DEVELOPING REGIONAL AIR DEFENCE CAPABILITIES: ROLE OF NC3A

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Abstract: The South Eastern European nations of the Balkan Region form an area of countries with similar geo-political issues. These nations need to go through a modernization process of their Air Defence capabilities, in times where financial limitations make it difficult for a single nation to acquire such capabilities on their own. The NATO C3 Agency is highly engaged with the nations of South East Europe in supporting their C4ISR transformation efforts, and possesses all skills, capabilities, and tools to design, procure and implement a regional, multi-national air defence capability, with truly joint situational awareness and integration of national sensors and Missile Defence systems.

Keywords: South East Europe, Balkan Region, NC3A, NATO, ISR, Command and Control, Missile Defence, C4ISR, C4I, Civil to Military cooperation and integration, Defence Planning, Russia, airspace, terrorist threat.

Introduction

The South Eastern European countries of the Balkan Region form an area of countries with similar geo-political issues. Most importantly, these countries are a connecting bridge between the rich and developed, but also aging Western and Central Europe, and Russia, which in turn is the gateway to the young and rising Asian powers. A modern, fast, and comprehensive development of the armed forces in the Balkan countries would give the region the capability to become self-reliant in the role of providing a secure eastern frontier to the NATO Alliance, and in fostering a true peer-to-peer cooperation with the 'big' Russian neighbour, also fulfilling on behalf of NATO the new task mandated by the NATO Secretary General of bringing NATO-Russia relationships into a new era of openness, integration and mutual support. Without armed forces skilfully trained to the newer technologies and equipped with state of the art defence capabilities and assets, these tasks are seemingly due to remain on paper.

Air Defence is a strategic area for the Balkan Region and for South East Europe in general. NATO defines air defence as "all measures designed to nullify or reduce the

effectiveness of hostile air action."[1] At first glance, this definition might just seem to concern the air domain; in reality, it touches all domains of the armed forces: land, maritime, airborne. And Air Defence clearly includes Missile Defence as well. Protection includes the concepts of situational awareness and identification of threats, which are not necessarily military threats coming from a neighbouring country. They could simply be threats coming from renegade aircrafts or terrorist attacks; this brings into the concept of Air Defence two other dimensions: that of civil to military interaction, i.e. the cooperation and integration between civilian air surveillance and military air defence capabilities; and that of airspace border control, which comes into play when such renegade aircraft transitions from one sovereign space into another. Air defence is therefore really a comprehensive capability, where the extent and quality of integration between air, maritime and land assets and cooperation between different entities (civil, military) and different nations is a key factor for a successful implementation. Last but not least, acquiring a full comprehensive and modern air defence capability is expensive to the extent that it becomes difficult to afford by a nation with a relatively small defence budget. For all these reasons, air defence is an area where the Balkan countries can leverage their own investments to jointly create a capability which will be bigger, more modern, and economically more sustainable than the air defence capabilities that the individual countries could afford without pooling their resources and capabilities into a common, multi-nationally funded project.

NC3A Role in the Balkan Region and South East Europe

The NATO C3 Agency (NC3A)[2] has been playing an active role in the South Eastern European Region since the second half of 2009, when for the first time it participated in the South East Defence Ministerial (SEDM)[3] meeting in Sofia on 21st of October. At that meeting, the NC3A Deputy General Manager, Mr Kevin Scheid, and the Director of the Sponsor Account NATO & Nations Dr. Velizar Shalamanov met with the Ministers and Deputy Ministers of Defence of Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Greece, Italy, the former Yugoslavian Republic of Macedonia, Romania, Slovenia, Turkey, Ukraine, USA, and the representatives of the SEDM Observers Georgia, Moldova, Montenegro and Serbia. This meeting was followed by the first C4ISR Chief Information Officers (CIO) Conference[4] jointly organized by the Bulgarian Ministry of Defence and NC3A in Sofia in February 2010, which saw the participation of NATO stakeholders and C4I leaders and heads of C4I departments from the SEDM nations. During this meeting, the nations started talking about possible and practical examples of multi-national cooperation in the field of C4I.

Over the course of 2010, NC3A started to be engaged in bi-lateral cooperation agreements with several countries of South East Europe. NC3A is currently engaged

with providing a series of C4ISR capabilities, ranging from defence planning to training on intelligence, naval communications, air surveillance and situational awareness, document handling and network connectivity and information systems, training and simulation and overall contract management to countries such as Bulgaria, Romania, Albania, Slovenia, Croatia, and Hungary.

