

The SKA is designed to be the radio telescope of the future. To achieve this goal it needs a highly adaptable correlator. For the SKA1 Low correlator the requirement is for a 512 station correlator. Each antenna station can generate up to 16 separate beams, although the total bandwidth is limited to 300MHz. The station can be divided into 16 sub arrays and each sub array can operate as 4kHz resolution correlator or in zoom mode. In zoom mode there are 4 zoom bands with each band operating at either 0.25, 0.5, 1 or 2kHz resolution. In addition in zoom all bandwidth not in a zoom band must be correlated with a 1MHz continuum resolution. Thus in zoom mode there may be 5 different frequency resolutions at one time and the zoom bands can differ from sub array to sub array.

These requirements lead to a correlator that must be able to process data in each coarse frequency channel (781kHz) from the antenna stations at six different frequency resolutions and up to 16 different look directions. Over the full 300MHz this increases to a maximum of simultaneous look directions (16 sub arrays each with 16 station beams)

The Low.CBF consortium has borrowed from software methods to develop a power efficient hardware correlator. This correlator that meets the requirements while at the same time is efficient and is simple being relatively simple to implement.