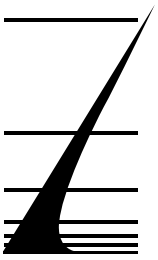
The Market for Surface-to-Air Missiles

Product Code #F657

A Special Focused Market Segment Analysis by:



FORECAST INTERNATIONAL

Analysis 2
The Market for Surface-to-Air Missiles through 2018

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Introduction

The earliest known use of specifically designed anti-aircraft weapons occurred during the Franco-Prussian War (1870-1871). This disastrous war saw the fall of Napoleon III, the rise of the French Third Republic, and the unification of the German states under the Prussian king.

During the siege of Paris, French troops attempted to use balloons to resupply the city. To counter this "airlift," Krupp, the famous German weapons manufacturer, offered a modified one-pounder (20mm) gun. The gun, mounted on a horse-drawn carriage, enabled gunners to engage airborne targets.

Besides Germany, First World War combatants had ignored the development of anti-aircraft systems prior to 1914. This quickly changed and soon all armies had deployed large numbers of "anti-aircraft" guns based on smaller field pieces (the British developed an entirely new weapon to meet its needs). These modified field pieces were not very successful ("useless" was how one author described them), and even at low altitudes they proved too cumbersome to effectively engage hostile aircraft. Platform-mounted machine guns were more effective, but their range was limited.

By the war's end, all the combatants understood that they needed specifically designed weapons to counter increasingly capable combat aircraft.

By the 1930s, Germany was again a leader in anti-aircraft system development. The 88mm Flak gun would become the most famous artillery piece of the war (besides aircraft, the "88" was highly effective against tanks).

As the Allied air offensive against Germany intensified, German scientists were called on to provide countermeasures. The *wunderwaffen* or "wonder weapons" were more appealing to Germany because they held out the promise of rapidly gaining a technological edge over its enemies. This effort included a number of ground-based anti-aircraft weapons such as the Rheintochter and Wasserfall. Information gained from captured Wasserfall rockets and technical information would help in the development of the Nike air defense system by the United States.

None of Germany's air defense missiles was ever fielded in quantities that could have affected the outcome of the war. These projects did help lay the groundwork for what would develop into a worldwide surface-to-air missile market.

In the years following World War II, air defense strategies continued to rely on fighter aircraft, as during the Battle of Britain. However, many countries (especially those influenced by the former Soviet Union) began to build intricate dense networks based around newly developed surface-to-air missiles (intermixed with various ordnance systems). Many of those countries could not be expected to match the capabilities of the major powers or the quality of their aircraft and, in some respects, their pilots. Yet they could make substantial investments in SAMs, possibly negating the advantages enjoyed by a potential opponent. The first to do so was North Vietnam, during its long war with the United States. It was during this conflict that the capabilities of such a network were first felt.

Southeast Asia. Early on in its involvement in Southeast Asia, the USAF used a ruse called Operation Bolo to lure out the newly established North Vietnamese Air Force (NVAF) and destroy it in the air. By 1967, the U.S. had destroyed or driven to Chinese bases almost all of North Vietnam's MiG fighters. Thereafter, the NVAF, although it continued to challenge the U.S. in the skies over North Vietnam, was effectively neutralized as a serious threat to U.S. air operations.

North Vietnam was forced to rely more heavily on its ground-based systems, in particular surface-to-air missiles. The first SAMs were shipped to North Vietnam in the aftermath of Operation Flaming Dart. Eventually, North Vietnam constructed one of the most formidable air defense networks in the world to counter the U.S. bombing campaigns.

The first Soviet SA-2 GUIDELINE surface-to-air missiles were detected in April 1965. By year's end, 56 sites had been pinpointed. The deployment of SAMs by North Vietnam forced the United States to modify its tactics and aircraft. The U.S. air arms were eventually equipped with radar warning receivers to detect incoming missiles, and provide new evasive maneuvers. The "Wild Weasel" anti-air defense aircraft was developed specifically to counter SAM sites.

