

The Future of the Missile Force and Artillery – Poland's 'Homar' Program

For over a decade, the Polish Armed Forces have been awaiting new generation multiple rocket launchers to replace the Soviet-era 9K79 Tochka missiles (NATO: SS-21 Scarab) which were decommissioned in 2005, as well as the systems that were decommissioned in the 1980s and 1990s – the 9K72 (NATO: SS-1C Scud-B) and 9K72 Luna-M launchers (NATO: Frog-7). The 'Homar' (Lobster) missile launchers with a range of nearly 300 km are supposed to act as a counterweight to Russia's missile force deployed in the Kaliningrad Special Region. The first phase of the 'Homar' program concerns the acquisition of 56 launchers (including two for training purposes) with missiles for three battalion-level fire modules (Pol. dywizjonowy moduł ogniowy, DMO). Based on the Strategic Defense Review, the Polish Armed Forces are in need of 9 battalion-level fire-modules that means the purchase of over 160 launchers until 2032. Currently, there are three countries interested in providing Poland with the rocket artillery systems, that is

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Israel (IMI Systems), the United States of America (Lockheed Martin), and Turkey (Roketsan). On July 4, 2017, the Polish Armaments Group (PGZ, a state-owned holding company) selected Lockheed Martin for further negotiations with the Polish government and submitted recommendations to the Ministry of National Defense. However, Polish decision makers have not reached the compromise with the American company so far. On December 22, 2017, Maciej Lew-Mirski, the Vice President of the Board of the Polish Armaments Group, said that the technology transfer had been the main issue in negotiations with

Lockheed Martin as a potential partner for the Polish consortium. The PGZ representative also confirmed that the company would continue negotiations with other producers, particularly Israeli IMI Systems, which declared its readiness to deliver advanced missile technologies to Poland's defence industry.

In January 2017, the Pulaski Foundation and the Potomac Foundation hosted their first wargame simulation based on HEGEMON platform and methodology which was supposed to analyse a regional military conflict in the Baltic States as well as Northern and Eastern Poland. One of the key conclusions of the simulation was to provide the Polish Armed Forces with offensive strike capabilities, such as ballistic and cruise missiles, as a response to hypothesised Russia's missile attacks on the air bases in Poland. Undoubtedly, this sort of simulations cannot embrace all the nuances and aspects of the conflict; nevertheless, it is definitely an invaluable source of information about potential threats to NATO's Eastern Flank.

Given the procurement of weapons such as the JASMM-ER missiles with a range of approximately 1,000 km, Poland is expected to increase its precision-strike capabilities. However, these several dozen missiles (the AGM-158A and AGM-158B variants) carried by Polish F-16 multirole fighters, as well as the RBS-15 Mk3 and NSM missiles used by other branches of the Polish Armed Forces ought to be perceived as one of the components of Poland's conventional deterrence strategy. It is worth noting that the Polish Air Force should be ready to face the A2/AD (anti-access area denial) threats, particularly Russia's Air Defence Forces. According to the simulation carried out by the Pulaski Foundation and the Potomac Foundation, the Russian air defence is able to prevent NATO from conducting air operations in the Baltic States. Given the limited number of modern multirole fighters of the Polish Air Force, it is crucial to extend capabilities and fire power of Poland's rocket artillery, which is expected not only to provide fire support, but also conduct effective strikes against strategic targets. For this reason the 'Homar' program is of primary importance to the Polish Armed Forces. Nevertheless, it is worth emphasising that the modernisation process of the rocket artillery also requires capabilities in the field of imagery intelligence.

