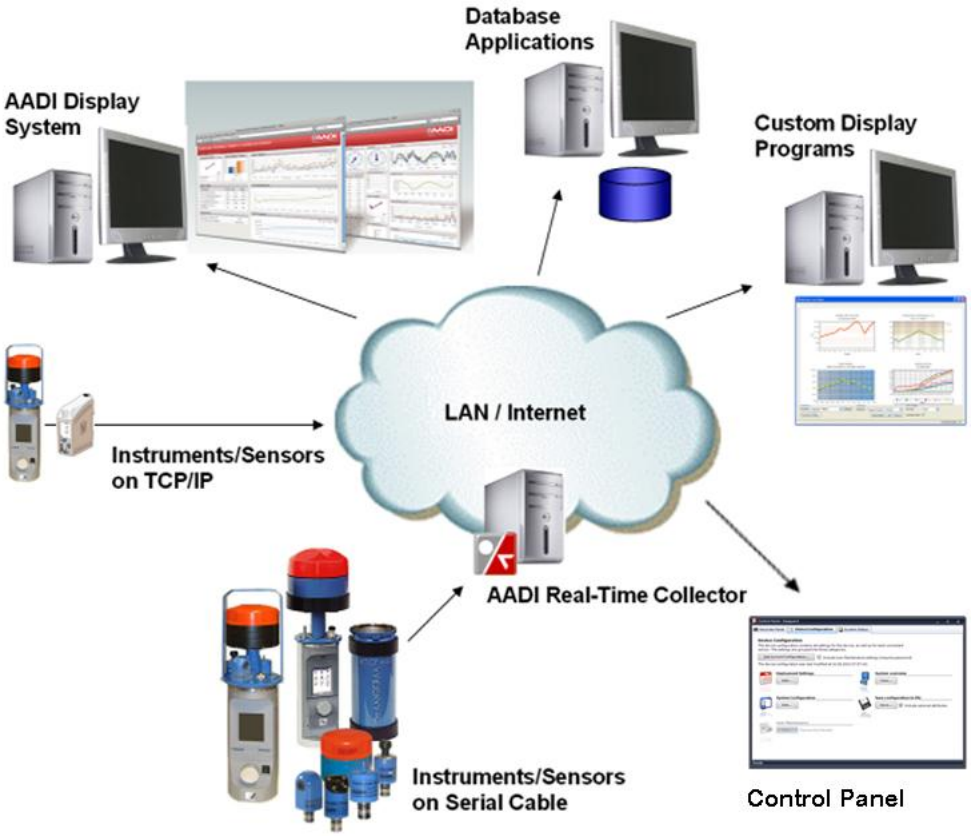
TD 271 AADI Real-Time Communication



AANDERAA DATA INSTRUMENTS

1st Edition 21 February 2008
2nd Edition 13 May 2008
3rd Edition 6 June 2008
4th Edition 15 January 2009
5th Edition 18 May 2010
6th Edition 21 November 2011

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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.

Related Documents

TD262a SEAGUARD® Platform Operating Manual

TD267a AADI Real-Time Output Protocol

TD268 AADI Real-Time Collector User's Manual

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.

The AADI Real-Time Collector is a PC application which connects to Real-Time enabled devices. It provides the necessary tools to connect to one or more devices, receive 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.

