

TURKEY AND NUCLEAR COMMAND, CONTROL AND COMMUNICATIONS



Recommended Citation

Can Kasapođlu, "TURKEY AND NUCLEAR COMMAND, CONTROL AND COMMUNICATIONS", NAPSNet Special Reports, June 27, 2019, <https://nautilus.org/napsnet/napsnet-special-reports/turkey-and-nuclear-command-control-and-communications/>

CAN KASAPOĐLU

JUNE 27, 2019

I. INTRODUCTION

In this essay, Can Kasapoğlu argues that in contrast to the other four NATO “nuclear delivery states (Belgium, Germany, Italy, The Netherlands, Turkey), Turkey no longer appears to have an active nuclear weapons delivery mission using bombers and its NC3 system is likely dormant. "Yet," he concludes, "in a hypothetical TNW scenario, the Turkish Air Force would manage the Incirlik base and air traffic for the US air wing, and would probably provide the strike package with fighter escort. In fact, the strong separation between active combat (the US) and support roles (Turkey) could be a complicating factor for the NC3 in real warfighting situations."

Can Kasapoglu is the defense analyst of the Istanbul-based think-tank EDAM and IPC-Stiftung Mercator Fellow at the German research institute SWP. Previously he was an Eisenhower Fellow at the NATO Defense College in Rome, and held a visiting research post at the NATO Cyber Center of Excellence in Tallinn.

Note: The author used only open-source, publicly available information and resources for this backgrounder.

Acknowledgments: The workshop was funded by the John D. and Catherine T. MacArthur Foundation.

This report is published simultaneously [here](#) by Technology for Global Security and [here](#) by Nautilus Institute and is published under a 4.0 International Creative Commons License the terms of which are found [here](#).

The views expressed in this report do not necessarily reflect the official policy or position of the Nautilus Institute. Readers should note that Nautilus seeks a diversity of views and opinions on significant topics in order to identify common ground.

Banner image is by Lauren Hostetter of [Heyhoss Design](#).

II. NAPSNET SPECIAL REPORT BY CAN KASAPOĞLU

TURKEY AND NUCLEAR COMMAND, CONTROL AND COMMUNICATIONS

JUNE 27, 2019

Summary

Of the five NATO “nuclear delivery states (Belgium, Germany, Italy, The Netherlands, Turkey),” Turkey no longer appears to have an active direct role in delivering nuclear weapons using its own bombers. Thus, whatever past Turkish *nuclear command, control and communications* (NC3) system would have supported this mission, once nuclear weapons were released, is likely dormant (although Turkish planes may still perform a conventional support missions for US bombers that fly to the US airbase in Turkey and then perform a nuclear delivery mission from Turkey). However, Turkey still plays an operational role in even US-only nuclear bomber strikes launched from Turkey via air traffic control and other support roles by Turkish forces at the Incirlik airbase. The future role of a possible a Turkish F-35 unit in fulfilling the NATO nuclear delivery mission is uncertain. Consequently, future Turkish NC3 systems are similarly uncertain.

A Closer Look into Turkey's NC3 Ambiguity

The *nuclear command, control and communications* (NC3) issue is more of a black box in Turkey than in the nuclear weapons states. First, the literature on tactical nuclear weapons (TNW)—just like the available writings on non-nuclear weapons of mass destruction proliferation at Turkey's Middle Eastern doorstep—is very limited. Turkey is yet to establish war studies as an academic discipline, and only few Turkish academics have political-military affairs expertise that could match the Western strategic community. Second, the Turkish legislation and strategic cultural practice leave little room for open-source information and open-source analyses concerning the national security agenda. In other words, in most cases, there is no difference between 'crucial' or 'strategic' and 'confidential' for researchers. Finally, the Turkish Foreign Policy's traditional stance on the TNW deployment has pursued a tacit approval and silent support favoring the presence of B-61 nuclear bombs. Thus, Ankara has not diligently encouraged public universities to undertake research on NATO burden-sharing, the air force's nuclear roles or the nation's host status. Some experts claimed that Turkey's defense planners saw some beneficial strategic ambiguity in the forward deployed tactical nuclear weapons to counterbalance the offensive strategic weapons programs (ballistic missiles and non-nuclear WMDs) of Ankara's Middle Eastern neighbors.[1] Interestingly, some recent Turkish writings (even the ones published by the official state news agency) suggest there is a global military trend towards less strict tactical nuclear weapons use with a lower threshold.[2]

