

April 4, 2012

**Iron Dome – an Inexcusable Self Contentment**  
**Dr. Oded Amichai**

**Top defense officials were quick to applause the successful interceptions of the Iron Dome system during the last confrontation in southern Israel. Is there any justification to this national euphoria? We doubt it.**

During the latest confrontations in southern Israel, top defense officials were quick to extol the successful interceptions of the Iron Dome rockets against those that were launched from the Gaza Strip. Media channels were ecstatically describing the actions. It evolved to a national euphoria: 58 successful interceptions and 18 unsuccessful interceptions out of 320 rockets and mortars launched at Israel, during the recent attacks on March 2012.

What has not been intercepted has either fallen within Israeli territory, termed as “fell in open spaces”, or alternatively has fallen outside the range of the few batteries that are installed. Under this misconceived reportage the “conclusion” is clear - more funding is required for additional Iron Dome batteries to eliminate the threat.

It is not easy to oppose conventional incorrect concepts that laud the Iron Dome. Is it really a success story? Most probably not! Why? Explanations bellow!

The Iron Dome system cannot offer a comprehensive solution, being limited both by technical and economic reasons:

- a. Minimum range: The Iron Dome cannot protect areas that are too near to the launching site of the mortars, Qassams and Grads. The minimum range, where the Iron Dome is ineffective, can reach over ~ 10 km (depending on the threats' speed). I.e. Sderot and all the communities surrounding the Gaza Strip cannot be protected by the Iron Dome system, in inconsistency to the original official commitments.
- b. Maximum range: The Iron Dome cannot protect areas that are beyond 70 or perhaps 50 km (depending on the attacking rocket's speed) from the launching site of the enemy's projectiles. I.e. most of central Israel, including Tel Aviv and its adjacent cities, as well as most of Israel's strategic sites cannot be protected by the Iron Dome system, in disparity to Ministry of Defense official assertions.
- c. The protection area of each battery is small, i.e. the battery installed in Ashkelon cannot protect Ashdod, and the battery installed in Beer Sheba cannot protect Ofakim or Kiryat Gat, etc, hence an inordinate number of Iron Dome batteries will be required.
- d. The cost of each Iron Dome missile (called Tamir) ranges between 70 to 100 thousand dollars each, (depending on varying sources). The amount of threats - tens of thousands of rockets (though, some Israel intelligence sources estimate even more) requires massive numbers of Iron Dome batteries and interceptors, which would leads to an economic collapse, when the solution is solely based on rockets intercepting enemy projectiles.

Minister for Home Land Security, MK Matan Vilnai, recently announced that in a future conflict Israel should expect 1,000 missiles and rockets per day, in all ranges and from all directions.

Since every interceptor has its own minimum and maximum range limit, Israel is basing its defense against these threats on a multi-layer concept, i.e.: Iron Dome; David Sling; Patriot pac-3; Arrow-2 and Arrow-3, each with its enormous price tag. Each Iron Dome missile costs ~\$100K; each David Sling projectile costs an estimated ~\$1M, (though not yet operational); and each of the other interceptors cost ~\$3M each, with only the Patriot pac-3 and Arrow 2 presently being operational. At the official estimates of a thousand rockets per day launched at Israel, the cost of intercepting the right combination of threats averages \$900M per day! Even if this figure is divided by 2, it is still an enormous amount, which Israel cannot afford, even with the US government generous support.

Disregarding the fate of the residents of Sderot and the communities surrounding the Gaza Strip, those hapless people whom the Iron Dome system was actually conceived to protect, yet does not (being situated below its effective minimum range), though it has been lauded as its main goal, is a tragic negligence. These residents will have to depend on their protected spaces, which are specially allotted sheltered rooms or areas, while waiting for quieter days. However those days are rare, since rockets fires are dripping over that area year round, when not down pouring.

The situation in the larger cities in southern Israel, those in which the Iron Dome system is stationed to protect - Beer Sheba, Ashkelon, and Ashdod, is also dire. The Iron Dome system intercepts projectiles there, in reasonable percentages:

- a. Nonetheless, life is paralyzed in those cities during missile attacks! Schools are closed and parents have to stay at home with their children!
- b. This should have been clear from the start; Iron Dome cannot provide any vital security. Thus the residents are obliged to follow the routine of their brethren's near the Gaza strip, who do not "enjoy" the umbrella protection of the Iron Dome batteries; meaning rush to shelter and stay put until the barrage are over.

The absurd situation is that during the intensive rockets attacks launched from Gaza into Israel, all school and academic studies were cancelled in areas located within the Iron Dome's protected range of 7 to 40 km. from Gaza, while studies were conducted in the regions that are not protected by the Iron Dome, those that are located within the 7 km range, since protected spaces in public places have been constructed there.

Minister for Home Land Security, MK Matan Vilnai, recently announced that in choosing between investments in more protected spaces, or purchasing additional Iron Dome batteries, he prefers the Iron Dome options.

