

DIRECT SAMPLING: REAL WORLD, REAL TIME, WIDE BAND ADC AND DSP DESIGN FOR RADIO ASTRONOMY APPLICATIONS

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Technological advances made in analogue to digital convertors (ADC), real time digital signal processing (DSP) elements like field programmable gate arrays (FPGA) and multi gigabit transceivers (MGT) data links, it has become possible to acquire and process large radio frequency (RF) bandwidths. This presentation aims to give an overview of how these technological advances can be utilized to design and implement new radio astronomy receiver and processing systems. Design parameters like RF bandwidth, anti-aliasing, sampling rate, dynamic range, input/output (IO) bandwidth and DSP resources will be explored. The proposed science case drives the input requirements for the system and these parameters. As with any real world system engineering problem, it requires various trade offs between the different stages or elements to ensure the best fit for the targeted system. These trade offs can be limited due to RF interference (RFI) and physical environment, current technology available, component or system cost, design cycle period, system integration with current or legacy systems and obsolescence. All of these aspects will in some way impact the final product and ultimately determine its success.