Such bi-lateral engagements enable NC3A to be best positioned within NATO to provide consultation and procurement support in the light of a multi-national interest of the region in one of the C4ISR domains. When it comes to the specific domain of air defence, the NATO C3 Agency has also unique and recognized technical excellence in the area of passive sensors and has acquired multi-year experience in procuring national turn-key air surveillance capabilities.

Within the framework of the NATO C4ISR Approach, NC3A can deliver C4ISR capabilities to nations by cooperating closely with the relevant NATO agencies and organizations, such as the NATO International Staff (IS), which often gathers the initial requirements from the nations and can provide a first assessment; the NATO Communication and Information Systems Services Agency (NCSA) and the NATO Programming Centre (NPC), which can provide ongoing maintenance to communication and information systems procured by NC3A; with the NATO Maintenance and Supply Agency (NAMSA), which provides maintenance and contracted logistic support (CLS) to solutions engineered, installed and fielded by NC3A in NATO operational theatres (e.g. in Afghanistan) and in NATO nations.

The NC3A actively cooperates with the NATO Analytical Air Defence Cell (NAADC) of the International Staff, which is actively engaged in South East Europe (SEE) to propose a multi-national approach to Air defence.

NC3A Air Defence Capabilities

NC3A possesses a wide range of capabilities in the area of Air Defence and can offer nations services, tools and highly qualified expertise in the following domains:

- Air Surveillance;
- Air Command & Control (Air C2);
- Ground Air Ground Communications;
- Missile Defence capabilities and their integration into C2;
- Civil to Military cooperation and integration.

Such capabilities can be integrated by NC3A to form a Comprehensive Air Defence capability, made of sensors, reporting and decision support systems, communications between relevant air policing ground, naval and airborne assets, and finally integration of the wider Theatre Missile Defence assets into the Command and Control deci-

sion support systems. The same systems that NC3A has developed to provide Air C2 functions are also capable of integrating the situational awareness coming from the land and maritime domains, providing the basis for an overarching Joint Common Operational Picture, all achieved through reliance over a single integrated platform.

The following sections further detail the services that NC3A provides in the five sub-domains of Air Defence listed above.

Air Surveillance

The main purpose of an air surveillance system is to provide Nations with positive control of the airspace over their territory. NATO requirements are for a nation to provide basic volumetric coverage, however a nation will typically have requirements to control lower altitudes, as well. Particular attention needs to be paid to the protection of high value assets, such as power plants and to protect avenues of low-level approach. The number and locations of sensor sites need to be carefully selected to maximise coverage and minimise the number of systems required. This selection depends on terrain, accessibility of the site, types of sensors, location of other infrastructure, possible interference, as well as a wide range of operational, political, economic and environmental concerns. In the light of a regional approach to Balkan Air Defence, the number and location of sensors is something that can be highly optimized, leading to consistent costs savings, when nations can share part of these sensors and their coverage for common use.

Major sub-elements that comprise a typical air surveillance capability are: civil works, long-range fixed air defence radars, mid/short range active and passive sensor systems, Identification Friend Foe (IFF) interrogator, radio equipment, cabling, power supplies, encryption devices, networking appliances, operator workstations, test and simulation equipment, software and all related tools and procedures to operate and maintain such a capability. Connectivity and integration with national and NATO command and control systems and legacy equipment is an important factor, whilst also taking account of future upgrade plans. It is clearly recognized that proper integration produces a capability that is greater than the sum of the individual parts.

Air Surveillance is a highly complex capability and every implementation must be tailored to the unique operational requirements and the legacy environment into which it must be integrated. It begins with a proper requirements analysis. This analysis will examine the operational requirements, the legacy environment, and any other relevant political or economic issues. It will identify existing gaps and alternatives to fill these gaps, gather rough order of magnitude (ROM) costing figures and present final recommendations and options to high-level decision makers.