Is the answer to the rockets attacks only by constructing more protected spaces and shelters across the country sustainable? Hardly! The need to protect public buildings like hospitals, schools, kindergartens, etc., is obvious. The question is whether such passive protection can be a comprehensive solution? Minister Vilnai correctly excluded it.

Its efficiency is limited as it is not designed to protect against direct hits, only against shrapnel and air blast waves. Moreover, it is actually impossible to protect against a direct hits, since against which warhead will the buildings be protected? Initially it would be against a five

kilograms warhead? Later a 10 kg warhead will appear. Then 20 kg warheads will ensue (and those are already in the arena), with no end in sight. So how should they be protected, and against which warhead?

The same is relevant regarding the rockets' range. Communities within the range of up to 4.5 km from the Gaza Strip have already been protected, by constructing additional sheltered room to each house or apartment, and protecting the roofs of public buildings. But for longer range rockets (Qassam-3 and Grad) communities within the range of 7 km are way out of the range of the Iron Dome system. Should the government decide to extend the construction of sheltered rooms up to this range? Why not to ranges of 15 km as Minister Vilnai declared? To which he himself responded with – no!!

Is it plausible to force people to stay within a running distance of a few seconds to a protected space, or a shelter? What about the old age and infirm population? Can they make it to the shelters on time? Is it possible to conduct routine normal life under these circumstances? The answer to all these questions is a flat no!

It is also imperative to allude to the meaning of life under continuous rocket attacks over years - traumas, post - traumas, emotional stress, injuries etc., from which many residents near the Gaza Strip suffer, especially children. Protection will also not prevent environmental or collateral damages, in those areas called "open spaces".

In the equation of extending the passive protection versus increasing the destructive power of the aggressor, the defender will always be the loser. Protection is a limited solution, not a comprehensive one.

Most senior defense officials still openly adhere to the concept that rockets fire threats can only be resolved by an aggressive attack, a model which has not been substantiated, neither during the Second Lebanese War, nor following the Gaza War (known as operation Cast Lead). It is impossible to aggressively respond everywhere or every time, and neither is it always viable. It is essential to formulate the precise combination between protection and attack, properly exploiting the offensive advantages of the IDF.

And yet there is a sustainable solution!

Israeli Ministry of Defense officials openly admit that the future solution against ballistic threats rests in laser systems, yet they vehemently disregard the existing laser option, the Nautilus / Skyguard system, which has been jointly developed in the USA, following an Israeli government request, more than 15 years ago. It has proved itself in dozens of tests executed a decade ago, with 100% success rates.

The Nautilus / Skyguard system, developed by Northrop Grumman can solve the rockets and mortars threat on the southern communities, at minimal cost compared to investment in missiles interceptors. The cost of firing a laser beam, at the speed of light, runs at ~2,000 each, compared to approximately \$100,000 for each Iron Dome missile, or ~\$1M for each David Sling missile. The economic disparage is too obvious to ignore.

Eight Skyguard systems can almost hermetically prevent projectiles shot from the Gaza Strip from hitting Israeli targets. There will be no need to defend each individual community. Residents of Beer Sheba, Ashkelon and Ashdod will be able to continue their routine daily life almost uninterruptedly. They will probably not even be aware of the fact that rockets have been directed towards them, as they would immediately be intercepted upon their detection. These laser systems do not suffer from minimum or maximum range limitations; hence they can also protect the area adjacent to the Gaza Strip, as well as northern and central Israel and all strategic installation across the country.

The reason for this eclipse is open to speculations. Is it plausible that Israeli Defense officials do not understand these basic facts? Or are they motivated by considerations that are not directly related to national security? Both options do not bode well. A probable substantiation to the latter can be found in two documentations:

- a. The States Comptroller report 59a of March 2009 which specified that Mafat (the IMoD's Administration for the Development of Weapons and Technological Infrastructure) ordered Rafael a full scale development of the Iron Dome project on November 2006, without any authorization, and three months prior to the initial convergence of an official committee (the Nagel Committee) that was supposed to select the appropriate solution against the short range projectiles launched on Israel.
- b. A statement by Mr. Shimon Lavie, a Mafat high level technical official (on channel 2 "Uvda" program, December 2007); quote: "I'm not ashamed to say it - we in Mafat are responsible for developing 'blue and white' (an Israeli term for locally made) systems, which the Nautilus was not".

How long will this unjustified euphoria of the success of the Iron Dome last?  
How long will it take before a professional and objective panel scrutinizes the benefits to home front security, by integrating the Nautilus / Skyguard laser, which till now has been rejected, without any serious investigations?

This is a wakeup call, before it is too late.

**Acknowledgement:** The author wishes to thank Ms. Yael Artzi for helpful comments.  
*The author is the chairman of the "MagenLaoref", a non-profit voluntary organization, and is an expert in high energy lasers and laser systems, with extensive managerial experience.*