reality clients

- Scalable, highly mobile solution
- Interactive teaming over long distances
- Can be used flexibly in stationary and mobile command posts as well as command vehicles down to soldier level without media disruption
- Simple operation by using a user interface known from the civilian world (smartphone/tablet/PC).

Virtual reality makes it possible to experience geodata in three dimensions through stereoscopic representation. In addition to viewing the data on the virtual table, the pedestrian mode allows complete immersion in the virtual world

making it possible to stand in the middle of a street intersection or fly to the roof of a high-rise building. No matter where the users actually are in the world, in virtual reality they can stand together at the same situation table and plan and analyze together using all the functions that are also available in the web interface.



#### The Position Selection Assistant

The Position Selection Assistant has been integrated into DigLT as a new feature. It automatically checks the terrain for features that are characteristic of effective positions.

An evaluation of the terrain is calculated in order to identify suitable positions. In particular, the maximum combat distance, visibility, and vehicle height, as well as the enemy's direction of attack are important parameters for the calculation. Knowledge of the own and the enemy weapon systems allows for a sound choice of parameterization. The military importance of terrain can be considered as a weight.

The user receives an evaluation of the area according to its positional quality. This allows unsuitable terrain to be discarded and suitable terrain to be investigated more closely. Special terrain features suitable for strong lines or flanking positions actual become visible.

Exercises with users have shown that this can save a considerable amount of time. Terrain reconnaissance is accelerated by a factor of about 5.

The focus of further development is the assessment of accessibility and interconnection of positions (access/exit routes) as well as the prediction of enemy movements.

#### 2.3.3. Android Team Awareness Kit ATAK

ATAK is a real-time tactical application for tablets and smartphones, such as the Tough Mobile 2<sup>™</sup> by Bittium or the Panasonic TOUGHBOOK. It provides geospatial data and facilitates collaborative efforts among emergency response teams at different locations using voice, chat, video, and a shared interactive map.

The illustration depicts the integration of enhancements developed by various manufacturers of sensors, communications, and other systems for ATAK.

ATAK networks can be set up using various communication technologies, including cellular devices, Wi-Fi, and radio-based tactical communication.

ATAK started as a simple situational awareness tool, and

has grown into a comprehensive application. Its adaptability allows for the swift integration of new technologies. For example, raw video from an unmanned system (UAS/UGS) can be processed by software on-site and fed into ATAK, empowering the operator to swiftly display georeferenced and other processed images.

Another example is one of the most challenging battlefield issues. The enemy's disruption of troop communications. ATAK, combined with additional third-party tools, can detect and identify potential disruption attempts, and alert the forces involved.

Together with the Digital Tactical Table (DigLT), it forms the front end in the tactical domain.



Position evaluation in blue with tactical symbols, enemy direction north



## 2.4. Platform Integration / Integration Kits / Mission Modules



Examples of the integration of various components in a vehicle

Mobile command posts are the order of the day. To accommodate rapid technological changes and high adaptation speeds, working with digital twins is a viable option. System adaptations in hardware and software can be simulated and optimized in advance, and the appropriate software version is generated using automated configuration servers. Faster deployment of adapted hardware is achieved through modularization and standardization, as well as the use of additive production methods.

#### 2.4.1. Integration Examples for Command Posts and Vehicles

At AFCEA 2025, we will be exhibiting a command container and a command vehicle as mock-ups.

Each mock-up contains three networked workstations for commanding units. V/UHF devices are integrated for communication with other units and dismounted forces, and satellite-on-the-move terminals and HF radio are integrated for long-range connections.

During the integration of the individual systems, particular attention was paid to modularity and standardized interfaces. This makes it possible to respond quickly and easily to changing conditions, for example, when different means of communication are required for interoperability in multinational missions.



Overview of the mock-ups shown at AFCEA 2025

Container	Vehicle			
Crew Stations				
<ul> <li>Tablet (Panasonic; 2.6.1)</li> <li>MDU Mobile Desk Unit (2.4.5) with inserted smartphone (Bittium Tough Mobile; 2.6.4)</li> <li>Intercom WiSPRevo (2.4.7)</li> </ul>	<ul> <li>Tablet (Panasonic; 2.6.1) and smartphone (Bittium Tough Mobile; 2.6.4) in Brodit Mount (2.4.5)</li> <li>INVISIO intercom system (2.4.6)</li> </ul>			
Commu	nication			
• C3Flex Communication Mission Module (2.5.1)	• C3Flex Communication Mission Module (2.5.1)			
• SignalShark spectrum analyzer (2.2.4)	• Sat-on-the-Move Terminal Ovzon OTM (2.5.3)			
• Antennas (V/UHF multiband with 20/50 Watt amplifier, TacSat, HF (2.5.7/2.5.4)	• Antennas (V/UHF multiband with 20/50 Watt amplifier, ADFA2 direction finder, HF (2.5.7/2.4.4/2.5.4)			
Power	Supply			
• GENAIRCON Silent Auxiliary Power System (SAPS)	• Energy Case (2.4.8)			
(2.4.8)	• Emily 3000 (2.4.8)			
Software App	lications, etc.			
• Spectrum Management (2.2.3/2.5.2)	• DigLT Client / WINTAK (2.3.2)			
• TASSTA Server with MCPTT, MCVideo,	• Radio surveillance (2.2.4)			
MCData functionality (2.5.1)	• TASSTA Server with MCPTT, MCVideo,			
• functionality incl. HW (2.3.1)	MCData functionality (2.5.1)			
	• HF application SW (2.5.4)			

(Numbering in brackets refers to chapters in this brochure)

#### 2.4.2. Integration in Armored Vehicles (FFG)

Based on decades of experience in the repair and modernization of heavy vehicles as well as in the construction of technology carriers, FFG has developed into a vehicle manufacturer and system house, offering versatile platforms for armed forces such as the WiSENT 1 and 2, the ACSV G5, and the Boxer recovery module.

As an innovator in vehicle development, upgrading and production, FFG proactively develops prototype vehicle systems to demonstrate and refine new vehicle technologies.

The Protected Mission Module Carrier (PMMC) G5, for example, offers maximum versatility and is an investment in the future of modern armed forces. Thanks to the availability of various mission modules and the use of standardized mission racks, variants adapted to the mission purpose can be created on the G5 base platform at any time.



Integration example for PMMC G5 (source: FFG)

# 2.4.3. Integration into Protected and Unprotected Vehicles/Command Posts (B&T Solutions, MOSOLF Group)

As a specialist in special vehicle construction, we offer you complete solutions from a single source.

Whether command vehicles, command centers, (installation of) equipment integration into military vehicles, or command post containers – we are your reliable partner.



Our portfolio includes not only conversions and upgrades, but also comprehensive solutions in the field of radio and component construction. From simple adapter cables and complete upgrade kits to complex systems for power supply, audio, video, or IT, we offer customized concepts.

Depending on your needs, we equip vehicles directly on-site, deliver the technical equipment for self-assembly, or carry out work directly in the field with our mobile service team.



#### 2.4.4. Modular Standardized Racks/Cases

While the service life of vehicles is several decades, the service life of communications and IT components, including those installed in mission sets, is much shorter due to the speed of technological development. Thus, the challenge is to provide secure, resilient, and flexible tactical communications that meet operational requirements over time.

