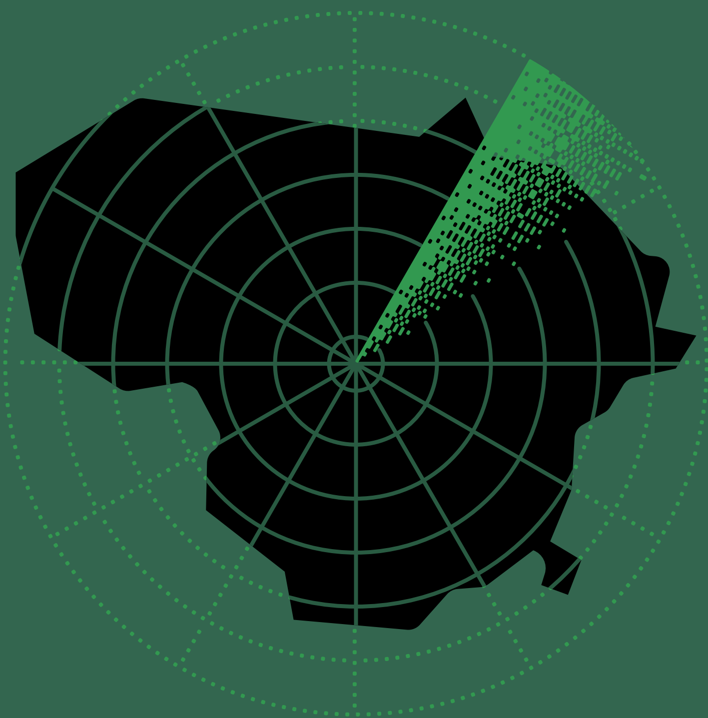
DRONE WALL



THE LITHUANIAN "DRONE WALL"

Introduction

In 2024–2025, Ukraine, drawing on its direct experience of its war with Russia, created an innovative 15 km-deep drone-based "access denial" A2/AD zone known as the "Drone Wall." This system fundamentally changed the dynamics of the battlefield – a model supported by sensors, radars, and drones enabled real-time detection of enemy movement and precise strikes within seconds, without involving live troops in the first contact. This significantly reduced Ukrainian casualties and increased the effectiveness of attacks, turning drones from a supporting tool into the primary instrument at the front.

This system was further strengthened by the transformation of the Ukrainian military that began in 2025, when leadership of the drone forces was taken over by Robert Brovdi – better known as Madjar. He announced a 12-point reform plan that marks a turning point in thinking: moving from decentralized volunteer initiatives to a unified, professional drone army architecture. Each brigade is creating standardized FPV, reconnaissance, and robotic demining units, with clearly defined tactical levels – from company to brigade. Real-time performance evaluation is introduced, along with a digital coordination system that enables reaction in minutes rather than weeks. Every decision – from the type of drone to operator training – is based solely on combat effectiveness. The system becomes a unified cybernetic entity, in which soldiers, analysts, instructors, and manufacturers operate as a single ecosystem, integrated through an AI-coordinated command network.

Ukraine's experience is mirrored by shifts in Western military strategy. The United Kingdom is implementing the "20-40-40" program, which aims for only 20% of its military to consist of traditional heavy weaponry, with the remaining 40% being remotely controlled and 40% autonomous or semi-autonomous systems. Meanwhile, the United States has launched the ambitious "Replicator" project, which seeks to rapidly deploy thousands of cheap, AI-controlled drone systems across all domains: air, land, sea, and even space. The core idea of these programs is not heavy equipment, but "mass without cost": a swarm of small, rapidly producible systems that can be lost without strategic consequence, overwhelming and paralyzing enemy action. Such initiatives show that drone- and AI-based defense is not a vision of the future – it is already the main choice of the most powerful states preparing for future war.

Every war is different. Although Ukraine's example is valuable, the next conflict could look completely different. This was demonstrated by the 2024–2025 Israel–Iran war, which became the first large-scale conflict to combine the use of both long-range rockets and drones. Nevertheless, the direction is clear: the structure dominated by live soldiers and heavy systems is being replaced by robotic solutions, in which sensors, unmanned systems, and artificial intelligence operate as a unified tactical network. Models are already being developed in which autonomous air, land, and naval platforms operate in coordination with manned fire positions. This means that soldiers will no longer be in the line, but in the network.

For Lithuania, as a NATO border state, the "Drone Wall" model is not an option but a necessity. Our territory is small, but our infrastructure – cities, highways, power grids, railways – are vulnerable and cannot be effectively defended by slow, static means based on doctrines of past wars. We need a system that is fast, responsive, autonomous, and capable of striking before the enemy even makes a decision.

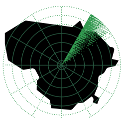
In May 2025, the "Vytautas Magnus Defense Line" was unveiled – a physical four-echelon defense system with border barriers, tunnels, mobile units, and air defense elements. This is an important first step, creating a physical framework for territorial defense. However, modern war is fought not only at the trench level – it begins with a signal, with a sensor, with an autonomous reaction. Therefore, the "Drone Wall" is the next logical step – the technological backbone of this physical line, based on sensor networks, the mass deployment of unmanned platforms, artificial intelligence, and systemic integration.

This system offers a rapid, flexible, and relatively inexpensive solution, based not on theory but on the real lessons of modern war from Ukraine and the real military reforms happening today. If implemented in time, the "Drone Wall" would become a cornerstone of Lithuania's deterrence and defense, requiring neither tank divisions nor billion-euro investments – only strategy, willpower, and coordinated execution. Lithuania must consistently move toward the robotization of its military, as these technologies will act as a multiplier of national defensive power in the future.

Structure of the "Drone Wall": A Multi-layered Autonomous Defense Architecture

The "Drone Wall" is an integrated, multi-layered defense system designed to maximize automation in detecting, assessing, and neutralizing enemy threats. It combines physical, electronic, unmanned, and artificial intelligence components into a unified, decentralized yet coordinated architecture. The goal of the system is to remove humans from the first-response chain and allow technology to react faster than the enemy can act.

Structurally, the "Drone Wall" consists of the following key elements:



1. SENSOR NETWORK

Early Detection and Response Architecture – the first barrier, composed of acoustic, radio-frequency, thermal imaging, seismic, electro-optical sensors, passive and active radars, and electronic warfare modules. These operate continuously, autonomously detecting any movement, heat, noise, or electromagnetic signal, thus creating a comprehensive early-warning shield.

2. CLOSE RANGE RECONNAISSANCE AND FPV DRONE RESPONSE LAYER

The second line, activated within seconds of target identification. These drones scout targets and strike at short distances (1–5 km), acting as "kamikaze" drones with explosives.

3. MEDIUM AND LONG-RANGE RECONNAISSANCE AND ATTACK DRONES

The third and fourth layers, enabling reconnaissance and strikes deeper within enemy operational areas (10–150+ km), including logistics, command posts, and infrastructure. Some of these systems operate autonomously along preplanned routes.

4. HEAVY MULTIROTOR DRONES

Unmanned aerial vehicles operating at night, designed to destroy targets by dropping bombs and mines from the air. They also perform aerial mining functions, creating obstacles along enemy movement routes. In addition to combat tasks, these drones perform logistical functions – delivering ammunition, medical supplies, food, and other necessary provisions to frontline positions.

5. NAVAL DRONES

Maritime Security Component – autonomous surface and underwater platforms designed to detect and neutralize maritime threats. They ensure the protection of ports, coastal facilities, and energy infrastructure against sabotage, mines, or enemy landings from the sea.

6. GROUND DRONES (UGVS)

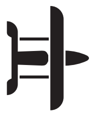
Integrated into the "Drone Wall" - Logistics and Mining – autonomous ground platforms designed to deliver ammunition, food, or equipment without human involvement, as well as deploy or neutralize explosives (mines) directly in the combat zone. These drones make it possible to conduct operations in dangerous areas, reducing personnel losses.

7. MULTI-LAYERED COUNTER-UNMANNED AIRCRAFT SYSTEM (C-UAS)

A system integrated into C5ISR, including both electronic and kinetic neutralization tools. It is based on a ring-shaped deployment from the border to the protection of critical facilities and operates within a unified "common air picture" network. Key elements include interceptor drones, RF jammers, kinetic missiles, towers with AHEAD munitions, and the "Blue Drone ID" identification system. Automated decision algorithms ensure a fast, coordinated response and minimize the risk of friendly fire.

8. C5ISR MODERN BATTLE MANAGEMENT SYSTEM

An AI-powered analysis system that connects all sensors, drones, and operators into a single coordination platform.



9. INTEGRATION OF DRONES INTO THE LITHUANIAN ARMED FORCES STRUCTURE

Incorporating all unmanned systems into the activities of brigades, battalions, and companies through specialized headquarters, strategic units, and standardized training systems. This process includes the management of drone operations, integration of reconnaissance and fire support, as well as adapting logistics and mining functions across different tactical levels.

10. DEFENSE INDUSTRY AND INNOVATION ECOSYSTEM

The modernization of the Lithuanian Armed Forces is based on a strong national defense industry and innovation base. A key element is a state-owned defense holding company uniting local and international partners for joint production and technology development projects. Additionally, following Ukraine's "Brave1" example, the creation of a specialized agency is proposed, tasked with attracting funding, evaluating, and supporting high-value defense technology initiatives. Innovation units within the military would be divisions where soldiers and engineers develop and test solutions based on real operational needs.

This architecture is modular and adaptable to different terrain types and threat levels – from border areas to the protection of military facilities or cities. In the following sections of this document, each of these components will be analyzed separately, with technological parameters, quantities, deployment principles, and preliminary cost estimates.

1 NETWORK OF SENSORS AND RADARS – EARLY DETECTION AND RESPONSE ARCHITECTURE

The essence of modern warfare is not to react, but to prevent. The earlier a threat is detected, the more effectively it can be neutralized. Therefore, an advanced sensor network must become the cornerstone of all modern defense architecture, ensuring uninterrupted monitoring, situational awareness, and threat identification along the entire border and deep within the state's territory.

THE MODEL: DETECT – CONFIRM – CLASSIFY – RESPOND.

The sensor and radar network is the first echelon and the foundation of the entire system, whose purpose is to ensure the earliest, most accurate, and uninterrupted situational awareness about the enemy's presence, movement, or activity at any point along the border. It is based on the principle of "seeing everything, always," using multi-channel sensor fusion and continuous operation without human intervention.

The sensor and radar network not only records events – it classifies, prioritizes, and processes them. This means that every sound, signal, or heat signature is immediately sent to AI modules, which identify the type of threat (human, vehicle, drone), direction, speed, and propose a response model. This network creates an extended electronic barrier, enabling hundreds of small, point-based sensors to function as a unified, collective "sensory skin."

