



Space
Technology
Centre
University of Dundee

SpaceWire-D

Trade-Off Criteria

Revision: Draft A

Date: March 2011

ESA Contract Number -

Ref: SpW-D Trade-Off

Space Technology Centre
School of Computing
University of Dundee
Dundee, DD1 4HN
Scotland, UK

spacotech.computing.dundee.ac.uk

Document Authors

Steve Parkes

Document Change Log

Date	Revision No	Comments
March 2011	Draft A	Initial draft version

CONTENTS

CONTENTS	3
LIST OF FIGURES	3
LIST OF TABLES	3
1 INTRODUCTION	4
1.1 AIMS AND OBJECTIVES	4
1.2 GUIDE TO DOCUMENT	4
1.3 ACRONYMS AND ABBREVIATIONS	4
1.4 APPLICABLE DOCUMENTS	4
2 TRADE-OFF CRITERIA	5

LIST OF FIGURES

No table of figures entries found.

LIST OF TABLES

Table 1-1: Applicable Documents	4
---------------------------------------	---

1 INTRODUCTION

1.1 AIMS AND OBJECTIVES

The aim is to list the trade-off criteria to be used in evaluating different options for SpW-D.

1.2 GUIDE TO DOCUMENT

Section **Error! Reference source not found.** lists the trade-off criteria.

1.3 ACRONYMS AND ABBREVIATIONS

AD	Applicable Document
AOCS	Attitude and Orbit Control System
ECSS	European Cooperation for Space Standardization
GNC	Guidance and Navigation Control
QoS	Quality of Service
RMAP	Remote Memory Access Protocol
RMW	Read/Modify/Write
SpW	SpaceWire

1.4 APPLICABLE DOCUMENTS

The documents applicable to this specification are listed in Table 1-1.

REF	Document Number	Document Title
AD1	ECSS-E-ST-50-12C Formerly ECSS-E50-12A, January 2003	SpaceWire: Links, nodes, routers and networks
AD2	ECSS-E-ST-50-51C	SpaceWire Protocol Identification
AD3	ECSS-E-ST-50-52C	SpaceWire Remote Memory Access Protocol

2 TRADE-OFF CRITERIA

In this section the trade-off criteria (principal requirements) for SpaceWire-D are presented.

Deterministic

- Deterministic to 1 ms (at link speeds of 50 Mbits/s or higher)
- Be able to collect data from several (e.g. ten) sensors within 1 ms

Range of performances depending on application need – lower link speed implies lower performance

Efficient use of link bandwidth

- Be able to achieve link bandwidth utilisation of at least 50% when transferring large amounts of data (e.g. 100 kbytes in length). The higher the link utilisation the better.
- Be able to achieve link bandwidth utilisation of at least 20% when sending and receiving short commands (4 bytes in length). The higher the link utilisation the better.

Random node access

- Be able to decide at run time which nodes you want data from.

Support concurrent data transfers

- Linear increase in overall bandwidth with additional devices initiating data transfers.

Simple

- Easy to explain.
- Concise specification.
- As few operating modes as possible.
- Simple specification of options and parameters to support interoperability.

Operate using existing SpaceWire devices

- As few constraints as possible on existing devices.
- Target devices no functional constraints and minimal performance constraints. Fewer or more relaxed performance constraints are better.

Be capable of detecting errors

- Transaction not completed in time.
- Failure of link to an initiating node?

Be capable of recovering from errors??

SpaceWire-D

- Maintaining determinism e.g. double transmission, possibly over different paths?
- Without maintaining determinism.