For the various requirements (line-of-sight, non-line-of-sight, point-to-point, MANET, ...), a multitude of communication devices, computer and storage media from different manufacturers with varying dimensions and special features are available, which makes integration into the vehicles more difficult.

In order to become more flexible in this respect, it is advisable to use racks (for installation in closed platforms and containers) and cases (for open platforms, protected against dust and moisture) that are as much standardized as possible, and that

- Contain basic components to fulfill basic functionalities (switching, routing), and standardized interfaces to the outside world, and
- Are supplemented with communication technologies specified by the customer.

The complete racks can be integrated into the platforms in such a way that a required exchange

- Of equipment within the system (e.g. new radio equipment), or
- Of an entire rack/case (e.g. with adapted functionalities due to a changed mission/role/deployment or failure/destruction of a platform)
- can be carried out much more efficiently as far as time, resources, and costs are concerned.



Examples of various model integrations and form sizes for installation in vehicles or deployable units

In case a replacement becomes necessary, the device to be replaced is removed and the new device is mounted and connected via the existing ports in the patch panel without altering the existing infrastructure. Racks of various sizes make it possible to meet user requirements in terms of space available and devices needed.

As an example of such a modular/standardized solution, we will be showing the C3Flex at AFCEA 2025 (see 2.5.1. for details).

#### 2.4.5. Assembly Solutions and Mountings for IT Devices (Brodit)

Brodit is one of the world's leading solution providers for the assembly and integration of mobile devices in vehicles and in demanding environments.

For example, Brodit has developed mounts for the Panasonic TOUGHBOOK (see also 2.6.1) in vehicles that will be presented at AFCEA 2025.

As an example, we will be showing the Imtradex Mobile Desk Unit (MDU) for a command post at AFCEA, which was created through a collaboration between Brodit and Imtradex. The mobile intercom offers easy and quick communication and consists of the table holder designed by Brodit including loudspeaker, gooseneck microphone and

PTT button from Imtratex to accommodate an EUD, e.g. smartphone. The EUD can be inserted into the holder and the holder takes care of the rest. The loudspeaker and microphone are active and the PTT button can be used, for example, to use Push-to-Talk over cellular applications or other 5G or VoIP applications.

Thanks to Brodit's flexibility, almost any device can be attached to the MDU and can also be adapted in the vehicle. For example, we also show holders for the Panasonic TOUGHBOOK (see also 2.6.1) that were developed by Brodit for vehicles.



#### 2.4.6. Intercom System INVISIO (Imtradex)

The "ICS" INVISIO Intercom System allows a seamless transition between dismounted and mounted soldiers. The very small and lightweight INVISIO intercom system can be installed firmly and yet flexibly in the backpack, on the Molle belt as well as in land, sea, and air platforms.

It has four multifunctional COM ports with automatic cable detection and five user ports for internal voice communication. It is possible to connect multiple devices to connect more than 20 users.



The "VCS" volume control (7 levels) allows users to independently control the incoming audio volume for all participants connected. The latest development – INVISIO Link – allows wireless connectivity by full functional features to have an extension to the INVISIO ICS system.

Intercom: 150 x 95 x 27 mm / 563 g Volume Control: 65 x 75 x 44 mm / 121 g

#### 2.4.7. WiSPRevo – Information & Communication System for Combat Vehicles (Intracom)

The WiSPRevo is an advanced information and communication system for military applications and the digitalization of battlefield operations. WiSPRevo is designed based on the latest open architecture and technology standards, providing a wide range of hardware and software interfaces to fulfill any interoperability and integration requirements of end users and integrators.



WiSPRevo complies with all related military standards and is a highly modular and expandable solution for use in various platforms such as wheeled and tracked vehicles, rapidly deployable military structures, and rigid inflatable boats.

#### Example of networking possibilities

WiSPREevo CCU user terminals are modern IP-based communication devices with PoE capabilities, providing a wide range of tactical voice and data services including intercom and tactical VoIP communication channels, RoIP, messaging, radio remote control. Moreover, CCU terminals support advanced Dynamic Noise Reduction (DNR) features, providing unmatched performance in very noisy environments, remarkable speech intelligibility, improved crew hearing safety, and increased situational awareness.





The Tactical Mission Node (TMN) is a state-of-the-art WiSPRevo component for building complete C4I solutions. TMN provides advanced IP networking and routing capabilities, multimedia services, Local Area Network, data processing and storage, voice and data recording as well as interfaces for connecting sensors, subsystems and effectors to the platform.

In addition, the TMN can embed optional modules for last-mile wireless communications, a generic MOTS processing unit to support applications coming from third-parties, real-time video streaming and distribution, extended data storage, etc.

#### 2.4.8. Power Supply

A logistical challenge, especially for mobile operations and in remote areas, is power supply. In addition to special robust batteries, permanently installed in vehicles or as a portable case solution, fuel cells are also increasingly being used to supply mobile units.

#### **GENAIRCON – Energy Solution for Vehicles (Intracom)**

In the modern battlefield, electric power sustainment is a critical mission success factor. Legacy vehicle power systems fall short in providing unrestricted mission capability, while not being able to support survivability through controlled signature management, combat range through fuel efficiency, and upgradability.

To support mission systems, platforms keep their engines idling, exposing themselves to thermal and acoustic detection, while fuel requirements drain logistical support and increase its vulnerability.

The Silent Auxiliary Power System (SAPS), part of Intracom's Hybrid GENAIRCON architecture, is an advanced military capability upgrade system for combat vehicles, providing hybrid auxiliary power and intelligent power management. This enables comprehensive Silent Watch capability, controlled signature management, reduced fuel consumption, and support for new systems with high performance requirements.



#### Energy Cases, Portable (B&W)

The energy.cases from B&W are mobile power supplies developed for the toughest requirements, regardless of whether 230 V, as from the wall socket, or 24 V direct current is needed. The compact and emission-free power suppliers can be charged with a power supply unit, a truck or car charging cable, or via solar modules, and are just as suitable for stationary continuous operation as for changing mobile applications.

	energy.case PR0500 AC	energy.case PR01500 AC	energy.case PR0500 DC	energy.case PR01500 DC
Battery capacity	500 Wh	1,500 Wh	500 Wh	1,500 Wh
Connectors	1 x 230 V socket, 1 x USB A, 1 x charging input	1 x 230 V socket, 2 x USB A, 2 x charging input	3 x B&W DC socket, 1 x USB A, 1 x charging input	1 x B&W DC socket, 2 x USB A, 2 x charging input
Continuous power	300 W	300 or 1000 W	300 W	24 V up to 500 W further configurations upon request
Charging power	200 W	200 W	200 W	200 W
Charging options	230 V charger, optional: 12 V car, 24 V truck, solar	230 V charger, optional: 12 V car, 24 V truck, solar	230 V charger, optional: 12 V car, 24 V truck, solar	230 V charger, optional: 12 V car, 24 V truck, solar
Operating temperature	-20 °C to +40 °C			
Further information	External keypad, IP54	Available with external or internal keypad, IP65	Internal keypad, IP65	Available with external or internal keypad, IP65
Dimensions	47 x 36.5 x 19 cm	66 x 49 x 33.5 cm	42 x 32.5 x 18 cm	66 x 49 x 33.5 cm
Weight	10.9 kg	29.9 kg	8.7 kg	28.4 kg

#### SFC EMILY – Fuel Cell (SFC Energy)

The SFC EMILY Fuel Cell takes care of the on-board power supply of a vehicle when the engine is not running. It is directly connected to the on-board battery for this purpose. Electrical peak loads are compensated directly from the battery, while the SFC EMILY continuously monitors this and, if necessary, recharges independently.

