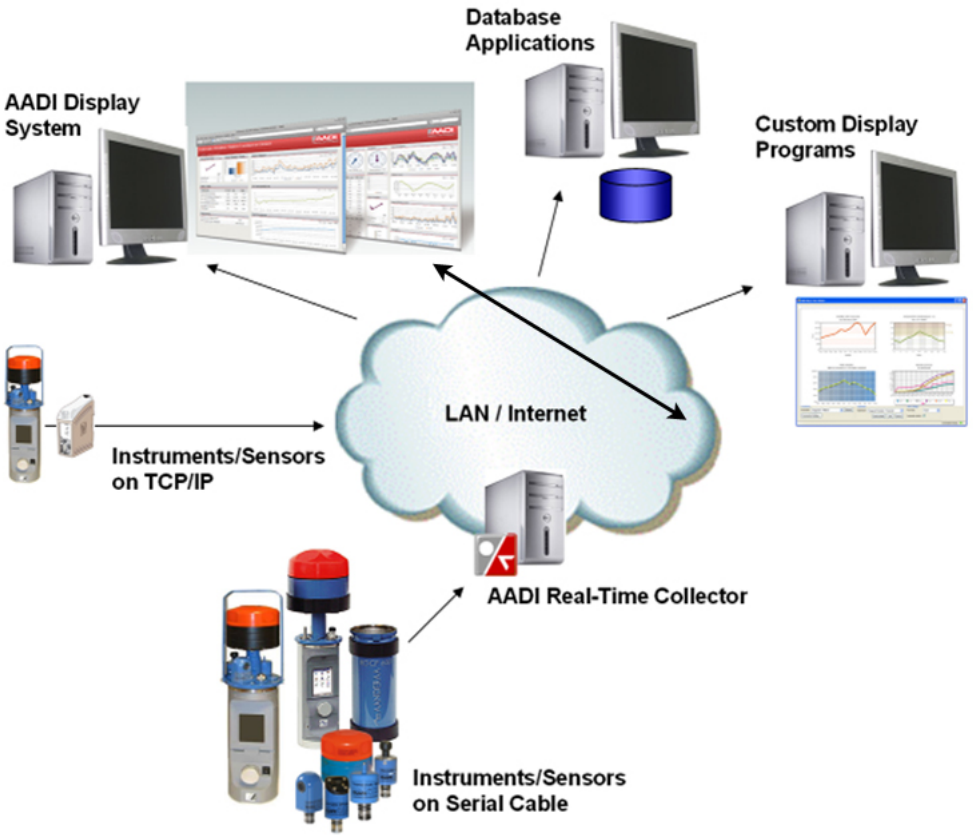
TD 271 AADI Real-Time Communication



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INTRODUCTION

Purpose and scope

The purpose of this document is to provide an overview of the AADI Real-Time Communication System, and to give a brief introduction to its different components.

Document Overview

CHAPTER 1 Gives a short introduction to the system.

CHAPTER 2 Describes how to connect an AADI SEAGUARD® instrument to a PC.

CHAPTER 3 Describes the AADI Real-Time Collector application.

CHAPTER 4 Describes the AADI Real-Time Output Protocol.

CHAPTER 5 Describes the AADI Real-Time Control Protocol.

Applicable Documents

TD262a SEAGUARD® Platform Operating Manual

TD267a AADI Real-Time Output Protocol

TD267b AADI Real-Time Output Protocol – Diagram View

TD268 AADI Real-Time Collector Users Manual

TD272 AADI Real-Time Control Protocol – Diagram View

TD278 AADI Real-Time Programming Reference

CHAPTER 1 The AADI Real-Time Communication System

The AADI Real-Time Communication System is designed to provide our customers and system integrators (and our own Engineering department) with powerful and efficient tools for data collection and control of our latest generation of oceanographic instruments.

The AADI Real-Time enabled devices like the SEAGUARD® Platform, and the AADI Smart sensors form the basis of this system. These devices may be configured to transmit data autonomously (non-polled mode). They may also respond to control commands for remote operation and configuration.

