Defence iQ

Military Radar

News Digest

April 2016

Contents

Future drones, planes, missiles no match for new Raytheon radar

Raytheon Company (NYSE: RTN) recently completed a series of company-funded milestones to upgrade the combat-proven Patriot Air and Missile Defense System. The projected upgrade delivers 360-degree capability and keeps Patriot ahead of increasingly more sophisticated threats, such as aircraft, drones, and cruise and ballistic missiles.
Artist's rendering of Raytheon's 360-degree capable Patriot radar array enhanced with gallium nitride- (GaN) based, Active Electronically Scanned Array (AESA) technology. Raytheon's Patriot is owned by 13 nations, has more than 200 combat engagements, 1,400 flight tests, and 3,000 ground tests.

The Patriot radar main array was enhanced with gallium nitride- (GaN) based, Active Electronically Scanned Array (AESA) technology. The same Raytheon engineers who completed those milestones are currently constructing a GaN-based AESA, full-size, main panel radar array. They are on track to have a full-scale main array prototype operational in early 2016 – just 24 months after the company started building it.

"Raytheon has invested more than $150 million in GaN technology and learned invaluable lessons while building our GaN-based AESA full-scale prototype," said Ralph Acaba, vice president of Integrated Air and Missile Defense at Raytheon's Integrated Defense Systems business. "This ensures Raytheon is able to rapidly develop, build, test and deliver a combat-ready GaN-based AESA radar that gives Patriot 360-degree capability."

In 2015, Raytheon built a GaN-based AESA rear-panel array and integrated it with a radar for potential use in Patriot, using existing and recently modernized back-end processing hardware and software. The radar then tracked targets of opportunity, leveraging a seamless 360-degree view.

"Raytheon's GaN-based AESA radar will outmatch future threats for the same reason today's Patriot is able to outmatch current threats – because it is designed to be upgraded and we have a growth path for the system," said Tim Glaeser, vice

president of Integrated Air and Missile Defense Business Development at Raytheon's Integrated Defense Systems business.

The recently accomplished AESA GaN milestones include:

- Completing construction of the AESA main array structure.
- Constructing the AESA arrays' radar shelter.
- Integrating receivers and a radar digital processor into the radar shelter.
- Delivering the shelter to Raytheon's test facility in Pelham, N.H.
- Testing the radar's cooling sub-system.

Raytheon's GaN-based AESA radar will work with future open architecture (such as the Integrated Air and Missile Defense Battle Command System) and retains backwards compatibility with the current Patriot Engagement Control Station. It will also be fully interoperable with NATO.

The Raytheon-built GaN-based AESA radar uses three antenna arrays mounted on a mobile radar shelter to provide 360-degrees of radar coverage. The main AESA array is a bolt-on replacement for the current Patriot antenna. The GaN-based AESA array measures roughly 9' wide x 13' tall, and is oriented toward the primary threat. The new rear panel arrays are a quarter the size of the main array, and let the system look behind and to the sides of the main array to offer Patriot the ability to engage threats in all directions.

Source: Raytheon

U.S. Army developing more adaptable, secure radar technology

Radar detectors signaling speeding motorists of police presence are about to get a run for their money, as the Army is developing innovative radar technology that could someday be common practice for users wanting to mask their radar emissions.

Over the past several years, the threat of being compromised has become an increasing issue for Soldiers in theater. The need to preserve radar system performance while operating in both a contested (adversarial attack) and congested (high traffic) radio frequency environment has presented a significant challenge to radar system designers.

These challenges led the U.S. Army Materiel Command's Communications-Electronics Research, Development and Engineering Center, or CERDEC, to research and develop a tunable, noise-encrypted radar waveform referred to as Advanced Pulse Compression Noise, or APCN.

"The battlespace is continually evolving, and with that, comes the need to change the way we think about radar design. Techniques such as real-time re-programmable waveform synthesis and low probability of intercept/low probability of detection (LPI/LPD) provide added capability that will address the emerging electromagnetic spectrum challenges our Soldiers are likely to face in the future," said Dr. Paul Zablocky, director of CERDEC's Intelligence and Information Warfare Directorate.

The APCN waveform embodies select aspects from both traditional and non-traditional radar waveforms, and can be programmed in real-time to allow the system user (the Soldier) to optimize radar performance based on the particular scenario.

"Encrypting our radar waveforms limits

the likelihood for adversaries to intercept and exploit our emissions. Programming the waveform in real-time takes this capability even further, and ensures operational effectiveness," said Dr. Mark Govoni, a research scientist in CERDEC I2WD's Radar Division who established the theory and patented the design for the APCN waveform.

