ACOUSTIC TELEMETRY SYSTEM INTERFACE CONTROL DOCUMENT

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Document Control Sheet

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1-00	07-16-2012	Initial Release per ECR 1303-00759	Romain Heux
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1 Introduction

1.1 Identification

This interface control document (ICD) describes the interface for the acoustic telemetry systems on the Coastal High Power Surface Mooring, Coastal Standard Power Surface Mooring, Low Power Surface Mooring, Global Surface Mooring, Global Mesoscale Flanking Mooring and Global Hybrid Profiler Mooring.

1.2 Ocean Observatories Initiative (OOI) System Overview

The Ocean Observatories Initiative (OOI) consists of sensors, networks, and support systems that will collect and make available ocean and seafloor data in a coordinated fashion to provide persistent observations over ranges of minutes up to years and decades. OOI will enable researchers to make simultaneous, interdisciplinary measurements to investigate a spectrum of phenomena including episodic, short-lived events (tectonic, volcanic, oceanographic, biological, and meteorological), and more subtle, longer-term changes and emergent phenomena in ocean systems (circulation patterns, climate change, ocean acidity, and ecosystem trends). For additional information on the OOI, the reader is directed to the OOI Final Network Design (FND) document.

1.3 Document Scope and Organization

This document is organized into the following four sections:

1. Introduction – provides the scope, document organization and change control procedure for this document.
2. Related Documentation – cites other documents that provide input and reference for this ICD.
3. Description of Interfaces – provides details of the interfaces.
4. Notes – contains general information that aids in the understanding of this document.

1.4 Change Control

This Interface Control Document is subject to the policies and procedures called out in the OOI Configuration Management Plan, 1000-00000, Section 3 and the CGSN CMP, 3101-00047. Changes to the released version of this document may only be made via an Engineering Change Request (ECR) that has been approved by the Coastal Global Scale Nodes (CGSN) Change Control Board (CCB).

The most recent document revision of this ICD maintained in the OOI Document Management System (DMS) is the authoritative version, as printed hard copies are not controlled. Prior revisions of this document may be maintained in the OOI DMS for reference reasons, but are not authoritative.

2 Related Documentation

2.1 Parent Documents

The following documents are the parents from which this document's scope and content derive:

N/A	L4 CG Telemetry System Requirements Module

2.2 Reference Documents

The following documents or drawings are referenced herein and are directly applicable to this document. In the event of conflict between any of these documents and this ICD, this document shall take precedence.

1101-00000	Final Network Design (FND)
N/A	L2 Reference Module

2.3 Informational Documents

The following documents amplify or clarify the information presented in this document, but are not binding.

D-270-056	OUTLINE, ATM-965 (ATM-887 4G) (Teledyne Benthos)
D-270-060	OUTLINE, ATM-926 Modem
D-270-259	OUTLINE, ATM-966 Modem
M-270-26	ATM-900 Series Acoustic Telemetry Modems User's Manual (Teledyne Benthos)

3 Description of Interfaces

3.1 Overview

The acoustic telemetry systems on fixed, CGSN-developed moorings must be compatible with other platform acoustic systems (e.g., open ocean gliders, ships, and profiler moorings). Acoustic telemetry systems will also be capable of transferring data in real-time from the CGSN fixed moorings to the open ocean gliders for data transfer to a dockserver. The dockserver will also have the capability of transmitting commands to the open ocean glider, which will forward them directly to the CGSN platforms. The modem will be used while deploying sub-surface moorings to ensure the controller is functioning correctly. The Global Mesoscale Flanking Mooring platform controllers will be referred as the sensor array controllers in this document since their functionality will be identical regarding the acoustic communications. The acoustic modems on the Coastal Surface Moorings will be used to communicate with the Coastal Surface Piercing Profilers (CSPPs).

3.2 Subsea Interface

The OOI subsea sensor node controller shall interface to a Teledyne Benthos ATM-900 series acoustic modem (henceforth referred to as “modem”) which will collect sensor data and command status while providing an acoustic communication link between the open ocean glider (or vessel for the deployment phase) and the sensor array controller. The specific modem models used for each CGSN mooring platform is listed below:

Modem Model	Configuration	Mooring Platforms
ATM-965-LF1-B	900 Series 4th generation modem; Aluminum 6000 m housing; Internal battery; Low Frequency (9-14 kHz) omnidirectional transducer; Dual serial port enabled.	Global Hybrid Profiler Mooring Global Mesoscale Flanking Mooring
ATM-966-LF1-B	900 Series 4th generation modem; Aluminum 6000 m housing; No internal battery; Low Frequency (9-14 kHz) omnidirectional transducer; Dual serial port enabled.	Global Surface Mooring
ATM-926-LF1-B	900 Series 4th generation modem; Aluminum 2000 m housing; No internal battery; Low Frequency (9-14 kHz) omnidirectional transducer; Dual serial port enabled.	Coastal Surface Moorings

3.2.1 Electrical

The electrical interface to the modem is via a 16-pin connector, part number MCBH16M. The connector is equipped with pins for power supply, external device enable, and two RS-232 serial ports. The pinout of the connector is shown below. A suitable cable with complementary female connector should be used to connect the sensor array controller with the modem.

