

Turkey's Turbulent Journey with the EPAA and Quest for a National System

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Executive Summary

This paper provides an overview of the European Phased Adaptive Approach (EPAA) missile defense debate from a Turkish perspective. While Turkey participates in the EPAA by hosting a U.S. early-warning radar in Kurecik, Malatya, its political and military concerns with NATO guarantees have led to the AKP government's quest for a national long-range air and missile defense system. However, Turkish decision makers' insistence on technology transfer shows that the Turkish debate is not adequately informed by the lessons learned from the EPAA, particularly the technical and financial challenges of missile defense.

Introduction

With Turkey being the closest NATO nation to the Middle East and lacking a robust integrated air and missile defense architecture, Turkish policymakers face decisions on continuing to rely on NATO resources, investing in indigenous capabilities, or procuring foreign systems. While the United States, Germany, and the Netherlands have historically provided Patriot systems to southeast Turkey, Turkey has political and technical concerns about NATO guarantees under the European Phased Adaptive Approach (EPAA), leading to the proposition that Turkey needs to develop indigenous air and missile defense capabilities to reduce vulnerability. However, Turkey's controversial tender for the foreign acquisition of a long-range air and missile defense system, dubbed the T-LORAMIDS process, has led to concerns within NATO about Turkey's strategic orientation and intentions.

This paper first identifies the missile threats to Turkey, mainly from Syria and Iran. It then defines Turkey's role in the EPAA and the Turkish activities towards procurement of a national long-range air and missile defense system that would allow for technology transfer to eventually achieve indigenous design. The main roadblocks to Turkish missile defense are the EPAA's technical limitations in providing continuous, comprehensive coverage to the entirety of Turkish territory, Turkey's insistence on domestic production that has led to the consideration of non-NATO systems, interoperability, and political issues. While Turkish authorities remain skeptical of the U.S./NATO security guarantees, this debate has proven that remaining interoperable under the NATO architecture and utilizing NATO resources as necessary is still Turkey's most efficient policy option, considering the financial and technical challenges of missile defense even for the US.

Missile Threats to Turkey

Turkey's calculus on missile threats is based on the wide range of capabilities state and non-state actors have in the Middle East, including ballistic and cruise missiles, advanced guided rockets, artillery and mortars, anti-ship missiles, and unmanned aerial vehicles.¹

Turkey's definition of the T-LORAMIDS project as 70% air defense and 30% ballistic missile defense reflects Turkey's perceptions in response to missile capabilities in its neighborhood: The system is only intended to address Turkey's regional competitor's systems, and not Israeli or

Russian missiles.

Regarding Russia, Turkey would not try to or be able to counter its huge nuclear arsenal with a national missile defense system. However, it is worth mentioning that Russia deployed SS-26 Iskander missiles in Gyumri, Armenia, in 2013, threatening eastern provinces of Turkey within its 400 km range.² The Russian nuclear posture, military modernization, and the Ukrainian conflict all contribute to Turkey's increased threat perception.³ Prior to the recent rapprochement, the situation was exacerbated by the November 2015 Turkish downing of a Russian Su-24 bomber along the Syrian-Turkish border due to airspace violation, and the major disagreements in the fight against ISIS and the future of Syria.

While the threat evaluation requires the consideration of both capabilities and intentions, heavy involvement of external actors such as Russia and the complexity of regional political relations make these "intentions" less predictable. Hence, Turkish decision makers prioritize a capabilities approach in their threat calculus, particularly toward Syrian and Iranian missile capabilities.

Syrian Missile Capabilities

Today, Turkey's most immediate concerns regarding missile threats originate from both state and non-state actors along its Syrian border.

Prior to the civil war, the Syrian regime was capable of producing approximately 30 Scud-B/Cs per year but was dependent on foreign assistance, mainly Russia, China, North Korea, and Iran, for the components and technology.⁴ The Assad regime has less than 100 road-mobile short-range ballistic missile (SRBM) launchers and solid-fuel SS-21 SRBMs and M-600 Tishreen ballistic missiles, which is the domestic version of the Iranian Fateh-110.⁵ Syria also possesses Russian Yakhont anti-ship cruise missiles (ASCM) and cruise missiles designed for coastal defense.⁶

