UC&NL
Underwater Communication
and Navigation Laboratory
http://unavlab.com
support@unavlab.com

uWAVE

Interfacing protocol specification

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Content

1 Introduction

1.1 Physical layer

uWAVE hydroacoustic modems support data pairing using the RS-232 physical layer standard for asynchronous interface (UART) with a 3.3V data line voltage.
The connection is made using a four-wire cable with Tx (transmitter), Rx (receiver), Vcc (power) and GND (ground) wires.
Without the use of additional repeaters and interface converters, the maximum cable length, for which the correct operation of the interface is guaranteed, is no more than 2 meters.
Default connection port settings[1]:

Baudrate: 9600 bit/s
Data bits: 8
Stop bits: 1
Parity: No
Hardware flow control: No

WARNING!

The modems are powered by a 5 or 12 Volt DC source, while the data line voltage is 3.3 V.

1.2 NMEA0183 Protocol standard

The NMEA0183 standard describes the format of text (ASCII) messages at the interactive level.

Sentence example: $PUWV0,1,0*hh<CR><LF>

[1] Specified parameters can be changed by the request

Parts of a message (sentence) NMEA0183:

- '$' - sentence start,
- 'P' - Proprietary
- 'UVW' - manufacturer identifier
- '0' - sentence identifier
- ',' - parameters separator
- '*' - checksum separator
- 'hh' - checksum in hexadecimal format (for example FF, 01). Byte-by-byte XOR for all characters between '$' and '*'.
- <CR><LF> - end of sentence

3 UWV sentences

WARNING!

If not specified, the format of the parameters should be understood literally: 'xx' means two decimal digits, if the number is less than 10, then the left position is padded with zero: '02', '09' and not '2' and '9'.

The prefix D2H in the name of the message means that it is transmitted from the device (D) to the host system (H).
The H2D prefix in the message name means that it is transmitted from the host system (Host) to the device (Device).

3.1 Sentence IC_D2H_ACK - device reaction

Sentence format $PUWV0,x,x*hh <CR><LF>	
Field/Parameter	**Description**
$	Sentence start '$'
PUWV	UWV
0	Sentence ID
cmdClass	Type of action (see 4.2)
errCode	Error code (see 4.1)
*	Checksum separator NMEA
hh	Checksum NMEA
<CR><LF>	Sentence end

3.2 IC_H2D_SETTINGS_WRITE - writing new settings

Sentence format $PUWV1,x,x,x.x*hh <CR><LF>

Field/Parameter	Description
$	Sentence start '$'
PUWV	UWV
1	Sentence ID
txChID	Tx code channel ID
rxChID	Rx code channel ID
STY	Salinity, PSU
*	Chechsum separator
hh	Checksum
<CR><LF>	Sentence end

3.3 IC_H2D_RC_REQUEST - code request to a remote subscriber

Sentence format $PUWV2,x,x*hh <CR><LF>	
Field/Parameter	**Description**
$	Sentence start '$'
PUWV	UWV
2	Sentence ID
txChID	Tx code channel ID
rcCmdID	Command ID (see 4.3)
*	Chechsum separator
hh	Checksum
<CR><LF>	Sentence end

3.4 IC_D2H_RC_RESPONSE - answer of remote subscriber

Sentence format $PUWV3,x,x.x,x.x,x.x,x.x,x.x*hh <CR><LF>	
Field/Parameter	**Description**

$	Sentence start '$'
PUWV	UWV
3	Sentence ID
rcCmdID	Command ID (see 4.3)
propTime	Signal propagation time, sec
SNR	Signal to noise ratio, dB
Value	Requested value
Reserved	Reserved
*	Chechsum separator
hh	Checksum
<CR><LF>	Sentence end

3.5 IC_D2H_RC_TIMEOUT - remote subscriber timeout

Sentence format $PUWV4,x*hh <CR><LF>	
Field/Parameter	**Description**
$	Sentence start '$'
PUWV	UWV
4	Sentence ID
rcCmdID	Command ID (see 4.3)
*	Chechsum separator
hh	Checksum
<CR><LF>	Sentence end