Although countermeasures reduced the effectiveness of North Vietnamese missiles, the inhibiting and harassing effects (and the diversion of assets to SAM suppression) had their impact on U.S. air operations. By the end of 1966, despite suppression efforts and new tactics and equipment, 455 aircraft had been downed and an additional large number damaged.

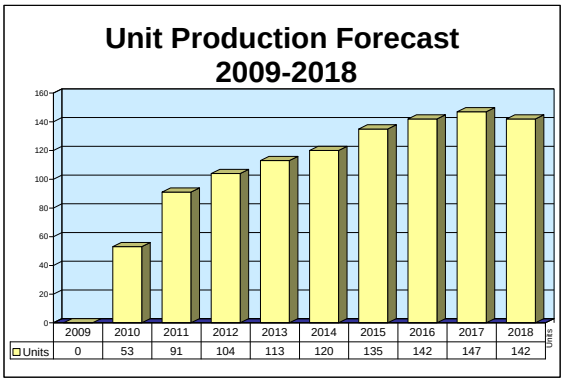
Middle East Experience. The next major conflict in which air defense missiles played an important part was the 1973 Arab-Israeli War. The air defense missile

Continued…

Israeli Missile Defense

Outlook

- In development
- U.S. supporting Israeli development of missile defense systems
- Iron Dome and David's Sling Wand will defend Israel from rockets and short-range missiles
- Iron Dome may be available in 2010, with David's Sling following in 2011
- Lebanese and Palestinian militant groups continue to fire rockets into Israeli territory



Orientation

Description. Land-based missile defense systems.

Sponsor. Israel Ministry of Defense, Tel Aviv, Israel; and the U.S. Department of Defense (DoD).

Status. Development under way. Israel is working on a layered missile defense shield that will include home-grown and foreign systems. Iron Dome and David's Sling are two new systems that will soon enter service.

Total Produced. Production has not started.

Application. These systems will provide an area defense against rockets and missiles.

Price Range. Estimated per-unit price of the Iron Dome interceptor is $40,000. The interceptor used by the David's Sling has a cost of approximately $350,000.

Contractors

Prime

Rafael Advanced Defense Systems Ltd	http://www.rafael.co.il, PO Box 2250, Haifa, 31021 Israel, Tel: + 972 4 879 4444, Fax: + 972 4 879 4613, Email: intl-mkt@rafael.co.il, Prime

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

	Metric	**U.S.**
	Stunner	Stunner
Dimensions		
Length	1.5 m(a)	4.92 ft
Diameter	10 cm(a)	3.94 in
Weight	100 kg	221 lb

Israeli Missile Defense

	Metric	U.S.
Performance		
Speed	1,000 m/s	2,280 ft/s
Range (max)	250+ km	155+ mi

(a) Estimate

Propulsion. The Stunner missile interceptor uses a two-stage, three-pulse propulsion system.

Control & Guidance. The Stunner combines technology from the Python V dual-wave imaging infrared air-to-air missile and Raytheon's low-cost tactical missile project. The dolphin nose of the Stunner allows the incorporation of a number of sensors for precision hit-to-kill operations.

The David's Sling system includes an IAI Elta Systems EL/M-2084 advanced phased-array multimission radar, a Tadiran Electronics Systems CS Battle Management Center, and a Rafael-designed rocket detection unit.

Launcher Mode. The Stunner is fired from standard PAC 2 launchers which are used by the Patriot air defense system. Each launcher has 16 interceptors.

Stunner does include an air-launch capability and may be integrated with Israeli unmanned air vehicles (UAVs).

Warhead. The Stunner is a "hit-to-kill" interceptor.