The Assad regime has three surface-to-surface missile brigades, with a concentration of Scud variants at the 4th Armored Division for regime survival.⁷ The SS-21 (120 km range) and M-600 (250 km range) can hit Turkish cities near the border.⁸ With the Scud-C (500-650 km range) and Scud-D (600-700 km range), Damascus could deliver both conventional and WMD warheads to Turkey's southeastern cities and critical facilities, while it could reach Ankara from Aleppo.⁹ The limited stockpile of the Scud-D variant that Damascus owns is particularly worrisome to Turkish decision makers, as the modifications for re-entry and improved range would lead to a decrease in payload and make use of WMD warheads more likely, demonstrated by the 2005 Syria test-fire of 3 Scud-Bs and Scud-Ds at low-altitude airburst mode.¹⁰ However, the civil war has brought uncertainty to the location and status of the missile arsenal, e.g. 2014 media reports that Hezbollah moved long-range Scud-D missiles, Iranian Fateh-110 and Fajr-5 rockets, and the Russian ASCM into Lebanon.¹¹ Since the conflict is prolonged, the Assad regime is likely to need to "replenish" its missile inventory by transfers from Iran, Russia, or China.¹²

Throughout the conflict, Turkish cities have been hit by stray artillery shells coming from Syria. On March 24, 2015, a Scud variant Fateh-110 missile fired by the Syrian army from the Tartus Russian naval base against the rebels exploded in the Reyhanli district of Hatay in Turkey, leaving a 15-meter wide crater and injuring five Turkish civilians.¹³ The area was reported to be

outside the radar range of the Patriot batteries, leading to the critiques that the batteries should protect the riskiest area, such as Hatay, instead of the Kurecik radar or the U.S. airbase in Incirlik.¹⁴

ISIS capabilities also threaten Turkey. ISIS fighters have been seen with Chinese-made FN-6 man-portable air defense systems or shoulder-fired heat-seeking MANDPADS.¹⁵ According to U.S. intelligence estimates, it is also probable that ISIS fighters acquired the shoulder-fired Stinger missiles in Iraq.¹⁶ Throughout 2016, ISIS has been hitting Turkish cities, especially Kilis, with Katyusha rockets.¹⁷

Turkey has also kept a close eye on Russian military buildup in Syria, despite the recent political rapprochement. Russia has deployed S-400 air defense systems in northern Syria with ranges extending into Turkish airspace. Russia has deployed at least one Iskander missile variant to its Humayyim Air Base according to satellite imagery.¹⁸ Turkey has also heavily criticized both the Assad regime's and Russia's continued missile and rocket attacks in rebel-held towns near Damascus and Aleppo, and hitting Turkmen villages near Latakia in November 2015 instead of ISIS targets.¹⁹ In November-December 2015, Russian warships and submarines in the Caspian Fleet and Mediterranean Sea launched sea-based Kalibr cruise missiles, the first use of the 3M-14 submarine variant, at ISIS targets in Syria, despite the incidents of deviation in flight path that crashed the cruise missiles in Iran and the Arctic.²⁰

Iran's Missile Capabilities

While Iran's Joint Comprehensive Plan of Action (JCPOA) deal with P5+1 has alleviated the international community's concerns with the Iranian nuclear program, Iran still has the largest and most diverse range of missile capabilities in the Middle East that can virtually target any critical asset in Turkey, including Istanbul, Ankara, U.S. and NATO bases. These capabilities include short-range artillery rockets, which can be used in irregular warfare, transferred to non-state or proxy actors such as Hezbollah, and have strategic impact to support ground forces without close air support.²¹

The main missile threats from Iran to Turkey are Iran's SRBMSs and medium-range ballistic missiles (MRBMs). Iran has around 100 SRBM launchers that can be reloaded and fewer than 50 silo and mobile MRBM launchers.²² The Iranian inventory of short-range missiles includes the Zelzal family (150-250 km), Fateh-110 (200-300 km), the Scud-B based Shahab-1 (350 km), Scud-C based Shahab-2 (750 km) and its upgrade Qiam-1 (700-800 km).²³ Iran's tactical ballistic missiles could be effective in an engagement with Turkish land forces close to the border, but the launches in salvos would be convenient targets for the Turkish Air Force.²⁴

In the medium to longer range, the Iranian inventory includes the modifications of the North Korean No Dong missiles, namely the silo-based and road-mobile Shahab-3 (around 1300 km), the flight tests of its modification, which is a longer range Ghadir-1 (around 1600 km, also referred to as Kavoshgar or Shahab-3M), and the solid-propellant two-stage Sajjill-2, or Ashura that may deliver a 750 kg warhead to a range of about 2000 km.²⁵ Developmental systems include the Shahab-5 and Shahab-6 (3000-5000 km).²⁶ By the 2020s, Tehran could have the capability to relocate the road-mobile Sajjill-2 for preventive targeting and its reduced launch-cycle would undermine early-warning measures.²⁷

