

# Euro Vision

## Raytheon's strategy for Integrated Air and Missile Defence in Europe

A Patriot weapons system is operated by Germany's Surface Air and Missile Defence Wing 1 at the NATO Missile Firing Installation (NAMFI) during Exercise Artemis Strike on 7 November 2017 in Chania, Greece

### Threat Assessment

With ongoing Russian aggression along NATO's eastern border and the future of the Iran nuclear deal now in jeopardy, European state actors are being urged to consider the alignment and optimisation of national and international interests to provide more efficient and cost-effective Integrated Air and Missile Defence (IAMD).

Calls from government and industry continue to gather momentum, particularly in light of recent developments in Russia which have most recently witnessed the design of the Yu-71/74 hypersonic strike weapon which threatens to change the dynamics of modern warfare, providing the ability for 'near-peer' adversaries to defeat even the most capable of contemporary air and space defence systems.

According to Raytheon VP for air and missile defense systems, Dr. Mitch Stevison, global growth in ballistic missile technology continues to grow at an "exponential" pace, with the threat environment following the same trajectory.

"In years past, US, NATO and European partners have always enjoyed a substantial technological advantage. With the speed of evolution, that distinct advantage has eroded. We still have the advantage but the gap is closer now, making IAMD more critical than ever," he urged.

Describing how a unified IAMD and layered defence strategy would allow European state actors to identify and neutralise threats as early as possible (particularly in the exo-atmospheric environment), Stevison explained: "It is essential to counter threats at all levels – from lower tier areas to endo- and exo-

atmospheric threats."

But as Stevison described, no single country is capable of solving this complex equation exclusively. Instead, Raytheon's strategy centres around the encouragement of European government and industrial partners to consider increased levels in integration, partnerships and overlap to defeat threats emanating from near-peer adversaries including Iran and Russia; as well as reducing costs; and avoiding duplication of effort.

### An Unprecedented Transformation in European Defence

According to Raytheon International VP European Business Development, Christopher Lombardi, countries are striving to find the right balance between driving investment to protect their people, critical infrastructure and sovereignty while also working together through NATO and the EU on joint initiatives to protect regional stability. This includes the demonstration of visible progress through increased spending, policy updates and strategic planning, Lombardi confirmed.

To date, Europe has benefited from multiple collaborative IAMD initiatives with one of the most notable – the US-led European Phased Adaptive Approach (EPAA) – allowing US companies to supply Aegis Ashore and Frigate-based technology to operational sites in Romania and Poland.

"This is such an essential and significant cornerstone of what is missile defence in Europe," Lombardi proclaimed while discussing how additional extensions to existing national capabilities could further

extend the influence of the EPAA in the future.

However, also acknowledging the importance of EU-led initiatives including the European Defence Fund and Permanent Structured Cooperation (PESCO) policy on defence and security, VP for Integrated Air and Missile Defense Business Development at Raytheon Integrated Defense Systems, Joseph P DeAntona described how it would be remiss of the company to fail to understand the influence of a "very complex network of nations and organisations" across the continent.

"There is no single organisation which is going to completely drive this requirement. It is going to be a collaborative effort. Raytheon's job is to try to understand them all and see where the commonality lies and make arguments and focus resources and efforts in these common areas," he explained while highlighting a series of new challenges and opportunities in IAMD emerging from legacy operations associated with the Cold War.

"Today, we are witnessing the same partnership approach as we saw in the late 1980s but the landscape has changed. This now includes a group of countries not part of NATO or the EU who are now partners so we have to expand our partnerships to include benefits and opportunities for everyone concerned. Our ambition is to try to help Europe achieve that desired end-state," he explained.

Describing how the last decade had witnessed very robust efforts by European state actors to understand the threat and which protection capabilities are currently

**EU-US MILITARY EXERCISES**

Over the course of 2017, EU and US militaries conducted a series of exercises on European soil designed to strengthen communication and interoperability between participating forces in regards to missile defence.

Exercise Tobruq Legacy, conducted between 11-22 July in the Czech Republic, Germany, Lithuania and Romania, provided an opportunity for participating nations to “improve levels in interoperability of multi-national surface based air defence (SBAD) and missile defence systems”.

Exercise participants included the US, Germany, Romania, Netherlands, Poland, Czech Republic, Slovakia CH, Hungary, Lithuania, UK, Canada, Austria and Slovenia (CH).

