

One of the more demanding functions is the defence and security role of detection and tracking of aircraft. In this case, visual sensors are of only limited use and then only at short ranges in clear weather during daylight hours. Infrared sensors have more potential for this role, and space based infrared sensors (Teal Ruby) are being considered as a possible solution to the wide-area surveillance problem faced by NORAD in the Arctic. These sensors are not able to provide all-weather coverage below cloud and will thus suffer significant periods of interruption. Airborne infrared systems have considerable tactical appeal but are useful only at short ranges and are weather limited. Neither infrared nor visual sensors have an inherent capability to detect moving targets against a non-moving background.

Radar is the most capable sensor for this role based on its all-weather, day-night, long range capability. Ground-based radar, due to its virtually unlimited capability for power generation and unrestricted antenna size, is very useful against higher altitude targets at great ranges (provided that the target is within its line of sight). Low level targets, particularly those moving at high speeds, are within the ground based radar's field of view for only a very short period of time. Over-the-horizon radars, utilizing energy reflected from the ionosphere, have demonstrated a capability to detect a variety of large and small moving targets at all altitudes at great ranges, however, this technology does not function well in the Arctic due to interference from the aurora borealis.

Airborne radars, such as that found in the Airborne Warning and Control System (AWACS) aircraft are very good against both high and low level targets, enjoy a significantly improved line of sight, and demonstrate considerable flexibility. However, the size and power capability of components is limited when compared with ground-based systems. Spaceborne radars have far smaller line-of-sight restrictions than either ground or airborne, resulting in a very large field of view. However, size and power are very limited, and component cost is extremely high due to the inaccessibility of the components after launch and the consequent need for extremely high reliability.