AADI Real-Time Collector is an application that must be installed on a PC that is to connect to the AADI Real-Time enabled devices. The AADI Real-Time Collector provides the necessary tools to connect to one or more devices, receive their transmitted data and by powerful interfaces and methods provide easy and efficient access to these data from higher level applications like display programs, databases etc. Refer to Figure 1-1 for an overview of the AADI Real-Time Communication System.

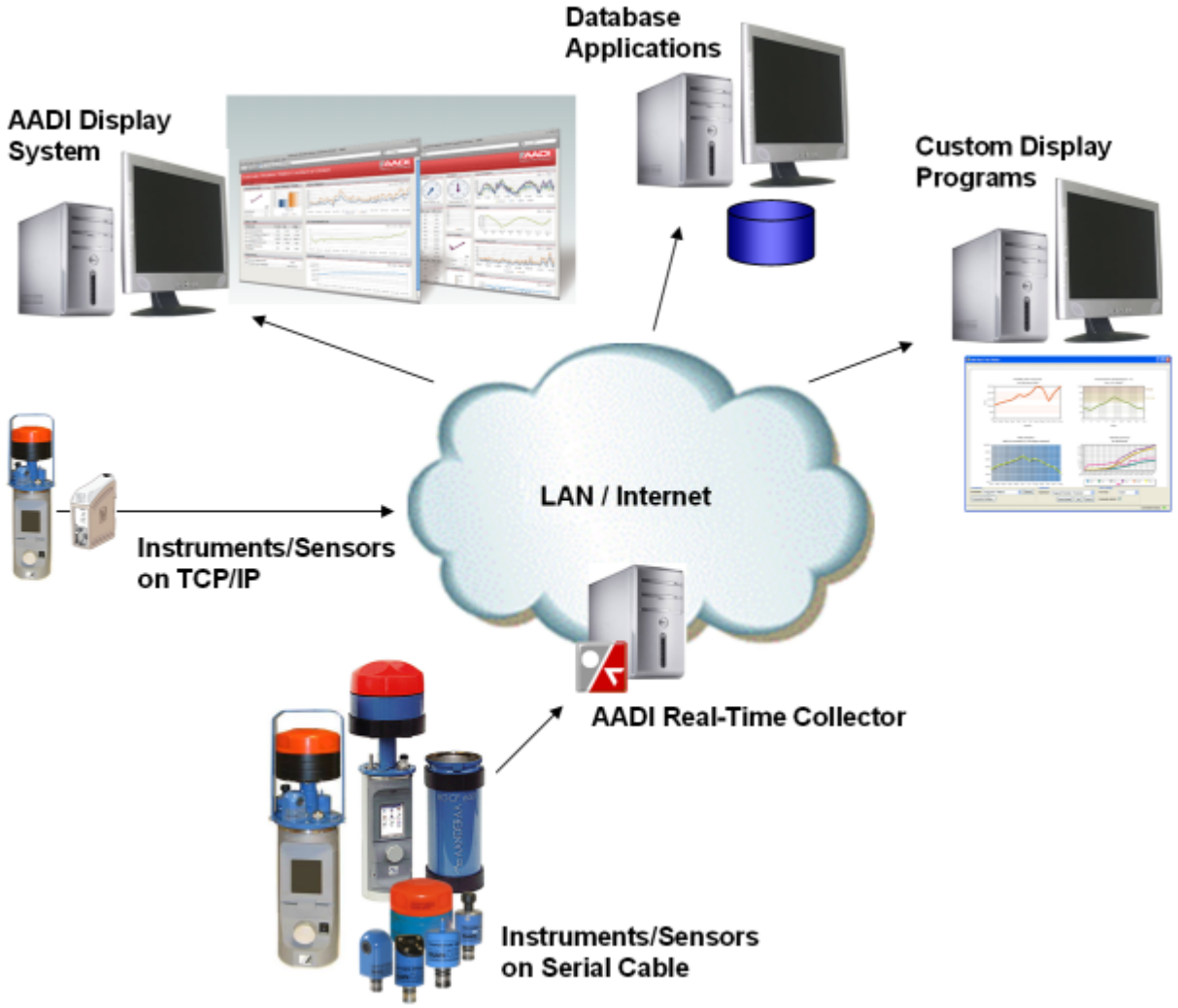


Figure 1-1 The AADI Real-Time Communication System.