It is suitable for remote use and as a battery charger in the field. The SFC EMILY can be directly connected to the 3G Power Manager using an accessory cable. Remote from the vehicle, it can therefore power



applications such as radios, radar and weapons systems, or at the same time recharge several batteries. The SFC EMILY 3000 has an extremely low consumption of not even 100 ml per hour and provides 3.0 kWh of electricity per day. It weighs only 12.5 kg.

#### Transport Cases for Batteries (B&W)

B&W battery.cases are the ideal solution for the safe storage as well as the transport of intact and defective lithium batteries. Robust and easy to handle thanks to the inner protective metal space. The innovative design of the B&W battery.cases is registered with the German Patent and Trademark Office. The cases are tested and approved as packaging according to the P 908 packaging regulation, and therefore suitable for the transport of intact as well as defective lithium batteries on public roads.



## 2.5. Communication in Mission



Communication in mission

In the field of communications and navigation, we are showing a combination of different technologies, ranging from wide-area communications and tactical communications to command post networking.

#### 2.5.1. Network Technologies

See also intercom systems (2.4.6 and 2.4.7.)

#### Mission Critical Communication via LTE and Conventional Networks (TASSTA)

TASSTA's Mission Critical (MCX) solution provides mission critical communications services via LTE and traditional networks. It provides secure, reliable, and resilient communications for government, public safety, and general commercial applications.

The TASSTA MCX solution includes a comprehensive range of services that are fully compliant with mobile radio 3GPP specifications:

 Mission Critical Push-to-Talk (MCPTT): PTT group calls such as group emergency calls, priority group calls, announcement or broadcast calls as well as the organization of dynamic group composition and individual call functions, including emergency call priority



- Mission Critical Video (MCVideo): Video-Group call via PTT (similar to MCPTT)
- Mission Critical Data (MCData): Service for mission critical data operations. For instance, MCDATA provides a text
  messaging service (Short Data Service, SDS). In addition, MCDATA offers file transfers, which are also available in
  principle using narrowband technologies but reach their physical limits when it comes to large data volumes and
  high bandwidth requirements.

The high data security of the 5G standard can be used for all features from the MCPTT, MCDATA and MCVIDEO areas – even with an encryption option.

#### Command, Control & communication System C3Flex (Intracom/griffity)

The C3Flex system is a highly mobile, highly flexible basic system for integrating/operating existing and/or new C3 elements (command, control, communication).

The C3Flex system was developed specifically for operations in which smaller teams are left to their own and need to communicate quickly and easily with each other and with the outside world. The C3Flex is therefore ideal for command post units, command and liaison units, foreign advance command units, joint logistic reconnaissance teams, etc.

The heart of the C3Flex V vehicle variant consists of a case with:

- Communications node that establishes the connection between the various handheld devices used by the emergency services (e.g. V/UHF, TETRA, TACSAT), as well as Wi-Fi and, if necessary, connection to wide area systems (HF, SatCom) (see also 2.5.1.3.)
- Slots for six handheld radios of various technologies and manufacturers
- Space for an additional manpack-sized device, e.g. an HF radio for implementing wide area connections
- A powerful tablet PC with a docking station for configuring system components and serving as a server for, for instance, command systems, feeds from unmanned systems, or sensors/detectors.

Generic amplifiers (20 or 50 W), which are installed in the vehicle's antenna bases to save space, increase the range around the vehicle.

In the C3Flex Mobile Command version, which accommodates up to four handheld radios, the generic amplifiers and antenna connectors are included directly in the case.



C3Flex and examples of various expansion options

#### **Tactical Mission Node TMN (Intracom)**

The Tactical Mission Node (TMN) is a state-of-the-art component for building complete C4I solutions.

TMN provides advanced IP networking and routing capabilities, multimedia services, Local Area Network, data processing and storage, voice and data recording as well as interfaces for connections to the platform's subsystems, sensors, and effectors.



In addition, TMN can embed optional modules for last-mile wireless comms, a Generic MOTS Processing Unit to support third-party applications, real-time video streaming and distribution, extended data storage, etc.

See also 2.4.7. WiSPRevo

## Bittium Tough Comnode™

Robust IP communication device designed for tactical networks for versatile use, e.g.



## 2.5.2. Planning Tools for Communication Networks

## Tactical Communication Tool (TCT) (COMROD)

Establishing reliable communications can pose a great challenge, whether on the battlefield or on the site of a natural disaster. TCT (Tactical Communication Tool) allows military and public safety organizations to leverage their communication assets, while dramatically reducing the planning time. TCT's dynamic planning can quickly adapt to changes in operational circumstances, while its sophisticated radio propagation analysis ensures accurate simulation of every communication link. A powerful map engine supports a wide range of geospatial formats, including DTED elevation data, vector-based road maps as well as several formats for grid-based maps and satellite imagery.



Types of communication equipment supported:

- Analog VHF and UHF radio
- HF radio
- TETRA
- Fixed frequency digital radio link
- Frequency hopping radio link
- Digital VHF radio

## HTZ Warfare – Defense Communications and Mission Network Planning (ATDI)

HTZ Warfare is an advanced radio network planning and EMS engineering tool for military tactical communications and EW mission networks. It supports all radio technologies from 8 kHz to 1 THz, including HF, VHF/UHF, satellite, cellular (2G–5G), and any offensive and defensive EW applications. Key features include dynamic scenario modeling, enabling on-the-move mission planning for mobile and fixed radios across ground, air, sea, and space, thanks to its built-in GIS and propagation engines—over



50 models of deterministic, empirical, ITU, and industry standards. Using its API, HTZ integrates with any 3rd party software enabling network planning automation, streamlining workflows and improving accuracy for critical missions efficiently and effectively in any battlespace scenario.

#### 2.5.3. Satellite Communication

Satellite communications are becoming increasingly important for civil and military missions. It is one of the best and most reliable means of establishing broadband connections to otherwise hard-to-reach areas quickly and easily.

Technology and service offerings are also evolving in this area, terminals are becoming smaller and more powerful, and the options and scope of services that can be contracted through a single service provider is increasing.

#### SatCom-on-the-Pause/SatCom-on-the-Move (Stellar)

Stellar stands for reliable and secure communication worldwide. Our teleports in Germany, Cyprus, and Fiji connect people and make research in space possible, while our customers benefit from a global terrestrial transport network.

In the German Heinrich Hertz satellite mission, we play a central role in satellite control, and also operate an antenna on our premises to support technical experiments.

Together with the Swedish Ovzon, Stellar offers optimized solutions for various missions. This has also been the case since the beginning of 2024 via Ovzon's own geostationary Ovzon 3 satellite.

Two key technologies mark Ovzon 3 as a breakthrough technology in the world of satellite communications: firstly, the most powerful steerable spot beams in space and secondly, Ovzon 3's on-board processor.

