# The Asymmetrical Missile-Rocket-Drone Paradigm:

## Understanding Israel's Aerial Threats and Defensive Capabilities

A defining feature of Israel's threat environment is the large stockpiles of rockets, missiles, drones, and other aerial munitions its adversaries possess. Since October 7, 2023, Israel's adversaries have **launched** over 26,000 rockets and missiles and hundreds of drones at Israel. While Israel has world-class air defense systems, the missile-rocket-drone paradigm favors the attacker and presents a financial and strategic threat to the Israeli homefront.

## The Ring of Fire: Adversary Capabilities

### Hamas

**Location/Affiliation:** Gaza/West Bank/Lebanon, Islamist/Palestinian militant, Iran-supported
**Pre-war Arsenal:** 12,000-15,000 rockets/missiles (mostly unguided and short- to medium-range), drones, RPGs/ATGMs
**IDF Degradation Estimate:** ~90% of rocket/missile stockpile destroyed
**Attacks Against Israel:** >14,000 launches (all Gazan groups, predominantly Hamas)

### Palestinian Islamic Jihad

**Location/Affiliation:** Gaza/West Bank/Lebanon, Islamist/Palestinian militant, Iran-backed
**Pre-war Arsenal:** 6,000-8,000 rockets/missiles
**IDF Degradation Estimate:** Unknown
**Attacks Against Israel:** >14,000 launches (all Gazan groups, predominantly Hamas)

### Iraqi Proxies

**Location/Affiliation:** Iraq, predominantly Shi'a & Iran-backed
**Attacks Against Israel:** >150 missiles and dozens of drones

### Hezbollah

**Location/Affiliation:** Lebanon, Shi'a & Iran-backed
**Pre-war Arsenal:** est. 150,000 rockets/missiles (10-15% long-range, including anti-ship and surface-to-air missiles), several thousand drones, large stores of RPGs/ATGMS
**IDF Degradation Estimate:** ~80% of rocket/missile arsenal and ~70% of drones destroyed
**Attacks Against Israel:** >15,500 rockets/missiles and hundreds of drones launched

### Iran

**Arsenal:** At least 3,000 ballistic missiles, unknown quantities of cruise missiles/drones
**IDF degradation estimate:** 90% of pre-war missile production capacity damaged/destroyed
**Attacks against Israel:** Two major aerial attacks on April 13/14 (estimated 110 ballistic missiles, 35 cruise missiles, and 185 drones) and October 1 (estimated 181 ballistic missiles)

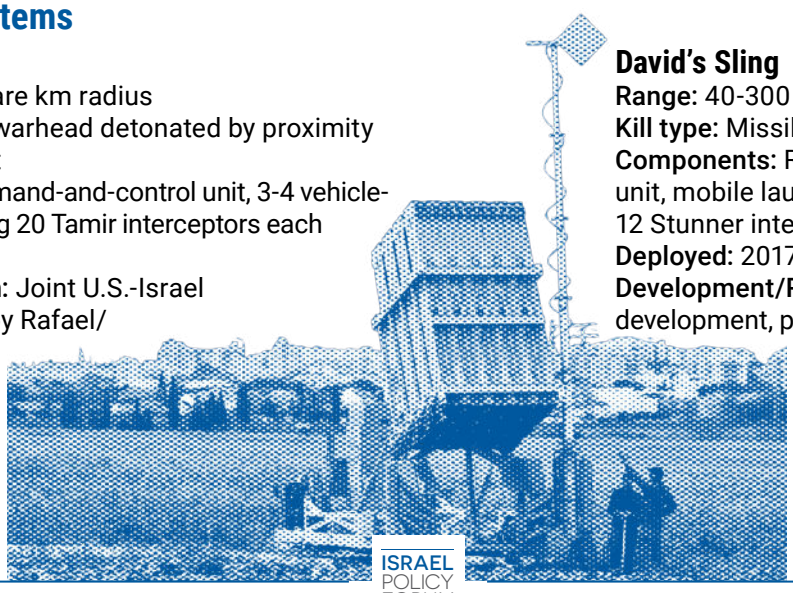
### Houthis

**Location/Affiliation:** Yemen, Shi'a & Iran-backed
**Attacks Against Israel:** >220 ballistic/cruise missiles and drones

## Israel's Defense Systems

### Iron Dome

**Range:** 4-70 km, 150 square km radius
**Kill type:** Fragmentation warhead detonated by proximity fuze within 10 m of target
**Components:** Radar, command-and-control unit, 3-4 vehicle-borne launchers containing 20 Tamir interceptors each
**Deployed:** 2011
**Development/Production:** Joint U.S.-Israel development, produced by Rafael/Raytheon
**Batteries deployed:** At least 10
**Cost:** ~$50-$100 million/system, ~$40,000-$50,000/interceptor

