

To speculate for a moment, this could take the form of radar combining the techniques of synthetic aperture, already proven as a most effective means of obtaining high-resolution imagery of stationary objects on the ground, with pulse-doppler, so far the best method of detecting small moving objects on or above the surface of the earth. If both modes of operation could be obtained in one satellite of bearable cost, the return for many national purposes could be most satisfactory. But it appears probable that provision of continuous early warning of the approach of aircraft or missiles would require a considerably greater number of satellites than would be needed for good coverage of ground imagery.

Alternatively, it could prove feasible to equip aircraft less costly than AWACS with radar able to provide useful surveillance of both fixed and small moving objects, supplemented by electro-optical sensors with great capabilities when allowed by cloud and weather. Such a system would have the advantage of portability to any part of the globe. However, aircraft are better adapted to provision of intermittent than of continuous cover over a large area.

Even after more experience and knowledge has been obtained, rather than seeking early procurement of a complete system capable of continuous warning, it could be more prudent to begin with a developmental deployment. Intermittent warning has some value for deterrence, the experience would contribute knowledge needed for making a later decision regarding a complete system, and the programme would develop Canadian expertise in the technology of the future.

A single satellite orbiting at low altitude and able to sweep a path no more than a few hundred km wide will not be able to cover all of Canada (let alone the approaches) in a period of less than several days. Also, since it may be impossible to rectify malfunctions in an orbiting satellite, reliability demands the presence of more than one. Consequently, any attempt to provide reliable and continuous space-borne warning of attack coming by aircraft or cruise missiles must inevitably involve a constellation of satellites. The number required in the constellation depends on the design of the satellites, the area to be surveyed, and on the degree of tracking demanded, but is likely to be around eight, ten, twelve, or more very expensive vehicles, probably using pulse-doppler