As is widely known, available writings suggest that Turkey hosts some 60 to 70 tactical nuclear weapons.[3] The historical background of the Turkish NC3 issue shows that the Turkish Air Force's dual-capable aircraft, certified for tactical nuclear delivery missions, were deployed in various airbases until the end of the Cold War.[4] These squadrons were assigned to NATO's emergency planning and enjoyed high combat-readiness. In addition, the Incirlik Air Base supported US bomber aircraft if / when needed for strategic nuclear missions.[5]

The doctrinal order of battle and the NC3-related issues would vary according to whether the host nation itself flies nuclear delivery missions—or not. The biggest ambiguity with respect to the contemporary Turkish case derives from exactly this point. According to a former air chief, someone who flew tactical nuclear drills in the Cold War days, the Turkish Air Force no longer flies such missions, but only conducts fighter escorts to the allied, nuclear certified aircraft. According to this view, the Turkish role in NATO's related exercises has also changed accordingly.[6]

However, some experts such as Hans Kristensen believe that Turkey never stopped being capable of nuclear delivery. Only, Kristensen adds, the level of readiness dropped drastically.[7] More recently, Kristensen states that the extent to which Turkey participates in the NATO nuclear mission is unclear, though it currently maintains nuclear-capable F-16s.[8]

Operational Level NC3 Assessment: Tactical Nuclear Basing, Air Wing Planning, and Potential TNW Target Set

Another key issue is the underlying operational concept and potential target-set of these weapons. An interesting report penned by a retired Turkish general claimed that if the Soviets had started a massive incursion, the Allies planned to employ the tactical nuclear weapons (TNWs) to halt or slow down the assault.[9] In other words, the TNWs were meant to be used within the Turkish territory during the Cold War.[10] Given the regional balance of power and NATO's military posture, today the equation is very different. If it were ever to happen in the future, TNW delivery missions would take place beyond Turkey's borders.

It is difficult to find good papers in the Turkish press on the TNWs, and especially command and control issues. A rare example in this respect explained that during the Cold War, while the bulk of

the TNWs (air-dropped bombs and artillery) were subject to dual control, the Incirlik Base hosted US- only controlled tactical nuclear weapons. Following the end of the Cold War, the remaining nukes in Turkey were the latter while those previously under dual control were removed.[11] Interestingly, the referred work highlights, while the Americans have sole control of the remaining B-61 nuclear weapons, the Turkish side has remained responsible of the air base and related facilities.[12] In other words, it is the US authorities (starting from the President) who would decide to use the TNWs in Turkey within NATO structures, but it would be the Turkish authorities[13] who could give (or not give) clear for take-off from the Incirlik base, including for the US aircraft.

The above-mentioned parameters lead to a very unusual situation with respect to NC3. Assuming that the Turkish Air Force no longer supports and does not prepare for the TNW delivery mission, while the forward-deployed US Air Force contingent is the primary responsible actor for the delivery mission (noting that there is not a permanent air-wing specifically deployed for nuclear missions in the Incirlik base), the Turkish government and military control the base and the air traffic. Separately, the Turkish Air Force would also provide fighter escort capabilities to TNW missions. Therefore, both the American and the Turkish sides must be involved in the operational planning and execution at the tactical level, even today, although this conventional role would not entail Turkey maintaining its own NC3 system.

Another important aspect of command and control debates revolving around the Incirlik Base is the Weapon Storage Security System (WS3). Having started in 1976 and first built in the Büchel Air Base (Germany) in 1990, Incirlik is the last TNW hosting air base that acquired the WS3 infrastructure.[14] The WS3 infrastructure remains key to Turkey's host nation status. Although some media suggested the B-61s could be moved to the Deveselu Base in Romania, the storage security system capabilities make the air bases equipped with this feature indispensable—and Deveselu has no such capability.

The Incirlik airbase and the US presence is the subject of a complicated political debate in Turkey. The air base has been exposed to controversial closure debates following each Turkish-American crisis. Thus, the abovementioned, unusual control-share (between the B-61 bombs and the base/air traffic control) could complicate the situation in case a real nuclear delivery mission occurs. More importantly, to date, the Cuban Missile Crisis and the United States' decision to remove its nuclear-capable Jupiter intermediate range ballistic missiles from Turkey was a traumatic experience that heavily contributes to the strategic cultural perceptions of the Turkish elite. Overall, Turkey would always prefer having a bigger share of and role in NC3 mechanisms even if Turkish air forces are not dedicated directly to the nuclear delivery mission at present.

