The Development of SpaceWire Communication Tester (SpaceWire Test Module)

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Outline

■ What is a SpaceWire Communication Tester (SpaceWire Test Module) ?
■ Why do we need SpaceWire Test Module?
■ SpaceWire Test Module
  – Function Block Diagram
  – Hardware and Set-up
  – Software
  – Performance Test
  – Trigger
  – Verification
■ Summary
What is a SpaceWire Communication Tester (SpaceWire Test Module)?

- A low-cost and customizable Debug and Analysis tool for SpaceWire
  - Source codes of FPGA logic and Software will be opened

- Four main functions
  - Signaling Rate Counters
  - Statistics Counters
  - Trigger
  - Self-checking
Why do we need SpaceWire Test Module?

- A laboratory (ex. college, institute, or etc.) that develops and/or uses SpaceWire devices needs to debug those by monitoring SpaceWire links
- If a laboratory operates some SpaceWire systems, It is desirable to have a couple of debug tools for SpaceWire
- But, budget is limited

The low-cost debug tool that can be freely used also in a bench scale test is needed

SpaceWire Test Module
Hardware and Set-up

- **SpaceWire Port**
- **FPGA**
- **RS-232C Port**
- **SpaceWire Device A**
- **SpaceWire Device B**
- **RS-232C Cable**
- **PC**

Dimensions:
- 130mm
- 74mm

Connections:
- SpaceWire
- SpaceWire
- SpaceWire
- SpaceWire
- RS-232C

Diagram shows a circuit board with various components and connections labeled accordingly.
Software

- Languages we used are C++ and Qt
- Statistics of SpaceWire Characters, Codes, and Errors are displayed in accumulated value and rate per a second on the plot
- The log files of all data are generated
- Interface of PC is Serial or USB
Performance Test

Performance test for Signaling Rate function and Statistics Counters function about Time-code were successful.

SpaceWire Device A: 10.416MHz
SpaceWire Device B: 20MHz

Graph showing MHz vs Time with data points for Signaling Rate A to B and B to A.
Trigger

![Trigger Window](image)
Verification

- How do we verify SpaceWire Test Module about the other SpaceWire Characters and Errors? and how does user verify the codes after the user modified the source codes?

Self-checking function
- This function works as a dummy SpaceWire device
- We can send arbitrary number of SpaceWire Characters, codes, and errors using this function
We are developing a low-cost and customizable debug and analysis tool for SpaceWire (SpaceWire Test Module)

Performance test of Signaling Rate Counters function, Statistics Counters function about Time-Code, and software were successful

Status of Development

<table>
<thead>
<tr>
<th></th>
<th>Signaling Rate</th>
<th>Statistics</th>
<th>Trigger</th>
<th>Self-checking</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPGA logic</td>
<td>○</td>
<td>○</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>Software</td>
<td>○</td>
<td>○</td>
<td>△</td>
<td>×</td>
</tr>
<tr>
<td>Verification</td>
<td>○</td>
<td>△</td>
<td>△</td>
<td>×</td>
</tr>
</tbody>
</table>

The source codes of FPGA logic and software are going to be opened and can be modified as the users like
Thank you for your attention