3.6 IC_D2H_RC_ASYNC_IN - incoming message from a remote subscriber

Sentence format $PUWV5,x*hh <CR><LF>	
Field/Parameter	**Description**
$	Sentence start '$'
PUWV	UWV
5	Sentence ID

rcCmdID	Command ID (см.п. 4.3)
snr	Signal to noise ratio, dB
Reserved	Reserved
*	Chechsum separator
hh	Checksum
<CR><LF>	Sentence end

3.7 IC_H2D_DINFO_GET - request device information

Sentence format $PUWV?,x*hh <CR><LF>	
Field/Parameter	**Description**
$	Sentence start '$'
PUWV	UWV
?	Sentence ID
Reserved	Reserved
*	Chechsum separator
hh	Checksum
<CR><LF>	Sentence end

3.8 IC_D2H_DINFO - device information

Sentence format $PUWV!,c--c,x,c--c,x,x.x,x,x*hh <CR><LF>	
Field/Parameter	**Description**
$	Sentence start '$'
PUWV	UWV
!	Sentence ID
System moniker	System name
System version	System version
Core moniker	Communication subsystem
Core version	Communication subsystem version

acBaudrate	Data transmission speed, baud
rxChID	Rx code channel ID
txChID	Tx code channel ID
*	Chechsum separator
hh	Checksum
<CR><LF>	Sentence end

4 Command mode

uWAVE modems provide the user with a so-called "transparent channel", when all data supplied to the input without changes and analysis are transmitted to the hydroacoustic channel, after which they are received by another modem and in unchanged form are given to the user at the receiving side. In this regard, in order to be able to configure modems, as well as measure the propagation time to remote subscribers, there is a command mode.
Modems analyze input data only in command mode. To switch to the command mode, the “service” core should be pulled to +3.3 V. After that, the “service” core should be pulled to the ground to exit the service mode.

WARNING!

The core "service" is pulled ONLY to 3-5 V or ground, connecting it to a higher voltage will cause a FATAL and NON-GUARANTEE failure of the device.

WARNING!

Before switching on the device, the "service" core should be pulled to the ground, otherwise the device will enter the software update mode.

5 Indentifiers

5.1 Error codes

Error	Value	Description
LOC_ERR_NO_ERROR	0	Request accepted
LOC_ERR_INVALID_SYNTAX	1	Syntax error
LOC_ERR_UNSUPPORTED	2	Request not supported
LOC_ERR_TRANSMITTER_BUSY	3	Transmitter is busy
LOC_ERR_ARGUMENT_OUT_OF_RANGE	4	Speified parameter out of range
LOC_ERR_INVALID_OPERATION	5	Invalid request
LOC_ERR_UNKNOWN_FIELD_ID	6	Unknown field identifier
LOC_ERR_VALUE_UNAVAILIBLE	7	Requested parameter is not available at the moment
LOC_ERR_RECEIVER_BUSY	8	Receiver is busy (wating for a remote answer)
LOC_ERR_TX_BUFFER_OVERRUN	9	Transmitter buffer is full
LOC_ERR_CHKSUM_ERROR	10	Checksum error

5.2 Action types

Action type	Value	Description
LAC_DC_INCOMING	0	Incoming message
LAC_DC_OUTCOMING	1	Outcoming message
LAC_RC_REQUEST	2	Incoming remote request
LAC_SACTION	3	Service action
LAC_LC_REQUEST	4	Incoming request

5.3 Remote commands

Command	Value	Description
RC_PING	0	Ping
RC_PONG	1	Pong
RC_DPT_GET	2	Request a depth value of a remote subscriber
RC_TMP_GET	3	Request a temp. Value of a remote subscriber
RC_BAT_V_GET	4	Request a battery voltage of a remote subscriber
RC_ERR_NSUP	5	Remote subscriber answered - request not supported
RC_ACK	6	Remote subscriber answered - request accepted
RC_USR_CMD_000	7	User command
RC_USR_CMD_001	8	User command

RC_USR_CMD_002	9	User command
RC_USR_CMD_003	10	User command
RC_USR_CMD_004	11	User command
RC_USR_CMD_005	12	User command
RC_USR_CMD_006	13	User command
RC_USR_CMD_007	14	User command
RC_USR_CMD_008	15	User command