ADVANCED SENSOR AND RADAR ARCHITECTURE

Acoustic sensors – capture low-frequency air vibrations – footsteps, engine noise, sounds of tracks, drone rotors or gunfire. Using artificial intelligence, they recognize object types by their acoustic signature, for example distinguishing human movement from vehicles or small drones. These sensors are particularly important during nighttime, in poor visibility, or in wooded and hilly terrain where optical sensors have limited range – they make it possible to "hear" an approaching threat before it appears visually.

Important: enables detection of threats before they enter the visual zone; smart filters reduce false alarms.

Seismic sensors – capture ground vibrations caused by infantry, ATVs, or tracked vehicles. These sensors are especially effective at detecting objects moving quietly, as well as during challenging weather conditions or low visibility. AI analyzes movement strength, direction, and speed, enabling accurate prediction of when and where the threat will approach. Seismic networks can be hidden underground and function independently of visibility or signal interference, making them indispensable in areas where the enemy might try to infiltrate undetected.

Important: This system is effective for detecting slow-moving or well-camouflaged objects when optical sensors are ineffective.

Electro-optical (EO) and thermal (IR) modules – EO modules provide high-resolution imagery, allowing precise observation of object shapes, movement direction, and environmental context, while IR modules register heat signatures – enabling target detection regardless of lighting or camouflage. Both types usually work synchronously, ensuring continuous monitoring, unaffected by time of day or weather. Using AI algorithms, these sensors can automatically identify and classify objects by their contour, movement dynamics, or thermal profile, reducing human error and speeding up response time.

Important: These are essential for target confirmation. Provide data to towers, balloons, or drones – particularly important for correcting long-range strikes.

PASSIVE RF RADARS AND ELECTRONIC WARFARE

Passive RF radars – advanced SIGINT (signals intelligence) components for monitoring electromagnetic emissions. Unlike active radars, they do not emit pulses but analyze existing signals – radio transmitters, drone control links, relay points, GPS spoofing, 4G/5G pulses, and even Wi-Fi networks. This allows the detection of enemy digital activity hotspots even under heavy camouflage or without visual contact.

Modern sensors such as CRFS, Aaronia, or HENSOLDT conduct multi-channel spectrum analysis in real time, with data synchronized via GNSS. This enables precise triangulation – locating enemy signal sources with 5–20 m accuracy. Such precision is crucial both for tactical decision-making and for determining strike coordinates. Detected RF activity is automatically fed into the Common Operating Picture (COP), where threats are classified, assessed, and incorporated into the real-time decision cycle.

It is important to emphasize that passive RF radars are not just a reconnaissance tool – they are the beginning of the electronic warfare (EW) system. The entire SIGINT architecture must be tightly integrated with active electronic attack (EA) means, allowing not only detection but immediate neutralization of threats.

Electronic attack modules, functioning as "soft-kill" weapons, become the primary response against cheap and mass-deployed enemy FPV systems.

THEY ALLOW:

- Suppression of control and relay links (2.4/5.8 GHz, analog, Wi-Fi, VHF/UHF, 4G/5G);
- Jamming of GNSS signals, rendering drones blind;
- Disruption or destruction of drone onboard electronics via pulsed interference;
- Deception of loitering munitions by simulating fake RF or GPS zones.

Technological examples include Aaronia X-DAR – 3D spatial spectrum analysis with real-time monitoring, Dedrone RF-300 – drone control frequency identification and tracking, Skylock Jammer 5G, KVERTUS EW – tactical or mobile jamming systems.

These tools must operate not as isolated points but as a unified EW system that detects, analyzes, and attacks. Sensors analyze, COP identifies, AI algorithms predict, and EW modules respond. This creates not a passive defense but an active electronic battlefield, in which the enemy's drone network becomes chaotic, uncontrollable, and economically unsustainable. These technologies not only prepare the strike but often are the strike themselves.

Important: passive RF radars not only help identify and locate the enemy but also reveal their intentions, level of electronic warfare readiness, and drone activity centers. They become an integrated part of the electronic warfare architecture, which does not stop at observation – it generates a tactical decision and immediately executes the attack. This expands the fire cycle beyond traditional visual limits and allows striking the enemy before they can make a decision.

Active radars – electromagnetic reconnaissance systems that emit pulses and analyze their reflections from objects. They are used in stationary points, mobile units, or rotating towers. Radars such as Giraffe 1X, Hensoldt TRML-4D, APS SkyCtrl, or Echodyne Echoshield can precisely track even small objects in 3D space – identifying their size, speed, direction, and trajectory.

These radars detect a wide range of objects: small drones (<1 kg) at distances of up to 10–15 km; low-flying threats such as FPV drones or loitering munitions; aircraft, helicopters, and even bird flocks – automatically distinguishing them from threats based on signal signature.

Active radar systems are essential for coordinating defensive response actions – determining firing parameters for kinetic anti-drone systems, adjusting artillery fire, and managing airspace security. They also serve as the primary data source for medium- and long-range strike drones, especially when visual or RF information is limited.

Important: these are the only sensor type capable of detecting unmanned aerial objects that emit no communication signal – e.g., autonomous drones or fiber-optically controlled devices. Such radars become a crucial link for accurately adjusting strike points when targets appear in the operational zone.

SENSOR NETWORK LAYOUT AND INTEGRATION

All sensors must be deployed in layered, consistent, and dense arrangements so that each area is covered by multiple sensors – taking into account threat intensity, terrain, and infrastructure. The sensor network must be connected to a common situational awareness platform (e.g., DELTA, Palantir, SitaWare), where data is processed, classified, and transmitted to operational units in real time.

BY INTEGRATING THESE SENSORS WITH:

- smart jammers;
- the FPV response layer;
- the C5ISR network;
- acybersecurity module,

a fully autonomous early detection and response mechanism is created.

Strategic conclusion: without this sensory architecture, no other "Drone Wall" components have an informational basis. The sensor network is the most important defensive function, enabling surprise avoidance, reducing troop casualties, and moving decision-making to the early phase.

TABLE 1 PROVIDES AN APPROXIMATE BUDGET FOR THE SENSOR AND RADAR NETWORK FOR A 100 KM SECTOR. (P. 15)

2 CLOSE-RANGE RECONNAISSANCE AND FPV DRONE RESPONSE LAYER – DIRECT STRIKE ECHELON

CLOSE-RANGE RECONNAISSANCE

Close-range reconnaissance drones are designed for tactical situational monitoring and target identification. Their role on the battlefield is increasingly important due to low cost, rapid deployment, and the ability to operate in dangerous zones without directly endangering personnel.

These drones feature high-quality imagery, stable control, encrypted communication, and sufficient flight time (30–43 min). Most have optical and digital zoom, allowing observation of targets up to 15 km away without physical approach.

PRIMARY CLOSE-RANGE RECONNAISSANCE TASKS:

- Monitoring enemy movement and fortifications;
- Assessing strike effectiveness;

- Adjusting artillery and FPV strikes;
- Identifying electronic and communication systems;
- Coordinating offensive and defensive actions.

Tactical reconnaissance drones – such as Parrot Anafi UKR, Teledyne FLIR SkyRanger, Atlas Pro, or Skydio X10 – are equipped with thermal cameras, encrypted communication, autonomous return functions, and high-resolution optics. Ukrainian forces also use platforms like Fury and modified FPV drones with HD transmission systems for close-range reconnaissance. These solutions are adapted to operate on the front line under active electronic warfare conditions, ensuring reliable video transmission to brigade-level C2 points via encrypted (e.g., AES) communication systems.

Close-range reconnaissance is an integral component of the "Drone Wall" architecture, ensuring continuous monitoring of the tactical environment and real-time target identification. It links sensors, AI analysis modules, the C2 network, and artillery correction systems into a unified information stream, enabling rapid assessment of enemy actions and precise decision-making. Its purpose is to detect threats before they actively manifest, provide accurate data to strike layers, and ensure coordinated response across the front.

FPV DRONES

The second component of this echelon is the FPV (First Person View) drone response layer, which activates within seconds of target identification. This is the first active strike level, designed for direct and precise enemy neutralization before they can establish positions or take cover. These drones are not intended for reconnaissance – they are strike-oriented, one-time-use tools created for destruction.

FPV drones are lightweight, fast, maneuverable, and relatively inexpensive, allowing for mass deployment even against localized threats. Their main advantage is reaction speed: only a few minutes pass from target detection to strike.

FPV drone operators are deployed at company or battalion level. This is an internal response structure within the units, closely coordinated with an AI-driven analysis and decision-making network. Drones are directly controlled, but target selection, launch timing, and flight trajectory are often automated using real-time analysis systems.

Operational range – 0–10 km radius, depending on terrain, weather conditions, and the level of electronic warfare (EW) interference.

PRIMARY TARGETS:

- Infantry and saboteurs;
- Light armored vehicles;
- Enemy drone operators and their infrastructure;
- Optical / communication systems (ground-based or mobile antennas);
- Logistical chains attempting to cross the contact zone.

FPV drone tactics are based on mass, speed, and repeatability. They do not operate as expensive, one-off solutions – attacks follow the principle of "mass at no cost." If one drone fails to strike, another will succeed.

FPV drones can be assembled on-site, even near the front line. Components include standard FPV frames, batteries, cameras, transmitters, and combat payloads (thermite capsules, improvised devices). Launch sites include tunnels, containers, buildings, and prepared positions.

FPV drones in use include models such as Wild Hornets (Queen Hornet / Sting), TAF Kolibry FPV, RSI Europe Špokas, 3DTech FiberLink FPV, and Terminal Autonomy AQ-400 Scythe – of both Ukrainian and Western origin, selected for their resistance to jamming, payload capacity, signal encryption, or AI integration. They reflect technological diversity and adaptation to different tactical needs – from mass FPV attacks to precise target elimination at night or hunting armored vehicles deep in enemy territory.

CONTAINERIZED FPV DRONE MAINTENANCE SYSTEM

For every 10 km sector, it is recommended to deploy at least one containerized drone maintenance system – a mobile, autonomous module providing technical drone support, logistics, and operator working conditions even under intensive electronic interference.

THESE CONTAINERS ALLOW ON-SITE:

- Charging or replacing batteries;
- Assembling or repairing FPV drones;
- Storing combat payloads;
- Maintaining encrypted communication with the AI network;
- Operating independently of external infrastructure (using solar power, optical, LoRa, or Starlink connections).

Modules are placed every 8–12 km in camouflaged positions, equipped with power sources, components, and workstations. They serve as local "drone airfields" from which continuous FPV operation rotation is organized.

It is important to emphasize that the FPV response is not a standalone tool but a networked, fast-acting strike system, integrating real-time reconnaissance data, algorithmic assessment, and operator skills into a unified reaction chain.

TABLE 2 PROVIDES AN APPROXIMATE BRIGADE-LEVEL BS BATTALION SHORT-RANGE CAPABILITY ESTIMATE (P. 17).

