

Active Denial Technology (ADT)



U.S. Department of Defense Non-Lethal Weapons Program

WHAT IS IT?

Active Denial Technology (ADT) produces a focused beam of directed energy (DE) to provide the Joint Force with an option to stop, deter and turn back suspicious individuals with minimal risk of injury. ADT is an intermediate force capability designed to bridge the gap between presence and lethal force without causing unnecessary destruction or loss of life.

HOW DOES IT WORK?

Traveling at the speed of light, an invisible DE beam of radio frequency millimeter waves engages the subject, penetrating skin to a depth of only about 1/64th of an inch—the equivalent of three sheets of printer paper. This *repel* effect produces an intolerable heating sensation, compelling the targeted individual to instinctively move. It ceases immediately after the individual moves out of the beam or when the operator turns off the ADT system. There is minimal risk of injury due to the shallow energy penetration of the skin, normal human instinctive reactions, and system engineering controls.

OPERATIONAL IMPACT

Active Denial Technology systems produce reversible effects at distances up to and beyond small arms range, providing U.S. forces with additional decision time and space to validate that a perceived hostile intent/act is, in fact, hostile. ADT may be used to complement force application and force protection missions, to include maneuver, patrol and convoy protection, perimeter security, and other defensive and offensive operations from fixed-site or mobile platforms.

HUMAN EFFECTS

Demonstration and testing of the large-scale version of ADT included more than 12,000 exposures on volunteers in static environments and realistic operational assessments. Laboratory research and full-scale test results demonstrated that there is less than a one-tenth of one percent chance of injury from system exposure.

Research on the safety and effectiveness of 95 gigahertz millimeter wave directed energy has been peer-reviewed in numerous professional journals and independently reviewed by a Human Effects Advisory Panel.



ADT denies, deters and/or stops non-compliant individuals without lasting effects.



A demonstration using the Active Denial System Two, embarked aboard an Army Landing Craft Utility vessel, was conducted to demonstrate the technology's benefits in a maritime environment.

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LEGACY CONFIGURATION

From 2002 to 2007, the Active Denial System (ADS) Advanced Concept Technology Demonstration packaged ADT into two system configurations. System One, the technology prototype, integrated the technology with a High Mobility Multi-Purpose Wheeled Vehicle. System Two was built afterwards as an armored, containerized system transportable by tactical vehicles. Each successfully completed a series of land- and maritime-based military utility assessments. From 2014-2015, System One was refurbished into a more robust and mobile system that could be transported by a Marine Corps Medium Tactical Vehicle Replacement truck.

Both prototypes are long-range, large spot-sized systems and available for Service or Combatant Command exercises. Each is suitable for testing, evaluation, exercises, and demonstrations.

NEXT-GENERATION ADT CONFIGURATION

From 2010 to 2015, a significantly more compact (less than two tons), shorter-range, solid-state technology-based ADS was built in partnership with the U.S. Army, and is also available for testing and evaluation.

FUTURE EFFORTS

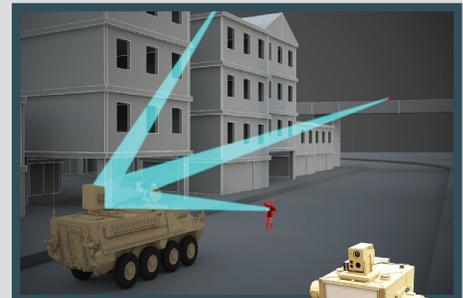
A third configuration of ADT leverages further advancements in solid-state gallium nitride (GaN) Monolithic Microwave Integrated Circuits. The U.S. Army is looking to improve size, weight, and power-cost/cooling (SWAP-C2) for integration into various mobile platforms. GaN is much more efficient than silicon for integrated circuits and is one of the core technologies that facilitates SWAP-C2 improvements.

Additional efforts include:

- Operational assessments
- NATO case studies
- Reduce size and weight in:
 - prime power generation
 - cooling alternatives
 - antenna design
 - armoring
- Incorporate ADT with other technologies as a system-of-systems for broader applications
- Leverage human effects research to inform optimal system design parameters
- W-band transparent armor



The Active Denial System uses ADT to mitigate unpredictable and ambiguous threats while minimizing civilian casualties and collateral damage.



Solid-state ADT will yield a shorter range, smaller, lighter, and lower power alternative to existing technology.



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