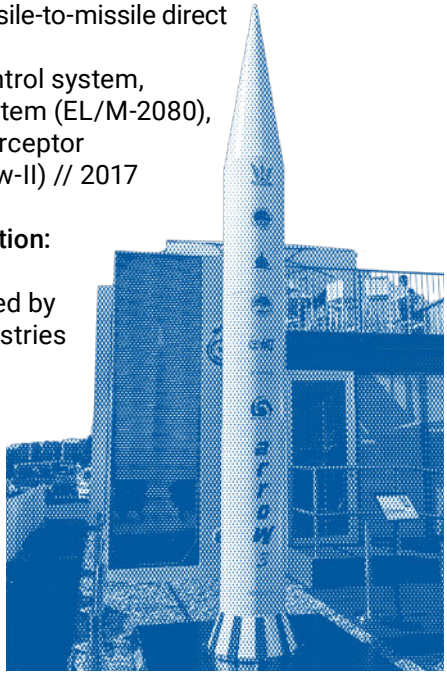


### David's Sling

**Range:** 40-300 km at up to 15 km altitude
**Kill type:** Missile-to-missile (direct impact)
**Components:** Radar, command-and-control unit, mobile launching units holding up to 12 Stunner interceptors each
**Deployed:** 2017
**Development/Production:** Joint U.S.-Israel development, produced by Rafael/Raytheon
**Batteries deployed:** Unknown
**Cost:** System cost unknown (sold for $345 million in 2023); $700,000-$1 million/interceptor

### Arrow Weapon System (II/III)

**Range:** 90 km at up to 50 km altitude (Arrow-II) // 2,400 km with exo-atmospheric interceptions (Arrow-III)
**Kill type:** Fragmentation warhead detonated within 50 m of target (Arrow-II) // missile-to-missile direct impact (Arrow-III)
**Components:** Fire control system, Green Pines radar system (EL/M-2080), Arrow-II/Arrow-III interceptor
**Deployed:** 2000 (Arrow-II) // 2017 (Arrow-III)
**Development/Production:** Joint U.S.-Israel development, produced by Israel Aerospace Industries
**Batteries deployed:** Unknown
**Cost:** System cost unknown (Arrow-III sold for $3.5 billion in 2023); $1.5 million/interceptor (Arrow-II) or $2 million/interceptor (Arrow-III)



### Iron Beam (in development)

**Range:** 10 km
**Kill type:** Directed energy (100 kilowatt laser)
**Components:** Radar, command-and-control unit, two lasers
**Deployed:** 2025 (est.), will be deployed alongside Iron Dome
**Development/Production:** Multiple Israeli firms
**Cost:** System cost unknown, estimated $3.50/interception (cost of electricity)

**Other systems:** Patriot missiles (Yahalom, or "Diamond"), THAAD (U.S.-operated), fighter jets, attack helicopters, Vulcan autocannons

## Financial Asymmetry

**The missile-rocket-drone paradigm is financially lopsided.** Basic mortars and short-range rockets cost only a few hundred dollars to produce, while even relatively cheap Iron Dome interceptors cost close to a hundred times as much.

**Complex attacks like Iran's are far more expensive to defend against.** Israel likely spent over **$550 million** and perhaps over **$1 billion** defending against Iran's April 13-14 attack.

**While missile defense is expensive, failure to defend is much more so.** Iran's October attack caused at least **$53 million** in damage to civilian targets alone, and total damage to civilian property since October 7 is estimated at over $400 million. Damage to military infrastructure and indirect economic costs likely run much higher.

## Defense Challenges

**Coverage:** Large remote or "low-priority" areas, including agricultural lands, are left unprotected due to equipment shortages and cost concerns. Border areas cannot be protected by Iron Dome. Older or less developed towns, including most Arab Israeli jurisdictions, have insufficient private saferooms and public shelters.

**Supply:** Israel has used an enormous number of interceptors in the current war, **raising concerns** about its ability to sustain robust missile defense. The U.S. produces most Iron Dome interceptors and is Israel's primary source of arms, but its defense industrial base is **overstretched**. Israel is working to increase domestic arms production, but full self-sufficiency is **unlikely** due to physical and intellectual property constraints.

**Complex Attacks:** Layered (combining drones, rockets, and missiles) and saturation (attempting to overwhelm individual batteries) attacks present a serious threat.

**Drones:** Drones are small and fly low in unpredictable, non-ballistic patterns that make them **difficult to detect** and intercept.

**New Technologies:** Iron Beam, which uses high-powered lasers to destroy targets, performs well against short-range rockets and drones. However, it is limited by distance, weather, and being able to intercept only one target at a time.

**There are no catch-all solutions to aerial threats, and Israel will focus on effective layering of its defenses.**