

**CONTENTS**

- FOREWORD..... 4
- INTRODUCTION..... 5
- 1 Scope..... 7
- 2 Normative reference ..... 7
- 3 Definitions, terms and abbreviations ..... 7
  - 3.1 Terms and definitions ..... 7
  - 3.2 Abbreviations ..... 8
- 4 Conformance..... 8
- 5 Responsive Link structure ..... 8
  - 5.1 Outline of Responsive Link ..... 8
  - 5.2 OSI reference model ..... 9
- 6 Layer 1 (physical layer) ..... 9
  - 6.1 Separate transmission of data and event..... 9
  - 6.2 Physical interface ..... 9
- 7 Layer 2 (data link layer)..... 10
  - 7.1 Error correction ..... 10
    - 7.1.1 General ..... 10
    - 7.1.2 CODEC ..... 10
    - 7.1.3 Error correction encoding ..... 10
    - 7.1.4 Bit stuffing ..... 10
    - 7.1.5 NRZI encoding ..... 11
  - 7.2 Frame format..... 11
    - 7.2.1 Packet ..... 11
    - 7.2.2 Frame..... 11
    - 7.2.3 Setup pattern..... 11
    - 7.2.4 Idle pattern ..... 11
    - 7.2.5 Bit synchronization and clock rate ..... 11
    - 7.2.6 Error handling..... 12
  - 7.3 Automatic reconfiguration (plug and play)..... 12
- 8 Layer 3 (network layer)..... 12
  - 8.1 Packet overtaking function ..... 12
  - 8.2 Responsive Link packet format ..... 12
    - 8.2.1 Header format ..... 12
    - 8.2.2 Priority..... 13
    - 8.2.3 Data packet ..... 13
    - 8.2.4 Event packet ..... 14
  - 8.3 Routing ..... 15
    - 8.3.1 General ..... 15
    - 8.3.2 Routing table ..... 15
    - 8.3.3 Independent routing of data and event..... 16
    - 8.3.4 Priority-based routing ..... 16
- 9 Layer 4 (transport layer) ..... 16
  - 9.1 Priority replacement for packet acceleration/deceleration ..... 16
  - 9.2 Multi-link ..... 17

|   |    |
|---|----|
| 9.3 Stream data transmission .....  | 17 |
| Annex A (informative) Characteristics of real-time communications.....        | 18 |
| Annex B (informative) Real-time scheduling.....                               | 19 |
| Annex C (informative) An implementation of the Responsive Link interface..... | 20 |
| Annex D (informative) Examples of implementation .....                        | 21 |
| D.1 An implementation of the Responsive Link switch.....                      | 21 |
| D.2 An implementation of overtaking buffers .....                             | 22 |
| Annex E (informative) Examples of routing of data and event.....              | 23 |
| E.1 An example of independent routing of data and event.....                  | 23 |
| E.2 An example of priority based routing.....                                 | 23 |
| Bibliography.....   | 24 |
| <br>  |    |
| Figure 1 – A humanoid robot.....  | 6  |
| Figure 2 – Logical interface of Responsive Link .....                         | 9  |
| Figure 3 – Header format.....   | 13 |
| Figure 4 – Data packet format.....  | 13 |
| Figure 5 – Trailer format of data packet .....                                | 13 |
| Figure 6 – Event packet format .....  | 14 |
| Figure 7 – Trailer format of event packet.....                                | 15 |
| Figure 8 – Routing table .....  | 16 |
| Figure B.1 – EDF scheduling .....   | 19 |
| Figure C.1 – Responsive Link connector and cable.....                         | 20 |
| Figure D.1 – A Responsive Link switch .....                                   | 21 |
| Figure D.2 – An overtaking buffer .....                                       | 22 |
| Figure E.1 – An example of routing.....                                       | 23 |
| <br>  |    |
| Table 1 – Syndrome and error digits .....                                     | 10 |
| Table 2 – Frame format .....  | 11 |
| Table A.1 – Syndrome and error digits.....                                    | 18 |
| Table C.1 – Maximum cable length .....  | 20 |