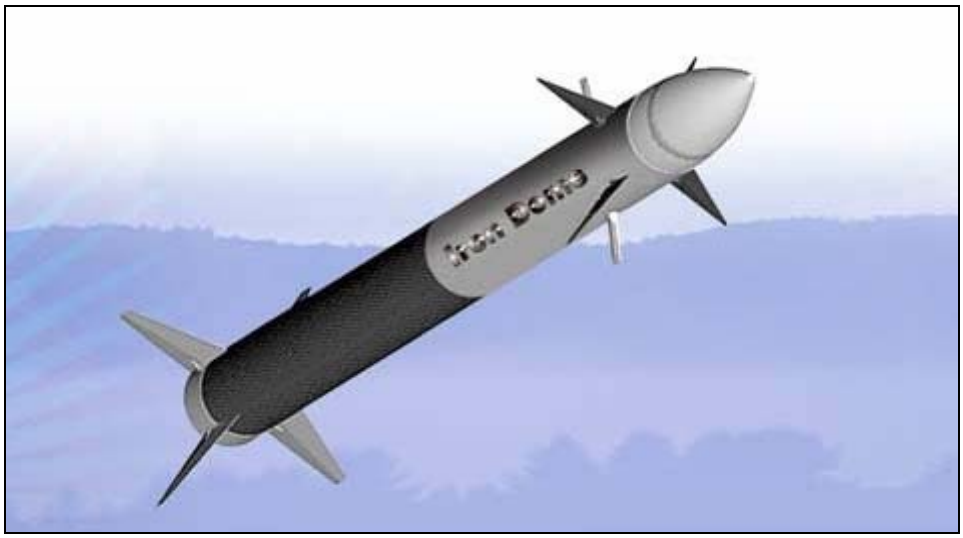
Variants/Upgrades

Israel is developing different systems to meet its all-around missile defense requirement. Israel plans to establish a five-tier missile defense system made up of the following:

- Iron Dome – intercepts mortars and rockets out to 40 kilometers.
- David's Sling – intercepts rockets and missiles between 40 and 250 kilometers.
- Patriot PAC 3 – intercepts missiles out to a distance of 500 kilometers.
- Arrow 2 – intercepts high-atmospheric ballistic missiles to a range of 3,000 kilometers.
- Arrow 3 – intercepts exo-atmospheric missiles out to 5,000 kilometers.

The Short-Range Ballistic Missile Defense (SRBMD) requirement will be met by the David's Sling (Magic Wand) system.

The Iron Dome system will meet Israel's Ultra-Short-Range Ballistic Missile Defense (USRBMD) requirement.



Interceptor for Iron Dome Missile Defense System

Source: Rafael

Program Review

Background. Initially, Israel was focused on the development of defensives against the perceived threat from Iranian and Syrian ballistic missiles. This effort produced the Arrow anti-tactical ballistic missile (ATBM) system, which is capable of dealing with threats like the Shahab 3.

Now, the continuing barrage of rockets from Palestinian and Lebanese militants is fueling Israel's desire to develop defensive systems capable of dealing with shorter range threats.

SRBMD. The United States is helping Israel to develop a more comprehensive missile defense shield in the wake of militant rocket attacks. During the July-August 2006 fighting between Israel and Hezbollah, the Lebanese terrorist group fired thousands of rockets into Israeli territory.

Israel had already been examining ways to strengthen its missile defense shield when its troops entered southern Lebanon. The current "system" includes the Arrow, Patriot, and HAWK air defense missiles.

The Short-Range Ballistic Missile Defense (SRBMD) program was initiated in March 2005 (an 18-month risk-reduction study was launched). The U.S. FY07 defense budget included funding ($25 million) for the SRBMD initiative.

The SRBMD requirement will be met by the Magic Wand system, which is called David's Sling (or David's Slingshot) in Israel. The name Stunner is used to describe the system's interceptor (Israel calls it Kela David). Rafael and Raytheon are working on this system. This team was selected over a proposal from IAI and Boeing (their bid centered on the Arrow).

The proposed interceptor, the Stunner, will use an ATK Tactical Systems booster motor. The projected cost is around $450-$500 million; each interceptor will cost $300,000-$400,000. Initial Operational Capability (IOC) will be achieved in 2011 or soon thereafter.