Once a decision has been made to acquire an air surveillance capability, there is a full spectrum of activities required to conduct a successful implementation, including: preparing formal notification of intent, developing specifications for an invitation for bid (formalised with the definition of the Statement of Work and the issuing of an Invitation for Bid (IFB) to industry, covering technical, logistical, programme management and contractual issues), preparing the bids, selecting a contractor, reviewing the detailed design documentation, preparation of the civil works and coordination of the civil works interface with the contractors, reviewing and approving the test procedures, physical installation, testing, training, documentation, to ultimately final commissioning and hand-over of the Air Surveillance capability to the nation and hand-over of the logistics to the maintenance authorities.

An Air Surveillance Capability is a large investment. It is therefore important to look at important factors that can reduce costs, such as cooperation with neighbouring NATO nations to share air pictures and the use of alternative lower-cost sensor technologies. Full competitive bidding will result in lower acquisition costs. But there are other significant factors: a well-written specification, successful contract negotiations, careful risk management, a soundly defined, well-executed testing programme, and effective communication with all involved parties. NC3A has a highly-skilled, interdisciplinary team who can cover all aspects of implementing successful air surveillance capabilities.[5] Furthermore, NC3A is a world-recognised leader in the field of passive sensor technology, which is a cost-effective and increasingly adopted supplement to traditional active radars.

Another aspect where NC3A can provide support to nations is in the integration of nationally-owned sensors and legacy sensors. Through the multi-year and multinational project called MAJIIC (a complex acronym which stands for Multi-Sensor Aerospace-Ground Joint Intelligence, Surveillance and Reconnaissance (ISR) Interoperability Coalition), the Agency has acquired the capability to enable interoperability and integration between NATO and national ISR and C2 systems through the use of common interfaces for data formats, based on NATO standardisation agreements (STANAGs). In practice, this means that the information captured and distributed by a wide range of national sensors, such as Unmanned Aerial Vehicles (UAV) or other aerospace-borne systems, ground-based or maritime sensors, ground moving target indicator (GMTI) radars, synthetic aperture radars (SAR), electro-optical and infra-red imaging and video sensors, electronic warfare support measures (ESM) sensors, and others, can be translated into a common, NATO compliant format, and can be published into a common repository (called Coalition Shared Database) for exploitation by decision support systems (such as C2 systems) and support the commanders and high-level decision makers.

Air Command and Control

Air Command and Control is a process and structure that aims at managing air operations, getting the air assets in the air at the correct time and place with timely information and accurate plans to provide the desired effect. With the increasing emphasis on joint operations and doctrines, Air Command and Control is no longer just 'Air' anymore. Today, both ground and naval assets are fully part of the Air C2 context, just like air assets become integral part of land-based and maritime operations. Moreover, command presupposes knowledge, and knowledge is a function of information and analysis. It is, therefore, no surprise that so much importance is being placed in the effective integration and use of ISTAR (Intelligence, Surveillance, Target Acquisition, and Reconnaissance) resources, and the fusion of intelligence information.[6] In the domain of Air Command and Control, the NC3A has a consolidated legacy which comes from having developed the NATO-wide Integrated Command and Control software for Air Operations (ICC) and leading for NATO in the industrialization of the future Air C2IS for the Bi-Strategic Command (Bi-SC) strategic-level. The NATO Integrated Command and Control system (ICC) is currently the de-facto standard for Air and Joint C2 operations in NATO and NATO nations with usage 24 hours a day, 7 days a week in 23 countries in more than 400 locations. The ICC is a NATO accredited capability, developed by NC3A, which provides capabilities for integrated planning, tasking, intelligence targeting and operations, information management and decision support to operational and tactical level air operations during peacetime, exercise, crisis and conflict. ICC is a truly comprehensive suite for Air C2, capable of displaying a Joint Common Operational Picture (COP) and to support the joint targeting cycle between the Joint Force Command (JFC) and the various Component Commands (CC),[7] with interfaces to get access to ISR data from the Coalition Shared Databases (CSD – MAJIIC) and display Friendly Force Tracking Information. NPC provides ongoing maintenance to all the ICC installations delivered by NC3A.

With the NATO successors of ICC being worked on, i.e. AIRC2IS (part of the Bi-SC AIS) and NATO ACCS, it is anticipated that NATO funding for ICC will be reduced in the upcoming years. For this reason the Agency, receiving clear interest from several NATO and partner nations (among others Belgium, Bulgaria, Czech Republic, France, Italy, The Netherlands, Poland, Portugal, Spain, the United Kingdom and the United States), has launched a Multi-national ICC Programme which will cater for the future developments and maintenance requested by the nations who joined the Programme and are currently using ICC for their national needs.

