

SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Tools and Technology in Support of Integrated Applications (1)

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Technology and Engineering Center for Space Utilization, Chinese Academy of Sciences, China,
gys@csu.ac.cnTIME SYNCHRONIZATION FOR PAYLOAD OF CHINESE SPACE STATION USING GPS AND
FIBER CHANNEL NETWORK**Abstract**

A wide variety of payloads will be installed on the Chinese space station which require high precision time synchronization service. In the future, some of these payloads maybe replaced according to scientific experiment demand. The traditional time synchronization method mainly includes GPS seconds pulse and broadcast time code through MIL-STD-1553B bus. The former way has a higher precision than the later one. However, using GPS pulse per second to realize time synchronization have to offer specific line connection with each payload which makes it much difficult to extend; Time synchronization through MIL-STD-1553B offer only 25 microseconds of synchronization precision which can't meet the demand of some experimental payload. This paper, based on the FC-AE-1553 network that adopted by the application information system of Chinese station, proposes a high-precision time synchronization method like IEEE1588 and time error offset compensation algorithm, which has been designed and implemented based on FPGA. The experimental results show that the time synchronization accuracy based on the single stage FC-AE-1553 network is better than 50 nanoseconds. The time synchronization mechanism is proposed in this paper which can provide a relatively high precision time synchronization service to meet the needs of most payloads. It can avoid the complicated mechanism of special routing for each payload, greatly improving the accuracy of the traditional method of bus broadcast time code. This paper provides excellent performance solutions for the space station payload required high-precision time synchronization service Which can reduce costs, improve scalability and compatibility.