This creates advantages, especially for military operations:

- Dynamically shift capacity to where it is needed
- Operation below background noise (therefore signal identification is not possible)
- Interception or jamming is made much more difficult by frequency hopping
- Less susceptibility to rain and changing weather conditions
- Direct connection between the small terminals, even if the ground control station is impaired, destroyed or unavailable for other reasons
- NSA-approved TT&C encryption (telemetry, tracking and control)
- On-board processor reprogrammable in orbit (e.g. to add new functions)

	So		
	Ovzon T7	Ovzon T6	Ovzon OTM Mini
	On-the-Pause	On-the-Pause	On-the Move
T x / R x up to (dependent from location)	10/60 Mbps	70/120 Mbps	60/100 Mbps
Typical power consumption	65 W, 24 VDC	140 W, 24 VDC	180-260 W, 24 VDC 100-240 VAC
Dimensions	202 x 179 x 78 mm	337 x 343 x 57 mm	290 x 210 mm
Weight	2.8 kg	6 kg	8.7 kg
Operating temperature	-20 °C to +55 °C	-20 °C to +55 °C	-40 °C to +50 °C
Environment	IP65, MIL-STD-810G	IP65	IP66





Ovzon OTM Mini – successfully tested on UH-60, 17/17 Mbps through the rotors

#### starlink.case (B&W)

B&W International offers a complete solution for the Starlink system including antenna and battery in a case. With the integrated power supply, the Starlink system is ready for use independently for at least 24 hours.

Case:

- Size/weight: 660 x 490 x 335 mm / 35 kg
- IP65
- Battery: 1,500 Wh / chargeable through 12 V (vehicle), 24 V (truck) or 230 V power supply unit, as well as via solar modules

The battery can also be used to charge cell phones or laptops.

#### 2.5.4. HF Communication



HF radio stands for a very high range and robustness. Due to further developments, especially with regard to increasing the bandwidth and simplifying the use of the system, HF radio is today once again appreciated as a means of communication in difficult environments.



#### SENTRY-H-6120-BM Mobile (DTC)

Robust Software-Defined Radio (SDR) vehicle mounted and base station solution for military organizations that require uncompromising, secure voice and data communications over long distances. With an RF power of 150 W, it is specifically designed for the smallest and lightest form factor to enable easy integration into base and mobile platforms. Working closely with military customers, the 6120-BM has been

optimized for ease of use and features an ergonomic, intelligent handset with a full-color, high-resolution, multilanguage user interface and a host of other features.

#### SENTRY-H-6110-MP Manpack (DTC)



Rugged, portable Software-Defined Radio (SDR) manpack solution for military organizations that require uncompromising, secure voice and data communications on the move. The 6110-MP is an integral part of the Sentry-H product family, meeting the needs of the modern battlefield while providing full backward compatibility with

legacy products. The 6110-MP is one of the smallest and lightest HF crew radios available.

It offers powerful 30 W RF power and up to 79 hours of battery life at a weight of less than 4.7 kg, without compromising on features.

#### **HF Application Software (DTC)**



**RC-50C:** STANAG 5066 E-mail via HF radio. In conjunction with the RM50 series RF transceivers and data modems, the software runs on a standard Windows<sup>™</sup> PC via a USB, ethernet or serial connection, and requires no special PC hardware. Once installed, the software runs in the background and requires no user interaction.



**SPRINT:** The STANAG 5066-compliant SprintNet application uses the 3G ALE waveform to provide connections quickly and securely.

RF data communications, peer-to-peer email, file transfer and chat are supported, as well as SMS and internet e-mail over the SprintNet gateway. The flexibility and interoperability benefits of the Sprint solution provide a powerful extension to your RF networking capabilities.

#### HF Antenna System (DTC)

#### Antenna Tuner 3046 with Whip Antenna

With an RF power capability of up to 150 W, the 3046 can be used for voice (including frequency hopping) and data operation over the entire frequency band from 2 to 30 MHz. The tuner has unlimited memory capacity, and with a state-of-the-art tuning algorithm, new



frequencies are typically tuned in less than one second. The 3046's circuit design ensures that the power output to the antenna is maximized and the receive performance is optimized by the internal receive amplifier. These features combine to provide a user-friendly, interference-free, high-performance mobile antenna solution.

The 3046 is offered with a 3-meter carbon fiber whip antenna and other accessories and options, and is compatible with almost every whip or wire antenna in the HF industry.

#### 2.5.5. Directional Radio

In contrast to other radio transmissions, the radio waves in directional radio are combined in a narrow band and transmitted specifically to the remote station. This allows higher distances to be achieved with the same transmission power (LoS, up to around 100 km), while at the same time it is more difficult to interfere with, or influence the beam and thus the connection.

In the highly mobile sector, similar effects can be achieved at shorter distances by using directional antennas in conjunction with mesh radios.

#### **Bittium TAC WIN Directional Radio System**

Bittium's TAC WIN system can be used to establish high data rate IP networks as a backbone for transmitting C2 data in the battlefield and to rear command facilities.



Connectivity on the entire battlefield

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#### TAC WIN components at AFCEA 2025:

#### Bittium TAC WIN Tactical Router™ includes:

- Routing and waveform processing unit
- Connections for three TAC WIN radio units (RadioHeads)
- Interfaces for both fiber optics (1000BASE) and LAN/WAN (RJ45) with PoE
- Real-time clock (RTC) and erase functionality when not powered, enabled with back-up battery
- Tactical Network Management (automatically optimized routing even in the event of line failures)
- Central network configuration
- Tactical VoIP functionality
- IPsec tunneling

#### Bittium TAC WIN Radiohead IV™

- Point-to-Point
- Range: LoS approx. 100 km
- Data rate: 72 Mbps (with TAC WIN Waveform)
- NATO IV frequency range (4,400-5,000 MHz)
- Flexible channel bandwidth: 5/10/20 MHz
- With integrated beam steering antenna or fixed beam antenna with external rotator integration
- Gain 19 dBi / high-gain variant: 23 dBi (vertical polarization)
- MIL-STD-810G and MIL-STD-461G certified

#### Bittium TAC WIN Radio Head III™

- Point-to-Multipoint
- Data rate: 36 Mbps (with TAC WIN Waveform)
- NATO III frequency range (1,350-2,400 MHz)
- Flexible channel bandwidth: 5/10 MHz
- MIL-STD-810G and MIL-STD 461G certified

#### 2.5.6. Tactical Communication (UHF/VHF)

#### **Bittium Tough SDR Vehicular and Handheld Radios**

Bittium Tough SDR™ – Latest Generation of Tactical Radios

The software-defined tactical vehicle and soldier radios provide voice and data over the widest frequency range and the highest data throughput across multiple frequency bands. Together with flexible configuration options and network routing, the radios support up to thousands of radios in one network.

Bittium is a founding member of the ESSOR industry consortium. Porting the ESSOR High Data Rate Waveform (NATO STANAG 5651) to the national software-defined radios enables compatibility between radios used in European coalition operations, in line with the objectives of the ESSOR program.







