**ROVER Message Specification 0.3**

This document aims to detail the complete, bit level specification of messages which will be passed via nodes on the distributed system. Based on the information contained within this specification, messages will be able to be created and and deconstructed. Each message can be made up from multiple packets. The maximum size of a packet is 64 bytes.

**Packet Requirements:**

Total Packet Maximum Size (<64 Bytes, buffer size)

Each packet is made up from Header and Packet Data components.

The first message in the sequence includes the message header.

**Packet Header Requirements:**

Start Byte

Flags

Message ID

Target Service

Source Service

Packet ID

CRC/Checksum of data

**Message Header Requirements:**

Type of Message (Function Call, Function Response, Advertisement, ...Continuation of previous packet, Ping, Packet Confirmation);

Number of packets in message.

Message flags/bitfields.

**Packet Data Content (**and requirements**)**:

**Function Call/Response Data:**

Function call name;

Flag indicating number of variables/parameters;

Flag with size of variables

Variable(s) themselves

**Advertisement Data:**

TBC;

(Similarities to function call data. Needs to be determined by needs of resource discovery)

**Continuation Data:**

\*Contains a continuation of the data defined in the previous Message Types\*

\*Should be concatenated on the end of the data from previous packets and entire message should be parsed at the end\*

**Ping Data:**

EMPTY

**Packet Confirmation:**

EMPTY

\*includes type of message in Message Header and Packet Number in Header\*

**Packet Termination** :

0xFF

Stop byte to signal end of Packet

**Packet Bit-level specification:**

**Packet Header - 6 Bytes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 8 bits | 3 bits | 5 bits | 8 bits | 8 bits | 8 bit | 8 bit |
| Start Byte | Flags | Message ID | Target Service | Source Service | Packet ID | CRC |

**Descriptors:**

**Start Byte:**

Length: 8 bits

Function: Distinct start byte that is elsewise never used (e.g. 0xFE) to make it obvious that a new packet is starting and to hence resynchronize byte orders.

**Flags:**

Length: 3 bits

Function: Bit field for packet flags, such as prioritise, expects response, delivery failed... remaining bits are reserved for future use

**Message ID:**

Length: 5 bits

Function: Used to make sure packets are matched up correctly

**Target:**

Length: 8 bits

Function: Contains ID of target node

**Source Service:**

Length: 8 bits

Function: Contains ID of source node

**Packet ID:**

Length: 8 bits

Function: Packet number

**CRC:**

Length: 8 bits

Function: Cyclic redundancy check on data in packet

**Message Header** (Sent in first packet of message)**:**

|  |  |  |
| --- | --- | --- |
| 8 bits | 5 bits | 3 bits |
| Number of Packets in Message | Type of Message | Message bitfields |

**Descriptors:**

**Number of Packets in Message**

Length: 8 bits

Function: The numbers of packets involved in the message.

**Type of Message**

Length: 5 bits

Function: Tells which message type is being sent, e.g. a ping. The representation for each function is shown in the Table 1.

|  |  |
| --- | --- |
| **Type of Message** | **Binary Representation** |
| Ping | 00000 |
| Packet Confirmation | 00001 |
| Advertisement | 00010 |
| Function Call | 00011 |
| Function Response | 00100 |
| Get | 00101 |
| Set | 00110 |
| Initiate Resource Discovery and Pass On | 00111 |
| Initiate Resource Discovery and Stop | 01000 |
| Pub / Sub? |  |

**Table 1.** Binary representation of the different possible message types

**Packet Data Content**:

**Function Call / Response Data:**

(Identical data content for function call and function response but with altered Message ID and different variable values.)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 16 Bytes | 8 bits | 16 bits | ? bits | ... |
| Function Name | Number of variables/parameters | Size of Variable(s) | Variable Data | ... |

**Descriptors:**

**Function Name**

Length: 16 Bytes

Function: The name of the function being called.

**Number of variables/parameters**

Length: 8 bits

Function: The number of variables / parameters that the function requires / is

**Size of variable**

Length: 16 bits

Function: Size of Variable.

**Variable Data**

Length: Depends on function.

Function: The data for the variables being sent.

**Advertisement Data:**

|  |  |
| --- | --- |
| 8 bits | ? bits |
| Number of jumps away  (int) | Sources / functions available  (string) |

**Descriptors:**

**Number of jumps**

Length: 8 bits

Function: The number of jumps that the advertised data is from the node

**Sources / Functions available**

Length: Depends on the number of sources and functions available, no set size

Function: The different sources and functions written in string format

**Initiate Resource Discovery and Pass On / Stop:**

|  |
| --- |
| X bits |
| Services / routes to ignore? |

**Pub / Sub?:**

|  |
| --- |
| 16 Bytes |
| Function Name |

**Ping Data:**

EMPTY

\*Just the packet and message header, empty data content\*

**Packet Confirmation:**

EMPTY

\*Just the packet and message header, empty data content\*

**Get / Set:**

|  |  |  |
| --- | --- | --- |
| 16 Bytes | 16 bits | ? bits |
| Variable Name | Size of Variable | Variable Data |

**Descriptors:**

**Variable Name**

Length: 16 Bytes

Function: The name of the variable being got / set to.

**Size of variable**

Length: 16 bits

Function: Size of Variable.

**Variable Data**

Length: Depends on variable.

Function: The data for the variables being sent.

**Packet Termination** :

|  |
| --- |
| 8 bits |
| Stop byte, terminate packet with 0xFF |

**EXAMPLE MESSAGES:**

**Function Call:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Start Byte** | **Flags** | **Message ID** | **Target ID** | **Source ID** | **Packet ID** | **CRC** |
| 0xFE | 0x1F | 0x0A | 0xA4 | 0xA5 | 0x01 | 0xFF |
| **Type of Message** | | | | **Number of Packets in Message** | | |
| 0011 | | | | 0x00 | | |
| **Function Name** | | **Number of variables/parameters** | **Size of Variable** | **Variable Data** | | |
| 0xDEADBEEFDEADBEEF | | 0x01 | 0x0001 | 0xFF | | |
| **Packet Termination**  0xFF (Message is whole number of bytes) | | | | | | |
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