3 MEDIUM - AND LONG-RANGE RECONNAISSANCE AND STRIKE DRONES

This echelon of the "Drone Wall" forms the deep-strike layer – a segment whose primary task is to extend the offensive strike field beyond the contact line. It is part of the drone architecture that takes over functions previously performed only by heavy artillery or tactical aviation, but now executes these tasks faster, cheaper, and without risking pilots' lives.

RECONNAISSANCE DRONES – DEEP INTELLIGENCE LAYER

Medium- and long-range reconnaissance drones ensure detection and observation of enemy defense perimeters, logistics, command posts, and artillery positions at long distances. They act as "eyes" in depth – providing enemy coordinates for HIMARS, FPV, artillery, or loitering munitions.

Drones such as Leleka-100, VXE 30 Stalker, Hornet XR (Širšė), or FlyEye use advanced EO/IR sensors, laser designators, HD or thermal optics, and can operate for 2–8 hours. They are usually controlled from 5–15 km behind the front line using both radio and satellite communication. Their most important function is providing high-quality video data to artillery correction or C4ISR centers.

Some reconnaissance drones also function as relays, maintaining communication with strike platforms deep in enemy territory. Autonomous flight and AI target recognition enable effective operation even under EW interference. The information collected by these drones often forms the basis for decisions in the strike echelon.

STRIKE DRONES – DEEP STRIKE ARCHITECTURE

Strike drones operate 10–150+ km from the front line, destroying tactical and operational targets. Their main strike targets include enemy logistics hubs, ammunition or fuel depots, communication infrastructure, radars, command posts, and EW (electronic warfare) system positions.

Multiple strikes on these targets can create a cascading effect: disrupting supply chains, isolating units, paralyzing artillery coordination, or even preventing withdrawal. Such effects cannot be achieved with conventional infantry or even artillery without significant losses or time. That is why this drone layer becomes a critical factor in modern deep maneuver defense.

The purpose of this echelon is to take over tasks previously assigned only to heavy artillery or tactical aviation, but accomplish them faster, more flexibly, and with significantly lower risk. Unlike HIMARS or artillery shells, which often operate "blindly" – even with coordinate data – strike drones can adapt in real time, adjust targets, or change routes in response to unexpected developments. This is especially important for mobile targets, such as command posts that frequently relocate or EW vehicles that operate intermittently.

These drones also perform follow-up strikes when conventional measures fail to inflict sufficient damage. For example, if a HIMARS rocket destroys a main fuel depot but nearby fuel transport remains intact, a drone can complete the strike within minutes, consolidating the effect and increasing firepower results.

From a technological perspective, medium- and long-range drones operate in two modes. Autonomous mode – with pre-programmed flight routes using GPS or AI target recognition – is most effective against stationary objects deep in the rear where communication coverage is limited or EW interference is active. Other drones operate under operator control – via relays or satellite links – allowing real-time surveillance, target correction, or mission cancellation.

These UAVs are closely integrated with artillery and rocket systems – especially HIMARS, Caesar, and Panzerhaubitze 2000. At the strategic level, this allows the creation of a combined strike cycle, where conventional fire provides an initial effect, and drones ensure correction, targeting, or final neutralization. This model increases fire efficiency, reduces ammunition waste, and allows high-priority targets to be destroyed with minimal resources.

Drones such as Rubaka-M, Bulava, Stork-FPV, UJ-26 Beaver, Darts, Grey Widow, Mugin-5, AN-196 Liutyi, Switchblade 600, Hero-400EC, AQ 100 Bayonet, and Dart 350 are designed to strike operational targets – logistics hubs, EW stations, fuel depots, radar systems, bridges, communications, and other critical infrastructure.

The operation of this layer is entrusted to specialized units operating 5–15 km from the front line. These units consist of operators, engineers, video and AI analysts, logistics, and communications teams.

TABLE 3 PROVIDES AN APPROXIMATE ESTIMATE OF THE BRIGADE-LEVEL MEDIUM- AND LONG-RANGE CAPABILITIES (P. 18).

4 HEAVY MULTIROTOR DRONES

Some strike drones – Nemesis, Kožan, Vampire – belong to the heavy multirotor category. These UAVs, also known as "agro-drones" or "Baba Yaga" class octocopters, are used for precise strikes, aerial mining, or urgent logistics over a 5–25 km range. They have become a key element in Ukrainian drone warfare due to their payload capacity, maneuverability, and ability to operate in challenging conditions.

These drones can carry 15–30 kg of payload, enabling them to perform various tasks – from destroying targets (personnel, fortifications, vehicles, artillery) with mines or specialized explosives, to laying mines along front lines or delivering ammunition and medical supplies to dangerous zones. Due to their high acoustic and thermal signature, they operate primarily at night, using darkness as natural concealment from enemy reconnaissance and air defense systems.

Each large multirotor drone team functions as an independent tactical unit composed of three personnel – a pilot, a target control operator, and a technical specialist. The group is provided with a vehicle equipped with a Starlink terminal, high-capacity battery system (e.g., EcoFlow), drone control equipment, and spare components. Their operational algorithm relies on rapid deployment – usually moving into positions at dusk, establishing 3–7 km from the target, performing several flights, and returning before dawn. Multiple drones are often launched simultaneously to strike several targets from different directions, creating a coordinated offensive effect. After each operation, teams change positions to avoid enemy counter-reconnaissance and fire response.

These drones often operate closely with FPV reconnaissance units, which ensure target verification before the strike and real-time correction. This data cycle significantly reduces the risk of failed attacks and maximizes the effectiveness of each flight. Additionally, some teams operate with artillery units, assisting with target designation or supplementing artillery strikes from the air.

The use of large multirotor drones requires a high level of training and systematic maintenance. Therefore, their operating teams often function as specialized units at brigade or battalion level, with dedicated logistics support, training bases, and technical maintenance chains. In the long term, the development of such units will ensure autonomous firepower without direct artillery support, particularly where the enemy deploys electronic warfare or air defense measures that limit other types of UAV operations.

TABLE 4 PROVIDES AN APPROXIMATE ESTIMATE OF THE BRIGADE-LEVEL CAPABILITIES OF LARGE MULTIROTOR DRONES (P. 19).

5 MARITIME DRONES – NAVAL DEFENSE COMPONENT

For the defense of Lithuania's maritime borders, it is necessary to integrate a network of unmanned maritime systems, which will allow not only monitoring and protecting critical infrastructure but also effectively striking enemy targets at sea. These drones are divided into three main categories: USV (surface), UUV (underwater), and FPV strike maritime drones. Each performs a unique function within the overall coastal defense and deterrence architecture.

USVs (Uncrewed Surface Vehicles) are autonomous or remotely controlled boats that patrol, monitor, and relay communications. They are used for direct coastal defense and enemy activity detection. USVs are often equipped with EO sensors, AIS (Automatic Identification System), RF analyzers, and AI-based recognition systems. Examples include U.S.-made MARTAC T38 Devil Ray or Anduril Ghost Fleet platforms, which feature high speed, maneuverability, and the ability to operate autonomously for multiple days without human intervention. They can be deployed in Klaipėda port, launched from ships or docks, and act as mobile surveillance and deterrence nodes.

UUVs (Uncrewed Underwater Vehicles) are autonomous underwater drones used for mine detection, diver activity monitoring, sabotage prevention, or inspection of critical underwater structures. They are equipped with sonar systems capable of detecting both static and moving objects on the seabed or in the water. Examples include REMUS 300 (HII, USA) and AUV62 (Saab, Sweden), which can be used to protect LNG terminals and ports. UUVs can regularly scan the seabed, pipelines, or detect explosive devices that are otherwise undetectable.

Strike FPV maritime drones are single-use kamikaze UAVs designed to destroy targets at sea or along the coast. Their mission is to infiltrate enemy-protected areas and strike critical targets: warships, landing craft, logistics platforms, coastal radars, or port structures. A notable example is the Ukrainian MAGURA V5, capable of operating up to 800 km, carrying a 200–300 kg warhead, and maneuvering even in rough seas. These drones have a low radar signature, can operate covertly, and strike accurately. They can be launched from shores, special mobile platforms, or concealed docks.

These drones are not only used for attacks but also for preventive and deterrent functions. Strategically deployed, they enable rapid response to any enemy attempt to land on Lithuanian shores. They can also be used for dynamic patrolling of Lithuania's territorial waters.

The MAGURA V5, integrated into the "Drone Wall" C2 network, can be pre-programmed as a coastal "barrier," operating in conjunction with USVs/UUVs, sonars, and aerial surveillance assets. Such a system not only reacts to threats but neutralizes them before they materialize, creating an unpredictable yet continuously active maritime strike risk.

For the Klaipėda LNG terminal, a three-layer protection principle should be applied: underwater (UUV or sonar networks), surface (USV patrols), and air (anti-drone radars and jammers). The Būtingė oil terminal should be monitored with mobile drones, coastal cameras, and sensors. Protection of these sites must be dynamic rather than stationary and extended into the sea, allowing reaction before threats reach a physical boundary.

All maritime components must be integrated into a unified C5ISR control system, ensuring a comprehensive view of both land and sea, coordinated response, and interoperability with NATO C4ISR systems. Launch points can be located in Klaipėda port, Dreverna, Ventė Cape areas, and on mobile maritime platforms, extending coastal control coverage and creating an uninterrupted maritime deterrence buffer across the entire Baltic coast.

6 INTEGRATION OF GROUND DRONES (UGVS) INTO THE "DRONE WALL"

Ground drones are becoming a key component of modern defense architecture, particularly in the "Drone Wall" system, where their role is closely tied to logistical support and engineering defense through remote mine-laying. The experience of the war in Ukraine has shown that autonomously operating or remotely controlled ground drones can maintain an uninterrupted supply chain even under intensive enemy FPV and artillery fire, as well as rapidly and safely create minefields, halt enemy advances, or localize enemy movements.

Logistic UGVs are designed to evacuate casualties, transport ammunition, drone batteries, communication relays, medical supplies, and other critical equipment from logistics bases or containerized drone service points to the front lines. These ground drones can operate autonomously along pre-planned routes or be controlled remotely by an operator from a safe location. They use secure communication channels and can independently bypass jammed zones or dangerous areas, identifying threats using AI analysis. In practice, one such UGV can supply several operator posts or a single drone container, ensuring rapid resupply even under active enemy action. During medium-intensity conflict, it is sufficient to deploy one logistic UGV every 2.5 km, so a 10 km front requires four units. Possible manufacturers include Milrem Robotics (THeMIS Cargo), Rheinmetall (Mission Master Cargo), Elbit Systems (REX MKII), and Ukrainian models (Volya-E, Ratel H, Termit, KNLR-E).