	Bittium Tough SDR Vehicular™	Bittium Tough SDR Handheld™		
	2-Channel radio / Manet	1-Channel Radio / Manet		
Frequency	30-512 MHz and 225-2,500 MHz	30-2,500 MHz		
Channel width	25 kHz-10 MHz / 25 kHz-5 MHz			
Waveforms	Bittium Narrowband Waveform™ (50 kHz)			
	<ul> <li>Bittium TAC WIN Waveform<sup>™</sup> (5/10 MHz; data throughput up to 36 Mbps)</li> </ul>			
	<ul> <li>ESSOR High Data Rate Waveform (NATO STANAG 5651, 1.25 MHz bandwidth, high data rate: ~1 Mbps, ~512 kbps, ~256 kbps at radio link, automatically selected. Maximum user throughput up to ~700 kbps with 1 Mbps radio link data rate)</li> </ul>			
	Porting of other waveforms possible			
Weight, Dimensions	< 15 kg / 210 x 270 x 300 mm	1.2 kg / 74 x2 44 x 47 mm		
Remarks	Application sandbox for flexible integration f C2 applications, such as BMS and blue force tracking	70 Wh rechargeable lithium-lon battery, wired or wireless integration of Tough SDR Handheld to soldier tablets or smartphones		

#### Special Role Radio Sentry 6161 (DTC)

DTC's Sentry Mesh 6161 is the ultimate personal / squad radio for demanding military applications that require performance, range and versatility in a lightweight and compact wearable unit that minimizes the burden on soldiers. The 6161 is a personal radio for dismounted soldiers built on the latest DTC MANET IP radio technology using the MeshUltra™ tactical waveform and multi-waveform options including TSM integration capabilities.

- Spatial diversity (MIMO 2x2)
- Frequency range: 1.2-1.7GHz (L band variant) (additional bands under development)
- Bandwidth: 1.25-10MHz
- Power output: 2W RF
- MIL-STD-461G and MIL-STD-810H certified
- 114 x 75 x 29 mm, excluding connector protrusions

The Sentry Mesh 6161 is compatible with a range of military accessories, such as headsets, PPT, antennas, batteries, power and data management systems, and cameras, allowing you to meet your specific mission requirements and combat ensemble configuration.





#### 2.5.7. Antennas and Masts (COMROD)

Every radio transmitter and receiver requires an antenna. With an increasing number of radios and the increasing use of multi-channel radios, the number of antennas on vehicles and shelters has continuously increased.

Integration of antennas onto limited platform space, while achieving antenna separation to maintain pattern performance, is the largest challenge in modern communication. Comrod offers multi-band antenna solutions together with passive or active antenna combiners for connecting multiple transceivers to a reduced number of antennas. Sharing antennas reduces pattern distortion associated with co-site antenna interference.

While maintaining their previous performance, the advanced dual-band, tri-band and wideband antenna solutions meet the new waveform requirements. Most products are available with integrated L1/L2 GPS antennas.



Example of an optimized antenna configuration with four antennas:

- 2 x VHF30512DB, 2 x VHF302700TB-WBS
- 30-88 / 225-450 / 225-512 / 700-2,700 MHz
- 4 antenna/10 transceiver frequencies configuration
- Single port antennas for minimal coaxial cable connections
- Narrow visual profile
- High gain: VHF 30-88 MHz
- Extended range: UHF 225-512 MHz
- Full LTE frequency band coverage of 700-2,700 MHz

#### **Mast Systems**

COMROD offers sectional and telescopic masts, from portable 5 meter to heavy duty 34 meter high masts.



Sectional Masts	Type/Series	Base Tube Diameter	Heights	Max. Headload
Light Duty – Sectional	AMX	33-38 mm	5-9 m	6 kg
Medium Duty – Tripod Sectional	ULM	48-92 mm	6-24 m	80 kg
Heavy Duty – Tripod Sectional	MLV	125 mm	10-34 m	130 kg

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Telescopic Masts	Type/Series	Base Tube Diameter	Heights	Max. Headload
Light Duty – Telescopic	ТМ	100-128 mm	9-18 m	50 kg
Heavy Duty – Telescopic	ТМ	150-210 mm	20-30 m	117 kg
Heavy Duty – Motor Driven	TM/LMT	210-525 mm	2-18 m	300 kg

## 2.6. Network & Integration of Dismounted Forces

Regardless of the conflict or scenario, communication is essential in every military environment. The ability to communicate on the battlefield determines the success or failure of an operation. Communication systems are



Vehicle integration, mission modules and network integration

becoming increasingly important for the individual soldier, as they now also enable the integration of (personally carried) sensors, detectors, and command and control systems via a single hub. The better these components work together, the better the impact on the safety and combat effectiveness of the individual soldier.

In the future, it will also increasingly rely on unmanned systems such as UAVs and UGVs and will be able to obtain additional information for mission completion by using VR/AR glasses.



# 2.6.1. TOUGHBOOK – Tablet for Use in Harsh Environments (Panasonic)

The 10.1" TOUGHBOOK G2 tablet with Windows 11 is designed for the toughest environments (IP65, MIL-STD 810H).

With a battery life of up to 15 hours and optional hot-swap, a sunlight-readable outdoor display that can be operated with gloves and in the rain, optional 4G/5G capability and many customer-specific customization options, it is a reliable COTS device for every application. Thanks to an optional clip-on keyboard and a wide range of vehicle docking options, including military connectors, it can be adapted for a wide range of applications in both industrial and military areas.

#### 2.6.2. Networking with Platforms (Imtradex)

The INVISIO Intercom System allows a seamless transition between dismounted and mounted soldiers. It fits seamlessly into the tactical control units of the soldier system. Thanks to its small dimensions, it can be used flexibly, both when permanently installed or carried in a backpack and reconnected to the existing intercom in the next vehicle.

See also 2.4.6.



Networking soldier - platform (INVISIO)

#### 2.6.3. Soldier System (Imtradex)

#### **Generation II INVISIO Control Units**

INVISIO's Generation II of Vxx control units heralds the next generation of modern communication. Powered by AI, it enhances hearing and speech. Thanks to its patented IntelliCable™ auto-sensing technology, it offers seamless plug and play integration. All COM ports support dual-net audio, making it ideal for multi-channel radios or intercom systems.

Туре	V 10 II	V20 II	V 50 II	V 60 II
	With large PTT button	For soldiers with one radio and up to two voice channels	Scalable, with central power support, high flexibility	Scalable, maximum flexibility, for advanced users
COM ports	for advanced users	1	2	3
PTT buttons	1	2	4	4
Dimensions, weight	69 x 40 x 27 mm 127 g	64 x 40 x 25 mm 100 g	70 x 63 x 30 mm 167 g	70 x 63 x 25 mm 152 g

#### Latest Control Unit V60 II ADP

The new V60 II ADP control unit is based on the well- known V60 Generation II, but also offers the option of combining audio, data and power, thus relieving the soldier of the burden of additional devices. New areas of application in connection with sensors, drones or cameras become possible easily and efficiently.

Audio is transmitted directly between communication devices and headset. An integrated USB 2.0 hub distributes data between the connected devices.



Notifications from the BMS system and voice prompts from the EUD can be received/ listened to via the integrated digital audio.

The EUD is supplied with power via USB PD (power delivery).