It is clear that the Balkan countries might have a collective interest in joining this programme, as to receive the full benefits of pooling their resources together with some of the leading NATO nations.

Ground-Air-Ground Communications System

The main purpose of a Ground-Air-Ground (G-A-G) communications system is to provide Nations with a solid ground-based wireless communications infrastructure, providing voice communications between tactical aircrafts and the territory above which the aircrafts are operating. This capability is required to provide secure communications by using encryption and needs to be resistant to Electronic Countermeasures (ECM).

A typical G-A-G communications system encompasses a number of Ground-Air-Ground radio sites (GAG sites) for providing the necessary radio coverage over the Nation's territory. Also, one or more Control-Entity sites (CE sites) are defined for hosting the operators and the administration of the G-A-G system. The number and locations of radio sites need to be carefully selected. This selection mostly depends on the expected amount of network traffic, as well as on the particular geographical situation of the countryside. Possible interference with other Radio Frequency (RF) equipment is an important selection criterion and needs to be properly surveyed. The existing terrestrial communications infrastructure of potential hosting sites, interconnected via the National Defence Network, also plays an important role. Major sub-elements of which a typical G-A-G infrastructure is composed of are: radio masts, UHF/VHF radio equipment, cabling, shelters, power supplies, encryption devices, networking appliances, operator workstations, software and all related tools and procedures to operate and maintain such a network.

NC3A can provide valuable support in the acquisition and implementation processes of a G-A-G communications capability. NC3A has gathered extensive experience in the past years in procuring such infrastructure to Poland, Hungary and the Czech Republic, through the use of NATO Common Funding granted by the NATO Security Investment Programme (NSIP). Similarly to the radars and sensors procurement, procuring a national G-A-G capability and infrastructure encompasses many critical phases, such as a clear definition of the requirements, competitive bidding procedure, site acceptance testing, commissioning of the systems. NC3A has the right skills to make sure that the best commercial providers and the most cost-effective solutions are selected and implemented, and can adequately monitor the interim and final testing phases to ensure that the capability delivered to the nation matches the contracted requirements and does not transfer inefficiencies into increased maintenance costs or future upgrades.

Missile Defence Capabilities and their integration into C2

A Missile Defence (MD) capability is a system, weapon, or technology involved in the detection, tracking, interception and neutralization of attacking missiles. It was

originally conceived as a defence against nuclear-armed intercontinental ballistic missiles; today it has come to include shorter-ranged non-nuclear tactical and theatre missiles.

Through support to the various NATO Expeditionary Operations, and particularly ISAF, the NC3A has gathered valuable experience in Theatre Missile Defence (TMD). Theatre Missile Defence operations are time critical and require a coordinated defensive strategy, planned in advance and executed in real-time, built on interoperable systems and coherent concepts to ensure the protection of forces and critical assets. NC3A has been engaged for over 15 years in performing modelling and simulation studies, architecture/C2 analyses, and development and exercising of prototype systems to help NATO nations and operational users asses how best to adapt NATO command and control capabilities to make effective use of national weapon and sensor systems which can help counter hostile ballistic missile threats.

On 27 January 2011, the Active Layered Theatre Ballistic Missile Defence (ALTBMD) Programme achieved a key milestone, delivering an interim capability. The ALTBMD was established in September 2005 after the completion of a seven year feasibility study in which eight NATO nations and various NATO projects cooperatively participated. The focus of the Programme is the upgrade, test and integration of NATO's command and control (C2) systems and underlying communication network to enable effective information exchanges between various NATO and national missile defence systems in both real-time (engagement) and non real-time (planning). This integrated system-of-systems architecture will create a larger range of detection, communication and missile defence capabilities for NATO forces, whether deployed within or beyond NATO's area of responsibility. It will also provide complete coverage against the threat posed by tactical ballistic missiles with ranges up to 3,000 kilometres.[8] Brigadier General Alessandro Pera, Head of the ALTBMD Programme Office, reported that "NATO commanders now have for the first time an initial, limited but integrated ability to manage a defensive battle to protect deployed forces against ballistic missile attacks."[9]

All these capabilities that the Agency has acquired on TMD can be transferred to the Balkan Nations for the purposes of supporting the building of national or Regional Missile Defence capabilities to counter potential medium to long range missile threats.