The High Mobility Artillery Rocket System (HIMARS) – Lockheed Martin

The Lockheed Martin's proposal for the 'Homar' program is based on the High Mobility Artillery Rocket System (HIMARS), which is a lighter version of the M270 Multiple Launch

Rocket System (MLRS) mounted on a tracked armoured launcher. HIMARS, on the other hand, has been designed as a 6x6 truck-mounted launcher loaded with 6 rockets (the M270 launcher can carry 12 missiles). Given the dimensions and weight of the launcher and wheeled chassis, HIMARS can fit in the C-130 Hercules aircraft. The HIMARS launchers have been integrated with the Guided Multiple Launch Rocket System (GMLRS) and the Army Tactical Missile System (ATACMS). The GMLRS rocket is 4 meters in length, 227 mm in diameter and has a range of 70 km. With a circular error probable (CEP) of 5 meters, the GMLRS missiles equipped with a 90-kilogram warhead are a good option when precision strikes are required. The ATACMS is a short-range, solid-propellant fuelled, 610-mm ballistic missile equipped with a 230-kilogram warhead. The missile variant that has been offered to the Polish Armed Forces has a range of 300 km. Both missiles use an inertial guidance system (INS) combined with the Global Positioning System (GPS). Despite the fact that both missile systems are equipped with the same guidance system, the accuracy of the ATACMS is significantly lower compared to the GMLRS. The circular error probable (CEP) for the ATACMS is between 10 and 50 m (according to the producer, for the sake of comparison, this parameter is of 'tens of meters'). The HIMARS launcher carries six GMLRS rockets or a single ATACMS ballistic missile. Furthermore, the HIMARS launcher can be mounted on the Polish JELCZ (663.32) 6x6 truck, which has been designed as a platform for the 'Kryl' 155-mm self-propelled howitzer. Currently, the HIMARS system is used by land forces of the United States, Singapore, United Arab Emirates and Jordan. The heavier variant of this system (MLRS) is also used by countries such as France, United Kingdom, Italy and Turkey.

HIMARS

Lockheed Martin

M142 HIMARS IS A LONG-RANGE ROCKET ARTILLERY SYSTEM MOUNTED ON A 6X6 TRUCK FRAME. THE HIMARS LAUNCHER CAN CARRY 6 GMLRS MISSILES OR A SINGLE ATACMS BALLISTIC MISSILE.

General Data

Crew	3
Range	15-300 km
Length	7.8 m
Width	2.5 m
Height	3.1 m (travel position) 6.2 m (combat position)

Given the dimensions and weight of the launcher, HIMARS can fit in the C-130 Hercules aircraft

Specifications

	GMLRS	ATACMS
Length	4 m	4 m
Diameter	227 mm	607 mm
Total weight	No Data	1,670 kg
Payload	90.1 kg	230 kg
Range	70 km	300 km
Number of rounds	6	1
Circular Error Probable (CEP)	approx. 5 m	Tens of meters
Guidance	INS/GPS	INS/GPS