The protocols that are used for communication and data transfer to and from the AADI Real-Time enabled devices are:

- The AADI Real-Time Output Protocol, which covers all messages sent *from* the device. This includes data messages, respones to control messages and notifications.

- The AADI Real-Time Control Protocol, which covers all messages sent *to* the device for remote control and configuration.

The AADI Real-Time System also includes some utilities and examples to provide users with Quick Start applications. These utilities may even in certain cases be sufficient in a simple system. However, they are provided as examples only and may not be maintained at the same level as the other modules.

The AADI Real-Time Communication System is further described in the following chapters of this document and in the referred applicable documents, refer page 4.

- CHAPTER 2 describes how to connect the AADI SEAGUARD® instrument to an RS422 port on a PC.

- CHAPTER 3 describes the AADI Real-Time Collector. This application provides the user with tools to set up any number of device connections, monitor the quality of the connections, receive incoming data, and operate and configure the device. AADI Real-Time Collector also provides a programming interface which enables other applications to retrieve data from any of the connected devices.

- CHAPTER 4 describes the AADI Real-Time Output Protocol used to transmit data from AADI devices in real-time. Messages are formatted using XML.

- CHAPTER 5 describes the AADI Real-Time Control Protocol used to send control messages to a connected device. As in the output protocol, all messages are XML-formatted.

CHAPTER 2 Connection between the AADI Real-Time device and a PC

The AADI Real-Time enabled device is connected to the PC using a serial port. Often, it will be a direct cable connection but it may also be a radio modem connection, a GPRS connection or other communication channels providing a point-to-point serial connection with a physical or virtual COM-port at the PC end and a physical serial port at the device end.

2.1 Connection between the SEAGUARD® Platform and a PC

The SEAGUARD® Platform output port is an RS422 serial port. The communication settings are given in Table 2-1.

Table 2-1 Communication settings.

Parameter	SEAGUARD® Platform Configuration Values	AADI Real-Time Collector Requirements:
Baud Rate	2400-115200	No requirements
Data Bits	7,8	8
Stop Bits	1, 1.5, 2	1
Parity	None, Even, Odd	None
Flow Control	None, Xon/Xoff	Xon/Xoff

