

# Raytheon Boosting Performance Of TPY-2 Radar

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***Raytheon is introducing gallium nitride-based components into the TPY-2 production process and upgrading to X86 microprocessors and digital receiver/exciter units: Raytheon***

The U.S. Missile Defense Agency (MDA) and Raytheon will greatly improve detection range and sensitivity of the X-band TPY-2 missile defense radar through the introduction of gallium nitride semiconductor components, and Saudi Arabia could be among the first beneficiaries. Raytheon says going forward all new and upgraded TPY-2 active electronically scanned array radars for domestic and international customers will be delivered with GaN-based transmit/receive modules rather than legacy gallium arsenide elements.

The manufacturer also will boost the TPY-2's computing power and image resolution by introducing X86 microprocessors and digital receiver/exciter units.

As the eyes of Lockheed Martin's Terminal High Altitude Area Defense (Thaad) antiballistic missile system, the radar can detect and track short- to intercontinental-range ballistic missiles from ascent to decent, depending on its proximity to the threat.

GaN components can operate at higher power levels, or more efficiently at the same power levels, compared to gallium arsenide components. By improving the TYP-2's range through the introduction of GaN components, military operators will have more time to act against ballistic missile threats. By adding processing power and higher resolution, the radar also can take advantage of more complex target tracking and discrimination algorithms.

Judy Lewis, vice president of business development at Raytheon's mission systems and sensors business, says the transitioning to GaN components as well as the X86 processor and digital receiver/exciter will multiply the TPY-2's performance.

"If you can see it farther out and see the details, that's incredible for missile defense," Lewis says. "It overall increases the battlespace."

The TPY-2 has an unclassified detection range of 621 mi. (1,000 km), but can probably see much farther. Raytheon won't say how far.

Raytheon produces GaN radio frequency amplifiers for military radars at its foundry in Andover, Massachusetts. GaN components already feature in the company's new SPY-6 Air and Missile Defense Radar and Next Generation Jammer, designed for the U.S. Navy's DDG 51 Flight III destroyer and Boeing EA-18G Growler electronic attack aircraft, respectively.

Under a "production planning" contract awarded to Raytheon last year, the company has been preparing for the introduction of GaN-based components into the TPY-2 production line. Once the first GaN-based TPY-2 unit is assembled and tested, all radars thereafter will be built to the same specifications, domestic or foreign.

The U.S. government currently operates 12 TPY-2 units: seven providing terminal-phase fire control for U.S. Army Thaad batteries and another five in a forward-base mode for early warning of missile threats.

Two more radars were ordered as part of an unspecified foreign military sales case, likely Qatar, which the State Department cleared in 2012 to receive up to 12 Thaad fire units and two TPY-2 radars.

The Pentagon could consider buying more Thaad batteries and radars to counter the growing missile threat abroad, or it might convert existing TPY-2s to the improved configuration through a depot-level upgrade that Raytheon has proposed.

Saudi Arabia could become the first foreign military operator of the GaN-based TPY-2 if it proceeds with a massive Thaad deal worth up to \$15 billion. On Oct. 6, the State Department approved Riyadh's request for up to 44 Thaad launchers, 360 interceptors, 16 fire control units and seven TPY-2 radars.

"After the production planning period, all new TPY-2s that are developed will incorporate GaN," Lewis says. "And, as old antennas are upgraded and replaced, those new components will receive GaN."

Separate from the GaN conversion and other upgrades, MDA has finalized long-term contract vehicles with Raytheon for operations, sustainment, research and development of the company's TPY-2 and Sea-Based X-Band (SBX) radar products.

One indefinite-delivery, indefinite-quantity (IDIQ) contract awarded on Oct. 27 provides operations and sustainment support for the TPY-2 and SBX through 2020. That contract is worth up to \$1.5 billion, with \$1.2 million obligated at the time of the award.

A second IDIQ contract awarded on Nov. 1 provides research and development support for the TPY-2 and SBX through 2022 and is worth up to \$371 million, with \$25 million obligated at the time of the award.