This secure waveform could be used not just by Soldiers but civilian law enforcement agencies as well.

"Having the ability to transmit a radar waveform that's continually changing, one that never repeats itself, and looks like noise, is extremely difficult to intercept and becomes advantageous for police because they can now remain anonymous to radar detectors," Govoni said.

"Given the prevalence of software-defined capabilities, it's totally conceivable to consider this type of technology as an alternative to what's currently used with some of the more critical communication networks like GPS and emergency broadcasting," he said.

Another benefit of the APCN waveform is its inherent robustness to frequency congestion. CERDEC researchers have investigated this aspect, and theorize that a follow-on approach called "cognitive radar waveform diversity" could further minimize challenges with interference.

For example, Soldiers using a programmable waveform like APCN, could someday rely on the system's ability to dynamically adapt and diversify its radar emissions while operating in heavy congestion.

Currently, this process is done manually, but researchers are looking for it to one day be done autonomously, Govoni said.

"Having the ability to transmit a radar waveform that's continually changing, one that never repeats itself, and looks like noise, is extremely difficult to intercept

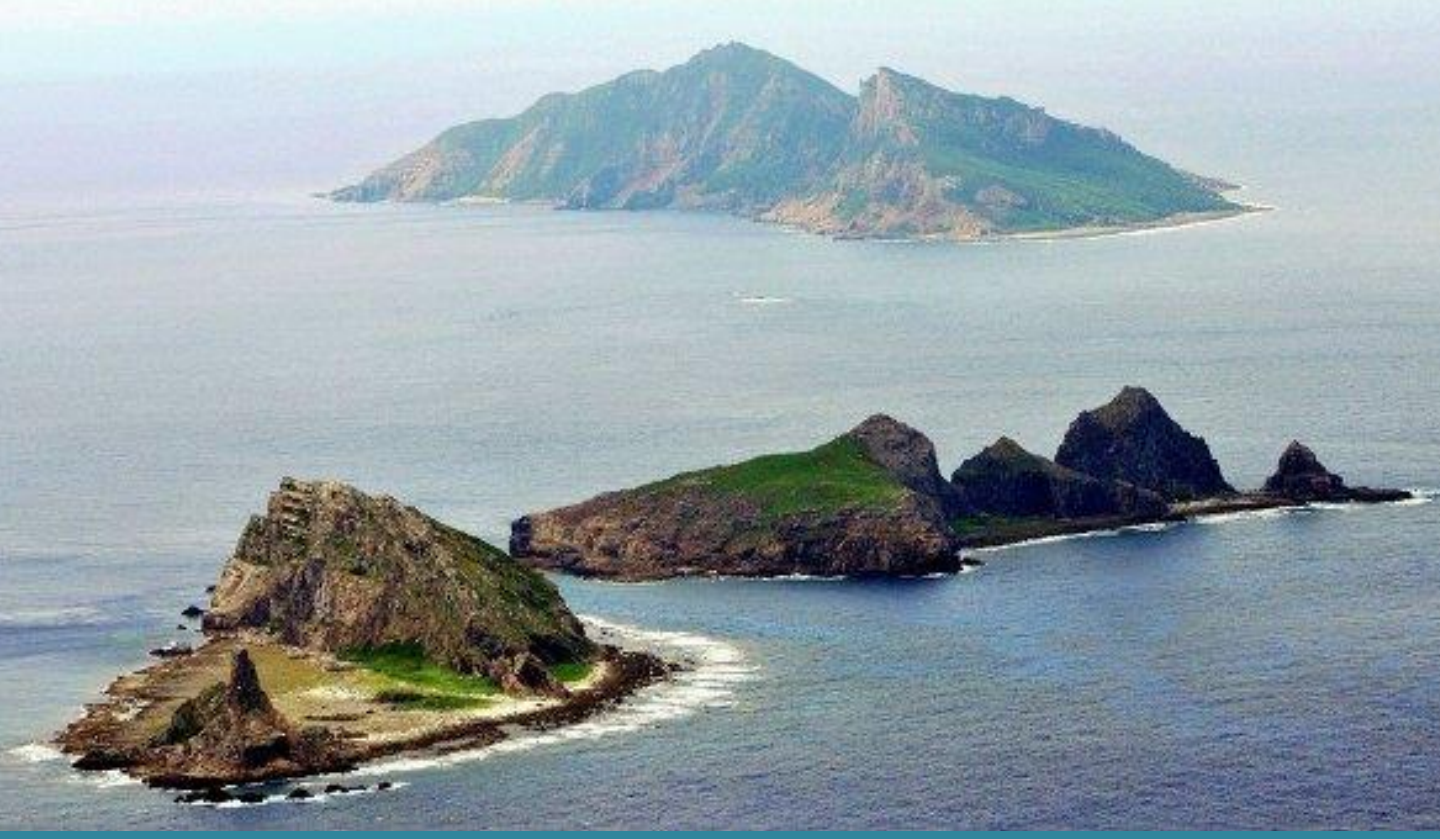
"Autonomy can relieve the Soldier of unnecessary burden, which then affords more attention for his or her primary tasks," Govoni said. "Technologies like waveform diversity and cognition provide exactly that, and are where we're headed with future radar capability."