Mine-laying UGVs are remote engineering barrier-formation platforms that allow rapid, precise minefield deployment without direct soldier involvement. They can transport and deploy various types of mines, both anti-personnel and anti-vehicle. Working in conjunction with AI-managed GIS (Geographic Information Systems), these drones accurately mark mined areas on maps, allowing for later monitoring or remote neutralization. For a 10 km stretch, an optimal number is four units, allowing both preemptive barrier creation and tactical response to enemy actions. Possible manufacturers include Milrem Robotics (THeMIS with Scanjack mine-laying module), DOK-ING (MV-4), and Ukrainian models (Ratel S, ARK-1).

Combat UGVs provide direct fire support, suppress enemy positions, and reinforce defensive positions. They are typically equipped with machine guns, automated weapon systems, thermal imaging, and remote control modules. Widely used in Ukraine are systems such as ShaBlya with 7.62 or 12.7 mm machine guns, tracked combat UGVs like Moroz, Lyut, D-11, or modular platforms such as Ironclad, which can function both as transport and fire support units. Combat UGVs are particularly effective in environments with active drone operations, as they can continuously deliver supporting fire from cover or difficult-to-access areas that would endanger human personnel. Possible manufacturers include Ukrainian models (ShaBlya, Ironclad, D-11, Lyut, Moroz), Rheinmetall (Mission Master Fire Support), and Milrem Robotics (THeMIS Combat with PROTECTOR module).

For Lithuania's border territory, it is recommended to deploy one logistic UGV every 2.5 km to serve the FPV operators, communication nodes, or defensive positions in each sector. Mine-laying UGVs should function as mobile units deployed where specific maneuver restrictions are required. Combat UGVs should be used in targeted zones needing fire support or localized suppression of enemy positions. All units must operate in integration with the "Drone Wall" AI control center and receive updates via secure data channels.

TABLE 5 PROVIDES AN APPROXIMATE ESTIMATE OF BRIGADE-LEVEL GROUND DRONE CAPABILITIES (P. 21).

7 LAYERED AIR DEFENSE AGAINST DRONES (C-UAS)

Lithuania's air defense against UAVs must be based on a fully integrated, multi-layered solution, fully incorporated into the national C5ISR architecture. All components – from radars, EO, and IR sensors to interception drones and kinetic neutralization systems – must operate as a unified system connected to a common air picture (CAP). The decision-making chain must be highly automated, from target detection and classification to action selection and execution. Artificial intelligence plays a crucial role, ensuring real-time response and decision-making capabilities even under high-density drone attacks.

It is essential to create a national "Blue Drone ID" system that allows each air defense component to automatically identify friendly drones. This prevents fratricide and ensures drone integration into the overall C5ISR system.

Effective UAV air defense should rely on a layered architecture combining both soft-kill (electronic effects) and hard-kill (physical neutralization) measures.

First defense layer: RF jammers, GNSS signal disruptors, and telemetry interception systems such as DroneShield, TRD, CerbAir, or Rheinmetall Rapid EW. These act as fast-response "electronic extinguishers," particularly effective against standard FPV or commercial drones. However, against autonomous or loitering UAVs operating without active communication, electronic measures alone are insufficient. Therefore, integration with physical neutralization systems – kinetic interception drones, missiles, or kinetic fire platforms – is required to ensure comprehensive protection across threat zones.

SECOND DEFENSE LAYER (HARD-KILL SYSTEMS):

- Interception drones, such as Swift Beat, Fortem DroneHunter, Anduril Interceptor, or other AI-driven autonomous models, neutralize targets over populated areas. Swift Beat systems include an integrated architecture: mobile 3D radar (10–15 km range), EO/IR visual analysis system, and AI decision module. These drones autonomously detect, chase, and kinetically destroy targets even under GPS jamming or at night. In Ukraine, they successfully neutralized hundreds of Shahed-type drones. One system costs under $5,000, a fraction of the target value. Lithuania would require 60–85 such systems to cover cities, critical infrastructure, and mobile defense areas.
- Kinetic missiles, such as Raytheon Coyote or Lithuanian Špokas-K, are designed for long-range target interception. They are highly accurate and suitable for both single drones and swarm attacks, deployable from stationary or mobile platforms.
- Autonomous towers with AHEAD-type ammunition, e.g., Skynex, Gepard, are stationary or mobile fire modules with automated barrels and pre-programmed targeting. They protect critical infrastructure, airports, or military units against high-intensity drone attacks.
- Infantry systems: portable grenade launchers with programmable ammunition, nets, mobile neutralizers, or im-

provised low-intensity solutions. They are easily deployable, suitable for tactical use, and cost-effective.

- Lasers and microwaves – directed-energy weapons that thermally or electromagnetically damage drone structures or electronics. Most effective for close-range defense and in urban environments where explosive collateral damage is a concern. Examples include Rheinmetall HEL, Raytheon HELWS, Epirus Leonidas.
- Autonomous AI interception drones capable of swarm operation represent the future of counter-UAV systems, allowing adaptation to high-density drone attacks in real time. These systems are being tested in the U.S. and Ukraine (e.g., Fortem, Anduril), but require significant investment and testing ranges.

ALL THESE MEASURES SHOULD BE DEPLOYED IN CONCENTRIC RINGS:

1. Border radar, passive sensors, NATO AEW&C, and satellite data integration.
2. National RF jamming network, radar nodes, and interception drone bases.
3. Urban protection, including EO/IR towers, short-range radars, and drone catchers. Municipalities must ensure minimum anti-drone capabilities.
4. Critical infrastructure point defense. Any unidentified drone without “Blue Drone ID” must be considered a threat.
5. Final defense line near troops and command posts: mobile guns, grenade launchers, barrier systems.

ADDITIONALLY, IT IS NECESSARY TO:

- Develop a centralized Drone Identification system, including for U-space operations.
- Develop national kinetic FPV drones for interception.
- Deploy automated response algorithms with human-on-the-loop control.
- Establish a national test and training range for anti-drone technologies.

CONCLUSION:

Electronic warfare tools can act only as temporary “extinguishers” but not as a strategic response. For effective and deterrent drone defense, Lithuania must invest in national kinetic solutions, AI interception architecture, and layered defense from the border to critical infrastructure points. The entire system must be controlled as one – with a single view and decision, faster than the enemy can act.

8 C5ISR – THE DIGITAL BACKBONE OF DEFENSE: FROM SENSOR TO DECISION

C5ISR is the integration of five key defense management areas into a unified, networked, real-time operating architecture: Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance. This means that every defense component—from command decisions (Command) and their execution (Control), to tactical communications (Communications), digital infrastructure (Computers), intelligence analysis (Intelligence), continuous monitoring (Surveillance), and specific target reconnaissance (Reconnaissance)—operates as a single system, ensuring informational dominance. In other words, it is a digital nervous system that allows seeing, understanding, making decisions, and acting faster than the enemy.

For Lithuania, as a NATO border state, C5ISR is not a luxury—it is a necessity that ensures timely response, interoperability with allies, and the ability to command combat operations under the most challenging conditions.

SitaWare is the main management component of the C5ISR architecture, connecting command posts, operator points, tactical-level units, and allied databases. This system ensures a real-time Common Operational Picture (COP), tactical coordination, and interoperability with NATO data exchange standards (MIP/NFFI). It functions as a digital central nervous system, integrating COP, communication channels, logistics information, intelligence data, and infrastructure status into a single dynamic decision-making display.

TO ACHIEVE SUCH SYSTEM EFFICIENCY, IT IS NECESSARY TO:

- Consistently deploy and implement all three SitaWare modules (Edge, Frontline, Headquarters).
- Integrate data from all sensors, drones, and electronic warfare (EW) systems into a unified COP information flow.
- Incorporate artificial intelligence for decision support.
- Implement a resilient tactical communication architecture based on the PACE model (primary, alternate, contingency, emergency communication channels).
- Develop a national C5ISR system fully compatible with NATO interoperability standards.

Only this way can Lithuania transition from linear defense to a fast, networked, and autonomously operating decision cycle.

Currently, the SitaWare Headquarters and SitaWare Edge modules used in Lithuania provide a strong foundation for strategic and local situational awareness management, but full SitaWare Frontline coverage at the tactical unit level is still lacking. Only with the implementation of this component will brigade and battalion leadership be able to make real-time decisions, view COP data, and coordinate actions directly from positions.

In addition to the SitaWare system, it is necessary to integrate open-standard decision-making platforms—such as Ukraine's Delta-type DI systems or their equivalents like US Anduril Lattice or Steel Rock TERRA. These systems would focus on tactical-level action automation and rapid response.

The entire C5ISR architecture would operate on three clearly defined levels:

1. **Edge DI nodes** – deployed every 10 km. They collect and analyze data from RF sensors, radars, optical systems, and reconnaissance drones. Upon detecting suspicious activity, they can automatically initiate FPV counterattacks, activate EW measures, or relay information to a higher command level. They can operate autonomously if communication is lost and synchronize data later.

2. **Operational centers** – established every 30–50 km. They serve as an intermediate command link between edge nodes and the national coordination level. They host visualization systems, encrypted communication, COP management, and human-AI interfaces. AI-suggested actions are verified, approved, or corrected here. In critical situations, they can take over local command.

3. **National coordination center** – located in Vilnius or Kaunas, based on SitaWare Headquarters. This is the highest-level COP management center, integrating data from all border segments, ensuring connectivity with NATO COP/C2 systems and allied networks. Threat analysis, enemy action modeling, response scenario generation, and intersegment coordination—from drone and EW activation to logistics flow management—are conducted here.

THE ENTIRE ARCHITECTURE IS BASED ON A CLEAR INFORMATION FLOW LOGIC:

1. Sensors / Drones → 2. Artificial intelligence analysis (Delta or other edge AI systems) → 3. Processed COP information flow → 4. SitaWare Frontline.

Thus, the SitaWare system receives not "noise" but structured situational information: object coordinates, threat type, and recommended response. Since SitaWare Frontline is intended for tactical users, it must be protected from overload with raw data. Before entering the COP system, data must be transformed—raw sensor signals (sound, heat, RF pulses) are converted into operational events: identified object, location, and threat level. Only such data should reach the decision-making system.

Additionally, the entire structure can be enhanced with Palantir Gotham or equivalent technologies, which integrate satellite, open-source, and drone data into a unified tactical picture. These systems automate object identification, track movement trajectories, and perform in-depth analysis. This analytical layer functions as an external AI core, improving decision quality even under communication or infrastructure disruptions.

The "drone border" management network is not just an addition—it is its central axis, on which the effectiveness of all other components depends. Only a networked, AI-coordinated system can ensure that sensors, FPV drones, electronic warfare, and deep strikes operate as a single fast, adaptive, and self-organizing defense architecture.