The Agency has also developed prototypes that can integrate MD capabilities into C2, such as the TMD Planning and resource Allocation Tool (PLATO), which is a Theatre Missile defence planning tool that allows active defence planning and tasking of TMD capable resources against ballistic missile threats. PLATO is integrated with the NATO Integrated Command and Control System.

Civil to Military Cooperation and Integration

Air Defence is an area where cooperation between the civilian entities (Air Traffic Management, civilian aircrafts) and military entities must be strong. As mentioned in the introduction, a threat to a nation and to its Air Defence can simply come from a "renegade" aircraft, i.e. an aircraft high-jacked by a terrorist or taken over by somebody with unclear intentions. It is possible that such threat involves not just a single country but develops across the air spaces of different countries, posing severe border control issues and consequent engagement issues; for example, there might be a situation in the proximity of a national border in which the aircraft could be better scrambled by airborne assets taking off from the neighbouring nation rather than the actual nation in control of the airspace. These situations need to be tackled through mutual trust and cooperation between national air operation centres and through exchange of radar tracks, so that all nations which might be interested by the event can follow its development. This is what the NC3A has implemented with the Cooperative Airspace Initiative (CAI), which is an initiative funded by the NATO Russia Council (NRC), to provide the necessary infrastructure, training, and policies to allow NATO countries bordering with Russia, such as Poland, Norway and Turkey, to exchange with Russia radar tracks of both civilian and military aircrafts flying over a defined buffer zone which include the borders between Russia and the above mentioned NATO countries. The new system has two coordination centres—in Warsaw and Moscow—and local coordination sites in Kaliningrad, Rostov-on-Don, Murmansk (Russia), Warsaw (Poland), Bodø (Norway), and Ankara (Turkey). The CAI system is expected to be operational in 2011 and is open for participation by other nations. The CAI initiative is targeted at identifying aircrafts that start to behave erratically and can pose a threat to both Russia and its bordering NATO countries. Beyond its practical objectives such as improving air safety and security, the NRC CAI project also significantly contributes to building mutual trust between NATO and Russia.[10] Balkan and South Eastern European nations such as Bulgaria and Romania, which border with Russia through the Black Sea, could be interested in joining this project. Besides this particular project or initiative, the entire Balkan community of nations could benefit by adopting a regional approach in the area of countering possible terrorist attacks coming from the air for disparate reasons.

Conclusions

The NATO C3 Agency is bi-laterally engaged with the nations of the Balkan Region and of South East Europe in general. The Agency has gathered extensive experience in the design, procurement, and implementation of air defence capabilities, which include air surveillance assets such as radars and sensors, command and control systems for air and joint operations, Ground-Air-Ground communications system for air

traffic management and control, integration of Missile Defence assets and capabilities into the Joint Common Operational Picture, and finally cooperation, exchange of information and integration between civilian and military entities and assets. The Balkan nations, and eventually the South Eastern European nations, could benefit from such expertise that NC3A has by pooling their resources together to fund a multi-national, regional, approach to building a new air defence capability for the region. NC3A could provide such integrated capability by working in partnership with other relevant NATO agencies and organizations, such the NATO IS and its Analytical Air Defence Cell (NAADC), the NATO Communication and Information Systems Services Agency, the NATO Programming Centre, and the NATO Maintenance and Supply Agency.

Notes:

[1] NATO Glossary of Terms, AAP-6 (2009).

[2] www.nc3a.nato.int.

[3] www.mod.government.bg/bg/EXT/SEDM/index.html.

[4] www.nc3a.nato.int/news/Pages/20100801-CIO.aspx.

[5] "Air Surveillance Expertise," in *NC3A Service Catalogue* (2010), p. 14.

[6] Air Chief Marshal Sir Glenn Torpy, "Effective Air Command and Control," *RUSI Defence Systems* (Spring 2007): 54–56.

[7] "Integrated Command and Control System Support," in *NC3A Service Catalogue*, p. 24.

[8] Official NATO Website of the ALTBMD, www.tmd.nato.int.

[9] www.nato.int/cps/en/SID-561BA484-AD96B5D0/natolive/news_70114.htm.

[10] www.nato.int/cps/en/SID-C5C7841D-03BEB702/natolive/news_62962.htm?mode= pressrelease.

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