Oreshnik, the trial by fire of the National Domes: today only Germany, Romania, and Poland are ready

Published on 31/12/2025

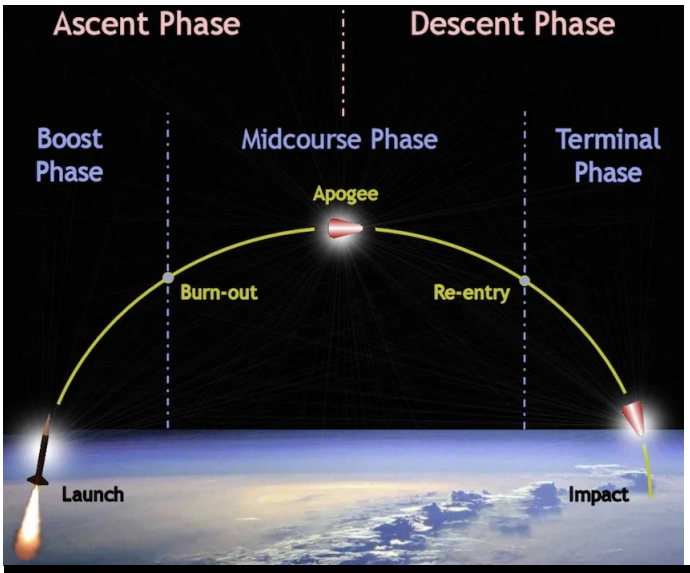
The Oreshnik has entered the European debate after its first combat use on **November 21, 2024** against Dnipro. Various open-source reconstructions describe it as an **IRBM** class weapon and associate it with a possible **multiple payload** (multiple re-entries/warheads), a detail that makes interception much more complex.

The question "which missiles can intercept it?" does not have a "list" answer: the complete technical data is not public, and there are no confirmed interceptions against Oreshnik. What can be done is to understand **in which phase of the flight** an engagement can be attempted and why some interceptors are more suitable than others.

The phases of a ballistic missile trajectory (and where it can be intercepted)

A ballistic missile follows fairly standard phases: **boost**, **post-boost** (final maneuvers of the "bus" and possible release of warheads/decoys), **midcourse** (longest segment, often in "near space"/space), **terminal** (re-entry and descent towards the target).

- **Boost-phase:** intercepting while the engines are thrusting is the "ideal" solution because it neutralizes the vector before it releases the payload, but it requires sensors and interceptors **very close** to the launch point.
- **Post-boost/separation:** if the threat is multi-object, release can occur here; after separation, the defender must manage **multiple targets** (and potential decoys).
- **Midcourse (exo-atmospheric):** it is the "strategic shield" window for MRBM/IRBM, as it allows engagements **at very high altitude or in space** with hit-to-kill interceptors; theoretically, it is also the most suitable window to reduce the risk of "multiplication" of targets.
- **Terminal:** it is the last belt, closest to the target; speeds are very high and, if there are multiple re-entries, the pressure on radars and interceptor stocks increases significantly.



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The most suitable interceptors and why

SM-3 (especially Block IIA). It is the "high layer" interceptor of the Aegis/Aegis Ashore architecture for **midcourse/exo-atmospheric** engagements against ballistic threats up to the MRBM/IRBM class: for an Oreshnik-type profile, the idea is to hit "high" with hit-to-kill, maximizing the probability of neutralizing the threat when it is still more "manageable". Manufacturers: **Raytheon/RTX (United States)**; for Block IIA co-development/co-production

with **Mitsubishi Heavy Industries (Japan)**.

Arrow-3. It is an explicitly “upper tier” system, designed for **exo-atmospheric** interceptions: thus, to recall the logic, it aims to stop ballistic threats at very high altitude, where the engagement is more consistent with the anti-IRBM requirement and the goal of reducing the complexity associated with multiple payloads. Manufacturers: **Israel Aerospace Industries – IAI (Israel)**; industrial partner **Boeing (United States)**.

THAAD. It is a hit-to-kill designed primarily for the **high-altitude terminal phase** (with capabilities between the end of the atmosphere and “near space”): it can be an important layer in a layered defense, but compared to SM-3/Arrow-3, it operates closer to the final phase, where a possible payload separation can make engagement more challenging. Manufacturer: **Lockheed Martin (United States)**.

Patriot (PAC-3 MSE / GEM-T). It is a very widespread point defense and can contribute in terminal against some ballistic threats, but it is not designed as a “high layer” anti-IRBM: it is more of a last belt to protect specific assets/areas with narrower engagement windows. Supply chain: **PAC-3 MSE** interceptor by **Lockheed Martin (United States)**; system components and radar historically linked to **Raytheon/RTX (United States)**.

SAMP/T – Aster 30 (including evolutions like Block 1NT). It is a key European component for air defense and some ballistic threats, but remains more “terminal/endo-atmospheric” compared to pure exo-atmospheric interceptors: useful as an additional layer, less “specialist” for midcourse anti-IRBM. Manufacturers: **eurosam (France/Italy)** as prime contractor; with **MBDA (multinational European group)** and **Thales (France)** in the industrial perimeter.

SM-6. It is a multi-role missile with ballistic defense capabilities also in the terminal phase in some profiles (not a pure midcourse like SM-3): it can contribute in Aegis architectures especially as a terminal layer, but it is not normally the first choice if the goal is an anti-IRBM “high up”. Manufacturer: **Raytheon/RTX (United States)**.

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Who can be considered “ready” today in Europe (and with which systems)

On paper, the most consistent candidates with a complex IRBM profile remain **Arrow-3** and **SM-3**, because they operate in the “high layer” (midcourse/exo-atmospheric). But looking at what is **already present and declared operational/deployed** in Europe, the picture narrows: **Germany** (with **Arrow-3**) and **Romania and Poland with SM-3** through the **Aegis Ashore** land sites.