#### Headsets

#### Invisio X7 Headset

- Extremely easy to wear thanks to ergonomic adjustment to the ear contour and various attachments
- Voice Pick-Up Technology: in conjunction with an INVISIO control unit, an AI filters out unwanted noises and thus ensures maximum voice transmission
- Best 360° ambient sound perception
- Extremely light (47 g) and robust (MIL-STD-810H compliant)
- 39 dB SNR with foam ear tips

#### Invisio T7 Headset

The T7 is a lightweight (350 g), submersible hearing protection headset with 360° environmental awareness. It is available in different versions, with neckband, for helmet, and with headband. The 28 dB hearing protection can be increased to 43 dB SNR when used with the INVISIO X7 in-ear headset – (certified as Dual Hearing Protection). It can be used up to altitudes of 12,000 meters, and up to 10 meters underwater. After surfacing, ambient noise technology allows immediate hearing thanks to innovative drainage technology.

#### **RACAL RA4000 Headset**

The RA4000 is based on a fully digital architecture with advanced digital signal processing (DSP), and a software-

defined feature set. It can be reconfigured for use with future communication devices as the software can easily be updated via the USB interface. An optional 3D engine supports up to eight audio channels in a virtual 3D environment.

With passive and active noise reduction (ANR), it achieves noise attenuation of 36 dB SNR. The integrated AA battery compartment powers ANR and the paging function, so users benefit from maximum hearing protection even when not connected to a communication system. The headset is IP68 certified, and can be immersed in water.

#### **RACAL RA5100 Headset**

The RA5100 is the headset developed for use in the seated and dismounted state. With convincing attenuation of 30 dB SNR, certification according to EN 352-1, -4, -5, -6, and thanks to integrated active noise reduction (ANR), it offers maximum protection for the user – at the highest technical level.

The headset impresses with its high degree of configuration options. The microphone can be easily changed from left to right in a few simple steps, allowing every shooter to use it comfortably with long guns.

Two external microphones and a 4-level volume control provide market-leading 360° ambient noise perception. Even sudden impulse noise when shooting or using hand grenades, for example, is safely reduced to the highest possible level in milliseconds.









#### 2.6.4. Networking/Communication Soldier Close Range

#### Bittium Tough Mobile 2<sup>™</sup> – Tough Mobile 2C<sup>™</sup>

Ultra-secure smartphones "Made in Finland" with intuitive and fully configurable mobile device management

- Secure hardened Android-based 4G LTE smartphone
- Dual SIM with Dual SIM Standby (DSDS)
- Hardware-based security platform
- Integration of proprietary and third-party security solutions (.apks) possible
- Three variants available:
  - Google Mobile Services included (GMS),
  - without Google Mobile Services (non-GMS) and
  - ultra-secure variant with two independent operating systems Tough Mobile 2, approved for NATO restricted level communications
- PTT, privacy button, freely configurable emergency button
- Up to four individually configurable containers (workspaces)
- Secure Suite VPN (AES 256 encryption), MDM with full control over devices, over-the-air updates (OTA) or configuration changes/deletion of devices possible
- Notification of unauthorized access attempts/manipulation

#### Bittium Tough SDR Handheld™

- 1-Channel Radio / Manet
- Frequency range: 30-2,500 MHz
- Channel width: 25 kHz-10 MHz / 25 kHz-5 MHz
- Waveforms
  - Bittium Narrowband Waveform™ (50 kHz)
  - Bittium TAC WIN Waveform™ (5/10 MHz; data throughput up to 36 Mbps)
  - ESSOR High Data Rate Waveform (NATO STANAG 5651, 1.25 MHz bandwidth, high data rate: ~1 Mbps, ~512 kbps, ~256 kbps at radio link, automatically selected. Maximum user throughput up to ~700 kbps with 1 Mbps radio link data rate)
  - Porting of other waveforms possible
- Weight, Dimensions: 1.2 kg / 74 x 244 x 47 mm
- 70 Wh rechargeable lithium-lon battery, wired or wireless integration of Tough SDR Handheld to soldier tablets or smartphones

See 2.5.6. Bittium Tough SDR™

## Soldier Radio Sentry 6161 (DTC)

DTC's Sentry Mesh 6161 is the ultimate personal / squad radio for demanding military applications that require performance, range and versatility in a lightweight and compact wearable unit that minimizes the burden on soldiers. The 6161 is a personal radio for dismounted soldiers built on the latest DTC MANET IP radio technology using the MeshUltra™ tactical waveform and multi-waveform options including TSM integration capabilities.





- Spatial diversity (MIMO 2x2)
- Frequency range: 1.2-1.7GHz (L band variant) (additional bands under development)
- Bandwidth: 1.25-10 MHz
- Power output: 2W RF
- MIL-STD-461G and MIL-STD-810H certified
- 114 x 75 x 29 mm, excluding connector protrusions

The Sentry Mesh 6161 is compatible with a range of military accessories, such as headsets, PPT, antennas, batteries, power and data management systems, and cameras, allowing you to meet your specific mission requirements and combat ensemble configuration.

The Sentry Mesh 6161 is compatible with a range of military accessories, such as headsets, PPT, antennas, batteries, power and data management systems, and cameras, allowing you to meet your specific mission requirements and combat ensemble configuration.

## 2.6.5. Networking/Communication Soldier Long Range

#### HF Manpack SENTRY-H-6110-MP (DTC)

Rugged, portable Software-Defined Radio (SDR) manpack solution for military organizations that require uncompromising, secure voice and data communications on the move. The 6110-MP is an integral part of the Sentry-H product family, meeting the needs of the modern battlefield while providing full backward compatibility with legacy products. The 6110-MP is one of the smallest and lightest HF crew radios available.

It offers powerful 30 W RF power and up to 79 hours of battery life at a weight of less than 4.7 kg, without compromising on features.

See also HF Application SW under 2.5.4.

#### SatCom-on-the-Pause Terminals (Stellar)

	Ovzon T7	Ovzon T6
	On-the-Pause	On-the-Pause
Tx / Rx up to (depending on location)	10/60 Mbps	70/120 Mbps
Typical power consumption	65 W, 24 VDC	140 W, 24 VDC
Dimensions	202x179x78 mm	337x343x57 mm
Weight	2.8 kg	6 kg
Operating temperature	-20 °C to +55 °C	-20 °C to +55 °C
Environment	IP65, MIL-STD-810G	IP65

#### More about Stellar/OVZON-Terminals: see: 2.5.3. SatCom-on-the-Pause/Move





## 2.7. Transport & Packing Solutions (B&W)

Special packaging for every application



Weapon Chest

- Case and gun cabinet in one
- Configurable interior (flexibly adapts to different weapon sizes and instruments)
- Meets the legal regulations for weapon storage (all weapons in the room are visible thanks to the removable lid)
- Safe and protected transport, stackable "like Lego bricks"





#### **Battery Transport Cases**

B&W battery.cases are the ideal solution for the safe storage as well as the transport of intact and defective lithium batteries. Robust and easy to handle thanks to the inner protective metal space. The innovative design of the B&W battery.cases is registered with the German Patent and Trademark Office. The cases are tested and approved as packaging according to the P908 packaging regulation, and therefore suitable for the transport of intact as well as defective lithium batteries on public roads.