A Core NC3 Element: The Turkish Air Force's Doctrinal Order of Battle

The Turkish Air Force's doctrinal order of battle prioritizes joint characteristics and unity of command given the geopolitical requirements of fast and organized response in dynamic battlespaces around Turkey. In this respect, both the Air and Missile Defense Command and the Combined Air Operations Command are in Eskişehir, a city with a pronounced aviation environment in northwestern—central Anatolia.[15] This posture centralizes all aerospace, missile, air and missile defense, fighter and bomber tactical aviation, and joint operations with the army and navy under one operational command.[16] On the other hand, the Air Force Command Headquarters, which deals with strategic level management of the branch, is in the capital Ankara.[17]

Following the 2016 shifts in the Turkish Armed Forces' chain of command, the branches, as well as the general staff, answer to the Ministry of Defense (previously the branches had answered to the General Staff which remained independent from the ministry of defense).[18] The President, when

considered necessary, can give orders to the general staff, the branches, or their subordinates directly.[19]

As seen in the brief information above, the Turkish Armed Forces and the Turkish Air Force have a very centralized chain of command structure, especially due to the changes adopted in recent years. The President has a consolidated oversight on the armed forces at policy and strategic, and when necessary operational, levels. At the operational level, the air force command structure is also highly centralized and combined. Military history suggests that centralization of command in strategic and operational levels could badly upset the tactical *marge de manoeuvre* in conventional warfighting. Yet, when it comes to more sensitive missions like the NC3 and tactical nuclear operations, it would minimize, theoretically, unforeseen incidents.

Turkey is set to acquire 100 F-35As. Although there are serious problems revolving around the S-400 procurement, there is no official cancellation of the F-35 acquisition program.[20] There is no clear information whether some of Turkey's dual-capable aircraft would be certified for nuclear missions or not in the future. Likewise, the Block-4 upgrade (that enables F-35 nuclear delivery missions[21]) is another unknown for Turkey's forthcoming Joint Strike Fighter fleet. However, one thing is clear. Turkey's defense minister told that the F-35 squadrons will be deployed in Malatya.[22] Thus, although the chances are slim, if Turkey's some F-35s were to be nuclear certified, they probably would be assigned to the Incirlik Base as a permanent air wing, or would be kept in Malatya with a pre-assignment order, and the required NC3 capability would have to be available, including the ability to daisy-chain communications beyond Turkish borders. Nevertheless, it is unlikely that the Turkish Air Force would return to active tactical nuclear delivery capabilities soon.

This overall picture brings about a somewhat problematic outlook in the NC3 at both allied at national levels. Clearly, as reported by open-source writings, the United States does not field a permanent, nuclear certified air wing in the Incirlik Base. Thus, in case of a TNW deliver mission, the United States will probably deploy the required strike package from Europe. As mentioned earlier, Turkey does not have a nuclear certified squadron in its air force as well.[23] As a result, in a hypothetical scenario in which NATO conducts TNW missions, the timeline of deciding, planning, and preparing for a tactical nuclear operation would be well delayed in Turkey compared to other European allies. Notably, in nuclear operations planning, these problems could turn into serious hindrances since flexibility, surprise, and shock remain important pillars of the US doctrines and concept of operations (CONOPS).[24]

In terms of networking and centralized command and control node, the entire air force assets are connected to the HvBS (Hava Kuvvetleri Bilgi Sistemi—Muharebe Yönetimi, the Air Force Information System—Battle Management) produced by the Turkish defense conglomerate Havelsan.[25] The C4ISR[26] system has been in use since 2007 through several modernizations. It provides a detailed battlefield picture with advanced friendly order of battle, foe order of battle, as well as operational data obtained from the battlespace. The C4ISR system has external system integrations with several tactical datalinks including Link1, Link 16, and Link11B.[27] In January 2018, Turkey's main procurement body (Savunma Sanayi Başkanlığı) kicked-off a project to link up the forthcoming F-35 Joint Strike Fighter aircraft to the HvBS-MY C4ISR infrastructure for "enabling safe sharing of sensitive and classified information." [28] Turkey's future 5th generation fleet (if everything goes as planned with the F-35 deliveries) will be composed of the F-35s (at least 100 for the air force and possibly some 20 for the naval aviation) as well as the TF-X air superiority fighter, which will be produced jointly by the British defense sector.[29]