The Magic Wand will serve in the middle layer of Israel's multi-tiered active defense network, intercepting rockets and missiles having ranges of 40-200 kilometers (well below the class of Scud and Shahab threats, which the Arrow was designed to engage). The system may have a capability against slow-moving cruise missiles.

The Rafael/Raytheon-designed hit-to-kill interceptor will cost around $200,000-$300,000 apiece. Rafael will leverage work on previous air-to-air (Python and Derby) and surface-to-air (Barak) missile systems. Raytheon will offer low-cost missile technology. The development portion of this contract could cost $250-$300 million, with initial procurement adding another $200 million.

Iron Dome. Israel will also add a system to defend against ultra-short-range threats (15 km or less), such as the Qassam, a crude rocket used by Gaza-based Palestinian militants. During the Second Lebanon War (2006), Palestinian militants fired over 1,000 rockets into southern Israel, as Hezbollah launched thousands into northern Israel from positions in southern Lebanon. This project is called the Ultra-Short-Range Ballistic Missile Defense (USRBMD) initiative.

A different solution is needed to protect Israeli border communities from short-range rocket attacks. Israel Military Industries (IMI) proposed the Magen Kassum (Magic Shield) based on its 160mm AccuLAR (Accurate Light Artillery Rocket). Other bids included Northrop Grumman's Skyguard, Raytheon's Laser Area Defense System (LADS), Lockheed Martin's Skyshield, and Rafael's Iron Dome (erroneously called David's Slingshot). The winning bid came from Rafael (this system is sometimes referred to as Iron Cap). The Barak missile can intercept rockets, but Israel saw no sense in downing a $100 rocket with a $300,000+ missile.

Iron Dome consists of an inexpensive kinetic interceptor based on Rafael missile technology, combined with an IAI targeting system. The interceptor will cost no more than $40,000. Several million dollars was set aside in Israel's 2007 defense budget for this anti-rocket system, with the final cost placed at $300 million.

Development began in 2007. At first, Israel mentioned an IOC of 2009, but this has slipped to 2010.

ADAMS. An earlier air defense system developed by Israel was the ADAMS/HVSD (Air Defense Anti-Missile System/High Value Site Defense). This system was to meet short-range area air defense requirements and offered a limited missile intercept capability.

The ADAMS consists of two different and independent weapons systems: the ADAMS surface-to-air missile (a derivative of the Barak 1), developed by Rafael; and the Phalanx CIWS (close-in weapon system) by General Dynamics, consisting of a 20mm six-barrel Gatling gun and radar. Each weapon retains its ability to operate independently and at different ranges. The ADAMS creates a two-level air defense system that can select the most appropriate weapon and operational mode,

according to the characteristics of the threat and its range.

Through integrated use of its two weapon subsystems, the ADAMS can create a defended area of approximately 200 kilometers square consisting of two partially overlapping belts. The external belt (from 12 km down to 500 m) is covered by the ADAMS missile, which is used to intercept aircraft and helicopters, as well as certain types of missiles and air-to-ground stand-off weapons. The internal belt (from 2,000 m down to 100 m) is covered by the M61 Vulcan gun, which provides a last-ditch defense against any threat that penetrates the external belt, as well as against pop-up targets. The gun also provides self-defense for the fire unit. The system can operate either as a completely autonomous unit or as an integral part of an existing air defense network of several ADAMS units or other anti-aircraft assets.

Israel offered various systems, including the following:

- ADAMS/IAI is a mobile configuration integrated with an IAI radar system and the Barak missile.
- ADAMS/HVSD (discussed above) is a mobile configuration incorporating General Dynamics (now Hughes) High Value Site Defense (a 20mm cannon) and Barak missiles, thereby creating a two-belt air defense system. This report focuses on the ADAMS/HVSD.
- HVSD/ADAMS is an alternative configuration incorporating a towed ADAMS launcher controlled by a radar system that was made by General Dynamics.
- ADAMS is integrated with an IAI/Eagle Eye or another air defense gun system.
- Relampago (Lightning) is the name for the export version of ADAMS.
- Defender is a further modified version of ADAMS aimed at meeting the needs of NATO Alliance members, but was offered to a wider market.