CERDEC worked with the Army Research Laboratory to build an experimental demonstrator that served as the radar system for the APCN waveform. Researchers modified the existing waveform and interfaced with the system using custom-designed control software. The experimental system was successfully demonstrated at APG in 2012.

CERDEC researchers are currently working to conduct additional experiments with advanced radar waveforms.

"There's a growing desire to consolidate systems operating in the electromagnetic spectrum. As a (large) tenant of this spectrum, radar is an attractive candidate. The kind of technology we're researching here at CERDEC gets us one step closer to real-time coordinated and cooperative operation with other systems," Govoni said. "It's a great example of where Army technologists are pushing the state-of-the-art."

Source: CERDEC



Japan boosts intelligence gathering capabilities in East China Sea with radar station

Japan recently turned on a radar station in the East China Sea, meaning it now has an intelligence gathering facility close to Taiwan and the disputed post close to Taiwan and a group of islands disputed Senkaku/Diaoyu islands. The move has drawn ire from China as the regional dispute over the islands continues.

The radar systems are located on the Japanese Self Defence Force base on the island of Yonaguni.

"Until yesterday, there was no coastal observation unit west of the main Okinawa island. It was a vacuum we needed to fill," Daigo Shiomitsu, a Ground Self Defence Force lieutenant colonel who commands the new base on Yonaguni, told Reuters. "It means we can keep watch on territory surrounding Japan and respond to all situations."
The listening post fits into a wider military build-up along the island chain, which stretches 870 miles from the Japanese mainland.

Toshi Yoshihara, a U.S. Naval War College professor, said "a network of overlapping radar sites along the island chain would boost Japan's ability to monitor the East China Sea."

The 11 square mile island is home to just 1,500 people and is just 62 miles east of Taiwan. It is a strategy designed to increase Japan's presence in the East China Sea, with another 10,000 personnel expected to be based in the region over the next five years.

Source: Reuters

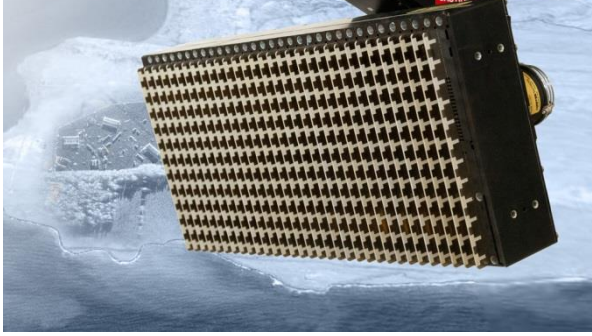
DoD invests in radar to integrate unmanned aircraft into airspace

The U.S. Department of Defense is investing $1.5 million to upgrade the DASR-11 radar at Grand Forks Air Force Base to provide clearer resolution for imaging.

The radar will enable the AFB to keep track of unmanned aircraft without having to keep them within the line of sight of a person.

Moreover, another $0.5 million will be used to fund a software upgrade for the radar system at Hector International Airport, which is all part of a wider ongoing national effort to integrate unmanned aircraft into airspace.
Source: Military.com

Global military radar market growing, worth $13 billion by 2020



The global military radar market is expected to be worth over £13 billion by 202, up from $11 billion in 2015. That represents an annual compound growth rate of 3.42% between 2015 to 2020, according to the study Military Radar Market by Platform, Band Type, Application & Geography - Global Forecast to 2020

Research and Markets said that increased concerns towards airborne fire control, surveillance, ground mapping, early warning, air traffic control (ATC), surface-to-air missile guidance, and so on are driving the demand for military radars across the globe. With increased demand for defence surveillance over porous and attack prone borders, increased spending on the defence sector by developing countries, and increased terrorism and ongoing inter-country conflicts, the market for military radars is expanding subsequently.