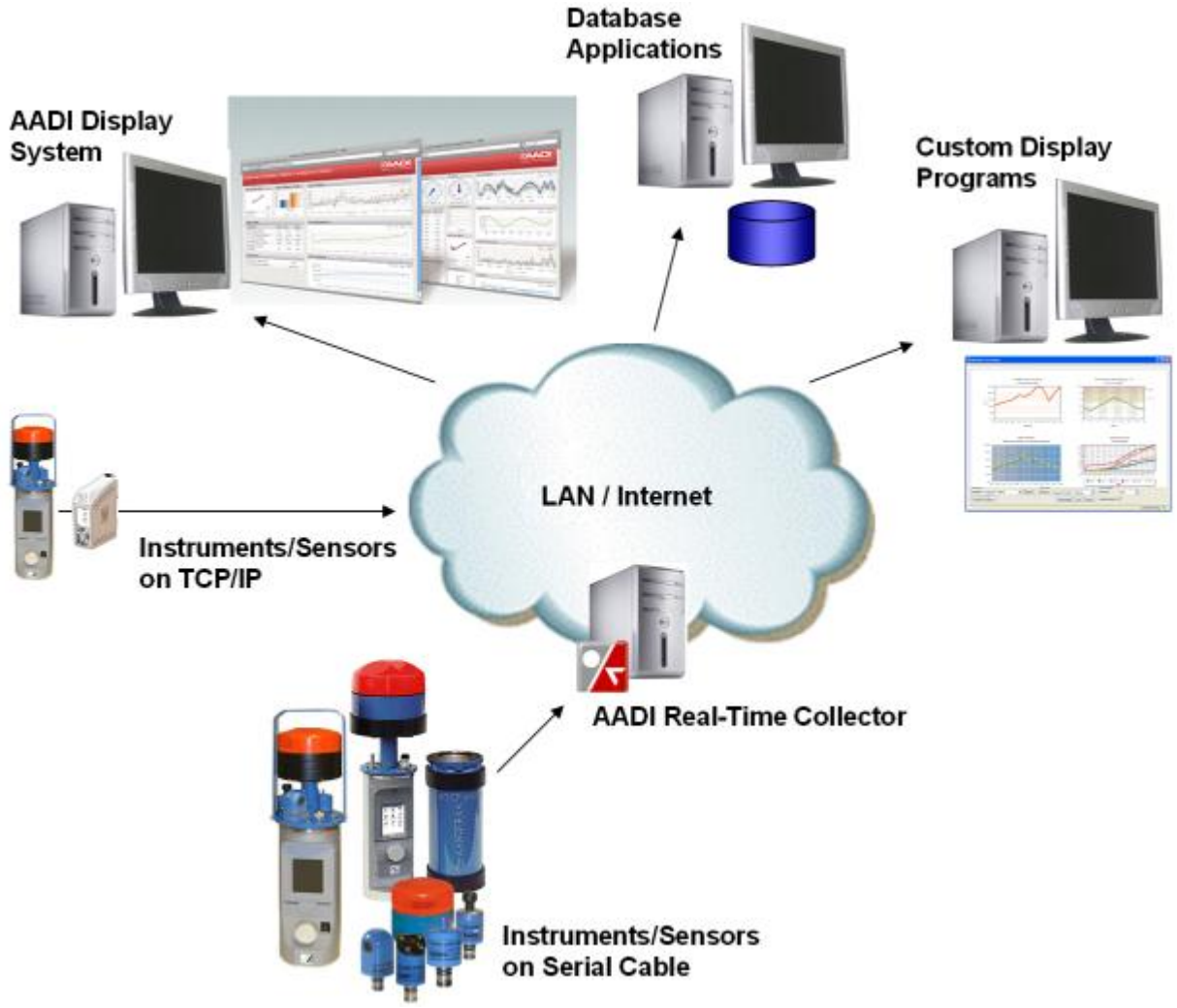

Figure 1-1 The AADI Real-Time Communication System.

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, responses 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 Communication System is further described in the following chapters of this document and in the referred related documents (page 4).

- **Error! Reference source not found.** describes how to connect a Real-Time enabled device to 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 and to a limited extent display incoming data as well as 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 Device connections

The AADI Real-Time enabled devices connect to a PC using a serial port, Ethernet or USB. 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 SEAGUARD® Platform and a PC

The SEAGUARD® Platform output port is an RS422 serial port. AADI provides serial cables for a variety of applications. Baud rates in the range from 2400 to 115 200 can be used. Xon/Xoff flow control is required.

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

2.2 Connection between AADI Smart Sensors and a PC

All AADI Smart Sensors may be connected to the Real-Time Collector. Data collection is available for all, seamless for new versions or through predefined “custom formats” when Real-Time Output protocol is not implemented. In order to do setup and control from the Real-Time Control Panel sensors with firmware supporting the Real-Time protocols are needed. Multiple sensors may be connected. One port is required for each sensor.

AADI Smart sensors uses 9600 baud and Xon/Xoff handshake.

AADI Smart Sensor R versions provides output on a RS422 serial port. Non-R versions have RS232 port. Recommended maximum length for RS422 is 1000m and 15 m for RS232.

2.3 Connection between an AADI SMARTGUARD and a PC

The new AADI SMARTGUARD connects to a PC through a serial port, USB or Ethernet. The SMARTGUARD is fully compliant with the Real-Time protocols both for data transfer and remote setup and control.

CHAPTER 3 AADI Real-Time Collector

Please refer to the AADI Real-Time Collector User's Manual, TD268, for a complete description of the application.