IMPORTANCE OF COMMUNICATION ARCHITECTURE

Proper C5ISR operation is impossible without a strong, multi-layered, and resilient communication architecture. Communication is not an optional element but a necessary component that allows sensors, decision-support systems, and command to operate as a unified, coordinated system. Loss of communication in combat conditions means not just an information gap but a breakdown of the decision chain. Every operator, soldier, or autonomous node must be integrated into this networked architecture, where each communication channel is a link in a shared combat awareness.

Therefore, it is necessary to develop various types of communication channels: optical fibers, tactical LTE/5G networks, MESH architecture, VHF/UHF radio, point-to-point laser links, and satellite communication. All channels must operate not as a hierarchical backup list (PACE) but as a parallel, continuously active multi-layer system. Only then, even under strong electronic interference, will it be possible to maintain information flow, ensure command continuity, and avoid tactical gaps.

9 INTEGRATION OF DRONES INTO THE LITHUANIAN ARMED FORCES STRUCTURE

To enhance the operational effectiveness of Lithuania's land force brigades, based on the experience of the war in Ukraine and the accelerating technological transformation of the battlefield, it is proposed to systematically integrate drone components into each brigade, consolidating all assets into a single specialized drone battalion within the brigade. This structure would allow real-time reconnaissance, coordination and execution of precision strikes, neutralization of enemy UAV threats, and progression toward a more automated, unmanned combat model.

MAIN COMPONENTS OF THE DRONE BATTALION:

Drone Operations Headquarters – the central planning and coordination hub of the battalion, responsible for task distribution to companies, situation analysis, synchronizing strikes with brigade artillery, and managing information flows through the COP system. AI solutions are applied here for both Battle Damage Assessment (BDA) and planning precision strikes based on real-time reconnaissance data. The operations headquarters works closely with brigade command, intelligence elements, artillery, and EW assets to ensure unified and agile control.

FPV Company – responsible for offensive operations in the first-line and immediate rear zones (0–10 km). Each team consists of an operator, navigator, and technician. Various FPV drones are used (Wild Hornets, TAF Kolibry, AQ-400 Scythe). The company works closely with the close reconnaissance company and artillery, operating on a rotational basis with teams switching sectors as tactically required. Control is conducted from mobile command posts with EW protection and logistical support.

Close Reconnaissance Company – responsible for surveillance of the 1–10 km area, identifying enemy positions, movements, and fortifications, and transmitting information to the FPV company and C2 systems (DELTA, COP). Drones used: Skydio X10, Parrot Anafi, Atlas Pro. Teams also handle fire adjustment, coordinating with battalion and brigade networks to ensure information integrity.

Heavy Multirotor Drone Company – performs several key functions: logistics delivery (ammunition, medical supplies), tactical evacuations (CASEVAC), and offensive armed drone operations. Heavy multirotors (Baba Yaga type) are used for grenade delivery, night strikes, and transport missions. Operations are closely coordinated with the engineering support company, particularly in configuring payloads.

Fixed-Wing Company – responsible for reconnaissance and precision strike operations in the brigade's area of responsibility (10–50+ km). Drones used for reconnaissance: Leleka-100, FlyEye, Hornet XR, VXE30 Stalker. For strikes: Rubaka-M, Hero-400EC, Bulava, UJ-26 Beaver. Teams operate both according to pre-planned missions and in response mode, using relay modules and AI planning solutions.

UGV Company – a unit of autonomous ground platforms responsible for tactical support, logistics tasks, reconnaissance, and performing hazardous missions without personnel involvement. The company includes three functional platoons: logistics, strike, and reconnaissance-engineering. The logistics platoon transports ammunition, equipment, and supplies to the front line, conducts casualty evacuation, and collects returning drones. The strike platoon deploys UGVs with remote mining systems or explosives for target neutralization and fire support. The reconnaissance-engineering platoon conducts close reconnaissance, deploys communication relays, smoke screens, electronic warfare tools, and performs special engineering tasks in hazardous areas. The company relies on containerized control stations.

Engineer Support Company – the technical backbone responsible for the battalion's equipment maintenance, repairs, and the implementation of innovations. Tasks include 3D printing, software updates, and replacement of sensor modules. The company manages mobile container workshop units that can be deployed to frontline positions. It also ensures data encryption, communication security, and the testing of specialized equipment.

Training Center – the battalion's internal training structure responsible for professional preparation of all unmanned system operators. The center conducts systematic training for FPV drone pilots, reconnaissance UAV operators, relay and logistics drone operators according to differentiated training programs. Training focuses on realistic combat conditions and includes both theoretical preparation and practical mission simulations. VR simulators, interactive tactical trainers, AI-based training platforms, and field exercises with training drone models are extensively used.

The Training Center is also responsible for instructor preparation, developing standardized course programs, and continuously updating them in line with the latest battlefield tactics, enemy capabilities, and technological changes. It acts as a multiplier of combat experience, ensuring that each operator is trained not only to operate equipment but also to make independent tactical decisions under dynamic combat conditions.

Electronic Warfare (EW) Company – a unit responsible for detecting, jamming, and neutralizing enemy UAVs. Mobile stations (SkyWiper, Skynex) and portable jamming devices, particularly for frontline protection against FPV threats, are deployed. The EW company also protects relay channels, stabilizes its UAV network, and cooperates with all battalion companies. It operates as a fully integrated component coordinated with the brigade's REW (Radio Electronic Warfare) network.

This concentrated battalion-level structural solution creates a unified unmanned systems management ecosystem, where rapid response, efficient resource and personnel allocation, technical integrity, and tactical decision flexibility become a necessity rather than an advantage. This internal integration allows the unit to independently plan, manage, and execute the entire operational cycle—from reconnaissance and target analysis to strikes and BDA assessment. Considering the dynamics of modern warfare, EW interference, and operations in both open and urban environments, this structure allows the unit to quickly adapt, operate independently, and maintain operational capability even if external communications are lost. In the context of the Lithuanian Armed Forces, this represents a crucial step toward a fast, intelligent, and autonomously operating combat structure.

10 DEFENSE INDUSTRY AND INNOVATION ECOSYSTEM

The development and modernization of the Lithuanian Armed Forces are inseparable from a strong national defense industry and systematic implementation of technological innovations. Modern warfare realities have shown that technological lag not only costs lives but also undermines the ability to resist. A lagging military cannot effectively stop, neutralize, or deter enemy actions and becomes vulnerable both on the frontline and at strategic points. Today, successful states are those that can quickly adapt civil, academic, and industrial capabilities into operational solutions. To ensure consistent technological progress, the state must strengthen its ability to coordinate and fund the defense industry. The optimal solution could be a state-owned defense holding, supporting the growth of Lithuanian defense companies. At the same time, innovation must be generated and implemented within the military itself—through specialized units capable of rapidly adapting technology to real needs.

STATE DEFENSE HOLDING – CATALYST FOR MILITARY INDUSTRY DEVELOPMENT

A key element of Lithuania's defense ecosystem could be a state-run defense holding, serving as a national military industry development engine. Its main function would be to systematically finance, assemble, and grow defense companies by investing in their capital, helping them establish, expand, and secure a presence in both Lithuanian and international markets.

The holding should focus on industrial development in critical defense sectors—from drone production, ammunition, and components to electronic warfare, sensors, optics, AI systems, energy modules, and tactical equipment. It could also act as an early-stage investor in defense startups, providing not only capital but also access to testing infrastructure and integration with military requirements.

An example is a joint project with Rheinmetall to create artillery ammunition production capacity in Lithuania. Such projects build long-term strategic value, strengthen the country's defense self-sufficiency, and ensure critical resources are produced domestically rather than imported during conflict.

The holding's partners would include both foreign defense industry leaders seeking regional production capacity and Lithuanian technology companies, research institutes, or engineering startups aiming to establish themselves in defense. The holding acts as a bridge between military needs and business opportunities, ensuring the state not only purchases but also produces, exports, and develops strategic technological potential.

Increasing defense funding to 5% of GDP from next year must include allocation not only to armaments but also to the growth of the national defense industry and the creation of production capabilities. This would strengthen technological independence, create high-value jobs, and enhance Lithuania's role as a regional defense provider.

VYTISTECH – MILITARY INNOVATION CENTER

Additionally, inspired by Ukraine's successful "Brave1" project, it is proposed to establish a specialized national structure in Lithuania—the VytisTech Military Innovation Center. Its main goal is to create a coordinated, rapid-response platform promoting the development, testing, and integration of high-value defense technologies into military structures. The center would act as a bridge between the armed forces, startups, research institutes, universities, and the private sector, concentrating resources, knowledge, and experience toward a national goal: technological defense advancement.

Activities would focus on several strategic directions: identifying priority military technologies, funding early-stage projects, testing prototypes under real conditions, and rapidly applying them. The center would have an internal funding pool, the ability to attract international investment, and support targeted solutions—from autonomous drones to AI, C5ISR systems, or electronic warfare tools.

A distinguishing feature of the center is rapid action. Unlike slow public procurement procedures, it would operate on a rapid-response principle, with a streamlined evaluation process, criteria aligned to military needs, and the ability to test prototypes directly with soldiers. This would create a living innovation ecosystem grounded in combat experience, tactical requirements, and the ability to generate solutions at the operational level rather than theoretically.

Over time, VytisTech could grow into a regional platform covering the Baltic states, becoming a significant node for strengthening NATO's Eastern Flank technological capabilities. Ukraine's experience demonstrates that battlefield-born innovations often outpace traditional industrial solutions—Lithuania needs a structure that not only follows these trends but actively shapes them.

INNOVATION UNITS IN THE ARMED FORCES – ENGINES OF TECHNOLOGY TRANSFER

To maintain combat advantage in a dynamic threat environment, it is necessary not only to produce but also to test, refine, and rapidly adapt technologies according to military needs. Innovation units—specialized Lithuanian Armed Forces units closely collaborating with the Ministry of Defense, the State Defense Holding, the Military Innovation Center, academic institutions, and technology developers—are required.

In these units, soldiers, engineers, and technical specialists must have the opportunity to experiment, build, and test prototypes under real conditions, including close interaction with frontline requirements. The priority is rapid transition from idea to functional solution.

Example technologies suitable for testing within the "Drone Wall" context:

- Augmented reality goggles (Lightspace3D, Latvia) – display real-time drone views, situational maps, and allow commanders to mark targets.
- Silent fuel cell generators (SFC, Germany) – produce no heat or sound signature, suitable for mobile bases.
- Camouflage nets (SSZ, Switzerland; Miranda, Poland) – reduce visibility in visual, thermal, and radar spectra.
- Remote-operated firing systems – mounted on logistics vehicles or as individual soldier modules, allowing firing from safe positions.

The goal of innovation is not theoretical experiments but practical solutions that increase situational awareness, precision, survivability, and soldier safety. Innovations must be generated from the units themselves—from those operating at the frontline, not in offices.

