Radar Upgrade Challenges

The variety of radar upgrade products offered by Intersoft Electronics utilise leading-edge technology to achieve field proven solutions for ageing radar systems.

When a radar system is past its mid life, owners are faced with the difficult and often expensive challenge of replacing their systems. Radar upgrades can become a cost effective solution to alleviate component obsolescence, which creates soaring maintenance and support costs, in turn affecting the performance and reliability of an ageing radar system. Many of these once state-of-the-art radar systems have also been outgrown by the environment they operate in. Increased levels of non-static clutter such as wind farms, increased air traffic densities and new requirements to track smaller cross section targets, like UAV’s, all place a performance overhead on a system that was already operating at the peak of technology for its time.

Intersoft Electronics’ 3D Radar Upgrade Solution

Intersoft Electronics has field proven upgrades for military and civil radar systems. These systems cover a diverse range of use from precision approach radars (PAR80), airport surveillance radars (TA10), 3D air defence radars (S723-743D) as well as tactical firefinder radars (AN/TPQ-36).

In 2009, NATO commissioned Intersoft Electronics to upgrade several Martello S723-743D radar systems under a Service Life Extension Program (SLEP). The core of the upgrade consists of a NextGen Signal Processor called the IF Signal Processor (ISP894). The upgrade successfully addressed all requirements of NATO’s Service Life Extension Program as well as providing significant performance gains in Probability of Detection (Pd), range/azimuth accuracy and range/azimuth resolution better than the original manufacturers specifications.

Out-Of-The-Box Radar Upgrade Solution

Intersoft Electronics now provides this 3D Radar Upgrade as an Out-Of-The-Box solution to owners of Martello S723-743D and AN/TPS-70 Vigilant radar systems. A team of technicians and engineers goes on site to provide training and initiate the installation in shadow mode. In this mode, the upgraded system runs in parallel with the original system without influencing the radar’s operation. The radar staff themselves accomplish the installation to master mode. Further on-site assistance can then take place for radar fine tuning, acceptance testing and performance evaluation with Intersoft Electronics’ Radar Analysis Support Systems (RASS) tools. These tools can also be used for applying a 3D antenna scan and derive the antenna diagram. Based on this measurement, the antenna pattern can be shaped in order to suppress side lobes and obtain the proper tilting.

Closed Loop Installation Concept (CLIC)

Once the system is operational, on site interventions can be limited thanks to the Closed Loop Installation Concept (CLIC). Maintenance staff can record performance anomalies as they occur and send this data on hard disk to Intersoft Electronics. Our experts will then play back the data containing the anomaly, analyze the problem and issue a new set of optimization parameters without the requirement for on-site intervention. This remote assistance results in a significant saving in cost and time for the radar owner.

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The hardware can be implemented into the existing shelter or built into a brand new 19” rack. The main 19” units are NextGen Signal Processors, a master control unit for radar interfacing and timing, combiner/tracker, time server, network switches and a KVM. Optionally, a Radar Environment Simulator (RES) can be implemented. The combiner/tracker outputs for example ASTERIX data towards the ATC network.

Selecting an Intersoft Electronics radar upgrade represents outstanding value to radar owners through increased performance gains, low upgrade costs and long term supportability.
NextGen Signal Processor

The NextGen Signal Processor (ISP894) is the heart of the upgrade solution and provides the majority of gains in radar performance. The ISP894 allows up to four IF Signal inputs and embeds high-end COTS components (FPGA, Quad-core processor) operating Intersoft Electronics’ patented smart antenna techniques (VCC). The VCC utilizes a self-tunable smart antenna technique in which a lower beam serves as a reference for its higher beam to cancel clutter. Unstable clutter produced by objects such as wind turbines is completely cancelled. The resulting clutter free signal can then be processed using advanced image processing techniques allowing disturbances from other radars and RF sources to be removed before Moving Target Detection using Doppler (MTD).

While for a two beam airport surveillance radar one ISP894 can do the job, several units can be stacked for 3D radars using more beams.