Iran is estimated to have 50 operational Shahab-3 launchers.²⁸ Iran also reverse engineered and manufactured copies of the Chinese C-801 and C-802 anti-ship cruise missiles which has led to concerns that it could convert the HY-2 Silkworm ASCMs into longer-range land attack systems.²⁹ As the threat of land-attack cruise missiles is on the rise, Turkey cannot defend against the Iranian cruise missiles without a more sophisticated system with airborne sensors. In March 2015, there were media reports that Iran domestically produced the long-range land-attack cruise missile dubbed Soumar, based on the Russian Kh-55 with a 2000 km range.³⁰

Iran conducts regular flight tests and exercises to demonstrate its missile capabilities. In July 2011, Iranian Revolutionary Guards Corp (IRGC) conducted a ten-day live-fire missile exercise dubbed “Great Prophet 6,” showcasing the solid-fuel Fateh-110, the Tondar, and Khalije Fars anti-ship ballistic missile, as well as the liquid-fuel Shahab-3.³¹ Iran successfully launched a liquid-propellant, two-stage Safir space launch vehicle that can be used as an intermediate-range ballistic missile, in addition to plans for a larger vehicle called Simorgh.³² During the February 2015 “Great Prophet 9” exercise, the naval wing of the IRGC implied that Iran had launched a missile from a submerged submarine.³³ In August 2015, Iran unveiled Fateh-330, the upgraded, 500 km version of the Fateh-110.³⁴ Following the formal adoption of the nuclear deal with P5+1 in October 2015, Iran test-fired a new, precision-guided ballistic missile dubbed Emad, leading to U.S. concern of violation of UNSCR 1929 and the nuclear deal.³⁵ While the US was expecting that Iran would be launching a Simorgh space rocket into orbit, in March 2016, Iran test-fired two missiles that were thought to be the Qiam-1 and Shahab-1.³⁶

There are also technical limitations to Iran’s missile capabilities. Sankaran argues that Iranian missile capabilities are very speculative, as Iran has been alleged to “mislead and misinform” regarding their missile and space launch tests to “bluster.”³⁷ The systems lack advanced precision guidance and accuracy in GPS.³⁸ Elleman argues that the successful destruction of a fixed military target would require Iran to utilize a significant portion of its missile inventory.³⁹ He interprets this problem as an indicator that Iran’s priority is enhancing accuracy and lethality over longer range.⁴⁰ There is near consensus among missile experts that resolving these technical issues in the short-term requires direct foreign assistance and the sources are well-known.⁴¹

While Turkey and Iran have historically had “neighborly” relations, prior to the JCPOA, Iran threatened to hit the Kurecik radar as a response to Turkish help to the “Zionist” regime.⁴² In Iranian Brigadier General Hacizade’s words: “If there is an attack on Iran, our first target will be the missile shield systems in Turkey, and then we’ll turn to other targets.”⁴³ While Turkey welcomes the JCPOA, a major consideration is the exclusion of ballistic missiles from the nuclear deal. The sanctions on the Iranian ballistic missile program are expected to be lifted within the next 8 years. However, the latest Iranian fire tests have led to new U.S. sanctions on the country’s ballistic missile program.

Turkey’s Role in the EPAA

Turkey’s direct role in the EPAA began in the completed Phase I by hosting the X-band early-warning radar in Kurecik, which is responsible for detecting the launch of a ballistic missile from

the Middle East and transferring the information to the U.S. SM-3 interceptors to hit the missile mid-flight. In addition, Turkey's military electronics manufacturer ASELSAN provides system engineering to improve NATO ballistic missile defense and contributes to air defense projects in Poland and Romania.⁴⁴

The main concerns that Turkey initially had with hosting the radar were naming Iran as a threat, the U.S. command and control not allowing any Turkish influence, whether the missile shield would cover all of Turkey, and data sharing with non-NATO countries, Israel in particular.⁴⁵ However, Kibaroglu argues that the degree of divergence between Turkey and NATO was not as wide as it was reflected in the media coverage.⁴⁶ Turkish authorities considered the radar as a sophisticated NATO defense capability that would be a strategic asset for Turkey's protection against "actual and potential" threats from its neighborhood.⁴⁷ They also perceive being one of the few host countries in EPAA as a privilege.⁴⁸ However, the future role of Turkey within the missile defense system is uncertain.