USERS OF THE HIMARS/M270 SYSTEMS



RANGE

GMLRS 70 km

ATACMS 300 km

Lynx – IMI Systems

Undoubtedly, Israeli IMI Systems has been perceived as the main competitor of Lockheed Martin in the 'Homar' procurement program. IMI Systems based its proposal on a highly versatile platform (Lynx), which has been integrated with a variety of munitions from 122 to 370 mm in diameter that have a various range and lethality. According to the producer, the launcher can be mounted on any 3 or 4-axle truck (such as Polish 8x8 JELCZ P882D.4), which may be important in the case of 370-mm rocket pods or larger ballistic missiles. Based on the latest announcements of IMI Systems, the 'Polish' variant of this system can be integrated with the Extended Range Artillery (EXTRA) munitions, as well as Predator Hawk or LORA (Long Range Attack) missiles. The EXTRA missile, equipped with a 120-kilogram warhead, is 306 mm in diameter. The Lynx launcher carries two 4-rocket pods for the EXTRA missiles. In this configuration, the system has a range of 30-150 km, which allows Polish Land Forces to significantly improve capabilities of the rocket artillery. It is worth noting that the Land Forces currently operate multiple rocket launchers equipped with 122-mm missiles such as M-21 FHE 'Feniks' with a range of 42 km. Israeli missiles have an improved range and the payload weight compared to munitions that can be provided by Lockheed Martin (GMLRS). The 370-mm Predator Hawk with a range of 300 km is the second missile offered by IMI Systems. The rocket has a 140-kilogram warhead, which is considerably smaller than the ATACMS. However, the Lynx launcher can carry 4 missiles of this type in two rocket pods compared to a single ballistic missile in Lockheed Martin's launcher. As an alternative option, IMI Systems proposed to integrate the Lynx launchers with a 624-mm LORA ballistic missile produced by Israel Aerospace Industries (IAI). Given its range of over 300 km (possibly about 400 km) and the payload of 250 kg (the producer can integrate the missile with larger warheads, however, it will decrease the effective range of the missile) the LORA missile is seen as a direct competitor of the ATACMS. The Israeli launcher in its standard configuration carries two LORA missiles. Nonetheless, according to the IAI, a 16-tonne 8x8 wheeled chassis can be integrated with a larger launcher carrying 4 missiles. It is also worth pointing out that, according to the Israeli producer, all types of missiles offered by the IMI Systems (in cooperation with IAI) provides high accuracy of 10 meters. All types of Israeli missiles use an inertial guidance system (INS) combined with the Global Positioning System (GPS).

LYNX

IMI SYSTEMS

General Data

Crew	3
Range	> 300 km
Length	~ 9 m
Width	~ 2.5 m
Height	~ 3 m (travel position)

The LYNX launchers can be integrated with a variety of 122-370 mm missiles as well as large 624-mm LORA (LONG Range Artillery) ballistic missiles.

Specifications

	PREDATOR HAWK	LORA	EXTRA
Length	approx. 5 m	5,2 m	3,97 m
Diameter	370 mm	624 mm	306 mm
Total weight	800 kg	1,600 kg	450 kg
Payload	140 kg	240 kg	120 kg
Range	300 km	> 300 km	150 km
Number of rounds	4	2	8
Circular Error Probable (CEP)	< 10 m	< 10 m	< 10 m
Guidance	INS/GPS	INS/GPS	INS/GPS



USERS OF THE EXTRA/LAR-160/LYNX LAUNCHERS



RANGE

EXTRA 150 km

PREDATOR HAWK 300 km

LORA > 300 km

To sum up, the Israeli proposal is not only based on a wider variety of missiles with better specifications (such as a range and payloads), but also a greater number of missiles carried by a single launcher compared to the Lockheed Martin's HIMARS. It is also worth noting that the Lynx can be integrated with the Polish M-21 'Feniks' missile family.

Turkish missile systems – Roketsan

Turkish Roketsan is the last company competing in the bid for Poland's 'Homar' rocket artillery system. Roketsan has not revealed its proposal details for the Land Forces, however, most analysts anticipated that the Turkish company based its offer on 300-mm rocket missiles as well as a new type of tactical ballistic missiles which are currently under development. Roketsan has developed a variety of 107-mm, 122-mm and 300-mm missiles for multiple rocket launcher systems. Given the capabilities of the Turkish rocket artillery and the requirements of Poland's Ministry of National Defence, the 300-mm missiles are perceived as the most likely option for the Polish Land Forces. The T-122/300 MBRL (Multi Barrel Rocket Launcher System) is a launching platform that can carry 40 120-mm rounds in two rocket pods (three meters in length) or four 300-mm missiles in two containers (5 meters in length) with a range of 100 km. The 122-mm rounds can be launched every 0.5 seconds, whereas the 300-mm missiles every 6 seconds. Both types of missiles use an inertial guidance system (INS) combined with the Global Positioning System (GPS). Roketsan has also developed the T-300 launching platform with the same specification as the T-122/300 equipped with 300-mm rounds. In the T-300 launcher, however, all missiles are packaged in a single four-rocket pod; in both types of launchers the missiles are stored in hermetically sealed cylindrical containers. The T-122-300 MBRL and T-300 systems can be mounted on 3-axle or 4-axle trucks operated by a two-person crew. According to the producer, the dimensions of the launchers are as follows: 9.2 meters in length, 2.5 meters in width, and 3.1 meters height. It is worth noting that the T-300 system is based on the Chinese WS-1 missile family, which has been developed since the 1980s. The Roketsan Company produces two types of 300-mm rounds, that is the TR-300 and TRG-300 missiles. TR-300 is a 590-kilogram missile with a range of 100 km, which is equipped with a 150-kilogram high-explosive fragmentation warhead (effective radius of over 70 meters). The second option is TRG-300 which is a 585-kilogram missile equipped with a 105-kilogram fragmentation warhead and has a range of 120 km. Both missiles use

