AYDP Communications Protocol

In contribution to
Autonomous Yacht Development Project
https://github.com/TimB-QNA/AYDP

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Chapter 1

Introduction

Chapter Text

Chapter 2

Message Construction

An AYDP message is constructed from three basic components; a header, a data section, and a checksum. The checksum at the end of each sentence is a single byte which is the XOR of all of the bytes in the sentence (excluding itself). This checksum byte is only intended to allow the recipient to ensure that the message is complete, not to re-build any missing data.

Figure 2.1: Basic protocol layout

The header is 27 bytes long and contains the message type and length as shown in table 2.1.

Byte	Content	Data Type	Length (bytes)
1	Start (0xFF)	uint8	1
2	Message Type	uint8	1
3	Message Length	uint32	4
7	Seconds from epoch	int64	8
19	Milliseconds into current second	int64	8

Table 2.1: Header Contents

For message types ≥ 127 (i.e. where the MSB of the message type is high) the timing data is omitted. This is termed an expedited message, and the header becomes only six bytes long. This is used to transfer high-speed data where the transmission time is secondary to the data rate. Any message can be expidited, simply by adding 127 to the message identifier.

2.1 Transmission limitations

The expidited message form is useful for serial links, but it should be noted that ethernet and WiFi links will hit packet rate limits before the bandwidth limits, except in the case of extremely large messages, where expedited transfer will make little difference anyway.

Chapter 3

Message Types

The AYDP protocol supports a number of message types, given below.

Message Type	Purpose	Link
0	Time sync	3.1
1	Wind speed and direction	3.2
2	Environmental conditions	3.3
3	Position	3.4
4	Position fix quality	3.5
5	Position fix detail	3.6
6	Vessel Data	3.7

Table 3.1: Message Types

3.1 Time synchronisation

Time Sync

3.2 Wind speed and direction

Time Sync

3.3 Environmental conditions

Time Sync

3.4 Position

Position

Byte	Description	Type
0-3	Latitude	uint8
4-7	Longitude	uflt16
8-11	Altitude	uflt16

Table 3.2: Position information

3.5 Position fix quality

Fix Quality

Byte	Description	Type
0	Fix Type	uint8
1-2	Mean DOP	ufIt16
3-4	Horizontal DOP	ufIt16
5-6	Vertical DOP	ufIt16
7	Number of satellites	uint8

Table 3.3: Position fix quality information

3.6 Position fix detail

For the fix detail, bytes 1 to 7 are repeated for each Satellite. Thus a message for 10 satellites would be 71 bytes long.

Byte	Description	Type
0	Number of satellites	uint8
1	Satellite #n ID	uint8
2-3	Satellite #n Azimuth	ufIt16
4-5	Satellite #n Elevation	ufIt16
6-7	Satellite #n Signal to Noise ratio	ufIt16

Table 3.4: Position fix detail from GPS

3.7 Vessel Data

Time Sync

Byte	Description	Type
0	Number of satellites	uint8
1	Satellite #n ID	uint8
2-3	Satellite #n Azimuth	ufIt16
4-5	Satellite #n Elevation	ufIt16
6-7	Satellite #n Signal to Noise ratio	ufIt16

Table 3.5: Position fix detail from GPS

Chapter 4

Bibliography