For robust defense, forward-based large radars in proximity to the origin of the missile are required, as the sea-based and land-based interceptors launch 100 seconds after the ballistic missile detection by the sensors.⁴⁹ The X-radar is the first chain loop in the system to transfer information to the interceptors, and has to be located at an optimum distance from the target. Proximity of Kurecik to the Middle East provides an advantage to the NATO system in providing cueing information. Establishing each radar system costs approximately \$200 million to the US.⁵⁰ The radar is exclusively operated by U.S. personnel, and has a twin system at the Nevatim Air Force Base in the Negev desert in Israel.⁵¹ The U.S. Army allocates roughly \$21 million per year for the Kurecik radar.⁵²

While the US is likely to continue to host the radar due to its location, beyond the Turkish domestic concerns about sharing information with Israel, there are also critiques of the adequacy of the radar: According to the U.S. Defense Science Board, the TPY-2 land-based radar's tracking range is not adequate for a robust defense of Alliance territory and increase in sensitivity is required, as well as extremely high speed data sharing among multiple sensors in effective discrimination.⁵³ Authors argue that the AN/TPY-2 radar system was chosen in part because it has limited ability to see into the Russian airspace.⁵⁴

Following the airspace conflicts between Turkey and Russia in Northern Syria, in December 2015, the NATO foreign ministers agreed on a Turkish air defense package to enhance air and naval presence, including maritime patrol aircraft, and an AWACS platform in the eastern Mediterranean provided by German and Danish ships.⁵⁵ The new NATO missile defense architecture is expected to include an extra deployment of Italian SAMP/T in Turkey and an Arleigh Burke-class U.S. ship to be deployed in the Black Sea on a constant basis.⁵⁶ While NATO underlines its commitment to Turkish security by readily-deployable forces, there is disagreement between Turkey and NATO on the types of threats and priorities, such as PKK terrorism vs. ISIS, Russian jets or missiles flying from Syria, and the measures to address these threats.

The Quest for a National Air and Missile Defense System: Current Status and Future Plans

Currently, Aselsan, the Turkish military electronics producer, and the national missile manufacturer Roketsan have designed low- and mid-altitude air defense systems worth approximately 200 million Euros and 130 million Euros respectively.⁵⁷ Hisar-A is designed to address short-range threats for the protection of land units, and Hisar-O is designed for the medium-range, for the protection of larger units such as air defense batteries.⁵⁸ According to Roketsan officials, Hisar systems have a dual pulse (or stage), solid-propellant rocket engine (the timing for the firing of the second stroke is optimized into the guidance algorithm, creating a surprise element and uncertainty in maneuvers).⁵⁹

Meanwhile, Turkey plans to carry its offensive, defensive, reconnaissance, surveillance, and early-warning resources and capabilities into space within the next ten years.⁶⁰ The Turkish Air Force is establishing a Space Group Command, an aerospace force unit that will specialize in satellite launches, reconnaissance space-based imagery, early warning, satellites, and satellite communications.⁶¹ The early concept design of a proposed space launch vehicle (SLV) has been commissioned to Roketsan. Turkey plans to invest \$100 million to develop the SLV, dubbed the Turkish Satellite Launching System (UFS). SSM also has a vision to complete the radar requirements of the long-range, high-altitude air and missile defense systems, including an early warning radar and the “CAFRAD” Multifunction Phased Array Radar System, within the next four years.⁶²

On long range BMD, after years of contention, in November 2015, Turkey entirely dropped the tentative agreement with China’s CPMIEC for T-LORAMIDS based on technology transfer concerns.⁶³ Since then, Turkish officials began to argue for an off-the-shelf “stopgap” acquisition until Turkey develops an indigenous system.⁶⁴

As the lead U.S. negotiator for missile defense basing agreements in Turkey, Romania, and Poland, Assistant Secretary of State Frank Rose, states, NATO encourages the allies to develop and contribute their own national capabilities, including early-warning missile defense capable radars, in addition to basing support.⁶⁵ However, the key to missile defense cooperation is interoperability to complement and supplement layered systems, as seen in Israel’s David’s Sling, Iron Dome, and Arrow systems. At this point, Turkey faces some strategic choices. NATO’s electronic warfare security codes require interoperability of the systems that will be plugged onto NATO systems, unless it is a “stand-alone” system. By purchasing U.S. or European systems, Turkey would benefit from an expanded NATO capability in the Eastern Mediterranean through the integration of a national Turkish system with the EPAA architecture.⁶⁶

Proponents of a stand-alone system or a possible non-NATO system argue that Turkey’s pursuit of air and missile defense technology is not a challenge against NATO. Regarding the China deal, Defense Minister Yilmaz had initially argued that the missile defense system would be only integrated to the national systems for Turkey’s defense without being integrated to NATO.⁶⁷ However, not integrating the national missile defense system to the NATO grid would only reduce efficiency and prevent the full coverage of threats to intercept ballistic missiles.⁶⁸ Meanwhile, high ranking defense procurement officials insisted that Turkey could address the concerns regarding information sharing between non-NATO and NATO systems by an

interphase filter produced by the Turkish AYESAS that provides one-sided information.⁶⁹ A view widely unpopular among NATO officials, Turkey seems to have cancelled the initial plans but has not entirely ruled out the possibility.

