

Non-lethal electromagnetic weapons for crowd control



Overview

- **Description:** Electromagnetic weapons for use against humans have been developed in the USA by the company Raytheon. They use millimeter-waves of 95 GHz that penetrate only the upper layer of the human skin where they cause a burning sensation. Goal of these weapons is to repel target subjects without inducing burn injuries. ^[1]
- **State of research:** First land systems with limited mobility have been developed and ongoing research aims for increased mobility, even use from airplanes is intended. Efforts are underway to identify new millimeter-wave sources that will allow for reduced size, weight and system cost with instant “turn-on” and “shoot-on-the-move” capabilities. Effects on humans have been tested. ^[2]
- **Capabilities:** These directed energy systems are designed as non-lethal weapons for the purpose of repelling persons. The envisioned scenarios comprise perimeter defense, crowd control, protection of military forces, protection of harbors/channels, other defensive and offensive operations from both fixed-site or mobile platforms. ^[2]
- **Limits:** The range is limited to about 1000 m, but significantly reduced in hard rain or dense fog. Line-of-sight is required. While there is a reasonable safety margin between the desired repelling effect and thermal injuries, there is no reliable way to remotely determine skin temperature to prevent overexposure resulting in permanent injury. ^[2] Today's truck mounted systems require 300 kW of power and several hours boot-up time, but developments in solid-state-based systems are expected to enable integration into tactical vehicles. ^[3]

Further Information

- **Key player:** Raytheon Company developed the Active Denial System (ADS) under a contract for the US MoD and also a smaller commercial version, the Silent Guardian. A system for use on aircraft is being developed by Communication & Power industries. ^[2] At Picatinny Arsenal a first prototype based on solid state technology was developed. ^[3] Russian and Chinese activities have also been reported.
- **Readiness:** The Active Denial System had been deployed in Afghanistan in 2010, but not been used operationally and was withdrawn the same year. Currently it is not listed as a currently fielded and in use system but as being in a conceptual stage. ^[2]
- **Users:** Police and Military.
- **Future outlook and foresight:** The use of this technology is likely in the mid- to long-term, if developers succeed in reducing the size, weight and cost of key components, e.g. by replacing current tube-based technologies with solid-state devices.
- **Related Technologies:** Millimeter-wave-sources, energy supply, sensing
- **Links:** [1] <http://www.bundesstiftung-friedensforschung.de/images/pdf/forschung/berichtaltmann2.pdf> ;
[2] <http://jnlwp.defense.gov/FutureNonLethalWeapons/ActiveDenialTechnology.aspx> ;
[3] <https://www.pica.army.mil/Picatinny/articles/article.aspx>