In fact, the Turkish defense planners' intentions to link up the F-35 to the HvBS-MY, given the fact that the S-400 procurement could indeed realize, alarmed the Western strategic community. A July

2018 article published by the National Interest magazine noted, “worse still, Turkey wants to link the F-35 fighter jet to its HvBS network. If S-400 computers are also connected to HvBS, they could be in a position to retrieve data collected by an F-35’s sensors. In fact, breaking into the dense stream of sensor data an F-35 is designed to transmit to friendly forces to create a fused sensor-picture would be another potential avenue for tracking the stealth jet’s activities and fatally compromising the capabilities of F-35 across Europe.”[30]

From an NC3 dimension, the abovementioned fear could grow even bigger. Assuming that the Turkish Air Force’s F-35s will play an important role in the TNW related missions—be it fighter escort to the US TNW delivering air wing or an actual nuclear-certified dual capable role resembling the Cold War days—having the S-400 systems and the F-35s within the very same C4ISR network would be dangerous. More importantly, noting that the forward deployed tactical nuclear deterrent is a part of the NATO - Russia military balance of power, these concerns would mount. One particular problem could be the unprecedented connectivity of the F-35 through the ALIS system.

The F-35’s Autonomic Logistics Information System (ALIS) is a key aspect of operating the Joint Strike Fighter with a global fleet understanding. The system integrates immense capabilities including supply chain, operations, technical data about the aircraft, and maintenance on a distributed network through a secure information environment. According to Lockheed Martin, “ALIS serves as the information infrastructure for the F-35 Lightning II, transmitting aircraft health and maintenance action information to the appropriate users on a globally distributed network.”[31] ALIS has hundreds of applications for maintenance, training, support, and technical data. Even more critically, it converts the F-35 data into actionable information.[32]

At the time of writing, Turkey’s procurement chief firmly underlined that the S-400 will operate as a standalone surface to the air (SAM) system augmenting high altitude / long range air defense.[33] Nevertheless, given the air force doctrinal order of battle, it is not possible to completely isolate the Russian system from the centralized command and control structure.

The S-400 Factor in Turkey’s Future Tactical Nuclear Weapons and the NC3 Trajectory

Another other scenario that one should not underestimate is the Turkish Air Force without F-35s and a problematic F-16 arsenal in the 2020s against the backdrop of a significant crisis in the Turkish - American bilateral ties. In fact, given the current developments revolving around the S-400 acquisition from the Russian Federation, such an outlook is not farfetched at all.

In the eventuality of the S-400 procurement going through, the United States’ reaction will probably be harsh, and could go well beyond the Joint Strike Fighter issue. The Pentagon report to the US Congress underlines that apart from the F-35 deliveries, a broad and critical portfolio such as CH-47 Chinook heavy-lift helicopters, UH-60 Black Hawk utility helicopters, and the F-16 Fighting Falcon aircraft could be affected by the S-400 procurement[34]. Probable CAATSA (Countering America’s Adversaries Through Sanctions Act) sanctions may also bring about a very heavy burden on the Turkish defense industry.

Interestingly, at the time of writing, a key development took place that could affect Turkey’s S-400 quest. On December 19, 2018, the US DSCA (Defense Security Cooperation Agency) notified the Congress about potential foreign military sales of the Patriot air and missile defense systems to Turkey[35]. Ankara had an unsuccessful Patriot procurement record in the past, mostly because of the unmet demands of co-production and technology transfer. However, different from the notification back in 2009[36], this time, Washington kept offset options open, which remains a high priority for the Turkish administration. The US Congress did not object to the DCSA’s plans within the 15 days window, and therefore, the deal could now proceed if certain difficulties, first and

foremost the S-400 procurement, are resolved.

The proposed package offers 60 PAC-3 MSE (Missile Segment Enhancement) and 80 Patriot MIM-104E GEM-T missiles (Guidance Enhanced Missiles)[37]. The GEM-T variant is built on the Patriot PAC-2 basis. It provides higher effectiveness against air-breathing targets. The system's ballistic missile defense capability is greater than the PAC-2, yet not as effective as the PAC-3 MSE[38]. The PAC-3 MSE has the critical hit-to-kill capability[39]. Furthermore, this variant's ability to operate at a higher altitude than the Patriot PAC-3 (40km reported for the PAC-3 MSE18, which is approximately twice the capacity of the standard Patriot PAC-3) marks a notable advancement against ballistic missile threats. The PAC-3 MSE's increased maneuverability and speed bring about serious advantages in ballistic missile defense[40].