## **Energy Cases**

The energy.cases from B&W are mobile power supplies developed for the toughest requirements, regardless of whether 230 V, as from the wall socket, or 24 V direct current is needed. The compact and emission-free power suppliers can be charged with a power supply unit, a truck or car charging cable, or via solar modules, and are just as suitable for stationary continuous operation as for changing mobile applications.



	energy.case PRO500 AC	energy.case PR01500 AC	energy.case PR0500 DC	energy.case PR01500 DC
Battery capacity	500 Wh	1,500 Wh	500 Wh	1,500 Wh
Connectors	1 x 230 V socket, 1 x USB A, 1 x charging input	1 x 230 V socket, 2 x USB A, 2 x charging input	3 x B&W DC socket, 1 x USB A, 1 x charging input	1 x B&W DC socket, 2 x USB A, 2 x charging input
Continuous power	300 W	300 or 1,000 W	300W	24 V up to 500 W further configurations upon request
Charging power	200 W	200 W	200 W	200 W
Charging options	230 V charger, optional: 12 V car, 24 V truck, solar	230 V charger, optional: 12 V car, 24 V truck, solar	230 V charger, optional: 12 V car, 24 V truck, solar	230 V charger, optional: 12 V car, 24 V truck, solar
Operating temperature	-20 °C to +40 °C			
Further information	External keypad, IP54	Available with external or internal keypad, IP65	Internal keypad, IP65	Available with external or internal keypad, IP65
Dimensions	47 x 36.5 x 19 cm	66 x 49 x 33.5 cm	42 x 32.5 x 18 cm	66 x 49 x 33.5 cm
Weight	10.9 kg	29.9 kg	8.7 kg	28.4 kg

#### SatCom: starlink.case

B&W International offers a complete solution for the Starlink system including antenna and battery in a case. With the integrated power supply, the Starlink system is ready for use independently for at least 24 hours.

Case:

- Size/weight: 660 x 490 x 335 mm / 35 kg
- IP65
- Battery: 1,500 Wh / chargeable through 12 V (vehicle), 24 V (truck) or 230 V power supply unit, as well as via solar modules

The battery can also be used to charge cell phones or laptops.



# 3. Overview of Participating Companies



Participating companies and their contributions

#### **ATDI Group**

ATDI is a global leader in spectrum management and electronic warfare solutions, supporting military organisations, defense research agencies, governments, and security forces for over three decades. With deep industry expertise, we enable secure, resilient communications, advanced signal intelligence, and effective spectrum dominance. Our technology-driven approach integrates seamlessly into defense operations, providing real-time monitoring, geolocation, and interference mitigation. By leveraging decades of experience in electromagnetic spectrum management, we deliver cutting-edge solutions that enhance operational readiness, tactical superiority, and national security. ATDI remains a trusted partner in safeguarding mission-critical communications in complex and contested environments.

#### B&T Solutions GmbH (MOSOLF Group)

B&T Solutions GmbH is part of the MOSOLF Group, a specialist in special vehicle construction in the areas of Public Safety & Security, Armored Solutions, Defence, Industry & Public Sector and offers complete solutions from a single source.

We equip vehicles in our production network or supply technical equipment according to customer requirements. With our mobile service team, we also carry out special solutions or retrofitting on site throughout Europe.

In addition to vehicle conversions, we offer holistic solutions in communications technology and component construction from mechanical and armored components to cable harnesses and complete radio cabling to complex information and communication systems.

Portfolio:

- Technical design of special vehicles with integration of complex systems
- Development and production of cable harnesses and electrical components
- Design, mechanical/additive manufacturing
- Special vehicle construction
- Conversion and retrofitting

#### **B&W International**

Rapid deployment, secure command communication, efficient logistics: forces all over the world rely on the mobile defense solutions offered by B&W International. Whether it's self-sufficient energy supply from the case, uncomplicated air transport of lithium-ion batteries, highly sensitive instruments ready to hand, or ad-hoc drone reconnaissance: the modern protective cases offer optimized logistics, cost reduction, speed and efficiency, but, above all, safety and operational readiness.

B&W International is a developer and producer of case solutions for the mobile protection of high-quality, sensitive, and security-relevant instruments, weapons, and ammunition. In addition, B&W excels with comprehensive certifications and approvals as well as well-thought-out full-service support. B&W is thus strategically positioned for rapid customization in the event of special challenges.

#### Bittium

Bittium is a Finnish company with 40 years of experience in radio communication technologies. As a trusted supplier in the Defense & Security market, Bittium provides next-generation mobile tactical communications systems for defense forces. The products and systems bring broadband data and voice seamlessly to all troops across the battlefield. Our offering is completed by mobile devices and cyber security solutions certified up to CONFIDENTIAL and NATO Restricted levels. Bittium is listed on the Nasdaq Helsinki Exchange.

#### Brodit

"Made in Sweden" – Brodit develops, designs and manufactures device and vehicle-specific integration and assembly solutions for tablets, printers, smartphones, radios and GPS devices made of plastic and aluminum. Brodit mounts and charging stations are tailor-made to meet everyday needs.

Brodit is one of the world's leading solution providers for the assembly and integration of mobile devices in vehicles and in demanding environments. Brodit holders for device manufacturers such as Samsung, Apple, Bittium, Ecom, and many others ensure that your devices are safely stored, charged, ready to hand and ready for use at all times.

The owner-managed company, founded in 1983, employs 220 people and exports its products to more than 100 countries.

#### DTC, a Codan Company

DTC is a global company that provides advanced communication solutions worldwide for military, broadcast, law enforcement, unmanned (UxV) systems, commercial and NGO markets. Operating in 150+ countries, we deliver regionally tailored solutions and essential support for mission-critical success. These solutions are designed to thrive in the most austere environments and provide the actionable insights needed to make decisions at the speed of relevance.

With over 65 years in the business, we have garnered a reputation for quality, reliability and trust, producing innovative and industry-leading technology solutions.

DTC is a member of the Codan group of companies.

For more information, visit DTCcodan.com.

#### **Comrod Communications**

Comrod Communication AS is headquartered in Stavanger, Norway, and has facilities in Norway, France, Hungary, and the United States. The group develops and manufactures antennas, antenna combination and control systems, telescopic and sectional masts, power supplies and battery chargers for the tactical communications market. Comrod also designs and manufactures marine antennas for the commercial marine market.

Comrod antenna products cover all frequency bands in the HF, VHF, UHF, and SHF spectrum, and include broadband, multiband and multiport products. These products can solve problems with co-site interference or availability of platform space. In addition to the extensive range of vehicle and manpack antennas, Comrod has a wide range of remote antennas for use with wide area networks, and to expand the range of tactical networks.

## **Dassault Systèmes Deutschland GmbH**

Dassault Systèmes is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating virtual twin experiences of the real world with our 3DEXPERIENCE platform and applications, our customers can redefine creation, production and life-cycle-management processes of their offer and thus have a meaningful impact to make the world more sustainable. We support more than 350,000 customers in more than 150 countries.

## FFG – Flensburger Fahrzeugbau Gesellschaft mbH

In addition to the modernization, conversion, and repair of military vehicles, FFG also offers in-house developments such as the PMMC G5. Taking into account current requirements for standardized armament sets, also in existing vehicles, FFG has worked out a number of concepts with partners.

Over the past fifty years, FFG has consistently developed from a repairer for the German armed forces and armies of friendly nations via upgrade specialization into a vehicle manufacturer and system provider.

These activities have led, among other things, to extensive further developments, such as for vehicles of the Leopard 1 family, M113, and the current development of the NDV Wiesel 1. Within the past few years, FFG has invested in its own developments, and has since been represented on the market with its own vehicle systems.

