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From MicroTCA to ATCA. Scalability issues for data acquisition systems.

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During hardware work on data acquisition systems, eicSys has evaluated several form factors and mezzanine standards. First of the most important requirements defined by customers is a system scalability from several analog channels up to thousands. Second one, very important for some customers, is reliability; therefore, ATCA and uTCA standards has been selected for further development.
The decision has been made to use a carrier-mezzanine approach, since it provides great flexibility in terms of board compatibility, upgrade costs and software compatibility. After investigations a custom mezzanine board and its interface has been defined and two types of carrier boards have been designed: ATCA blade and MTCA.4.
The mezzanines are custom driven boards with different requirements such as number of channels, sampling frequency for ADCs, special filtering of input signals and so on. The ADC mezzanine with 24 channels and special filtering features has been designed for detectors readout. Another types of ADC mezzanine boards with 20 and 40 channels (different precision and ADC sampling frequency) have been designed for a control and diagnostic system required by fusion energy experiments.
A modular approach together with the development of 1U MTCA.4 chassis and enhanced for a high precision instrumentation ATCA backplane gives possibility to build scalable systems from a few analog channels (1U chassis) up to several hundreds analog channels (ATCA 14-slot crates) using the same type of mezzanine module. Different platform (ATCA and MTCA.4) offers diversified processing power and reliability level. Functionality of MTCA.4 based system might be extended with DAMC-FMC20 MTCA.4 carrier and any available on the market FMC board. It gives a wide range of possibilities for system design.

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