

THE NATO C3 AGENCY SUPPORT TO THE IED FIGHT: A COMPREHENSIVE APPROACH

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Abstract: This paper briefly addresses the activities the NATO C3 Agency is performing in support to the Counter Improvised Explosive Devices (C-IED) fight, ranging from support to ISAF operations to Research and Development, down to unbiased field testing of emerging technologies to be utilized in the IED fight. The recent impulse given by the NATO Secretary General to the Multinational Cooperation approach to the IED battle provided NC3A with the ability to work closer with the C-IED task Force, the Conference of National Armament Directors (CNAD) and the Defence Investment Division at NATO HQ in order to collect inputs on current projects the nations were running in the C-IED area with the main goal to identify common requirements and provide a framework for Multinational procurement with the end goal of achieving interoperability and standardization of C-IED assets with a cost-saving for the Nations as a value added factor, mainly achieved due to economy of scale acquisitions.

Keywords: Improvised Explosive Devices, CIED, jamming, X-ray, direct energy, radar technology, ISAF, airport security.

Introduction

Being cheap and effective, Improvised Explosives Devices (IEDs) are the current weapons of choice of insurgents against indigenous and coalition troops in Afghanistan. There were more than 14,000 IED-related incidents in 2010 – including explosions, discovery and defusing or civilians reporting – compared to 81 in 2003. Suicide and IED attacks caused more civilian casualties than any other tactic, killing tens of hundreds of civilians. Although such attacks were directed mainly against Afghan or foreign security forces, they were often carried out in areas frequented by civilians. Provided that there is no silver bullet for countering every kind of hand-made bomb, there are technologies designed to detect them or to prevent them from going off. In the latter case, radio-frequency jammers are the tool of choice in Afghanistan for remotely activated IEDs, even if they are expensive and not effective against command-wire devices or pressure-plates.

Jammers against Remotely Controlled IEDs

Up until to now the most effective tool against remotely-activated IEDs is the radio frequency jammer. Today a jamming device can be mounted on every military vehicle. In the future, every military vehicle will have to be equipped with a jammer in the same way today every vehicle is equipped with a system against Nuclear, Biological and Chemical (NBC) threats. There are two kinds of jammer: one is active, the other one is reactive. The active jammer is a broadband device that is used to constantly jam a wide range of frequencies (given a fixed amount of power available, the wider the frequency you are trying to jam the less range you will have). The reactive jammer, instead, is designed to detect and identify threat signals in the area of interest and then jam only the suspected signals. Jammers are usually mounted on one or more vehicles, depending on the size and the speed of the convoy, as well as the number of frequencies to be jammed. It is difficult to estimate whether a jammer is effective or not. Jammers are critical to saving lives in Afghanistan, yet they are only a small part of the equation. NATO provides Counter-IED training to troops as they prepare to deploy, and ISAF supports further training in Afghanistan once troops have arrived. We believe training is the best defence against IEDs, there is no such thing as an IED-proof vehicle. Jammers are useful for protecting not only convoys, but also entry control points.

The main drawback of an active jammer is related to the radio-frequency management, because an active device often interferes with reactive jammers operated by friendly forces in a given area, as well as with both military and civilian communications. One of the solutions adopted to avoid conflict among friendly forces is the Frequency Time Division Multiple Access (TDMA). This is a method that allows several users to share the same frequency channel, by dividing the signal into different time slots. In this way the users can jam in rapid succession, one after the other, each using its own time slot. This method works very well with jammers operated by the same country or manufactured by the same company, because they are synchronized with one another.

The NATO C3 Agency has recently fielded an Electronic Counter Measures (ECM) capability to ISAF and is continuing to look at way to avoid interferences caused by these systems.

Direct Energy Weapons, Ground Penetrating Radars and the usage of X-Ray technology

Jammers cannot be effective against IEDs like suicide-vests (not remotely activated), pressure plates or command-wired traps. To neutralize these kinds of threats, one can resort to Direct Energy Weapon or High Power Microwave under certain circum-

stances. Firstly, these solutions have still a relatively low Technology Readiness Level (TRL): 5 or 6 out of 9. Secondly, they are not suitable for urban areas. Thirdly, mounting such a system on a vehicle is more difficult and expensive than mounting a jammer: there is often a need for a dedicated vehicle for this purpose (otherwise there is lack of available power, space for the equipment, shielding, etc.).

Moreover, there are electronics solutions designed to penetrate the ground with radar or X-ray technology, in order to detect anomalies under the ground: either in terms of shape or material. Up until now, for example, NC3A have installed more than 20 X-ray sensors in Afghanistan to scan people and vehicles at the entry control points of the main ISAF bases in Kabul and Kandahar. According to the experience gained in the field, the same X-ray technology could be deployed in two ways to scan the ground: for materials' discrimination or shape recognition. The challenge is the power available on the vehicle: the more power you have, the more you can penetrate the ground. Even if there is a drawback: when using an X-ray device, one has to take into account that beyond a certain power threshold the device cannot discriminate organic materials from inorganic materials since the radiation basically passes through the material and does not backscatter. Explosives traps are made of organic materials, each of which has a specific density that that X-ray devices can recognize.

Stand-off detection of explosives

One of the main threats, as the news also reports, stems from the attacks perpetrated by suicide bombers.