One of the off-the-shelf systems that is currently being considered is the “Medium Extended Air Defense System”- MEADS, jointly developed by the US, Germany, and Italy.⁷⁰ The system uses a phase-array radar that provides 360-degree coverage that appeals to the Turkish decision makers.⁷¹ While this system was initially intended to replace the Patriot systems, the US decided to discontinue funding the program, and Germany has not finalized the agreement with Europe’s MBDA and Lockheed Martin Corp that they will fund the procurement of the system.⁷² The funding issue casts doubt on the feasibility of this option, unless Germany gives Turkey financial guarantees.

Turkey’s Roadblocks to an Integrated Air and Missile Defense Architecture

Turkish decision makers face technical challenges that lead to gaps in coverage in the EPAA architecture, procurement challenges originating from the AKP government’s insistence on not purchasing an off-the-shelf system, and political implications on Turkey’s commitment to NATO in the midst of the crisis in Syria and Iraq, as well as Turkey’s military restructuring after the July 15th failed coup attempt.

Technical challenges with EPAA

There has been little debate in Turkey on the technical limitations and vulnerabilities of EPAA systems, such as intercepting countermeasures and decoys, lack of realistic battlefield tests, and inability to intercept low-flying cruise missiles. Instead, the discussion has focused on whether the EPAA can address Turkey’s security needs from purely a geographical coverage perspective. Ankara has been negotiating concrete security guarantees that all of Turkish territory will be protected by the EPAA plan. This idea was explored as an option to have 10 SM-3 Block IIA land-based interceptors at the Incirlik Air Base and Ramstein Air Base in Germany each.⁷³ However, the U.S. Missile Defense Agency’s (MDA) plan to choose Romania and Poland instead left parts of Turkey uncovered, unless additional resources, such as the Terminal High-Altitude Area Defense System (THAAD) system, were added to expand coverage and area defense.

According to Phase II of EPAA, THAAD can be introduced as “potential surge” for enhanced medium-range missile defense for areas out of coverage.⁷⁴ However, as the U.S. has more critical strategic assets such as military bases in the Arab Gulf countries, and can protect Incirlik Air Base from the sea, it is unlikely that a THAAD system would be permanently stationed in eastern Turkey.⁷⁵

Due to the trajectory of ballistic missiles and Turkey’s geographical proximity to the region, the existing architecture doesn’t provide defense over the entirety Turkish territory.⁷⁶ The SM-3 interceptor engages the target midcourse and therefore cannot engage the missile while it is in eastern Turkey during its ascent phase.⁷⁷

To demonstrate this selective coverage issue, Sankaran simulates an Iranian missile attack with current capabilities on two U.S. bases in Turkey. First is the Incirlik Air Base at a 964-km distance to the launch site of a Shahab-3 in Tabriz, reached by the EPAA SM-3 IB interceptors (3.5 km/s burnout velocity) launched from the Eastern Mediterranean Sea with a time delay of 100 seconds needed for tracking the target missile and pinpointing the location for intercept.⁷⁸ Second is NATO's Izmir Air Base at a 16700-km distance from Tabriz, reached by the EPAA SM-3 IB interceptors launched from Deveselu, Romania with 100 seconds delay.⁷⁹ Sankaran concludes that, in both cases, assuming perfect information, minimum energy trajectory, and no countermeasures, intercept is kinematically possible.⁸⁰ Meanwhile, an EPAA SM-3 IB interceptor launched from Deveselu would not be able to defend against the missile attack on Incirlik Air Base, even with no time delay, whereas an Aegis ship in the Eastern Mediterranean would reach the Shahab-3 targeting Izmir Air Base with 100 seconds delay.⁸¹

Procurement Issues and Financing

Turkey's policy objectives in national air and missile defense acquisition are strengthening the domestic defense industry through international partnerships in technology transfer and military modernization. Hence, the Turkish government set the selection criteria as the possibility of coproduction, cost, and delivery date, instead of the technical specifications and track record of the systems in effectively addressing the range of air and missile threats, and the political implications of the decision. It is also crucial to note that the Turkish Defense Ministry prioritizes cost and technology transfer, while the Turkish Air Force demands to acquire the most advanced systems, heavily influenced by NATO. Meanwhile, the discrepancy between Turkey's national defense objectives and the \$15 billion annual defense spending motivates Turkish policymakers to prioritize costs in decision making.

