STREAMING TRANSPORT PROTOCOL FOR SPACEWIRE NETWORKS

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Long Paper

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ABSTRACT

The basic SpaceWire Protocol Stack, standard ECSS-E-50-12C, covers a set of layers, from PHY to Network level. The Transport level framework is under standardization. It specifies general structure of the Transport PDU, claims that a variety of Transport protocols can be specified and work simultaneously in a SpaceWire interconnection. Transport layer protocols are in development with a couple of them ready for standardisation: RMAP, implementing remote memory access paradigm, and the CCSDS TCP/IP-like packet transfer protocol.

For Transport protocols we discuss a variety of choices between Connectionless (CL) and Connection-oriented (CO) protocols. The RMAP protocol is considered as a case study of a CL protocol. It is efficient for system administration, for setting/checking device parameters, for casual data polling. In regular and intensive data transfer the RMAP request/reply scheme could be of excess in overheads both in communications loads and operation overheads, non-consistent in the stream delivery to its consumer and in pumping data out from sources with limited buffering.

Many prospective applications to work over SpaceWire network interconnections operate with streaming data: data streams from high-rate sensors, ADCs, video streams input and output, etc. Some applications require support of multiple coherent data streams.

An outline for a new CO-type transport protocol – Streaming Transport Protocol (STP) is presented. We consider features that characterised streaming transport connection and consider the selected set of connection parameters, data packet parameters and additional data flow information.

The STP is implemented in our designs as a proprietary protocol. After its demonstration and trial it could be proposed for standardization by the SpaceWire community.