an inertial guidance system (INS) and the Global Positioning System (GPS). The Turkish missiles, however, are not equal to American and Israeli systems in terms of accuracy; according to the producer, the circular error probable is less than 50 meters.

In 2017, Turkey successfully tested a new tactical ballistic missile designated as 'Khan' (the missile is also known as 'Bora' in Turkey). The Khan missile weighs 2,500 kg and is 610 mm in diameter. According to the information unveiled by the Roketsan Company, the missile carries a 470-kilogram warhead and uses INS/GPS guidance systems. The missile is currently under development and more detailed system specifications remain classified. Prior to the announcement of the Khan system, the Roketsan Company had also designed in cooperation with China Precision Machinery Import-Export Corporation (CPMIEC) the J-600T Yıldırım missile, which is based on the Chinese B-611 short-range ballistic missile. The J-600T Yıldırım weighs over 2,000 kg and carries a 480-kilogram warhead. Turkey has developed a few variants of the missile including one that has a range of 300 km. The Khan ballistic missile is most likely based on the J-600T Yıldırım.

Prospects for Industrial Cooperation

All entities interested in participation in the 'Homar' program have declared to transfer a variety of technologies to Poland's defence industry. It is worth noting, however, that participation of Polish companies in the missile manufacturing process will be limited in scope, mostly due to expected delivery of the first launchers in 2019. Undoubtedly, the transfer of missile technology remains a key issue for Poland's decision makers. As far as Lockheed Martin's HIMARS is concerned, the so-called 'Polonization' process of the system will be associated with the use of specific technologies and systems designed in Poland such as counter-battery radars or missile vehicles. Nevertheless, it is still unclear whether Poland's defence industry will be able to acquire the most important technology, that is production of guided missiles. On the other hand, IMI Systems has declared to transfer most technologies of the Lynx system, including production of missiles and joint missile development in the future. Given that the Polish Armed Forces require 9 battalion-level fire-modules of the 'Homar' missile launchers according to the Strategic Defence Review, the Polish Armaments Group seeks to develop missile production capabilities to meet the demand and supply the army with domestically manufactured missiles. The acquisition of missile technologies is also crucial to development of Poland's defence industry, which lacks

adequate supply base and experience. Poland could also deepen industrial cooperation with Turkey. In addition to the 'Homar' program, the Roketsan Company is capable of providing Poland with a variety of armament systems such as cruise and anti-tank missiles, which is an important asset of the Turkish producer given other modernisation programs and industrial cooperation in the future. On the other hand, the US producer has emphasised that the HIMARS system could be successfully integrated as an 'offensive component' of Poland's air defence and used against enemy rocket artillery, radars and communication systems. Given the capabilities of the systems as well as the potential technology transfer offered by all producers, the Israeli proposal seems particularly worth considering.

