

## **TSC21020 Application Experience Aiding Next Generation Spaceborne DSP Selection**

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"Austrian Aerospace (AAE) has been active in the field of spaceborne digital signal processing (DSP) since the introduction of the TSC21020. After having applied DSP techniques to CDMA Terminals and advanced Electronic Ground Support Equipment such as Radar-Return-Signal-Simulators, the advent of the TSC21020 as off-the-shelf item together with a long queue of spaceborne applications eagerly waiting for appropriate spaceborne signal processing technology, opened a new product niche, in particular for small companies, lacking proprietary silicon technology, but being acquainted with "squeezing" ultimate DSP performance by means of algorithm optimization. Already for METOP AAE provided 3 out of 4 on-board DSP-systems. In the present paper we apply a sub-system provider's perspective to investigate the particular circumstances leading to the outstanding success of the TSC21020 in space. The results of "lessons learnt" during our DSP developments for METOP and succeeding applications are presented for hardware, software and verification issues, leading to the conclusion that software development tools (compiler, debugger, emulator, etc.) are of greater importance for a spaceborne DSP than are raw MIPS or MFLOPS, if the price to pay is low-level language programming. From this and our current experience with the use of the LEON for GNSS-related on-board digital signal processing the rationale towards our preferred choices among the 6 options proposed by ESA for the next generation spaceborne DSP will be developed. While from a pure processing point of view programmable systolic arrays are of great interest, continuity suggests inclusion of the LEON, either as general purpose processor, as part of a DIOPSIS-type DSP system-on-chip (variant b), or in form of a multi-core architecture (variant c). Finally, suggestions for improvements to the LEON-2/3 architecture in support of future on-board DSP-systems and potential architectures are presented."