The ground-based radars segment is expected to be the major contributor to the overall military radars market. Ground-based radar systems provide real-time information to military personnel; help locate unexploded ordinance and tunnels; detect movement near exterior walls, critical infrastructure, and buildings; and are used along with airborne, naval, and satellite platform radars for target integration. Current conflicts in Syria, Afghanistan, and the Crimean Peninsula are driving the demand for ground-based military radars, analysts say.

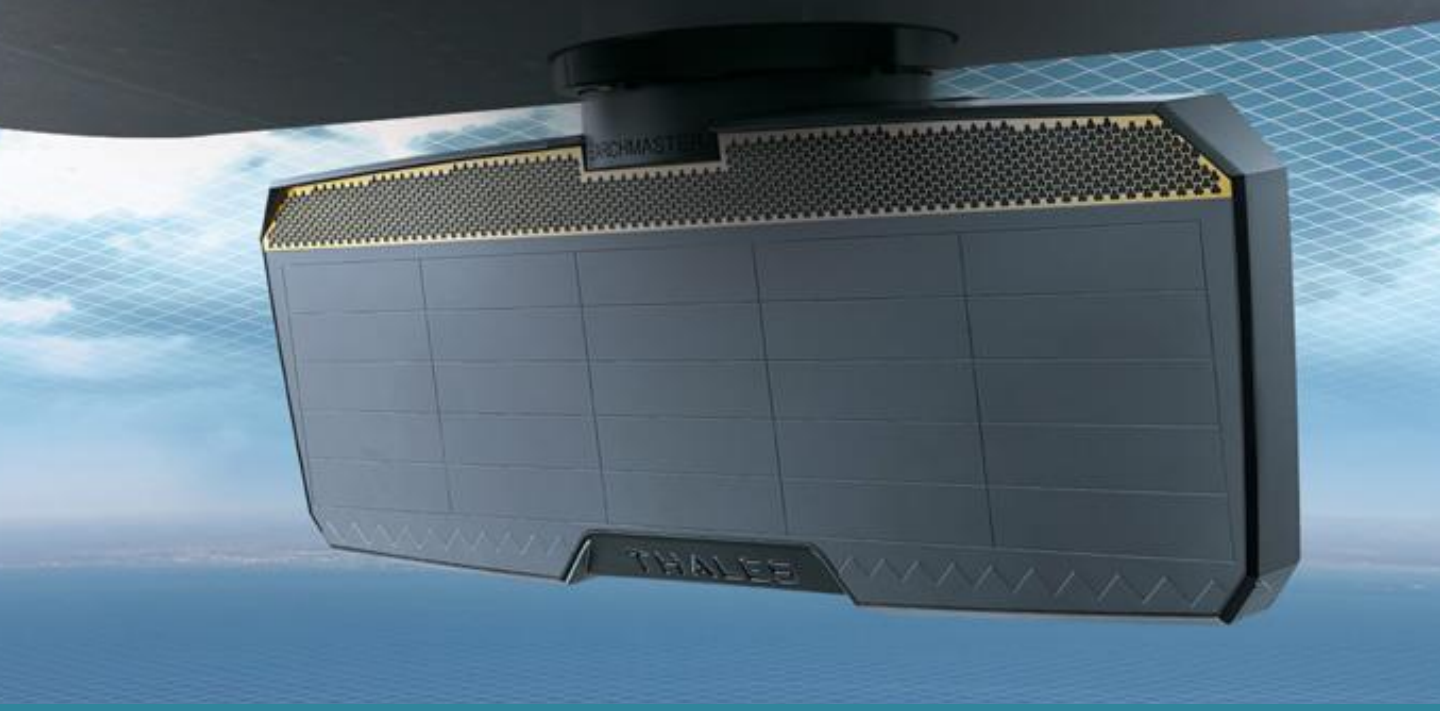
Weapon guidance systems rely on the tracking functions of military radar systems. Laser guidance, ground reference, and other systems used for weapon guidance use various types of radar, driving market growth. Military forces around the globe expect improvements in the accuracy and precision of military radars.

The Asia-Pacific region is expected to have the second-largest market share and highest growth rate in the global military radars market. Conflict over the disputed area of South China Sea is a major factor compelling the authorities to increase surveillance capabilities in the affected region. China, Taiwan, Vietnam, Malaysia, Brunei, and the Philippines have competing territorial and jurisdictional claims, particularly over rights to exploit the regions extensive reserves of oil and gas.