Thanks to their modularity, the highly protected vehicle platforms ACSV, G5, and WiSENT 2 offer customers a wide range of possible applications, paving the way for FFG to establish itself as a system house on the world market. The focus on maximum flexibility of in-house developments and low life cycle costs form the cornerstone for future-oriented and economical emergency vehicles with a long service life.

## Fraunhofer Institute of Optronics, System Technologies and Image Exploitation (IOSB)

The Defense business unit of Fraunhofer IOSB is guided by the theme of "Consulting and Technology for Defense." It evaluates trends and technologies, tests and develops demonstrators, supports industry, and manufactures innovative equipment.

Core competencies include the acquisition of images and related sensor signals, the associated signal processing, and the use of image data in systems.

At AFCEA 2025, IOSB will show RecceMan<sup>®</sup>, an interactive recognition assistance for imaging reconnaissance, ABUL, an automated image analysis tool for unmanned aircraft, and the digital map table (DigLT) for joint situation work from remote locations and in VR as well as position selection assistants to support operation planning and battle management through terrain evaluation.

#### griffity defense GmbH

griffity defense offers, among other things, comprehensive services related to the development of complex technical and application-related scenarios, from concept creation to support in implementation, e.g. by finding the right partners. One focus is system design and the development of cross-platform architectures and concepts, including tactical scenarios.

#### Imtradex Hör- und Sprechsysteme GmbH

Imtradex Hör- und Sprechsysteme GmbH supports its customers in safety-critical applications under the motto "command & control". Imtradex is the exclusive distributor of the world's leading INVISIO hearing/voice system in the German market. Users in over 50 nations rely on, and accept, this system. Over 250,000 systems have been delivered and are used by military and special forces worldwide in a wide variety of operational areas and climates.

Whether connecting different types of headsets or radios, mobile phones, intercom systems in vehicles, airplanes, helicopters or even boats, flexibility and easy handling are leading the way. The system is also already in use in various federal states and areas of application in Germany.

Since 2021, Racal Acoustics, the English specialist for high-noise and CVC headsets, has been part of the INVISIO group of companies, thus offering an even wider field of applications.

Our latest development allows for an innovative approach in control center and mobile areas; the Mobile Desk Unit (MDU) turns your smartphone into a flexible communication device.

As your partner for professional communication, we offer expertise when it comes to communication under difficult conditions, both dismounted and mounted. We protect hearing and offer individual solutions with suitable means of communication – at sea, in the air, or on land. Simplicity that convinces!

#### Intracom Defense (IDE)

Intracom Defense (IDE) is a recognized defense industry company with a high reputation in Greece and a high export rate to international customers such as Finland, France, Germany, Israel, the UK, and the USA.

IDE uses high-end technologies for the design and development of advanced systems in the fields of tactical IP communications, integrated C4I systems, missile electronics, surveillance, hybrid electric power systems, and unmanned systems. The company is internationally recognized for its long-term participation in European and NATO programs for the development of new technologies.

Leveraging advanced production methods and extensive project management know- how, IDE is a major player in the high-technology sector of the Greek defense industry.

#### Narda Safety Test Solutions GmbH

Lightweight and portable radio direction finders are required for tactical radio surveillance and reconnaissance or own emission control on the battlefield, in border control scenarios, and for intelligence applications. This also enables covert operations, if required. The SignalShark provides efficient support in monitoring, analyzing, and protecting the corresponding frequency spectra as a COTS (commercial off-the-shelf system).

Narda is a market leader in the field of electromagnetic spectrum analysis. Narda develops hand-held, portable and vehicle-integrated direction finders. Our AoA/TDoA hybrid technologies use High Dynamic Range (HDR) SignalShark receivers "Made in Germany" and Narda's unique Automatic Direction Finding Antenna (ADFA). Narda devices are freed from time-consuming export control procedures and can also be used highly effectively in autonomous outdoor remote monitoring stations.

#### Panasonic TOUGHBOOK

As an industry leader in rugged mobile computing, Panasonic TOUGHBOOK offers ready-to-use "fully ruggedized" laptops and tablets that have been tested for reliability and durability according to military standards (MIL-STD 810G) and IP65 and some IP66.

Our COTS-based devices are ideally designed for every mission in the defense sector thanks to modular customization options such as integrated tailor-made military connectors and interfaces, encrypted or quickly removable SSDs and a wide range of accessories, vehicle docking and carrying solutions. Thanks to bright outdoor displays with glove mode, extremely long battery life and hot-swap functions, they guarantee uninterrupted 24-hour use. TOUGHBOOK devices are available with Windows, but are also certified for operation with Red Hat Enterprise Linux.

#### SFC Energy

SFC Energy AG is a leading provider of hydrogen and methanol fuel cells for stationary, portable, and mobile hybrid power solutions. With its Clean Energy and Clean Power Management business units, SFC Energy AG is a sustainably profitable fuel cell producer. The company markets its award-winning products worldwide and has sold more than 75,000 fuel cells to date. The company is headquartered in Brunnthal/Munich, Germany, and operates offices in India, Canada, the Netherlands, Romania, Denmark, the United Kingdom, and the United States. SFC Energy AG is listed in the Prime Standard segment of Deutsche Börse and has been a member of the SDAX selection index since 2022 (WKN: 756857 ISIN: DE0007568578).

#### Stellar

Stellar is a fully equipped teleport service provider with teleports in Germany, Cyprus, and Fiji. We specialize in connecting the Americas, the Middle East, Africa, and Asia via satellite and our own fiber network.

Our experience is in operating bi-directional IP and digital TV distribution platforms. We are passionate about providing turnkey satellite and fiber-based communications solutions that combine the latest and proven technologies, supported by our dedicated and highly responsive team.

Panasonic Avionics leverages Stellar's range and flexibility for commercial use and aircraft communications via satellite. Stellar operates a satellite-based network for the state of Fiji, providing TV broadcasting via satellite.

In the German Heinrich Hertz satellite mission, we play a central role in satellite control and also operate an antenna on our site to support technical experiments. The Heinrich Hertz satellite mission is carried out by the German Space Agency at DLR on behalf of the German Federal Ministry for Economic Affairs and Climate Action (BMWK) and with the participation of the German Federal Ministry of Defense (BMVg).

Today, we are proud of our long-standing relationships with many customers whose businesses have flourished with our support. We believe in the success of our customers, and measure our own success against it.

### TASSTA

TASSTA is the perfect mission-critical solution, developed according to ETSI 3GPP standard, for military operations featuring secure communication, real-time location tracking, a customizable contact list, encrypted text messaging, and an ability to work in low connectivity environments. TASSTA has a user-friendly interface for Android, iOS, and Windows, and runs on mission-critical rugged devices for use in extreme conditions. TASSTA includes a certified emergency alert system that can be triggered quickly to notify other team members of an urgent situation. The device is equipped with GPS, as well as an accelerometer and altimeter, to ensure accurate location and altitude data.

#### Thinklogical

Thinklogical helps defense and intelligence organizations turn all-domain, video-rich data into actionable information, leading by using as well system-immanent collaboration features for faster and better-informed decision-making and improved mission outcomes. Thinklogical's unique highly-secure command and control signal management infrastructure is powered by its IA-certified product line of scalable, modular fiber-optic KVM matrix switch systems.

# 4. Contact Information

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