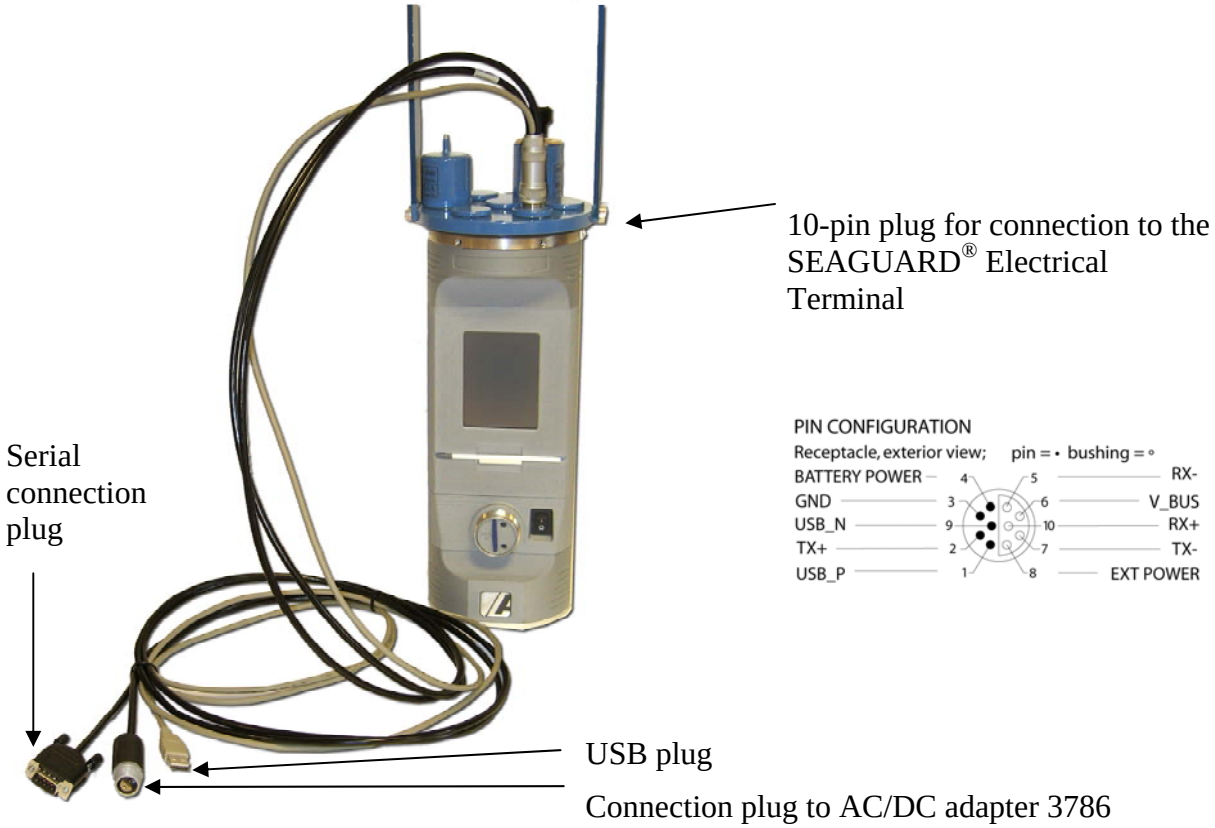


Figure 2-1 Cable 4573.

For a direct cable connection between the SEAGUARD® Platform and your PC, use AADI cable 4573 (Figure 2-1). If your PC does not come with a RS422 Port, you must install a RS422 to RS232 Converter between the standard cable and the PC.

Note! Some converters may require the RTS signal to be set from the computer to accept incoming data.

IMPORTANT! The maximum RS422 cable length depends on the cable properties and baudrate. 1000 m is the general recommended maximum length.

2.2 Connection between an AADI Smart Sensor and a PC

Future versions of AADI Smart Sensors will become AADI Real-Time enabled devices. Connection details will be described when the sensor are available.

CHAPTER 3 AADI Real-Time Collector

Note! Refer the AADI Real-Time Collector Users Manual, TD268, for a complete description of the application.

The AADI Real-Time Collector is a background application running on a PC. Its main task is to:

- Receive data from devices that uses the AADI Real-Time Output Protocol.
- Receive and convert data from devices that uses certain custom data formats.
- Provide an interface for client applications that utilize the data, e.g. a display program.

The application has dialogs for:

- Setting up a connection between the transmitting device and the receiver PC.
- Displaying status information for all of the defined connections.
- Controlling the device recorder.
- Changing the device configuration.

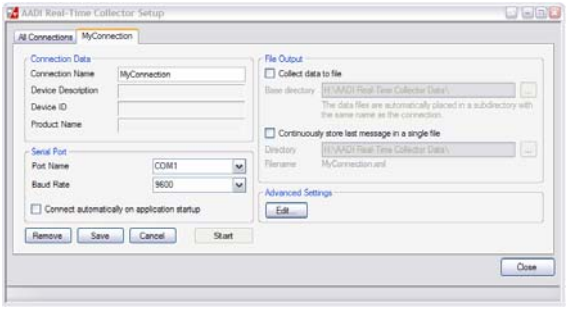
The AADI Real-Time Collector can:

- Receive data from multiple devices.
- Serve multiple client applications through the provided .NET programming interface.
- Store data to files.