In early 2006, Rafael and Thales Nederland successfully tested the Defender short-range air defense system. This system uses the Barak missile. The Defender uses the Flycatcher Mk 2 surveillance radar. The system was developed to meet the requirements of Venezuela.

SPYDER. Rafael and IAI have also developed the SPYDER (Surface-to-Air Python and Derby) air defense system. Elta is also involved in this project. The initial system unveiled by Rafael was reclassified SPYDER-SR after the SPYDER-MR was introduced.

The SPYDER-SR is equipped with the Python V and Derby air-to-air missiles. This system is a quick reaction, low-level missile system designed to counter attacks by aircraft, helicopters, UAVs, and precision-guided missiles (PGMs).

The SPYDER launch vehicle (a 6x6 truck) has four ready-to-fire missiles: two Python Vs for point defense and two Derbys for long-range engagements. The Derby is equipped with a booster to extend its range to 40 kilometers. Elta Electronics provides a mast-mounted search radar carried on a separate vehicle.

The SPYDER system provides a 360-degree engagement capability day and night, under all weather conditions. The SPYDER can engage targets at distances of 1 to 15 kilometers flying at altitudes between 20 and 9,000 meters. The system can also engage multiple threats simultaneously.

A typical SPYDER system consists of a command and control unit, a radar sensor unit, six missile fire units, and a logistical support vehicle.

The SPYDER-MR is more capable than the SR version and features a new surveillance radar (the MF-STAR) incorporating enhanced counter-countermeasures and the ability to track multiple targets. The MF-STAR replaces the earlier EL/M 2106 ATAR 3-D radar that is used by the SPYDER-SR. The SPYDER-MR also has a higher missile capacity: four Python Vs and four Derbys. The missiles are equipped with boosters to expand their intercept envelope to 35+ kilometers. This version also provides 360-degree coverage.

By June 2006, India announced that the SPYDER would meet its Low Level Quick Reaction Missile (LLQRM) need. India may purchase upwards of nine batteries.

Related News

Skyguard Not an Alternative to Iron Dome – Some Israeli military officials and analysts favor the Northrop Grumman Skyguard missile defense system, which they claim is less expensive and can be deployed more quickly than alternatives like the Iron Dome. The Skyguard uses lasers to shoot down inbound missiles and rockets. Israel abandoned its interest in this project in 2005.

Israel is currently developing the Iron Dome system, which uses a short-range rocket to counter missile threats. Rafael is the Iron Dome prime contractor.

Israeli Defense Ministry officials say Skyguard is not a viable alternative to Iron Dome. Israel expects to perform an intercept test of the Iron Dome in spring 2009, and deployment may take place in early 2010. Iron Dome will be capable of intercepting short-range – less than 4 kilometer – rockets.

Israel said that the Centurion system, deployed by the U.S. to protect bases in Iraq and Afghanistan, has only limited potential application for Israel. Centurion can only defend small, specific locations. (*The Jerusalem Post,* 1/09)

Israeli Missile Defense Not Ready – As Israel pounds targets in the Gaza Strip, building a defense shield against Hamas rocket attacks is far from finished. Despite the Israeli air strikes, Hamas continues to fire rockets into Israel, and a medium-range rocket hit the Israeli city of Beersheba for the first time. Israel is working on the Iron Dome defensive system, but it is years from being complete. (*The Herald,* 1/09)

2009 U.S. Defense Budget Includes More Money for Israel – Israel will see more money from the United States in 2009. The U.S. 2009 Defense Appropriation Bill significantly increases U.S. military aid to Israel. The need to build a missile defense system in Israel is largely behind this increase in assistance, but money is also allocated for UAV programs.