Turkish political-military decision-makers' rhetoric suggests that Ankara would opt for proceeding with the Patriot and the S-400 procurements at the same time. However, present political dynamics in the US, as well as the abovementioned Pentagon report to the Congress, make this an extremely difficult option if not a dead end. In fact, the Patriot offer, interestingly, could even increase the risk of being exposed to CAATSA sanctions if Turkey finalizes the S-400 acquisition. President Donald Trump enjoys a waiver option over the sanctions decisions taken by the Congress. Yet, when the administration notified the Congress about the prospects of Patriot sale to Turkey, it also informed lawmakers that Ankara would come under the CAATSA regime if the S-400 deal were materialized[41]. It seems that due to the lack of adequate track 1.5 and track 2 diplomacy channels in Turkey's transatlantic ties, in addition to the harsh rhetoric of top Western political-military figures, the S-400 issue is now perceived a national sovereignty matter by the Turkish strategic community, something that is hard to explain in solely rational military-technical calculus.

At this point, one should not underestimate the role of Turkey's future air and missile defense posture in the NC3 discussions. First, any present and future tactical nuclear weapons delivery scenario will take place over very dangerous airspaces protected by menacing anti-access / area denial (A2 / AD) assets. Thus, in the absence of the F-35 (in case the S-400 acquisition hinders the deliveries), the Turkish Air Force's ability to conduct escort missions to TNW delivery strike packages would be problematic. This hindrance would not only stem from the Joint Strike Fighter's stealth capabilities. The F-35 is primarily about superior situational awareness, networking connectivity, as well as information superiority[42]. As a 2016 RUSI report highlights, "the F-35's open software architecture, powerful sensors, unprecedented automatic data fusion and analysis capabilities, combined with its low-observability should, in time, unlock combat tactics and options previously impossible for combat aircraft." [43] In other words, the F-35 is a coalition warfare asset, and Turkey's exclusion from the project could resonate with the NC3 functions of its air force, forcing Ankara to adopt a more idle stance. Secondly and more critically, deploying a highly sensitive US nuclear certified air wing in Turkey would be very problematic if the airspace is protected by the standalone S-400 engagement envelopes. Thus, the Turkish administration's forthcoming decision on Turkey's air and missile defense roadmap would be important in the NC3 trajectories.

On a separate note, an uncontrollable and spiraling break in the Turkish - American bilateral defense and security relations, as well as Turkey's position within the NATO Alliance, would inevitably affect the *raison d'être* of the tactical nuclear weapons deployment and the allied nuclear burden sharing. Simply put, Turkish political-military elites have traditionally seen the TNW deployment as an emblem of prestige within NATO and a privilege symbol. At the same time, they have perceived these assets as a tool that solidifies the Turkish - American defense partnership. [44]

Key Findings:

- Turkey remains a unique case among the NATO TNW hosting nations since the Turkish Air Force no longer have a direct role in tactical nuclear weapons delivery in offensive operations.
- Yet, in a hypothetical TNW scenario, the Turkish Air Force would manage the Incirlik base and air traffic for the US air wing, and would probably provide the strike package with fighter escort. In fact, the strong separation between active combat (the US) and support roles (Turkey) could be a complicating factor for the NC3 in real warfighting situations.
- Although the nuclear certification and related modifications remain uncertain, the F-35 acquisition is believed to have a critical impact on Turkey's future TNW role as well as the NC3 issues. In this respect, the S-400 procurement would be a highly detrimental factor if realized.
- Turkey's command and control structures are very centralized both at policy decision-making, strategic, and operational levels. Although the Turkish NC3's details are unknown in the open-source literature, it is highly likely that it depends on a carefully tailored mechanism that necessitates strictly centralized oversight at all times.

III. ENDNOTES

[1] For a good study on the issue, see. Mustafa, Kibaroglu, Orta Doğu'da Nükleer Teknolojinin Yayılması ve Türkiye'nin Olası Yanıtları, EDAM, 2012.

[2] Anadolu Agency, <https://www.aa.com.tr/tr/analiz-haber/abd-nin-yeni-nukleer-silah-anma-programinin-sifreleri/1382981>, Accessed on: February 28, 2019.