The main objectives of the AADI Real-Time Collector are 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.
- Configure and control connected devices.
- Provide an interface for client applications that utilize the data, e.g. a display program.

The AADI Real-Time Collector can:

- Receive data from multiple devices.
- Serve multiple client applications on any platform through the WCF service.
- Store data to files.
- Display data in a basic chart view.

The main purpose of the AADI Real-Time Collector is not to display data, although a basic chart view is included in the application.

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.

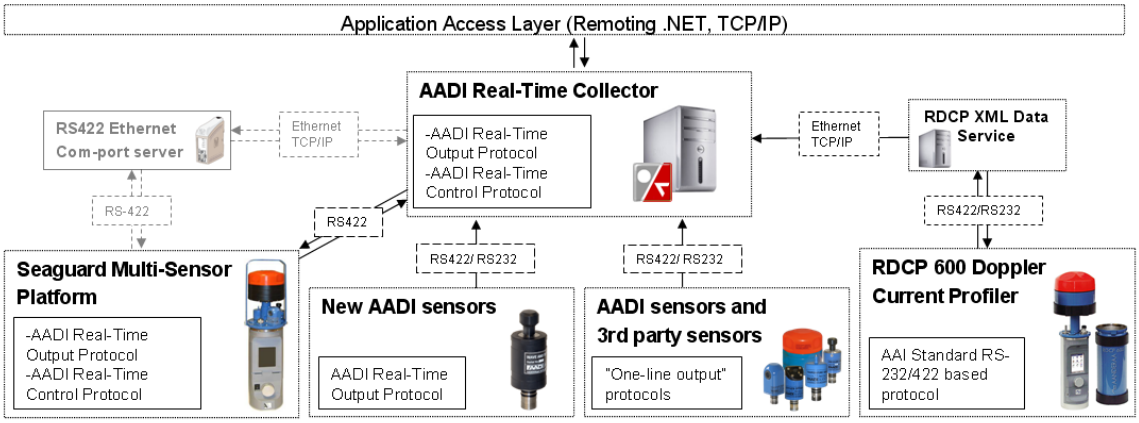

Figure 3-1 The AADI Real-Time Collector system overview.

The AADI Real-Time Control Panel allows a client to control the device Recorder and to change the device configuration remotely. The application connects to the device (sensor or instrument) utilizing the Application Access Layer provided by the Real-Time Collector. The AADI Display System also uses the same interface as may a variety of customer applications too.

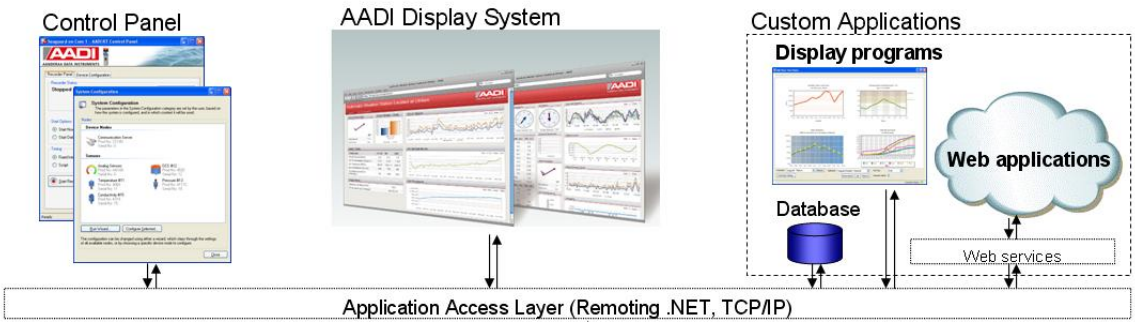

Figure 3-2 AADI Real-Time user applications.

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 checksum value which provides integrity control. Refer to **Error! Reference source not found.** and **Error! Reference source not found.** 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 human readable although XML messages are generally read and interpreted by computer applications.

The precise definition of the protocol is given by the XML schema file *RTOutSchema.xsd*, which is available for download on www.aadi.no. Customers can register to get a user name and password required to gain access to manuals, technical notes and software. Please contact aadi.info@xyleminc.com 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.

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.

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.

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 to TD267a for details).

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 www.aadi.no. Customers can register to get a user name and password necessary to gain access to user manuals, technical notes and software. Please contact aadi.info@xyleminc.com for guidance.

5.1 Control Message Types

There are two main scenarios in which a connected device is operated through the Control Protocol.

Operation

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.

Configuration

A device can be configured 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.