

# Remote Control Protocol

## IsoLOG 3D Array



## Version 1.1

## Introduction

This document is extending the basic Aaronia Remote Control Protocol (short ARCP) specification with specifics regarding the Aaronia IsoLOG 3D Array antenna (from now on just references as „the antenna“ or „the IsoLOG“).

## Scope

Only antennas conforming to the ARCP specifications are covered here. It should be noted that older revisions of the IsoLOG antennas used different control and/or discovery protocols that are not compatible with the ARCP specification. In particular some models conform to parts of the discovery specification while using a different control protocol. Please see the discovery section of the basic ARCP specification regarding details.

## Communication Parameters / Authentication

Antennas conforming to version 1.1 of this specification will use unencrypted HTTP with no authentication.



## Overview

The core of the IsoLOG consists of several rings of antennas. Each ring can be of a different antenna type and/or use a different orientation to catch different signals. The IsoLOG can only have a single individual antenna active at a time, however it can switch between them very fast. The number of available radial sectors is specified in the <sectors> tag in the <configuration> part of the „info“ endpoint, and the current active sector can be accessed by the generic „sector“ variable. The different rings are specified in the <elements> tag of the <configuration> part and can be accessed by the generic „element“ variable.

To improve signal quality the IsoLOG can contain multiple signal filter and amplifier elements described in the <filters> and <amplifiers> tags in the configuration section. They are controlled by the corresponding „filter“ and „amplifier“ variables.

The IsoLOG may further contain additional sensors outside the signal path for identification and monitoring of the device, like a GPS receiver or compass for location or temperature and humidity sensors. These are defined in the <extradata> section and their values can be accessed over the individual <data> elements.

Please see the following sections for syntactic and semantic details.



## Endpoints

IsoLOG antennas extend the basic „info“ and „state“ endpoints with additional fields, and define new endpoints „batch“ and „firmware“.

### *info*

The following fields are changed from the default specification:

#### <versions>

parent: device  
attributes: none  
text content: none  
child elements: firmware (1), controlboard (1), hfboard (1)

#### <configuration>

parent: device  
attributes: none  
text content: none  
child elements: sectors (1), elements (1), settings (1), filters (1), amplifiers(1), extradata (1)

#### <status>

parent: device  
attributes: none  
text content: none  
child elements: value (2-N), data (0-N)

#### <value>

parent: settings  
attributes:  
– existing attributes from basic specification

The following fields are defined in addition to the default specification:

### <controlboard>

parent: versions  
attributes: none  
text content: version string (typically YYYYMMDD)  
child elements: none

### <hfboard>

parent: versions  
attributes: none  
text content: version string (typically YYYYMMDD)  
child elements: none

### <sectors>

parent: configuration  
attributes: none  
text content: number of radial sectors (usually in range 4 to 16)  
child elements: none

### <elements>

parent: configuration  
attributes: none  
text content: none  
child elements: group (1-N)

### <filters>

parent: configuration  
attributes: none  
text content: none  
child elements: item (1-N)

### <amplifiers>

parent: configuration  
attributes: none  
text content: none  
child elements: item (1-N)



### <chopper>

parent: configuration  
attributes: none  
text content: none  
child elements: item

### <extradata>

parent: configuration  
attributes: none  
text content: none  
child elements: data (0-N)

### <group>

parent: elements  
attributes:

- id: numeric value that is unique inside the parent element to reference this element group. If this attribute is missing the element should be ignored by applications.
- pos: numeric value that is unique inside the parent element to specify the absolute position of this element group for visualization purposes
- type: one of „logper“, „loop“ or „special“
- orientation (optional): one of „vertical“ or „horizontal“
- angle (optional): numeric value between -90 and 90
- disabled (optional): semicolon separated list of sector-numbers that are not available in this element group. The list may contain ranges, e.g. „1-4;7-9“

text content: user-visible element description

child elements: port (0-N) (only for type=“special“)

### <item>

parent: filters, amplifiers

attributes:

- min\_freq: minimum frequency that is processed by this element
- max\_freq: maximum frequency that is processed by this element
- max\_gain: maximum gain (or loss if negative) in signal power of this element
- name: unique identifier used in the „filter“ or „amplifier“ variable values

text content: user visible element description

child elements: none

### <item>

parent: chopper

attributes:

- name: unique identifier used in the „automode“ and „startmode“ variable values

text content: user visible element description

child elements: none

### <data>

parent: extradata

attributes:

- id: numeric value that is unique inside the parent element to reference this data element. If this attribute is missing the element should be ignored by applications.
- class: value class that is reported by this sensor, e.g. „temperature“ or „location“
- unit: describes the measurement unit for data of this data element, e.g. „celsius“, „dbm“ or „degree“ (see section „Sensors“)

text content: user-visible data element description

child elements: none

### <data>

parent: status

attributes:

- id: value of the id attribute of the corresponding configuration <data>

text content: string that should be parsed according to corresponding fields attribute in configuration

child elements: none

### <port>

parent: group

attributes:

- type: identifier to describe what this port is used for

text content: user-visible description of this port

child elements: none



### **state**

The state endpoint includes the following tags: value and data



### Variables

This section contains a list of currently specified variable names and their semantics. Note that individual antennas may miss certain variables specified here, or support additional variables, so you should only attempt to use those variables that are present in the device configuration description.

#### **sector**

Type: integer

Contains the numeric value of the currently selected sector, starting at 0 which typically represents north. The maximum value is specified by the <sectors> element in the configuration description as well as the „max“ attribute.