Comprising a total of 2,200 personnel, the exercise was designed to increase interoperability levels between air and missile defense systems across multiple countries; strengthened coordination and cooperation between participating nations; improved data gathering and information sharing; as well as created a common understanding of NATO tactics, techniques and procedures.

The exercise feature a total of three SBAD Operations Centres featuring multiple layers of defensive solutions provided by multinational partners, tasked with generating a Recognised Air Picture for the NATO Allied Air Command. Exercise components were commanded and controlled by US, Czech and Lithuanian battalions.

According to Col David Shank, Commander of the US 10th Army Air and Missile Defense Command, the event was “vital” in providing participating nations with the unique opportunity to technically integrate systems.

“These three SBAD Operations Centres help us share information and conduct live-fire exercises like never before,” he explained at the event.

Tobruq Legacy was followed by Exercise Aurora, Sweden, conducted between 11-29 September, which witnessed the participation of 21,500 personnel from Norway, Sweden, the US, Denmark, Estonia, France, Finland and Lithuania.

According to the Swedish Armed Forces, the exercise was designed as a national exercise to build a strong defence and increase the overall capability of the country to withstand an attack, centred around air, land and sea operations across seven training locations.

The exercise relied upon the Patriot Air & Missile Defence System to counter simulated air attacks by enemy forces and also included the operational deployment of equipment by air and sea to Gotland.

Exercise Aurora allowed Sweden to improve the “preparedness and civilian-military cooperation in response to a military attack”; as well as enhancing the understanding of participating countries in allies’ military structures, processes and tools.

Additionally, the exercise encouraged the best practice in a multinational operating environment and strengthened Sweden’s ability to respond to “complex attacks”, a Swedish Armed Forces statement concluded.

available, DeAntona warned that Europe is now facing one of the most advanced threats anywhere in the World, with many state actors still reliant upon “woefully inadequate air and missile defence” systems.

The only way to assure a successful end-state for the European continent, he added, would be through the sharing of experiences and facilitation of partnerships.

Discussing Raytheon’s ongoing strategy to encourage such partnerships, he explained: “We are helping the European countries on a path towards improving their defensive capabilities to meet 21st century requirements that they now generally recognise need to be considered. But there are only so many resources and priorities you can have.”

Raytheon’s strategy to deliver a unified, coherent and layered IAMD strategy encompasses a “strength in numbers” approach although the company concedes this can sometimes create a “double-edged weapon” due to increasing complexities associated with multi-lateral agreements and partnerships.

“With more numbers involved, you have to integrate and collaborate more which can be challenging,” DeAntona explained. “But I also see the opportunity to form a baseline of countries to assist in the development of an integrated and compatible solution as opposed to multiple individual solutions.

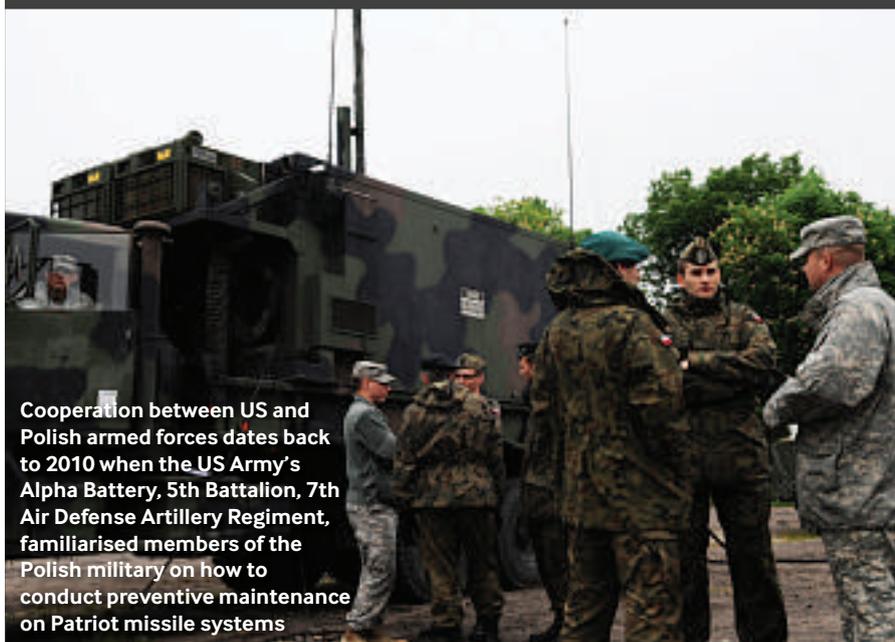
“If the European leadership can recognise that if the transatlantic security community all agree on a baseline and how we want to move forward, it will make the journey easier and cheaper and a lot better than they currently have,” DeAntona urged while calling for an interoperability and integration pathway for member states.