Turkish security policy makers argue that Turkey remains dependent on the system providers as long as it doesn't co-develop the technology. "If Turkey opts for direct purchase of the system then it will be obliged to make new off-the-shelf purchases 15 or 20 years later. We will not settle for this. Our target is to gain national technological capability in the missile project," stated Ismail Demir, the Undersecretary of Defense Industries (SSM).⁸² According to a Roketsan official, the measures that technology-providing countries impose to protect their competitive advantage requires Turkey to eventually develop the technology themselves beyond transfer agreements in the procurement plan.⁸³ However, they realize that Turkey's national solutions might bring lower performance, longer production times, and higher costs.

Political Considerations and Lessons Learned from T-LORAMIDS

Turkey considers lack of air and missile defense systems as a strategic weakness that left Turkish security policies dependent on the U.S. and allies' guarantees in every crisis. Turkey faced political hesitation leading to delay in the decision to send NATO systems, leading to loss of trust.⁸⁴ If NATO provides the systems to Turkey, there is concern in Ankara that there can be "strings attached," leading to the independence argument.⁸⁵

According to Turkish decision makers, since Turkey cannot rely solely on the NATO alliance for its security needs, it is rational to develop indigenous capabilities.⁸⁶ L. Gen. Salih Ulusoy, former president of Turkish General Staff planning and principles, states that off-the-shelf systems can no longer be the only option for Turkey, but this effort toward independence should not be

interpreted as a threat to the U.S. defense industry, but as Turkey becoming a stable partner in the Middle East to cooperate more with.⁸⁷

However, Turkey's quest for independence has not necessarily been welcome by its NATO partners, interpreted as a shift in Turkey's strategic orientation away from the Alliance. While aiming to bargain for strategic advantage, Turkey almost made a decision to choose a system that would not be interoperable with NATO assets. In addition, the US was particularly concerned with the choice of the Chinese company. CPMIEC has been listed under a number of nonproliferation sanctions by the United States. Had Turkey proceeded with the Chinese offer, missile defense would have had broader strategic consequences on U.S.-Turkish relations.

Turkey's domestic constraints

Following the July 15th failed coup attempt, Turkey has internal security concerns that complicate the decisions regarding its defense spending and priorities. In addition to the massive restructuring in its state bureaucracy and the armed forces, Turkey has gone back to conducting military operations in its counterinsurgency efforts against PKK, despite the ineffectiveness of air strikes. and joined anti-ISIS coalition operations. Major Turkish cities have also been targeted by ISIS. In addition to the high costs of the war against terror, Turkish economy no longer enjoys the high growth rate it had during the 2000s and has reached a plateau. Moreover, Turkey has spent \$10 million for approximately 3 million registered Syrian refugees in Turkey. Despite the financial aid agreement with the Germany for 3 million Euros, the future costs of hosting these refugees remain to be seen.

President Erdogan's quest for consolidation of power under an executive presidency through constitutional reform and the great purge in state apparatus following the coup attempt lead to concerns of increased authoritarianism, contributing to Turkey's never-ending democracy issues. This domestic struggle has dire implications on Turkey's regional and transatlantic relations, generating concern about Turkey's strategic orientation.

Lessons from the EPAA

The main lesson for Turkey from the EPAA experience is how establishing a missile shield is technically, financially, and politically very challenging, even for the US and NATO. Technical challenges include but are not limited to low bandwidth of early warning radars, leading to discrimination problems against countermeasures and decoys, limited time for interception, need for continuous coverage, costs and lack of realistic operational conditions for flight testing, and the offense-defense cost curve being in favor of offensive missiles. Financially, each test costs approximately \$400 million and generates terabytes of data to be analyzed, leading to one test on average per year.⁸⁸ In adjusted terms, the U.S. appropriations since 1996 on missile defense add up to \$274 billion.⁸⁹ Since 2006, 150 to 250 million Euros (approximately \$321 million) have been spent on theater missile defense, and additional 850 million euros will be needed to expand the system in the next decade.⁹⁰ European allies plan to contribute more than \$1 billion to develop the missile shield.⁹¹

Finally, BMD has strategic implications on Turkey's political relationships with its neighbors.

