Workshop: 2nd ESA Workshop on Tracking, Telemetry, and Command Systems for Space Applications

Topic: Ground Segment Technology and Infrastructure

Title: Deep Space Network Turbo Decoder Implementation

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A new decoder is being developed by the Jet Propulsion Laboratory for NASA's Deep Space Network. This unit will decode the new turbo codes, which have recently been approved by the Consultative Committee for Space Data Systems (CCSDS). Turbo codes provide up to 0.8 dB improvement in Eb/N0 over the current best codes used by deep space missions.

The new decoder has been implemented in software running on commercial Digital Signal Processor (DSP) chips, removing the need to design complicated and expensive hardware as was the case with the previous generation of codes. The decoder time-tags the data frames, performs a buffered frame synchronization in the symbol domain (as opposed to the current bit domain synchronization), decodes the turbo coded frames (using the **TBD** algorithm), and outputs the decoded bits in the CCSDS Standard Formatted Data Units format. The decoder makes use of **TBD Type** stopping rules to detect decoding convergence. The decoder currently decodes at rates up to 700 kbps (depending on the frame length), but will increase in rate as DSP clock rates increase. The implementation will go operational in October, 2003.