A modern military is one capable of self-improvement faster than the enemy can catch up. Achieving this requires a clearly defined National Defense Industry Development Strategy, based on long-term investments, close collaboration with science and technology sectors, and operational military needs. Only then can technological potential be purposefully directed toward practical solutions that directly impact defense effectiveness and deterrence capabilities.

Conclusion

The “Drone Wall” is a multi-layered, advanced defense system designed to fundamentally modernize Lithuania’s national defense principles and establish a new technological operational model. It is based on the latest principles of modern warfare, emphasizing decentralized, automated, and rapid-response structures built on sensor networks, unmanned aerial vehicles, artificial intelligence, and tactical-level autonomy.

The system integrates a wide range of technologies: from multispectral sensors, SIGINT, and FPV drones to deep-strike platforms, robotic ground and maritime systems, electronic warfare modules, and AI-based situational analysis. These tools form a unified architecture in which information collection, decision-making, and threat response occur in real-time with AI-enabled solutions.

Unlike classical hierarchical defense systems, the “Drone Wall” operates on a networked warfare logic. It emphasizes speed, situational awareness, and the ability to act before the enemy. It is an architecture that not only reacts but anticipates—detecting, forecasting, and initiating actions before the enemy actively engages. Such a system allows not only defense but also seizing the initiative even when the enemy has numerical or firepower superiority.

This defense architecture encompasses not only unmanned systems and AI but also the integration of all national institutional decisions—from reviewing defense doctrine, military structure, and strengthening C5ISR to establishing the national defense holding and VytisTech innovation center. The “Drone Wall” covers all operational levels: from reconnaissance sensors at the border to central command nodes, from FPV operators to autonomous ground drones and deep-strike architecture.

It is not just a technological solution. It is a strategic stance, demonstrating that Lithuania will not only defend itself but act faster, smarter, and more effectively. It reflects the state’s capability to organize its protection based on knowledge, awareness, and precise response. This system demonstrates that a modern state bases its defense not on tank numbers but on the ability to systematically use all reconnaissance, strike, and coordination tools in real-time.

The “Drone Wall” is not a hypothetical vision but a practical, implementable model, with each component already operational on the Ukrainian frontline and in Israeli defense structures. Implementing it would strengthen Lithuania’s position as a state capable of employing the most advanced next-generation defense solutions.

Therefore, the “Drone Wall” is today not an option but a strategic necessity. It is an opportunity to reorient the national defense system to the realities of the 21st century, supported by actionable solutions that do not merely react but preempt. It is Lithuania’s answer to a new type of warfare—fast, smart, and technologically superior.

ATTACHMENTS

TABLE 1

Estimate: sensor system (for a 100 km section)

The likely area of responsibility for a single brigade in Lithuania – 100 km.

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
Acoustic sensors	600	500	300,000
Acoustic sensors – loss replacement (20%)	120	500	60,000
Seismic sensors	400	700	280,000
Seismic sensors – loss replacement (20%)	80	700	56,000
RF analyzers (tactical)	60	7,000	420,000
RF analyzers (tactical) – loss replacement (25%)	15	7,000	105,000
Passive RF radar nodes	20	90,000	1,800,000
Passive RF radar nodes – loss replacement (30%)	6	90,000	540,000
Thermal imagers (IR)	200	3,500	700,000
Thermal imagers (IR) – loss replacement (25%)	50	3,500	175,000
EO cameras (high-end)	100	5,000	500,000
EO cameras (high-end)) – loss replacement (20%)	20	5,000	100,000
IR tripwire systems	250	400	100,000
IR tripwire systems – loss replacement (20%)	50	400	20,000
Modular observation towers	60	30,000	1,800,000
Modular observation towers – loss replacement (30%)	18	30,000	540,000
Active radars (for drone detection)	20	200,000	4,000,000
Active radars (for drone detection) – loss replacement (40%)	8	200,000	1,600,000
Electronic attack modules	60	25,000	1,500,000
Electronic attack modules – loss replacement (30%)	18	25,000	450,000
Communication network equipment	100	2,000	200,000
Communication network equipment – loss replacement (40%)	40	2,000	80,000
Power modules	200	1,500	300,000
Power modules – loss replacement (20%)	40	1,500	60,000
Engineering works	-	-	800,000
Local AI analysis equipment	-	-	400,000
Local AI analysis equipment – loss replacement (20%)	-	-	80,000
In total	-	-	13,100,000
In total – loss replacement (20%)	-	-	3,866,000

In total (without reserves): 16,966,000 €

Reserves (10%): 1,696,600 €

IN TOTAL (WITH RESERVES): 18,662,600 €

Calculation logic (summarized):

- Active radars and communication nodes – ~40%.
- Passive RF nodes, towers, EW – ~25–30%.
- Optical, acoustic, seismic sensors and AI nodes – ~20%.
- Installation work – 0%.

Notes

- Acoustic sensors – purpose: Detection of sound sources (footsteps, engines, drones)
- Acoustic sensors – note: SenseGuard type used in Ukraine
- Seismic sensors – purpose: Detection of ground vibrations (people, vehicles)
- Seismic sensors – note: Metrum or geophone type with AI module
- RF analyzers (tactical) – purpose: Portable RF analyzers for local detection
- RF analyzers (tactical) – note: Aaronia Spectran V6
- Passive RF radar nodes – purpose: Triangulation, COP integration
- Passive RF radar nodes – note: CRFS Node+SensorCore with GNSS and AI
- Thermal imagers (IR) – purpose: Observation of heat-emitting objects
- Thermal imagers (IR) – note: FLIR Boson / Teledyne level
- EO cameras (high-end) – purpose: High-resolution optical observation
- EO cameras (high-end) – note: Teledyne, Sierra-Olympia or AXIS Q60
- IR systems – purpose: Beam sensors at crossing points
- IR systems – note: Optex AX-350, AX-650, military adaptations
- Modular observation towers – purpose: Autonomous towers with EO/IR/RF and AI
- Modular observation towers – note: Anduril Sentry or equivalents
- Active radars (for drone detection) – purpose: Detection of UAVs without RF emission
- Active radars (for drone detection) – note: Giraffe 1X, SkyCtrl Mobile, RADA RPS-42
- Electronic attack modules – purpose: EW jamming and suppression
- Electronic attack modules – note: Skylock 5G, KVERTUS SkySec, Dedrone Jammer
- Communication network equipment – purpose: Starlink, LoRa, retransmission
- Communication network equipment – note: Starlink terminals + LoRa routers
- ower modules – purpose: Solar panels + batteries
- Power modules – note: Victron, EcoFlow suitable for military use
- Engineering works – purpose: Installation, camouflage
- Engineering works – note: Installation of trenches, shelters, camouflage works
- Local AI analysis equipment – purpose: Edge AI nodes
- Local AI analysis equipment – note: Nvidia Jetson / Intel NUC + encryption

TABLE 2

Estimate: BS battalion short-range company

(FPV + Close Reconnaissance)

All missing items restored (Starlink, tablets, etc.). Losses: recon UAVs and antennas 50%, other components 20%.
FPV teams: 16 (8 active); Artillery reconnaissance teams: 32 (16 active).

A. FPV Company – Combat Drone and Munition Requirements (30 days)

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
FPV drones (kamikaze)	7200	600	4320000
Combat munitions (average loadout)	7200	200	1440000

B. FPV Company – Equipment and Losses

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
Operator control kits (goggles + controller + Rx)	32	1500	48000
Operator control kits – loss replacement (20%)	6	1500	9000
LiPo batteries (high voltage) – inventory	150	50	7500
LiPo batteries – loss replacement/burnout (20%)	30	50	1500
Charging stations	8	400	3200
Charging stations – loss replacement (20%)	2	400	800
Antenna/retransmission kits	8	2000	16000
Antenna/retransmission kits – loss replacement (50%)	4	2000	8000
UHF/VHF radio communication kits for one team	8	900	7200
UHF/VHF radio communication kits – loss replacement (20%)	2	900	1800
Starlink terminals (FPV – active posts)	8	2000	16000
Starlink terminals (FPV) – loss replacement (20%)	2	2000	4000
2.2kW Generators (Honda EU22i class)	8	1300	10400
2.2 kW Generators – loss replacement (20%)	2	1300	2600
EcoFlow (1 kWh) power modules	16	1000	16000
EcoFlow (1 kWh) – loss replacement (20%)	3	1000	3000
Antenna masts and cables	8	300	2400
Antenna masts and cables – loss replacement (50%)	4	300	1200

C. Close Reconnaissance Company – Equipment and Losses

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
Recon UAVs – active inventory (EO/IR, encrypted communication)	32	8800	281600
Recon UAVs – loss replacement (50%)	16	8800	140800
Additional batteries for recon UAVs (6 units/UAV)	192	150	28800
Chargers for recon UAVs	8	300	2400
Video retransmission kits for recon	4	2000	8000
Video retransmission kits for recon – loss replacement (50%)	2	2000	4000
Antenna masts and cables	16	300	4800
Antenna masts and cables – loss replacement (50%)	8	300	2400
Tablets / C2 terminals (rugged)	24	1200	28800
Tablets / C2 terminals – loss replacement (20%)	5	1200	6000
Starlink terminals (Artillery reconnaissance – active posts)	16	2000	32000

Starlink terminals – loss replacement (20%)	3	2000	6000
Generators 2.2 kW (Honda EU22i class)	16	1300	20800
Generators 2.2 kW – loss replacement (20%)	3	1300	3900
EcoFlow (1 kWh) power modules	32	1000	32000
EcoFlow (1 kWh) – loss replacement (20%)	6	1000	6000

TOTAL (FULL VERSION, WITH LOSSES 50% / 20%): €6,526,900

TABLE 3

Estimate: BS battalion medium- and long-range fixed-wing company (attack + reconnaissance)

Losses: recon UAVs 20%, antennas 50%, other components 20%.
Attack teams: 4 (4 active); Long-range reconnaissance teams: 4 (4 active).