As seen in EPAA's impact on Russian and Chinese threat perceptions, an increased BMD capability is likely to trigger political reaction from countries such as Russia and Iran. Turkish BMD capability could also lead to missile and countermeasures proliferation in the region in the shorter range.

The U.S. Role in Turkey's Air and Missile Defense

While the United States is working toward a region-wide ballistic missile defense (BMD) capability extending from Europe to the Persian Gulf, one of its key allies, Turkey, is questioning its role in the EPAA architecture and pursuing national air and missile defense. At the heart of the disagreements between the United States and Turkey are Turkey's historic concerns about the U.S. commitment to Turkish security, given political disagreements and divergences of security interests, as well as the "bureaucratic red tape" leading to significant delays in defense cooperation agreements.

In August 2015, the German and U.S. governments announced that the Patriot batteries and soldiers deployed in Turkey would not be renewed by the end of their mandate in 2016.⁹² Meanwhile Spain continues to provide a BMD capability with a PAC-2 unit consisting of six launchers of four missiles near the Adana airport. The joint Turkish-U.S. statement underlined the U.S. commitment to support Turkish air and missile defense, and the need for "critical modernization upgrades" to the Patriot assets, prepared to return "within one week if needed."⁹³

The U.S. withdrawal of the Patriot batteries deployed at the Gaziantep 5th Armored Brigade Command began in early October 2015.⁹⁴ In order to prove their commitment to military coordination against the instability in the Middle East and increased Russian military buildup in the region, the U.S. and Turkish Naval Forces held a joint training exercise called the "Eastern Mediterranean Sea Exercise" in November 2015, including the BMD-equipped USS Donald Cook, submarines, surface and air defense units.⁹⁵ In addition, the U.S. Defense Security Cooperation Agency (DSCA) approved a \$70 million sale of Joint Direct Attack Munitions (JDAM) to Turkey to be used on guidance kits and hard target penetrator warheads.⁹⁶

Aiming to strengthen the defense of Turkey's airspace against non-NATO forces, in November 2015, the US deployed six F-15C air-to-air combat aircraft to Incirlik Air Base to join other U.S. aerial assets, including A-10 attack aircraft deployed at the base to fight against ISIS.⁹⁷ While these deployments were temporary and were withdrawn in December 2015, the U.S. intention is to demonstrate to Turkish officials that their requests for air-to-air support can be fulfilled on short notice.

Given the evolution of the conflicts in Syria and unstable relations with Russia, Turkey's demands for U.S. security guarantees have become broader than missile defense and the EPAA architecture. One of the main points of contention between Turkish and American officials is barriers to defense exports such as classification of sensitive materials and technology, delays in licensing, and controlling commercial components as military items. Turkish officials argue that these difficulties function as an "embargo," and lead to expensive and low-performing products.⁹⁸

U.S. defense officials argue that there is an interagency process to develop a more flexible licensing mechanism for strategic trade authorization of close allies.⁹⁹ They add that it is the U.S. strategic interest to reduce the complexities and impediments to sharing technology with Turkey, as its defense sector is growing and becoming more sophisticated.¹⁰⁰ However, the Turkish defense authorities find this approach unconvincing due to the administrative delays that have a detrimental impact on Turkish security.¹⁰¹ Hence, a major issue to be considered in future rounds of strategic dialogue is how U.S. allies such as Turkey perceive missile defense as an instrument in the larger strategic relationship and could be given security reassurances in alternative terms tailor-made to their security needs.

Consequences of a Reduced U.S. Role on NATO Missile Defense

A reduced U.S. role on NATO missile defense is likely to trigger Turkey's historical concerns with respect to reliance on NATO guarantees, due to the technical and political implications of such a decision. Without U.S. platforms, early warning radars and Aegis ships in particular, neither Turkey nor its European allies are likely to succeed in the integration of layered BMD systems and proper testing. These countries would not be able to carry the technological and financial burden of EPAA without U.S. support.

In terms of the political relationship, a U.S. reduction in support for European missile defense would deteriorate the already stressed Turkey-US relations as a signal of abandonment. In such a scenario, Turkish authorities might go back to exploring non-NATO options for stopgap and technology transfer, which would have a detrimental impact on the U.S.-Turkish strategic partnership and Turkey's commitment to NATO.