#### **element**

Type: integer

Contains the numeric identity of the currently selected element group, referring to the „id“ attribute of the selected <group> element.

#### **filter**

Type: select

Specifies the currently active filter configuration.

#### **amplifier**

Type: select

Specifies the currently active amplifier configuration.

#### **automode**

Type: select

The IsoLOG antenna can support different modes for automatic switching of sector and element groups. The possible values are listed in the „values“ attribute. Note that when using this setting the device state may change without specific request and data returned on requests may not reflect the actual device state (as switches may occur in extremely short timeframes).





### ***autotime***

Type: int

Specifies the time interval in microseconds for switching antennas if „automode“ is set to „custom“.

It has no effect when using other modes.

### ***startmode***

Type: select (hidden)

Specifies in which mode the antenna should start when it is powered on. Available values are generally identical to the „automode“ variable.

### ***silent***

Type: bool

This setting can disable the integrated control LEDs of the IsoLog antenna so it is less likely to be detected.



## Sensors

An IsoLOG 3D antenna may contain extra sensors that are not directly linked to the signal path, so their values can be read over this interface. This section is only a rough overview about possible options and how they might appear in the <extradata> section.

### GPS

Unit: nmea\_rmc, nmea\_gga

Class: location

A included GPS receiver might provide information about the general area where the antenna is located, including but not limited to latitude, longitude and elevation. Data is transmitted using the standard NMEA0183 format with the RMC and GGA sentences as default. Future version may support additional sentences as well.

### Humidity

Unit: rel\_percent

Class: humidity

To ensure the antenna is working properly in outdoor environments the humidity inside the antenna is reported and should stay within the limits specified in the datasheet.

### Temperature

Unit: celsius

Class: temperature

Optional Temperature sensors reporting internal and/or external temperature.

### Compass

Unit: degree

Class: orientation

Optional magnetic compass reporting the orientation of sector 0 (warning: subject to internal magnetic interference).



## Examples

Note: The following examples are only to provide a reference for the syntax, the actual content may differ significantly from real-world devices.

### *Info Endpoint GET reply*

```
<device>
<info>
<model>IsoLOG 3D Array 64 6 GHz</model>
<serial>98146</serial>
</info>

<versions>
<firmware>20170516</firmware>
<controlboard>20170423</controlboard>
<hfboard>20170322</hfboard>
<filterboard>20180111</filterboard>
<gpsboard>20190712</gpsboard>
</versions>

<configuration>
<sectors>16</sectors>

<elements>
<group id="1" pos="0" type="logger" orientation="vertical" angle="45">
HF Antenna 45
</group>
<group id="0" pos="1" type="logger" orientation="vertical" angle="0">
HF Antenna 0
```



```
</group>

<group id="3" pos="2" type="logper" orientation="horizontal" angle="45"
disabled="1;3;5;7;9;11;13;15">

HF Antenna Horizontal

</group>

<group id="4" pos="3" type="loop">

Loop Antenna

</group>

</elements>

<settings>

<value id="0" var="sector" type="int" min="0" max="15">

Sector

</value>

<value id="1" var="element" type="int" min="0" max="3">

Element

</value>

<value id="2" var="automode" type="select" values="off;all">

Autorotation

</value>

<value id="3" var="startmode" hide="1" type="select" values="off;all">

Autorotation Mode at Startup

</value>

<value id="4" var="filter" type="select" values="none;filter2.4;filter5.8">

Filter Configuration

</value>

<value id="5" var="amplifiers" type="text">

Active Amplifiers

</value>

</settings>
```

# Remote Control Protocol

## IsoLOG 3D Array



```
<filters>
<item min_freq="2300" max_freq="2600" name="filter2.4">2.4 Ghz Filter</item>
<item min_freq="5300" max_freq="5900" name="filter5.8">5.8 Ghz Filter</item>
</filters>

<amplifiers>
<item min_freq="0" max_freq="6000" max_gain="20" name="amp6_1">Preamplifier 6 Ghz Stage 1</item>
<item min_freq="0" max_freq="6000" max_gain="40" name="amp6_2">Preamplifier 6 Ghz Stage 2</item>
<item min_freq="10000" max_freq="20000" max_gain="20" name="amp20_1">Preamplifier 20 GHz Stage 1</item>
<item min_freq="10000" max_freq="20000" max_gain="40" name="amp20_2">Preamplifier 20 GHz Stage 2</item>
</amplifiers>

<extradata>
<data id="0" class="location" unit="nmea_rmc">
GPS Receiver NMEA RMC
</data>
<data id="1" class="location" unit="nmea_gga">
GPS Receiver NMEA GGA
</data>
<data id="3" class="temperature" unit="celsius">
Device Temperature
</data>
<data id="4" class="temperature" unit="celsius">
Outside Temperature
</data>
</extradata>
```



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```
</configuration>

<status>
<value id="0">7</value>
<value id="1">4</value>
<value id="2">none</value>
<value id="3">amp6_2; amp20_2</value>
<value id="4">off</value>
<value id="5">off</value>
<data id="0">$GPRMC,103319.0,A,3534.76,N,13924.49,E,25.1,125.4,090617,, ,A*5C
</data>
<data id="1">$GPGGA,103319.0,3534.76,N,13924.49,E,1,10,1.01,116.2,M,39.3,M,,*6D
</data>
<data id="2">10.2</data>
<data id="3">20.6</data>
<data id="4">10.8</data>
<data id="5">-22.5</data>
</status>

</device>
```