A. Attack company – combat drone requirements (30 days)

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
Strike drones Grant Autonomy (with warhead)	1200	25,000	30,000,000

B. Attack company – equipment and losses

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
Operator control kits (goggles + controller + Rx)	8	1,500	12,000
Operator control kits – loss replacement (20%)	2	1,500	3,000
LiPo batteries (high voltage) – inventory	150	50	7,500
LiPo batteries (high voltage) – inventory – loss replacement (20%)	30	50	1,500
Charging stations	4	400	1,600
Charging stations – loss replacement (20%)	1	400	400
Antenna/retransmission kits	8	2,000	16,000
Antenna/retransmission kits – loss replacement (50%)	4	2,000	8,000
UHF/VHF radio communication kits for one team	4	900	3,600
UHF/VHF radio communication kits for one team – loss replacement (20%)	1	900	900
Starlink terminals (attack posts)	4	2,000	8,000
Starlink terminals (attack posts) – loss replacement (20%)	1	2,000	2,000
Generators 2.2 kW (Honda EU22i class)	4	1,300	5,200
Generators 2.2 kW – loss replacement (20%)	1	1,300	1,300
EcoFlow (1 kWh) power modules	8	1,000	8,000
EcoFlow (1 kWh) power modules – loss replacement (20%)	2	1,000	2,000
Antenna masts and cables	4	300	1,200
Antenna masts and cables – loss replacement (50%)	2	300	600

C. Long Range Reconnaissance Company – Equipment and Losses

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
Recon UAVs – active inventory (EO/IR, encrypted communication)	8	8,800	70,400
Recon UAVs – loss replacement (20%)	2	8,800	17,600
Additional batteries for recon UAVs (6 units/UAV)	48	150	7,200

Chargers for recon UAVs	4	300	1,200
Video retransmission kits for recon	4	2,000	8,000
Video retransmission kits – loss replacement (50%)	2	2,000	4,000
Antenna masts and cables	8	300	2,400
Antenna masts and cables – loss replacement (50%)	4	300	1,200
Tablets / C2 terminals (rugged)	8	1,200	9,600
Tablets / C2 terminals (rugged) – loss replacement (20%)	2	1,200	2,400
Starlink terminals (long-range recon posts)	4	2,000	8,000
Starlink terminals (long-range recon posts) – loss replacement (20%)	1	2,000	2,000
Generators 2.2 kW (Honda EU22i class)	4	1,300	5,200
Generators 2.2 kW (Honda EU22i class) – loss replacement (20%)	1	1,300	1,300
EcoFlow (1 kWh) power modules	8	1,000	8,000
EcoFlow (1 kWh) power modules – loss replacement (20%)	2	1,000	2,000

TOTAL (FULL VERSION, WITH LOSSES 50% / 20%): €30,233,300

Notes

- Grant Autonomy cost consists of €10,000 per drone body and €15,000 per combat payload.
- Quantity calculation performed using the formula: number of teams × number of days × 10 drones consumed per day.
- Losses included: recon UAVs – 20%, antennas and retransmission kits – 50%, other equipment – 20%.
- Estimate prepared at the company level: 4 attack and 4 reconnaissance teams.

TABLE 4

Estimate: BS battalion heavy multirotor drone company

Losses: heavy UAVs 20%, antennas 50%, other components 20%.

Heavy drone teams: 8 (8 active).

A. Heavy multirotor drone company – combat drones and munitions requirements (30 days)

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
Heavy strike drone platforms (1 drone per team per day, 30 days, 8 teams)	240	20 000	4 800 000
Combat munitions (mines, special explosive devices) – STRYKI requirement (60% of flights)	1728	1 500	2 592 000

B. Heavy Multirotor Drones – Equipment and Losses

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
Operator control kits (goggles + controller + Rx)	16	1,500	24000
Operator control kits – loss replacement (20%)	3	1,500	4500
LiPo batteries (high voltage) – parkas	80	50	4000
LiPo batteries – loss/burnout replacement (20%)	16	50	800
Charging stations	8	400	3200
Charging stations – loss replacement (20%)	2	400	800
Antenna/retransmission kits	8	2,000	16000
Antenna/retransmission kits – loss replacement (50%)	4	2,000	8000
UHF/VHF radio communication kits for the team	8	900	7200
UHF/VHF radio communication kits – loss replacement (20%)	2	900	1800

Starlink terminals (active posts)	8	2,000	16000
Starlink terminals – loss replacement (20%)	2	2,000	4000
Generators 2.2 kW (Honda EU22i class)	8	1,300	10400
Generators 2.2 kW – loss replacement (20%)	2	1,300	2600
EcoFlow (1 kWh) power modules	16	1,000	16000
EcoFlow (1 kWh) – loss replacement (20%)	3	1,000	3000
Antenna masts and cables	8	300	2400
Antenna masts and cables – loss replacement (50%)	4	300	1200
Tablets / C2 terminals (rugged)	8	1,200	9600
Tablets / C2 terminals – loss replacement (20%)	2	1,200	2400

TOTAL (FULL VERSION, INTENSE COMBAT: 1 DRONE PER TEAM PER DAY) – €7,529,900

Notes

1. The cost of heavy multirotor drones (Nemesis, Kožan, Vampire) is estimated based on publicly available and semi-public sources; the average market value is approximately €20,000 per unit (excluding combat payload).
2. The cost of combat munitions (mines, explosive devices) is calculated at an average of €1,500 per unit, based on experience from the war in Ukraine.
3. Loss rates: UAVs and other components – 20%, antennas/retransmission systems – 50%, as determined in other battalion sections.
4. Equipment and infrastructure (Starlink, generators, EcoFlow, tablets) are calculated according to standardized battalion requirements, maintaining a consistent logistics model with FPV, reconnaissance, and fixed-wing companies.
5. The estimate is prepared based on a 30-day active operations model, including spare components and anticipated losses.

Additional notes on costs and calculation method:

Munitions price range: 82 mm mine ~€300–600, 120 mm mine ~€1,000–1,500, special 15–30 kg improvised devices ~€1,500–3,000, €5,000 – reserve maximum (thermobaric or with complex fuses).

The estimate uses an average of €1,500 per munition.

Calculation scheme: 12 munitions per night per platform × 30 days × 8 platforms = 2,880 munitions/month; after subtracting 40% for logistical flights (leaving 60% for strikes) – 1,728 munitions/month for strikes.

Note on platform losses:

Based on Ukrainian experience, “Baba Jaga” type drones (Vampire, Nemesis, Kožan) are lost approximately every 5–10 missions.

If it is assumed that “Baba Jaga” type drones survive only 5–10 missions, and a team performs 10 flights per day, then each team requires at least one new drone per day.

This means: 8 teams × 30 days = 240 drones/month for intensive combat.

TABLE 5

Estimate: BS battalion UGV (unmanned ground vehicle) company

Losses: UGVs 30%, antennas 50%, other components 20%
UGV teams: 8 (8 active)

A. UGV company – logistical and mine-laying drone requirements (30 days)

COMPONENT	COUNT	COST (€/UNIT.)	SUM (€)
UGV platforms – logistical	15	40 000	600 000
UGV platforms – mine-laying	20	40 000	800 000
Tablets	8	1 000	8 000
Communication antennas / Starlink	8	1 500	12 000
Batteries and generators	8	5 000	40 000
Control kits (C2)	8	5 000	40 000
Vehicles (pickup)	2	50 000	100 000
Service and spare parts (~15%)	-	-	210 000
Total:			1 810 000

Notes

Logistical UGVs: one team conducts approximately 90 missions per month; the lifespan of a single UGV is 15–30 missions. Therefore, 4 teams require ~15 platforms/month (including reserve).

Mine-laying UGVs: one team conducts approximately 45 missions per month; the lifespan of a single UGV is 10–15 missions. Therefore, 4 teams require ~20 platforms/month (including reserve).

Service line (15%) is calculated from the value of the platforms (€1.4 million).

All teams are integrated into the C5ISR COP network, so additional tablets, antennas, and control kits are included.

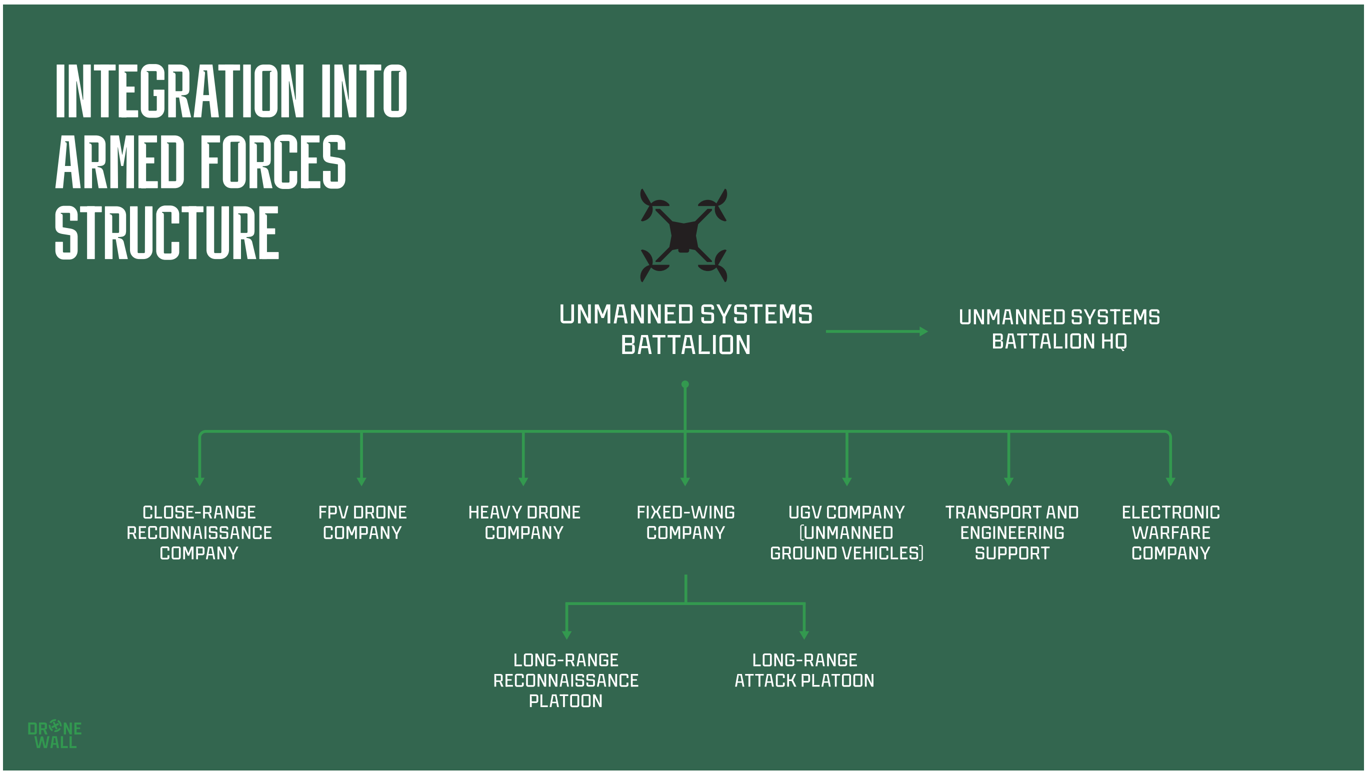
Final total: ~€1.81 million

TABLE 6

Appendix: Specialized Unmanned Systems (BS) Battalion

Appendix includes the structure of the BS battalion, company composition, and equipment allocation. All units are integrated into the brigade C2/C3 system and interact with ISR, FPV, UGV, fixed-wing, air defense against UAVs, RER/EW, logistics, and medical elements. Tables are presented in a modernized format, maintaining clarity and structured information.