[3] Hans, M. Kristensen. Non-Strategic Nuclear Weapons, *Federation of American Scientists*, 2012.

[4] Mustafa, Kibaroglu. Orta Doğu'da Nükleer Teknolojinin Yayılması ve Türkiye'nin Olası Yanıtları, EDAM, 2012.

[5] Ibid.

[6] Mustafa, Kibaroglu. Orta Doğu'da Nükleer Teknolojinin Yayılması ve Türkiye'nin Olası Yanıtları, EDAM, 2012.

[7] For a detailed study, see: Hans, M. Kristensen. Non-Strategic Nuclear Weapons, *Federation of American Scientists*, 2012.

[8] in S. Andreason et al, Building a Safe, Secure, and Credible NATO Nuclear Posture, Nuclear Threat Initiative, Washington DC, January 2018, at: https://www.nti.org/media/documents/NTI_NATO_RPT_Web.pdf.

[9] Oktay, Bingöl. İncirlik ve ABD'nin Alternatif Arayışları, Merkez Strateji Enstitüsü, 2017.

[10] Ibid.

[11] Sedat, Ergin. "Erdoğan İncirlik'teki Atom Bombalarını Ne Yapacak?", *Hurriyet*, <http://www.hurriyet.com.tr/erdogan-incirlik-teki-atom-bombalarini-ne-yapacak-14363817>, Accessed on: January 15, 2018.

[12] Ibid.

[13] Constitutionally, the President has the authority to order the use of military, while the Parliament exercise the power to declare war or the decide deploying the Turkish troops abroad.

While the parliamentary allowance is granted (within a time limit), the government, headed by the President, decides on how and when to initiate the armed forces.

[14] Hans, M. Kristensen. US Nuclear Weapons in Europe: A Review of Post-Cold War Policy Force Levels and War Planning, *Natural Resources Defense Council*, 2005, s.14.

[15] The Turkish Air Force Command, Order of Battle, https://www.hvkk.tsk.tr/T%C3%BCrk_Hava_Kuvvetleri/Hakk%C4%B1m%C4%B1zda/Te%C5%9Fkil%C3%A2t/MuhHvKvKl%C4%B1%C4%9F%C4%B1, Accessed on: February 28, 2019.

[16] Ibid.

[17] The Turkish Air Force Command, https://www.hvkk.tsk.tr/T%C3%BCrk_Hava_Kuvvetleri/Hakk%C4%B1m%C4%B1zda/Te%C5%9Fkil%C3%A2t/HvKKl%C4%B1%C4%9F%C4%B1_Kararg%C3%A2h%C4%B1, Accessed on: February 28, 2019.

[18] Haberturk, <https://www.haberturk.com/son-dakika-genelkurmay-baskanligi-milli-saunma-bakanligina-baglandi-2059351>, Accessed on: February 28, 2019.

[19] Ibid.

[20] Savunma Sanayii Başkanlığı, <https://www.ssb.gov.tr/website/ContentList.aspx?PageID=881>, Accessed on: January 16, 2019.

[21] Kris, Osborn. "The F-35: The Ultimate Nuclear Bomber?", *The National Interest*, May 2018, <https://nationalinterest.org/blog/the-buzz/the-f-35-the-ultimate-nuclear-bomber-25932>, Accessed on: January 16, 2019.

[22] Aksam, <https://www.aksam.com.tr/guncel/malatya-f35e-hazirlaniyor/haber-695876>, Accessed on: January 16, 2019.

[23] Sinan Ulgen. *Turkey and the Bomb*, Carnegie Endowment For International Peace, 2012, p. 12.

[24] The US Army, *FM 100 - 30 Nuclear Operations*, 1996.

[25] Havelan, <http://www.havelan.com.tr/tr/komuta-kontrol-savunma-teknolojileri-proje-ve-yetkinlikler-hava-kuvvetleri-bilgi-sistemi-hvbs-projesi>, Accessed on: February 28, 2019.

[26] Command, control, communications, computers, intelligence, surveillance, reconnaissance.

[27] Havelan, Hava Kuvvetleri Bilgi Sistemi - Muharebe Yönetimi, http://www.havelan.com.tr/files/files/document/26122017180158758_komuta-kontrol-savas-sistemleri-hava-kuvvetleri-bilgi-sistemi-hvbs-projesi.pdf, Accessed on: February 28, 2019.