Israel is to receive $2.55 billion in military assistance from the United States in FY09. Furthermore, $177 million will be provided to enhance and deploy a missile defense system. This amount is $58 million more than requested by former President George W. Bush and $22 million more than provided to Israel in FY08.

Of this aid money, $104 million is for enhancement and deployment of the Israeli Arrow anti-tactical ballistic missile (ATBM) system. Another $73 million will support development the David's Sling medium-range rocket and missile defense system. This money is double the amount allocated in FY08.

In addition to funding Israeli missile defense projects, the U.S. Congress included $35 million to enhance Hunter UAVs; the Hunter is also in service with the U.S. Army. A further $3 million is earmarked for Israel's Heron UAV project. (*World Tribune,* 10/08)

Israel to Have Multi-Layered Missile Shield by 2010 – Israel plans to have a multi-layered rocket and missile defense shield operational in 2010. This shield will protect the nation from the rocket and missile arsenal of Hezbollah, the Lebanese terrorist group.

Hezbollah has as many as 30,000 rockets and missiles in its inventory, including the Zelzal, which can hit as far south as Tel Aviv from launch sites in southern Lebanon. In addition, Hezbollah has land-based versions of the Chinese-designed C802 anti-ship missile. These rockets and missiles were provided by Iran.

Israel already operates the Arrow anti-tactical ballistic missile (ATBM) and Patriot systems, which are used against long-range threats. To be added to this shield is the Iron Dome, for use against short-range rockets, and the Magic Wand, to intercept longer-range missiles. The Iron Dome and Magic Wand are both in development. (*Telegraph,* 10/08)

Israeli Air Force Unveils Prototype Missile Defense Interceptors – Israel has unveiled prototype missile interceptors that will be used in the proposed Iron Dome and David's Sling systems. These systems are designed to protect Israel from rockets and missiles fired by Palestinian and Lebanese terrorist groups.

Iron Dome is designed to intercept short-range rockets. This system is to be operational in the first half of 2010. The Iron Dome system is being developed by Rafael.

David's Sling is meant to counter medium-range rockets. This system is to be operational in 2012 or 2013.

Israel is also working to enhance its Patriot and Arrow missile defense systems. The upgraded Arrow-3 is to be operational midway through the next decade. This system will be able to intercept ballistic missiles high above the ground and far outside Israel's borders.

The new Sniper system will identify targets that are hundreds of kilometers from Israel. This system will work with Israel's Patriot air defense missile batteries and is not for export. The first Sniper units were deployed in summer 2008. More systems will be deployed in the future. (*Haaretz,* 8/08)

Israeli Missile Defense

Laser Defense System to Complement Iron Dome SAM – Israel plans to deploy Rafael's laser-based system to complement Rafael's other defensive weapon – the Iron Dome. The Iron Dome uses a guided missile to intercept rockets and other unmanned threats. Work on these systems is proceeding in tandem. Together, these systems may provide an effective anti-rocket capability to protect communities in southern Israel. (*Israel Today*, 7/08)

Israel Successfully Tests Iron Dome System – The new Israeli air-defense system Iron Dome has successfully been tested, according to Israeli security officials cited on public radio. The Iron Dome system is designed to intercept Katyusha rockets fired by Hezbollah guerrillas from southern Lebanon and Qassam rockets used by Hamas militants in the Gaza Strip. Designed with a multi-layered structure, Iron Dome is also capable of intercepting the longer-range missiles of Syria and Iran.