Technology can greatly help in identifying potential suicide bombers. In addition to the standard metal detectors employed at gates and checkpoints, Millimetre Waves, X-ray and radar technology can play a big role in detecting items hidden under the clothes, especially organic material like explosives or metal used in wiring the IED before it is placed in a suicide vest.

NC3A has been analyzing novel technologies in this area, always in an unbiased way. Working from requirements down to fielding of capability, the steps undertaken to analyze a technology and its usage in an operational environment consists of identification of a technology, Research and Development (including simulation), NATO trials and exercise execution, followed by tests in an operational environment like Afghanistan.

The results of this unbiased analysis can then be shared with all the NATO Nations and used as needed, for example to write consistent technical requirement for C-IED assets procurement and fielding.

Airport security enhancement and psychological profiling of potential threatening person

Airport security checkpoint nowadays often do not employ the right technologies to counter the IED threat, especially suicide bombers, IEDs hidden in luggage, ceramic weapons and other types of weapons and IEDs that metal detectors and normal hand luggage screening sensors cannot find.

The main reason for not employing these types of technology is the lead time to get a person cleared: there should be a balance between the screening time, the threat level expected and the threat detection threshold to be achieved. Using a multisensory approach (parallel usage of sensors for screening a person) may lower the screening time, increasing at the same time the probability of detection of a potential IED.

NC3A has recently been engaged in these activities and is working in support of the NATO HQ Counter-terrorism section under the Emerging Security Challenges Division. Making use of the experience matured in Afghanistan while installing several screening sensors at the ISAF checkpoints, NC3A in collaboration with industry and research organizations will be looking at fusing results coming from different sensors like X-ray backscatter, Millimetre Waves, radioactive material detection and video processing, the latter to identify recognizable signs of a potential threat in the behaviour of a person (psychological profiling). The main goal will be to lower the detection threshold without increasing the screening time. This could be achieved utilizing in a better way the time a person is sitting in a queue allowing this time to be utilized to do additional screening, possibly in a passive way.

The task is challenging, but considered doable. After some analysis and simulation, followed by a test in a laboratory, the goal is to execute a live demonstration on real targets (airport checkpoint) by the end of 2012.

Multinational Cooperation on Counter IED

Under the mandate of NATO Secretary General,¹ NC3A has been supporting Allied Command Transformation in Norfolk, VA (USA), together with Allied Command Operations, Joint Force Command Brunssum and NATO HQ Assistant Secretary General/ Defence Investment office, on a NATO-wide C-IED action plan. The goal is to point out shortfalls, how to fix them, by when, and at which cost.

One of the items the C-IED Action Plan is targeting is to implement NATO Secretary General recommendations on Multinational Approach to Counter IEDs: the goal is to provide an environment where the collective resources and expertise in C-IED can be pooled to respond to the demanding requirements in this area by means of a project office consisting of NATO and partner nations. This concept has evolved over the

past year based on discussions with Nations and NATO organizations and is positioned within the framework of the Allied Command Transformation (ACT) C-IED Action Plan and NC3A involvement in the C-IED Task Force activities.

With the goal of achieving standardization and interoperability, coupled with savings of resources due to the implementation of an economy of scale strategy, the MN C-IED programme will provide NATO nations with a platform to enable cooperation in delivering coherent and sustainable C-IED activities based on the collective expertise and resources of the group. The NC3A proposes to act as the executive agency in this programme, where the knowledge gained from Research and Development and technology field testing, coupled with well-established procurement processes for C-IED capabilities, can contribute to a successful response to needs of individual Nations and allow economies of scale to be realised.

Conclusions

In countering IEDs, there is no ‘silver bullet’: the IED threat is a battle that we all will be fighting in the near and long-term period.

The NATO C3 Agency is mainly involved in the technology aspect of this fight, but a great deal of training and situational awareness is also necessary to properly prepare soldiers.

The Multinational approach to this problem could greatly help in establishing a common framework where nations will be able to achieve Interoperability and Standardization of equipment and technology, saving at the same time limited resources by implementing an economy of scale approach to the problem.

Technology enhancement and progresses in the upcoming years will help us in facing and fighting better this threat, but we also need to have in mind that the enemy adapts quite rapidly to our countermeasures while for us the adaptation process can take much longer.

Notes:

¹ NATO Secretary General Anders Fogh Rasmussen stated at the Fourth NATO Strategic Concept Seminar, Washington DC, 23 February 2010, that “Having multiple national projects running at the same time is not only a waste of time and money; it ultimately also puts the lives of our soldiers at risk”. For details see the seminar webpage at www.nato.int/cps/en/natolive/events_61583.htm.



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Counter-Terrorism and C-IED activities as well as the NATO HQ Counter Terrorism Technology Section under the Emerging Security Challenges Division. He liaised with the NATO – Russia Council for Counter-terrorism matters as well as with the Science for Peace and Security organizations at NATO HQ. In 2008 Dr. Fiore, in recognition of his outstanding contribution to the Counter-Terrorism and C-IED support to the Alliance, has been awarded with the NATO Meritorious Service Medal. He has a Master degree in Computer Engineer and a Ph.D. in Telecommunications and Electronics and has PRINCE 2 Project Management qualification. Dr. Fiore is author of numerous papers, technical notes and articles on newspapers and magazines on Counter-terrorism and C-IED. He speaks fluent English, German and Italian and has a good knowledge of French and Dutch.

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