Specialized Unmanned Systems (BS) Battalion



Note: Diagram of the unmanned systems battalion, which is responsible for a defense sector approximately 40 km wide. Additionally, the battalion should include units for command, communications, and first medical aid support.

CLOSE RECONNAISSANCE COMPANY

Personnel of the Close Reconnaissance Company

The Close Reconnaissance Company consists of 4 platoons. Each platoon has 4 sections, and each section has 2 squads. In total, the company forms 32 separate close reconnaissance teams, with 3 soldiers in each. Two teams (one section) operate in shifts from a single position.

UNIT	DUTIES	PERSONNEL COUNT
Artillery section		
	Operator No. 1	2
	Operator No. 2	2
	Assistant	2

Drones and equipment:

- Control transmitter
- Drones (2–4 units)
- Active antenna(s) (e.g., Alientech Duo II, Avenge Angel, etc.)
- Cable (8–10 m)
- Antenna stand
- Power bank (for additional transmitter power supply)
- Drone batteries (10–20 units)
- External monitor

Starlink equipment:

- Antenna
- Router
- Cable (10–20 m)

Power sources:

Generator (e.g., Honda EU22i, max power 2.2 kW)

EcoFlow units ×2 (e.g., EcoFlow Delta 3, capacity 1024 Wh)

Fuel for generator

Computing / communication devices:

Tablet 1 (for map applications such as TAK, MilChat, etc.)

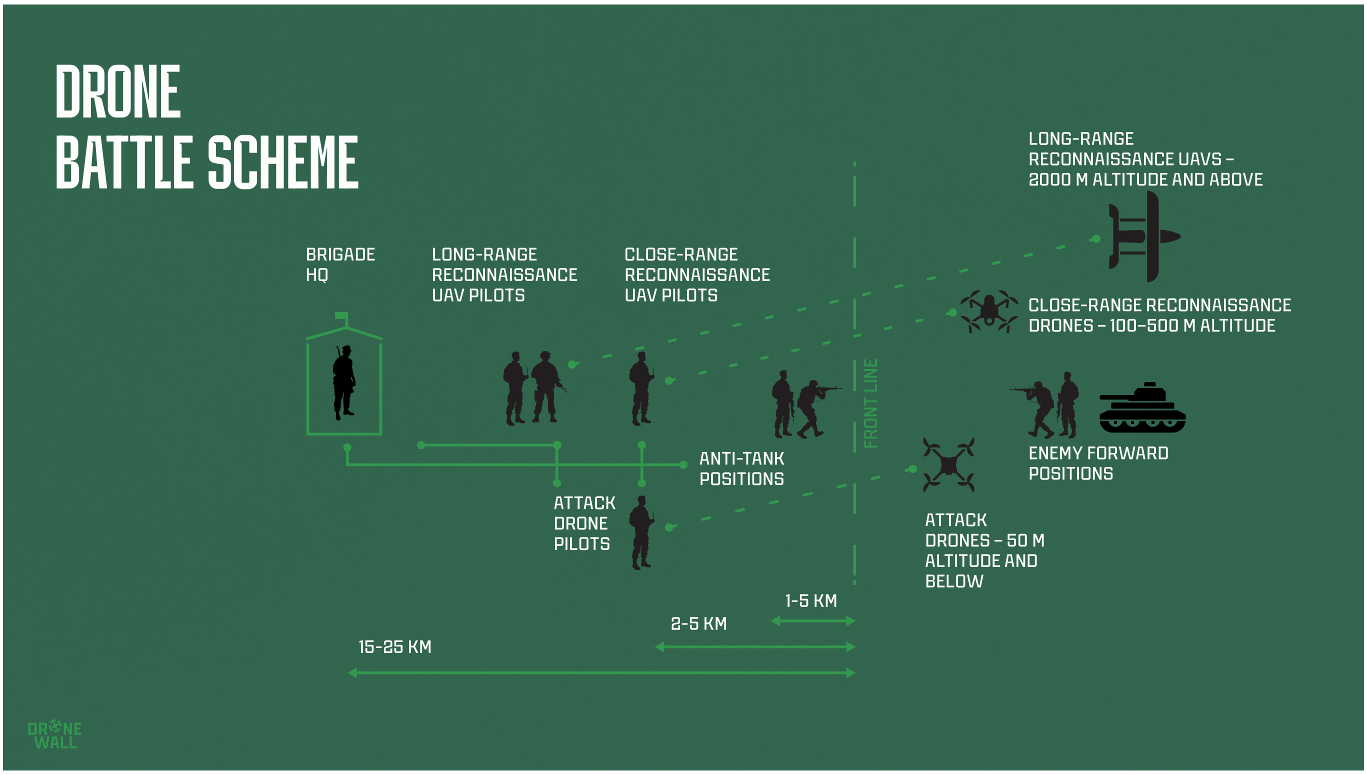
Tablet 2 or phone (for communication)

Additional equipment:

- Lighting
- SD card reader / transfer device
- Electrical extension cords (10–15 m from generator – 1 unit; 2–3 m for connecting internal devices – 1 unit)
- Heater (for winter use)

Supplies:

- Food and water



FPV COMPANY

FPV Company Personnel

The FPV company consists of 2 platoons. Each platoon has 4 sections, and each section has 2 squads. In total, the company forms 16 separate close reconnaissance teams, with 3 soldiers in each team. Two teams (one section) work in shifts from a single position.

UNIT	DUTIES	PERSONNEL COUNT
FPV Section		
	FPV operator	2
	Navigator - second operator	2
	Engineer	2

Inventory used by the FPV Operator Section

FPV control equipment:

- Control transmitter (e.g., TX12, TX16, Radio Master Boxer, etc.)
- Goggles (e.g., Skyzone, Shark, HD EZero, etc.)
- External video monitor (e.g., LCD5802D 5802 5.8G 40CH 7-inch)
- Control station / Ground station (optional, priority on simplicity and versatility)
- Telescopic antenna mast (8–12 m)
- Video receiving antenna(s)

- Control antenna (Jagi)
- Cable from antenna to control unit (20–50 m)
- Antenna power batteries (2 units)

Starlink equipment:

- Antenna
- Router
- Cable (10–20 m.)

Power sources:

- Generator (e.g., Honda EU22i, max power 2.2 kW)
- EcoFlow units ×2 (e.g., EcoFlow Delta 3, capacity 1024 Wh)
- Fuel for generator

Computing / communication devices:

- Computer
- Tablet 1 (for map applications such as TAK, MilChat, etc.)
- Tablet 2 or phone (for communication)
- Compass (for antenna azimuth alignment)

Additional equipment:

- Lighting (recommended with connection compatible with FPV battery)
- SD card reader / transfer device
- Electrical extension cords (10–15 m from generator – 1 unit; 2–3 m for connecting internal devices – 1 unit)
- Straps (to attach batteries to drones)
- Insulation

Tools:

- Pliers
- Screwdriver
- Wire cutters
- Tester / multimeter
- FPV battery charge level meter
- Heater (for winter use)

Supplies:

- Food and water

Ammunition / payloads:

- FPV drones (30 units per day)
- Drone batteries
- Impact explosive initiators
- Electric detonators
- Explosives (for vehicles, personnel, confined spaces)

CLOSE RECONNAISSANCE COMPANY

Personnel of the Close Reconnaissance Company

The Close Reconnaissance Company consists of 4 platoons. Each platoon has 4 sections, and each section has 2 squads. In total, the company forms 32 separate close reconnaissance teams, with 3 soldiers in each. Two teams (one section) operate in shifts from a single position.

UNIT	DUTIES	PERSONNEL COUNT
Artillery section		
	Operator No. 1	2
	Operator No. 2	2
	Assistant	2

Drones and equipment:

- Control transmitter
- Drones (2–4 units)
- Active antenna(s) (e.g., Alientech Duo II, Avenge Angel, etc.)
- Cable (8–10 m)
- Antenna stand
- Power bank (for additional transmitter power supply)
- Drone batteries (10–20 units)
- External monitor

Starlink equipment:

- Antenna
- Router
- Cable (10–20 m)

Power sources:

Generator (e.g., Honda EU22i, max power 2.2 kW)

EcoFlow units ×2 (e.g., EcoFlow Delta 3, capacity 1024 Wh)

Fuel for generator

Computing / communication devices:

Tablet 1 (for map applications such as TAK, MilChat, etc.)

Tablet 2 or phone (for communication)

Additional equipment:

- Lighting
- SD card reader / transfer device
- Electrical extension cords (10–15 m from generator – 1 unit; 2–3 m for connecting internal devices – 1 unit)
- Heater (for winter use)

Supplies:

- Food and water

HEAVY DRONE COMPANY

Personnel of the Heavy Drone Company

The Heavy Drone Company consists of 2 platoons. Each platoon has 2 sections, and each section has 2 teams. In total, the company forms 8 separate heavy drone teams, with 3 soldiers in each.

UNIT	DUTIES	PERSONNEL COUNT
Heavy drone section		
	Operator	2
	Assistant	2
	Assistant	2

FIXED-WING COMPANY

Fixed-Wing Company Personnel

The fixed-wing company consists of 2 platoons – long-range reconnaissance and attack. Each platoon consists of 2 sections, and each section consists of 2 teams. In total, the company has 4 long-range reconnaissance and 4 attack fixed-wing UAV teams, with 4 soldiers in each team.

UNIT	DUTIES	PERSONNEL COUNT
Fixed wing section		
	Operator	2
	Assistant	2
	Assistant	2
	Driver	2

UGV (UNMANNED GROUND VEHICLE) COMPANY

UGV Company Personnel

The UGV company consists of 2 platoons. Each platoon has 2 sections, and each section has 2 teams. In total, the company forms 8 separate UGV teams, with 3 soldiers in each team.

UNIT	DUTIES	PERSONNEL COUNT
Heavy drone section		
	Operator	2
	Assistant	2
	Assistant	2

TECHNICAL SUPPORT AND TRANSPORT COMPANY

Technical Support and Transport Company Personnel

The technical support and transport company consists of 2 platoons – technical support and transport. Each platoon consists of 2 sections, and each section consists of 2 team.

UNIT	DUTIES	PERSONNEL COUNT
Technical support section		
	Senior technician	2
	Technician	2
	Assistant	2

AIR DEFENSE COMPANY

Air Defense Company Personnel

An air defense company consists of 2 platoons. Each platoon has 4 sections, and each section has 2 teams. In total, the company forms 16 separate air defense teams, with 4 soldiers in each.

UNIT	DUTIES	PERSONNEL COUNT
Air defense section		
	Radar operator	2
	Drone operator	2
	Assistant No. 1	2
	Assistant No. 2	2

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