The $200 million system is being developed by domestic manufacturer Rafael Advanced Defense Systems. It is considered a crucial component of national security in light of Hamas' increased use of rocket attacks on Israeli soil from Gaza, which follows the success by Hezbollah militants in the same regard during their brief 34-day war with Israel Defense Forces (IDF) in the summer of 2006. (*AFP*, 7/08)

Funding

Israel is developing its missile defenses with the assistance of the United States. The U.S. has long provided monies for work on the Arrow ATBM system. Now, the U.S. is also funding a Short-Range Ballistic Missile Defense initiative. Money for the SRBMD initiative appeared in the U.S. FY07 defense budget, but the amount was not published in the most recent documents. FY07 funding was to study the feasibility of developing a defense against short-range rockets. Raytheon and Rafael were involved in this study, and possibly IAI.

Funding for David's Sling falls under PE#0603881C, Project WX34.

U.S. FUNDING

	FY07 QTY	FY07 AMT	FY08 QTY	FY08 AMT	FY09 QTY	FY09 AMT	FY10 (Req) QTY	FY10 (Req) AMT
RDT&E								
Proj - 1	-	-	-	36.5	-	44.9	-	-

All $ are in millions.

Proj - 1: PE#0603881C Ballistic Missile Defense Terminal Defense Segment; WX34 Short Range Ballistic Missile Defense.

Timetable

Month	Year	Major Development
	1985	ADAMS announced by Rafael
May	1986	Ground testing of the ADAMS begun
Jul	1987	ADAMS left out of U.S. Army FAADS-LOS trials
	1992	ADATS program canceled
	1994	Reports that ADAMS was purchased by Chilean Army
	1999	Venezuela, considered launch customer, buys ADAMS
	2001	Rafael and IAI work on enhanced Barak missile
	2007	Rafael working on Iron Dome system
Dec	2008	Israel launches offensive against Hamas in the Gaza Strip
	2010(a)	New land-based air defense system enters production
	2011(a)	David's Sling to become operational

(a) Estimate

Worldwide Distribution/Inventories

So far, **Israel** is the only customer for the Iron Dome and David's Sling missile defense systems. Tel Aviv is marketing these systems to potential customers overseas.

The **Chilean Army** reportedly purchased a version of ADAMS in 1994 for its local-area air defense requirements. A coproduction agreement is also on offer as part of this package. However, others have said that no such order was placed.

User Countries. The initial customer for the Iron Dome and David's Sling is **Israel**. The first customer for the ADAMS was **Chile**. The system reportedly sold to the Chilean Army may have been the Relampago. **Venezuela** may have been the launch customer for the ADAMS.

Forecast Rationale

Israel's incursion into the Gaza Strip had the objective of stopping Hamas rocket fire into Israeli territory. This offensive will also buy Israel more time to establish a defensive shield against future rocket attacks.

Hamas, the Palestinian terrorist group that controls the Gaza Strip, was unable to inflict any significant damage on the Israeli incursion force. What it did accomplish was the firing of rockets into Israel through the fighting. Even as Israel declared a unilateral ceasefire, Hamas announced it would rebuild its rocket inventory to an even greater number in the future. This kind of statement, along with rocket fire from Hezbollah in Lebanon, is a major motivator behind Israel's defensive shield program.

Filling the Gaps in Defensive Shield

Without massive cooperation with foreign nations, Israel will not be able to counter the barrage of Hezbollah and Hamas rockets on its territory. Israel launched Operation Change of Direction (July-August 2006) to stop rocket attacks by Hezbollah on northern Israeli territory and retrieve two soldiers kidnapped by the terrorist group. Hezbollah, the Lebanese terrorist group, fired over 4,000 rockets during 34 days of fighting. Yet within months of the ceasefire, Hezbollah claimed to have rebuilt its rocket inventory and acquired even longer-range versions.

Israel is working to erect a multi-tiered missile defense shield. Initially, Israel's focus was on countering long-range threats, such as Syrian and Iranian ballistic missiles. The Patriot and Arrow systems met this need, but were not suited for intercepting shorter-range rockets and missiles. Israel, with U.S. assistance, is working to develop new systems to fill this "capability gap."