High growth in military expenditure and modernisation of surveillance and battle systems is driving the radar market in India. For instance, the Indian Navy finalised the naval satellite for testing, prior to being shipped abroad and orbited on a non-Indian launch system, which is equipped with advanced radar systems.

The Brazilian Army is also spending on sensors, remote sensing, and command and control systems for defence, which is driving the radars market in the area.

Source: intelligent aerospace



Qatar selects Thales' Searchmaster Radar for its OPV-a UAV requirement

At this year's DIMDEX exhibition, the Qatar Armed Forces announced a memorandum of understanding regarding the selection of Thales' SEARCHMASTER multirole surveillance radar. If an order contract is signed, the radar will equip Qatar's Optionally Piloted Vehicles - Aircraft (OPV-A) and respond to the country's airborne land and naval surveillance requirements.

The SEARCHMASTER is an airborne capable of being tailored to fit most platform types. For Qatar, the radar will fulfill five surveillance mission types: ground surveillance, anti-surface warfare, anti-submarine warfare, maritime surveillance, and tactical air support. An AESA (active electronically scanned array) antenna based on the technologies developed for the Rafale fighter's nose-mounted unit helps increase the SEARCHMASTER's power over older generations of radars.

Thales touts the SEARCHMASTER's compact, lightweight design as a key to its applicability across many platforms. The company says that SEARCHMASTER can be easily and effectively deployed on board Medium Altitude Long Endurance (MALE) UAVs, helicopters for medium to heavy missions, and turboprop-powered special mission aircraft.

In air-to-surface mode, the SEARCHMASTER can provide a 200 nautical mile (370 km) range where it can detect anywhere from large to very small stationary and moving targets in high sea states. Additionally, the radar can function in a high-resolution radar imaging role.

General Khalid Ahmad Al-Kuwari, Qatar Armed Forces, said, "The Qatar Armed Forces aim at excellence and innovation. We have been partnering with Thales for decades. Thanks to this new Thales solution, we shall grow further our Intelligence, Surveillance & Reconnaissance (ISR) capabilities."

Source: Thales

Ukroboronprom, Turkey plan joint production of radar equipment

Ukraine's major state-owned arms manufacturer Ukroboronprom and Turkey's Havelsan signed April 8 a memorandum on joint development and production of radar stations, Ukroboronprom's press service reported.

"Ukroboronprom has significant experience in the development of radar equipment. We will combine our efforts with the leading Turkish company and develop a powerful innovative product that will meet international military standards," the press service quoted Ukroboronprom CEO Roman Romanov as saying.

According to Romanov, one of the priorities of the Ukrainian military and industrial complex is to adopt international standards in arms and military equipment production.

MILITARY RADAR

28 August, 2016
London, UK

DOWNLOAD THE AGENDA

In recent years, there have been a number of key developments in radar technology which have enhanced radar capabilities in areas such as range,detection, identification, integration with other sensors and adaptability to new missions, platforms and environments. As operators are confronted by emerging threats and increasingly congested and contested operational environments, these technological advancements are filling critical capability gaps; therefore, there will be severe consequences for militaries which fail to adapt to recent developments. Ultimately, understanding these complex challenges and making decisions on procurements and upgrades is vital to national security.

Defence IQ is delighted to announce the return of our 14th Annual Military Radar conference. This summit stands alone as an established event which is dedicated to the military applications of radar technology. As a result, it has gained international recognition as a unique forum for discussion and is consistently able to attract senior representatives from military services, commercial organisations and research institutions. With devoted exhibition facilities and networking sessions, this conference provides the perfect environment for military and industry partners to debate changing mission sets and the future capability potential of radar systems.

Top Reasons to Attend:

- ✓ Exclusive testimonies on future requirements, operational experiences, and the results of research programmes to gain unparalleled insights which will inform the future deployment and application of radar systems
- ✓ Unique opportunity for a holistic exchange of information between representatives from military, industry and academia on the future application of radar to ensure that your procurement and training programmes are prepared for imminent capability advances
- ✓ Evaluate the potential capability gaps threatening national security, which are emerging as legacy radar systems are increasingly required to counter new threats and environmental challenges
- ✓ Access innovative methodologies and technological approaches to counter emerging threats and challenging operational environments
- ✓ Adopt a sophisticated, efficient and cost effective approach to resource management during procurement and systems upgrades through a comprehensive review of available technologies and the balance between their utility and required investment
- ✓ Develop new contacts in our dedicated networking sessions to facilitate greater partnering and co-operation between governmental organisations, industry and research bodies

Defence iQ