Conclusions and recommendations

1. The specification of the Lynx system gives it an advantage over Lockheed Martin's HIMARS in certain aspects; for example, the EXTRA missile has a considerably greater range and more powerful warhead than the GMLRS and, furthermore, Israeli launchers equipped with Predator Hawk and Lora can also carry more rounds, that is four and two missiles respectively, than the American launcher with ATACMS. On the other hand, it is worth noting that the HIMARS is operated by a large number of NATO member states, therefore, the system will be certainly modernised and developed in the future. The selection of Lockheed Martin as a partner of the Polish Armaments Groups within the framework of the 'Homar' programme ought to be considered as a political decision given that the announcement of the company's recommendations and press releases from the Ministry of National Defence were coincident with Donald Trump's visit to Warsaw, Poland. Undoubtedly, the procurement of American missile systems is based upon political calculus of Poland's government. Increasing spending for the military, procurement of air defence systems, and plans to acquire 5th generation fighter jets seem a clear message that Poland will continue its contribution to NATO, particularly in the financial dimension of Alliance security. Given that the US military presence in Poland is of vital importance for the government in Warsaw, the compliance with the US military interoperability standards is another crucial factor taken into consideration by Polish decision makers.
2. Since IMI Systems announced its plans to provide the Polish Land Forces with the LORA ballistic missiles, the Lynx system has been perceived as an unmatched option. The Lynx

launcher can be equipped with a variety of munitions such as domestically produced 122-mm 'Feniks' missiles. Moreover, Israel has declared to deliver advanced 306-mm EXTRA missiles, whose range (150 km) is much greater than the American GMLRS (70 km). The Israeli missile is also equipped with a heavier warhead than its counterpart (EXTRA: 140 kg; GMLRS: 90 kg). Israeli launchers can also carry more missiles than the Lockheed Martin's HIMARS (8 and 6 missiles respectively). Initially, the IMI Systems declared to deliver the Lynx launchers with the Predator Hawk missiles, which are significantly smaller than the ATACMS (800 kg and 1,600 kg respectively) and carry less powerful warheads (140 kg and 230 kg respectively), but both have a range of 300 km. However, the extended Israeli proposal with the IAI's LORA missile (certain missile components, such as the warhead, are produced by IMI Systems) has significantly strengthened the producer's position in the bid. Based on the information released by IMI Systems, the specification of LORA missiles outclass capabilities of the ATACMS (probably, the Israeli ballistic missile has a range of over 400 km).

3. The Israeli offer seemed more competitive than the American one in terms of potential industrial cooperation. IMI Systems has declared to transfer most technologies of the Lynx system to Poland's defence industry, including production of missiles and joint missile development as well as the so-called 'Polonization' of the system based on missile vehicles and other systems produced in Poland, for example, counter-battery radars. Given the technological capabilities of the Israeli military industry in other fields, the Polish Armaments Group could also benefit from deeper industrial cooperation with Israel in the future. It is also worth noting the advancement of Turkish R&D programs related to a variety of technologies such as missile systems; therefore, the cooperation with Turkey should be also taken into consideration.
4. As far as cooperation with Lockheed Martin is concerned, acquiring the technology to build advanced guided missiles is one of the greatest challenges faced by Polish negotiators. Given that the Polish Armed Forces require 9 battalion-level fire-modules of the 'Homar' missile launchers, that is 160 multiple rocket launchers until 2032, the technology to produce the GMLRS missiles is of primary importance for Poland's defence industry (the GMLRS will be the main type of munitions used by the 'Homar' system launchers). Furthermore, the Land Forces will operate 'Homar' missile systems for the next several dozen years; therefore, the missile technology is a key issue for modernisation of both Poland's defence industry and the army. Today, it is necessary to

take into consideration the purchase of additional launchers and missiles in the future, and that is why the current procurement ought to be perceived as the first phase of the modernization process of Poland's rocket artillery. It is also worth emphasising that 'Homar' missile launchers should be integrated with the ICBS (Integrated Air and Missile Defense Battle Command System), which will be a component of the Patriot air defence system in Poland.

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