Israel has two initiatives: the Ultra-Short-Range Ballistic Missile Defense (USRBMD) system and the Short-Range Ballistic Missile Defense (SRBMD) system. These two systems will engage lower-tier threats (rockets with ranges of 200 km or less). Rafael is currently developing systems to meet both needs: the USRBMD solution will be the Iron Dome system, and the SRBMD requirement will be met with the David's Sling (Magic Wand), which Rafael is developing in cooperation with Raytheon. The interceptor for David's Sling is the Stunner.

Israel wants these systems fielded as soon as possible, but some schedule slip has occurred. As a result, the Iron Dome may not become operational until next year (2010), with David's Sling following in 2011 or so. The purchase of these systems to defend Israel against short-range rockets will be sizable, considering the multiple threats Israel must defend against. Dozens of Iron Dome systems may be needed to defend hundreds of miles of border. There is a chance the U.S. could procure one or both of these systems. Besides the United States, these systems could be marketed to other nations in need of missile defenses, such as India and South Korea.

Note: *The following forecasts are for the interceptors and not the entire systems.*

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program		**High Confidence**				**Good Confidence**			**Speculative**			
	Thru 2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**
Rafael Advanced Defense Systems Ltd												
Iron Dome												
	0	0	53	60	71	83	85	95	95	97	99	738
Stunner (David's Sling)												
	0	0	0	31	33	30	35	40	47	50	43	309
Subtotal	0	0	53	91	104	113	120	135	142	147	142	1,047
Total	0	0	53	91	104	113	120	135	142	147	142	1,047

FORECAST INTERNATIONAL

ORDER FORM

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Cardholder Name _____

Card# _____ Exp. _____ csc# _____

Billing Address (if different from above) _____

_____

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☐ Bill Company
(Purchase Order # and Signature Required)
☐ Quotation Requested
☐ VISA ☐ MasterCard
☐ American Express

Name of Product/Service	Code	E-Mail Address	Qty.	Price

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E-Market ALERT

Merchandise Subtotal	
Shipping	
Subtotal	
In Connecticut add 6% sales tax	
Grand Total	

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DVD	$50	$95
Binder & DVD	$95	$180
Binder & RT	$45	$85
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Aerospace/Engine/Power Systems		
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Weapons Systems		
Hard Copy	$45	$85
CD	$50	$95
Power Systems		
Hard Copy	$45	$85
Focused Market Segment Analyses		
Hard Copy	$25	$45
Market Intelligence Libraries		
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Binder	$1,575	$2,975
DVD	$50	$95
Binder & DVD	$1,625	$3,070
Binder & RT	$1,575	$2,975
Complete Military Library		
Binder	$1,440	$2,720
DVD	$50	$95
Binder & DVD	$1,490	$2.815
Binder & RT	$1,440	$2,720

	U.S.	World
Intermediate Military Library		
Binder	$540	$1,020
DVD	$50	$95
Binder & DVD	$590	$1,115
Binder & RT	$540	$1,020
Basic Military Library		
Binder	$315	$595
DVD	$50	$95
Binder & DVD	$365	$690
Binder & RT	$315	$595
Civil/Commercial Library		
Binder	$360	$680
DVD	$50	$95
Binder & DVD	$410	$775
Binder & RT	$360	$680
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DVD	$50	$95
Binder & DVD	$410	$775
Binder & RT	$360	$680
Electronics		
Binder	$360	$680
DVD	$50	$95
Binder & DVD	$410	$775
Binder & RT	$360	$680

	U.S.	World
Governments & Industries		
Binder	$540	$1,020
DVD	$50	$95
Binder & DVD	$590	$1,115
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International Military Markets (A Subset of G&I above)		
Binder	$270	$510
DVD	$50	$95
Binder & DVD	$320	$605
Binder & RT	$270	$510
Naval		
Binder	$90	$170
DVD	$50	$95
Binder & DVD	$140	$265
Binder & RT	$90	$170
Power		
Binder	$90	$170
DVD	$50	$95
Binder & DVD	$140	$265
Binder & RT	$90	$170
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