MARS ECHOES GENERATION FOR SHARAD

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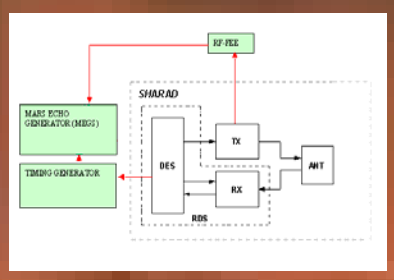
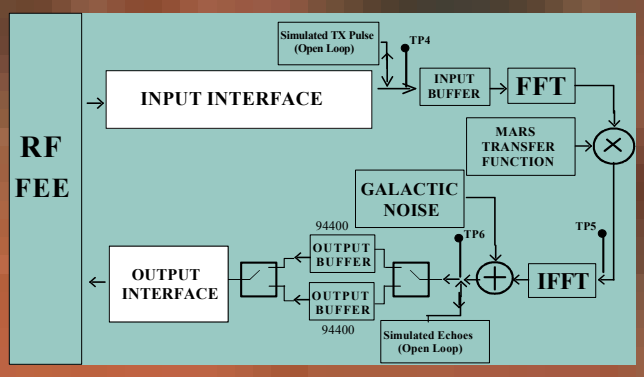
MEGS

MEGS has in charge the digital data handling and data conversion in interfacing SHARAD front end electronic.

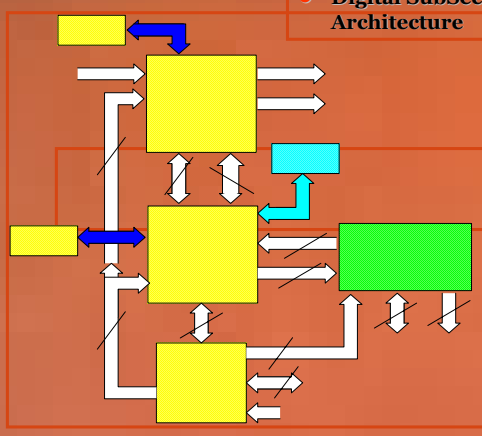
- MEGS is able to support all the Operative Modes and Operative Phases of SHARAD;
- MEGS is able to work in open loop configuration using simulated transmitted pulse;
- MEGS is able to closed loop configuration by acquiring SHARAD echoes and by convolving work in them with a simulated Mars Transfer Function;
- MEGS is synchronized with SHARAD;



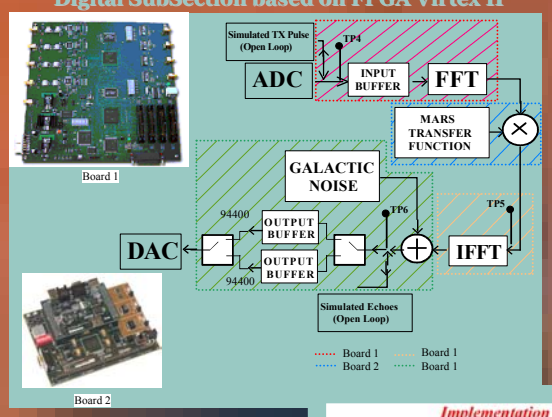
MEGS functional diagram (Closed Loop)

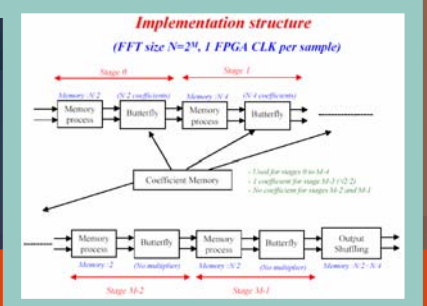


- **Digital SubSection Architecture**



Digital SubSection based on FPGA Virtex II



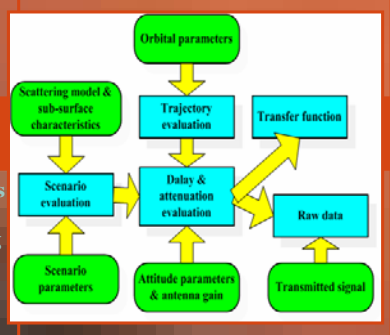


SHARAD SIMULATOR BLOCK DIAGRAM

The Mars transfer function is generated by a SW simulator. The simulator works in time domain by considering the appropriate superposition of returns from scattering element of the simulated scenario.

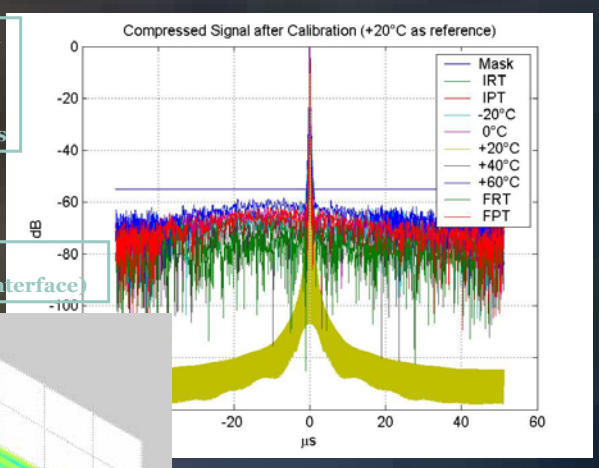
The simulator takes into account the satellite trajectory and attitude while the scene is described in terms of height profile and backscattering function of surface and underlying strata. Either isolated scatters and extended targets can be simulated by approximating the scattering surface by square plane facets, large in terms of the incident wavelength but small when compared to the resolution length.

Sub-superficial attenuation and delay are taken into account by considering electromagnetic parameters (permittivity e and conductivity) of the underlying materials.

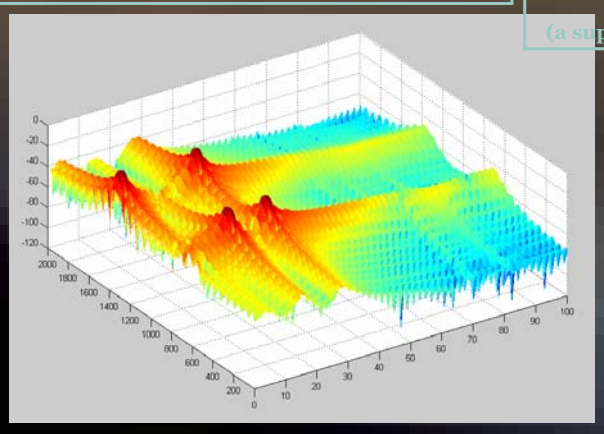


Results of Flight test campaign

Compressed received signal.
After calibration it is possible to reach more than 60 dB of dynamics



Compressed image in closed loop (4 point-targets)



Compressed image in closed loop
(a superficial interface with a sub-superficial interface)