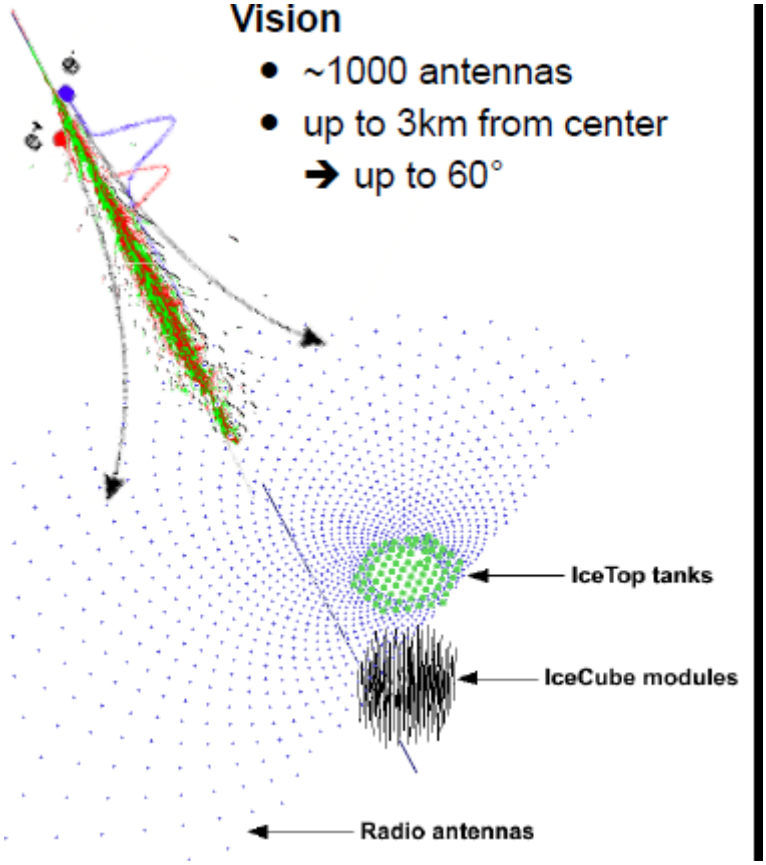
The surface array of IceCube has a dual role. It makes IceCube a 3-dimensional air shower detector for the study of cosmic rays and it serves as a partial veto of cosmic-ray background for IceCube's primary objective of neutrino astronomy. The veto function is particularly important in the EeV range where the search for cosmogenic neutrinos is limited to events near the horizontal because the Earth is opaque to neutrinos of such high energy from below. At present, the footprint of IceTop is limited to the area immediately above the deep IceCube array.

An attractive possibility for extending the coverage of the surface component of IceCube is with an array of radio antennas. The technique for radio detection of the geo-synchrotron radiation of extensive air showers is developing rapidly to the point that it is becoming a well understood technique. The technique has been demonstrated at the LOPES array triggered by the KASCADE air shower array at Karlsruhe. A radio array with a 20 sq km footprint is under construction at the Pierre Auger Observatory in Argentina. We expect the ability of radio arrays to self-trigger on air showers will be demonstrated soon, if not already. The figure below illustrates the concept as it could be realized at IceCube.



A radio array with an area of order 30 sq km as indicated in the figure would extend the maximum cosmic-ray energy accessible to ~5 EeV and would provide a considerable increase in the power of the surface array for vetoing EeV neutrinos. Before such an ambitious project can be contemplated, a smaller test demonstration project is needed.

Radio Air Shower Test Array (RASTA) is a proposal for 36 pairs of radio antennas on the edge of IceTop. The radio hubs would use existing cables left over from tank freezing to carry signals back to the IceCube Lab. The purpose would be to demonstrate the ability to self trigger on air showers with energies above 10 EeV by offline coincidences with IceTop. The plan would be to accomplish this in three seasons to determine the feasibility of proposing for a significantly larger array. The proposed test array is shown in the figure below.