[28] For the project tender (in Turkish) see:Savunma Sanayi Başkanlığı, https://www.ssb.gov.tr/Images/Uploads/MyContents/V_20180103130752709974.pdf, January 2018, Accessed on: February 28, 2019.

[29] Defense News, "Turkey wants to link F-35 jets to its Air Force network", *Defense News*, January 2018, <https://www.defensenews.com/air/2018/01/09/turkey-wants-to-link-f-35-jets-to-its-air-force-network/>, Accessed on: February 28, 2019.

- [30] Sebastien Roblin. "America's Big Fear: Turkey Mixing F-35s and Russia's S-400 Air Defense System", *the National Interest*, July 2018, <https://nationalinterest.org/blog/buzz/americas-big-fear-turkey-mixing-f-35s-and-russias-s-400-air-defense-system-25152>, Accessed on: February 28, 2019.
- [31] Lockheed Martin, https://www.lockheedmartin.com/content/dam/lockheed-martin/rms/documents/f35-training/F-35-Lightning-II-PC-bifold-Blue_2015.pdf, Accessed on: February 28, 2019.
- [32] Lockheed Martin. <https://www.lockheedmartin.com/en-us/products/autonomic-logistics-information-system-alis.html>, Accessed on: February 28, 2019.
- [33] For the full interview (in Turkish), see: <https://www.youtube.com/watch?v=2cUC3kNlpWM>, Accessed on: February 28, 2019.
- [34] The US DoD, FY19 NDAA Sec 1282 Report, Unclassified - Cleared for Open Publication, November 26, 2018.
- [35] DSCA, <http://www.dsca.mil/major-arms-sales/turkey-patriot-missile-system-and-related-support-and-equipment>, Accessed on: December 25, 2018.
- [36] DSCA, <http://www.dsca.mil/major-arms-sales/turkey-patriot-advanced-capability-3-guided-missiles>, Accessed on: December 25, 2018.
- [37] DSCA, <http://www.dsca.mil/major-arms-sales/turkey-patriot-missile-system-and-related-support-and-equipment>, Accessed on: December 24, 2018.
- [38] IHS Markit Jane's, Patriot, November 2018.
- [39] IHS Markit Jane's, Patriot, November 2018.
- [40] Lockheed Martin, <https://www.lockheedmartin.com/content/dam/lockheed-martin/mfc/pc/pac-mse/mfc-pac-3-mse-pc.pdf>, Accessed on: December 24, 2018.
- [41] Can, Kasapoglu and Sinan Ulgen. *Strategic Weapon Systems in the Turkey - Russia - US Triangle*, EDAM, 2019.
- [42] Justin, Bronk. *Next Generation Combat Aircraft: Threat Outlook and Potential Solutions*, RUSI, 2018, pp.7-8.
- [43] Justin, Bronk. *Maximum Value from the F-35: Harnessing Transformational Fifth-Generation Capabilities for the UK Military*, RUSI, 2016, p.10.
- [44] Sinan Ulgen. *Turkey and the Bomb*, Carnegie Endowment For International Peace, 2012, p. 12. In his in-depth assessment, Ulgen argues that "The direct link that the forward-deployed nuclear weapons establish between Turkey and the United States is also of relevance to those Turkish policymakers that are increasingly uncertain about NATO's willingness and ability to honor its collective defense commitments under Article 5 of the North Atlantic Treaty. They have some reason to be wary. During the first Iraq war in 1991, the Turks requested the invocation of Article 5 so as to obtain a NATO sponsored missile defense system. That request was blocked for several weeks at the NATO Council, and the episode is still fresh in the memory of the Turkish security establishment.

This inability of the Alliance to act decisively at a time when Ankara believed itself to be threatened by Saddam Hussein's weapons of mass destruction convinced Turkish policymakers to strengthen their security relationship with the United States as a hedge against the inability of NATO to honor its commitments to Turkey in a time of crisis".

IV. NAUTILUS INVITES YOUR RESPONSE

The Nautilus Asia Peace and Security Network invites your responses to this report. Please send responses to: nautilus@nautilus.org. Responses will be considered for redistribution to the network only if they include the author's name, affiliation, and explicit consent

View this online at: <https://nautilus.org/napsnet/napsnet-special-reports/turkey-and-nuclear-command-control-and-communications/>

Nautilus Institute

608 San Miguel Ave., Berkeley, CA 94707-1535 | Phone: (510) 423-0372 | Email:

nautilus@nautilus.org