“This is easiest to achieve as opposed to trying to integrate systems never designed to interoperate with each other,” he added before acknowledging the desire for sovereign solutions in addition to membership of a wider cooperative effort within the EU or NATO.

To achieve this, DeAntona called for the creation of joint training and certification exercises allowing participating state actors to become more naturally integrated with their end-state objectives in the IAMD domain.

**Strengthening European Security**

According to Steverson, Raytheon benefits from an unparalleled experience in its ongoing support of US homeland security and regional air defence systems in Europe, both of which feature the Standard Missile 3 (SM-3) Interceptor. This, he urged, provided the company



Cooperation between US and Polish armed forces dates back to 2010 when the US Army’s Alpha Battery, 5th Battalion, 7th Air Defense Artillery Regiment, familiarised members of the Polish military on how to conduct preventive maintenance on Patriot missile systems

an “invaluable” insight and capability into European IAMD requirements and solutions today.

SM-3 comprises a key component in the US contribution to European ballistic missile defence capabilities, with a first land-based launch site achieving full operational capacity in Romania in 2016.

“We are witnessing significant moves from a technical standpoint operating in that domain with hit-to-kill aspects,” Stevison highlighted while referring to an ongoing “evolution in learning”.

“Threats are changing and we need to ensure the system is suitable and viable for upper tier defence systems for years to come. Performance and capability are exceeding expectations and original mission sets,” he added before describing how SM-3 in Romania and Poland provided an ability to defend against threats across continental Europe.

“That’s just the start. We need to think beyond Aegis Ashore and look at continued evolution,” Stevison continued while describing potential for increased sensor coverage across Europe as threats evolve towards the proliferation of hypersonic strike weapons.

“Sensor coverage is going to be imperative to track threats and to give effectors the advantage as they defeat threats,” he said.

As a result, Raytheon continues to drive upgrades to SM-3 providing it with an extended ability to counter sophisticated ballistic missile threats. According to Stevison, ongoing tests will begin to define the future of SM-3 missiles integrated with Aegis Ashore in Europe to achieve “higher level capabilities than seen today”.

Raytheon’s Standard Missile-6 (SM-6) has also experienced a spiral of capability as it extends beyond its original anti-air warfare mission. The US Navy has already successfully tested the SM-6 against ballistic missile threats in their final – or terminal phase – and against objects on the ocean’s surface, like enemy ships.

The decision to further develop SM-6 follows the longest range surface-to-air intercept by the missile type at Point Mugu Naval Station in California, on 29 September 2016, where it engaged an over-the-horizon threat. The SM-6 was fired from the USS Princeton (CG59), a US Navy Cruiser equipped with the latest Aegis baseline 9 combat system.

“We want to see this capability more overtly looked at by European navies,” Stevison said before illustrating how Raytheon was looking to integrate the capability into additional platforms.

Raytheon also continues to develop its own air-breathing solutions as part of the joint US Defense Advanced Projects Agency

and US Air Force Research Laboratory Hypersonic Air-breathing Weapon Concept (HAWC). However, the company was unable to provide further details due to operational security concerns.

Meanwhile, employment of Raytheon’s Patriot system continues to spread across Europe. On 28 March 2018, the US Government signed a Letter of Offer and Acceptance (LOA) with the Polish government with the aim of overhauling the country’s air defence solutions. This makes Poland the 15th nation to have procured Raytheon’s Patriot.

Ahead of the LOA, Poland signed an industrial cooperation proposal with the US government agreeing a technology transfer to the Central Europe country.



**A Standard Missile-3 (SM-3) Block 1B interceptor missile can be launched by the Aegis Combat System, which can be integrated onto surface vessels as well as installations ashore**

**The SM-6 continues to be adapted for multi-mission warfare, extending capabilities beyond its legacy anti-air warfare role**



The LOA supports the first phase of Poland's two-phase medium-range IAMD procurement programme, designated "WISLA", which will see a second phase comprising the procurement of additional Patriot units with Gallium Nitride-based Active Electronically Scanning Array Radar and SkyCeptor interceptor missiles.

The news follows another LOA signed with Romania on 28 November 2017 and a US government notification regarding a future sale to Sweden.