The purpose of the AADI Real-Time Collector is not to display data. Display programs and other client applications must be arranged by the user. A couple of 'getting started' applications with source code are provided to show the application designer how to connect and obtain data from the AADI Real-Time Collector.

AADI Real-Time Collector basics

Connection setup and status dialogs



User application interfaces

AADI.Realtime.Collector.ClientInterface.dll

- *Methods to Subscribe to a device*
- *Interface for*
  - *Data*
  - *Device Control*
  - *Status info*
- *Methods for high level readout of data and other info from the device*

Device communication

AADI Real-Time Control Panel

The AADI Real-Time Control Panel allows a client to control the device Recorder and to change the device configuration remotely.

CHAPTER 4 Real-Time Output Protocol

The AADI Real-Time Output Protocol is used to transmit data from AADI devices in Real-Time.

The data messages from the device are framed to secure precise synchronisation. The frame includes a CRC16 value which provides integrity control. Refer to Appendix 1 in *TD 267a AADI Real-Time Output Protocol* for a detailed description of the frame format.

The data is delivered as an XML formatted message. XML is a markup language 'designed to describe data and to focus on what data is' (http://w3schools.com/xml/default.asp).

XML is an ASCII based format and as such human readable, although XML messages are generally read and interpreted by computer applications.

The precise definition of the message format is given by the XML schema file *RTOutSchema.xsd*, which is available for download on our web site www.aanderaa.no. Customers can register to get a user name and password necessary to gain access to e.g. user manuals, technical notes and software. Please contact info@aadi.no for guidance.

Modern development tools such as *Microsoft Visual Studio* or *Altova XML Spy* provide several ways for quick and easy access to data in XML format using the defining schema file.

4.1 Message Types

There are three main scenarios in which data can be received from a connected device, as explained below. The output from the device is always formatted using the AADI Real-Time Output Protocol, regardless of the content.

4.1.1 Non-polled data

A device can be set up to automatically transmit data recordings at regular intervals, i.e. non-polled mode. Each message contains all necessary information to identify the measured parameters and to be fully traceable down to every physical unit involved in the measurement.

The message content automatically adapts to the current configuration of the device.

4.1.2 Response to Control Messages

If the connected device supports it, the AADI Real-Time Control Protocol can be used to control a deployed device (refer TD272). This includes starting and stopping the recorder, and changing the device configuration. Any response from the device will be formatted using the AADI Real-Time Output Protocol, but will usually just contain relevant return values rather than recording data.

4.1.3 Notification Messages

A notification message is an asynchronous message sent by the device to notify about an event on the device. This notification message contains notification data, specifying the event that

triggered the message, but also associated data records, configuration and sensor information may be included.

CHAPTER 5 Real-Time Control Protocol

The AADI Real-Time Control Protocol is used to issue basic control messages to AADI devices in Real-Time.

The control messages to the device are framed in the same way as for the AADI Real-Time Output Protocol; refer Appendix 1 in TD267a.

The messages are XML formatted like the Output Protocol.

The precise definition of the control format is given by the XML schema file *RTControlSchema.xsd*, which is available for download on our web site www.aanderaa.no. Customers can register to get a user name and password necessary to gain access to e.g. user manuals, technical notes and software. Please contact info@aadi.no for guidance.

5.1 Control Message Types

There are two main scenarios in which a connected device is operated through the Control Protocol, refer chapter 5.1.1 and chapter 5.1.2.

5.1.1 Operating

A device can be controlled through a set of control commands. These include start and stop of the data recording. The command for stating the data recording may include arguments for the start time and the interval at which data are recorded and transmitted to the receiving system.

5.1.2 Reconfiguring

A device can be reconfigured through a set of control commands where the device setup is downloaded from the device for modification and subsequent uploaded to activate the new settings.