Subsea Modem POWER/SERIAL Connector Pinouts

PIN	LABEL	PORT	FUNCTION	PIN
1	Power		External Power Input (21-xxVDC)	To Modem
2	SPARE			
3	GND		Ground	
4	TX(+)	PORT 1	RS-422 Transmit(+)	Modem to Host
5	DE	PORT 1	Device Enable (See NOTE below.)	Modem to Host
6	RTS/RX(+)	PORT 1	Request to Send/RS-422 Receive(+)	Modem to Host/ Host to Modem
7	TX(-)	PORT 1	RS-422 Transmit(-)	Host to Modem
8	RXD	PORT 1	RS-232 Receive	Host to Modem
9	TXD/RX(-)	PORT 1	RS-232 Transmit/RS-422 Receive(-)	Modem to Host/ Host to Modem
10	GND	PORT 1	Ground	
11	RXD	PORT 2	RS-23 Receive	Host to Modem
12	TXD	PORT 2	RS-232 Transmit	Host to Modem
13	RTS	PORT 2	Request to Send	Host to Modem
14	DE	PORT 2	Device Enable	Host to Modem
15	GND	PORT 2	Ground	
16	SPARE			

Serial port 1 shall be connected to the sensor array controller using pins 8, 9, and 10. Serial port 2 shall be connected to the sensor array controller using pins 11, 12, and 15. No other connections are necessary for serial communication. If power is to be supplied externally, it shall be done using pins 1 and 3.

3.2.2 Mechanical

For mechanical specifications of the acoustic modems, please refer to Teledyne Benthos document M-270-26 Rev A: ATM-900 Series Users Manual, Section 9.

3.2.3 Logical/Data

3.2.3.1 Acoustic Communications

The sensor array controller will store data in the modem through serial port 1. The modem will be configured to stay in the data logger mode, which allows the storage of any data coming from the serial ports to be stored in its 6 MB flash memory. The data will be available for acoustic download by either a open ocean glider or a vessel modem. Also, using serial port 2, the modem will be able to transfer any commands received acoustically from a open ocean glider or a vessel modem to the sensor array controller. The controller will then, when finished with pre-scheduled tasks, store an acknowledgment of these commands inside the modem's memory. The open ocean glider or vessel modem will then be able to download these acknowledgments acoustically from the mooring modem to be used for verification.

3.2.3.2 Serial Port Communications

The subsea cable used to join the modem with the sensor array controller contains RxD, TxD, and ground connections for two RS-232 serial ports. Both serial ports will be configured to run at 9600 baud with 8-bit bytes, no parity, and one stop bit (9600-8-N-1). This configuration may be changed should it be deemed necessary, as the modem will support RS-232 baud rates up to 115200. See electrical interface specification for details on which pins to use for proper serial port connection.

The sensor array controller shall transmit collected data through serial port 1, and transmit any command status on serial port 2. This allows the different data types to be collected independently by the open ocean glider via acoustic communication. No flow control is needed if no more than 8196 bytes are transmitted at a time on a given serial port.

Any commands being transmitted to the sensor array modem from the open ocean glider will be output on serial port 2, where they will be processed by the sensor array controller.

3.2.3.3 Data Logger

The modem contains an internal data logger with a maximum capacity of about 6 MB of data (plus meta-data used for indexing and accessing purposes). The modem will be configured to run in "dual data logger" mode during deployment, allowing for the logging of data from both serial ports. Any characters received from the sensor array on either serial port will be placed in the modem's internal data logger. Prior to sending any byte, a check should be done by the sensor array controller to verify that there is no '+' (ASCII value 0x2B) in the data stream. If any '+' is found, it shall be escaped by sending a 'CAN' (ASCII value 0x18) followed by a 'k' character (ASCII value of the '+' character plus 0x40 equals 0x6B, ASCII value of the 'k' character). The data will then have to be translated back by the open ocean glider or the dockserver. The reason for this precaution is that if three '+' characters are received by the modem, it will leave the data logger mode to enter in the command mode, thus preventing the sensor array controller from storing the rest of its data into the modem memory. The data from the separate serial ports will be serialized before logging, even if received concurrently, and will be de-interleaved upon retrieval. Data from either serial port may be independently retrieved via acoustic communications, allowing priority to be given to command response or sensor data retrieval as is required.

The data logger will default to "flat" mode, meaning that once the logger has filled up it will stop logging data until it is cleared.

For more detail on the ATM-900 series enhanced data logger, please refer to Teledyne Benthos document M-270-26 Rev A: ATM-900 Series Users Manual, page 5-15, in the section entitled "Datalogger Mode."

3.2.4 Error Handling and Recovery

Does not apply to this interface.

3.2.5 Privacy and Security

In order to protect the integrity of the data saved in the modem's data logger, a password-protect mechanism is implemented on the acoustic command used to remotely erase the data logger. This will prevent another ATM-900 series modem owner from indiscriminately erasing the data collected from the OOI sensor array. Only data logger erasure requests containing the proper user-defined password will cause the data to be erased.

4 Note

5 Appendices