Moving down to the lowest tier in IAMD, Raytheon also continues to mature its SkyHunter solution, which comprises a US variant of the Israeli Defense Force's Iron Dome counter rocket, artillery and mortar (CRAM) system. Developed in tandem with Rafael Advanced Defense Systems, the SkyHunter is capable of intercepting incoming munitions at distances out to 70km.

"Today, we are using existing systems and getting them into the fight quickly to address both capacity and immediate capability gaps," Steverson described while discussing tactical capabilities to counter the proliferation of threats across the modern battlespace. "We are seeing a lot of interest in our joint venture with Rafael for the SkyHunter system because it's the most battle-certified system in the world with thousands of engagements in combat operations."

**Building on Decades of Transatlantic Industry Partnership**

Another central pillar of Raytheon's European strategy is collaboration with industry partners across the Continent. Currently, Raytheon is teamed with Rheinmetall, Kongsberg, Saab, PGZ and others with close attention to the leveraging of partner technology and investment across emerging market areas.

According to DeAntona, Raytheon recognises the requirement to continue such a strategy if it is to become a major provider of IAMD capabilities to European customers. "We are collaborating and introducing innovative solutions for our European customers and then taking these out to the international market," he explained.

Examples include Raytheon's partnership with Kongsberg to develop the National Advanced Surface-to-Air Missile System (NASAMS), an adaptable AMRAAM mid-range solution for ground-to-air defensive capabilities. Available to European partners, NASAMS is already operational in Norway, Finland, Spain and the Netherlands, with Lithuania most recently joining the NASAMS partnership. DeAntona described how both

**EXERCISE FORMIDABLE SHIELD 17**

On 17 October 2017, an SM-3 successfully intercepted a medium-range ballistic missile at sea as part of the NATO-led Exercise Formidable Shield 17- a multinational operational exercise in the Hebrides, Scotland.

According to Raytheon, Formidable Shield represents the ideal operating model capable of supporting growing levels in international collaboration of IAMD, not only within NATO but across the entire European continent.

As Steverson explained, the exercise provided a "clear indication of the right trajectory we are working towards with NATO partnerships to show the art of the possible and the ability to interconnect to wider sensor coverage and multiple effectors. This is the beginning and not the end of the story".

Supported by the US Missile Defense Agency and US Navy, the event was designed to evaluate the ability of allied navies' ballistic missile and air warfare defences to "work together quickly and effectively to defeat incoming threats".

The exercise saw the firing of SM-3, SM-2 and Evolved Seasparrow missiles, all of which were coordinated against simulated cruise missile threats. Additionally, the exercise witnessed the second successful exo-atmospheric intercept by a SM-3 outside the US.

According to Steverson, the exercise demonstrated international collaboration across a "spread of sovereign entities, difficult constructs in policy and vast differences between countries".

As Raytheon Missile Systems president, Dr Taylor W Lawrence, explained after the event: "Strong cooperation between allied nations and industry helps ensure we are ready to defeat complex threats around the world."

companies delivered different system components to provide an unmatched medium range air defence capability against emerging threats, including ballistic and cruise missiles, advanced fighters, UAVs and rotary-wing assets.

Similarly, DeAntona highlighted the US government's recent agreement regarding technology transfer to local conglomerate PGZ in support of the Polish WISLA programme.

"Poland will be a qualified Patriot supplier in a large number of areas and will have the potential to exporting to new and existing Patriot customers," DeAntona explained.

Meanwhile in Germany, Raytheon continues to partner with Rheinmetall to develop a full spectrum solution for IAMD, despite the government's continued exploration of MEADS. This holistic solution is one pillar of a broader teaming agreement that include

effectors, combat vehicles, training and cyber.

**Stronger Together**

According to Raytheon, only a unified and multi-lateral layered IAMD solution will provide Europe with the protection, efficiency and affordability it requires to protect against next-generation threats. However, this will only be achieved through shared strategic thinking and asset-sharing across a political environment featuring dozens of state actors promoting national interests.

But as Steverson neatly summarised: "The more our alliances and partnerships are forced to rely upon each other, the more we must communicate and benefit from our relationships on economic, political and military levels. If we can reach that point for a robust layered missile defence construct, the better partners we will become across everything we do."

**Norway fired one AIM-120C7 AMRAAM® missile from a NASAMS™ high mobility launcher during the Thor's Hammer international firing exercises in Sweden. The missile, originally developed for the US military, is now sold to 37 foreign military allies**