Conclusion

The national air and missile defense debate in Turkey reflects a larger independence and military modernization trend. The "equal partner" principle—that Turkey should utilize its national capacities and be a partner, not only a market for international defense projects—is unequivocally reflected in the guiding principles for national air and missile defense procurement. However, given the technical differences between low- and medium-altitude air defense systems and long-range ballistic missile defense systems, it is a technological leap for the Turkish defense industry. Since Turkey is years away from achieving indigenous capability, it should continue to rely on NATO force generation as needed and maintain a coherent NATO strategy that involves missile defense, instead of independence from the Alliance.

As seen by the progression of the missile defense deal with China, sudden deterioration of relations with Russia, and continued lack of progress in Russia-NATO relations, it is clear that Turkey's resources and current capabilities are inadequate to address its security concerns outside a NATO architecture. In making future procurement decisions, Turkish decision makers should carefully consider not only the financial and technical limitations of missile defense, but also the political implications, to maintain interoperability with NATO. By doing so, Turkey benefits from NATO information sharing, early warning and tracking data from radars, and

intelligence. NATO pays for the costs of installing, operating, and maintaining expensive systems. Turkey benefits from layered NATO platforms, i.e. Aegis ships in the Mediterranean and the Black Sea, Aegis Ashore, THAAD if needed, PAC-3, and interoperability with the U.S. C2BMC (command and control, battle management, and communications system) and Geosynchronous Space Situational Awareness Program (GSSAP).

While the future of the EPAA architecture remains to be seen under the new U.S. presidency, considering missile defense as a component of NATO deterrence under U.S. guarantees is a less risky decision for Turkish policymakers than investing in disconnected, ineffective platforms of their own.

Timeline

1991: After NATO's slow response to Ankara's request for air defense reinforcements during the Gulf War, Turkish Armed Forces create the *Air Defense Master Plan* to prioritize the acquisition of low-altitude air defense systems.

1997: Turkey begins negotiations with Israel for the co-production of the Arrow air and missile defense system. (The deal fails in 2001 due to the financial crisis in Turkey.)

March 2002: The Turkish Air Force announces the "Aerospace and Missile Defense Concept," assigning the missile defense command to the Turkish Air Force.

February 2003: France, Germany, and Belgium block the deployment of NATO equipment to Turkey, including Patriot missile batteries and Airborne Warning and Control System (AWACS) surveillance planes prior to Operation Iraqi Freedom. U.S. and Dutch batteries are deployed instead.

April 2009: The Turkish Undersecretariat for the Defense Industry (SSM) issues a proposal for the purchase of a long-range air and missile defense system (T-LORAMIDS), and the following companies file bids for the \$4 billion tender:

- U.S. Raytheon and Lockheed Martin, PAC-3s
- Russian Rosoboronexport, S-300,
- China Precision Machinery Export Import Corp (CPMIEC), FD-2000 (export version of HQ-9)
- Italian-French joint venture Eurosam, the SAMP/T Aster 30.

September 2009: The Obama administration notifies Congress of a potential \$7.8 billion sale to Turkey, including 13 Patriot fire units, 72 Patriot Advanced Capability (PAC)-3 missiles, 197 MIM-104E Patriot Guidance Enhanced Missiles (GEM-T) and 4 validation missiles, and hardware for ground-based air defense.

September 2011: Turkey agrees to host the U.S. Army Navy/Transportable Radar Surveillance (AN/TPY-2) early-warning radar system in Kurecik, Malatya.

September 2013: Turkey selects China's CPMIEC for T-LORAMIDS.

February 2013: Following the June 2012 shooting of a Turkish reconnaissance jet by Syrian forces and shells killing Turkish civilians in Akcakale, NATO's "Active Fence" mission begins in southeast Turkey. The United States, Germany, the Netherlands, and later Spain provide Patriot missiles for protection of the Turkish-Syrian border.

August 2014: Combat Air Force and Air-Missile Defense Command is established in Eskisehir, responsible for missile defense control, strategic air assets, intelligence, and space activities under one C2.

January 2015: Turkey extends the deadline for T-LORAMIDS bids for the sixth time to open parallel talks with Eurosam and Raytheon/Lockheed Martin.

March 2015: The Turkish military's electronics manufacturer ASELSAN launches a Radar and Electronic Warfare Technology Center in Ankara.

May 2015: Turkish Aerospace Industries (TAI) establishes a Spacecraft Assembly, Integration, and Test Center in Ankara.

November 2015: Turkey cancels the long-range air and missile defense system tender.

December 2015: The United States and Germany withdraw their Patriot batteries and soldiers from Turkey, while Spain decides to extend its participation in the “Active Fence” mission until December 2016.

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