

# IEEE 1451.0 HTTP Command-response specifications

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Proposed by NIST

**HTTP command-response pairs are described as follows (use MBARI parameters as examples):**

For sting types, we use "UNKNOWN" for something you do not know and "NONE" for something does not exist. For number types, we use "-9999" for something you do not know.

We use "<CRLF>" to represent CR/LF.

Each parameter is separated by "<CRLF>" and each element in an array is separated by ",".

We use port 1451.

## 1) TIM discovery request:

**http://<host>:<port>/<path>?<parameters>**

**<host>:** "xxx.xx.x.xx" host IPAddress

**<port>:** 1451

**<path>:** 1451/Discovery/TIMDiscovery /TIMDiscovery

**<parameters>:**

- **UInt16 ncapId**
- **\_String responseFormat: (text)**

**HTTP methods:** "GET"

**HTTPRequest: (URLConnection)**

**<http://xxx.xx.x.xx:1451/1451/Discovery/TIMDiscovery?ncapId=1&responseFormat=text>**

**HTTPResponse (text):**

- **UInt16 errorCode**
- **UInt16 ncapId**
- **UInt16Array timIds**

**For example:**

**<http://oidemo.mbari.org:1451/1451/Discovery/TIMDiscovery?ncapId=1&responseFormat=text>**

HTTP response:

1<CRLF>1<CRLF>1,2,3,4<CRLF>

## 2) TIM transducer discovery request:

http://<host>:<port>/<path>?<parameters>

<host>: "xxx.xx.x.xx" host IPAddress

<port>: 1451

<path>: IEEE1451/Discovery/TransducerDiscovery

<parameters>:

- UInt16 ncapId
- UInt16 timId : (1)
- \_String responseFormat: (text)

HTTP methods: "GET"

HTTPRequest:

<http://xxx.xx.x.xx:1451/1451/Discovery/TransducerDiscovery?ncapId=1&timId=1&responseFormat=text>

HTTPResponse:

- UInt16 errorCode
- UInt16 ncapId
- UInt16 timId
- UInt16 numberOfTIMs
- UInt16Array channelIds
- StringArray transducerNames ( **each URI for each transducer**)

example:

http://oidemo.mbari.org:1451/1451/Discovery/TransducerDiscovery?ncapId=1&timId=4&responseFormat=text

HTTP response:

0<CRLF>1<CRLF>4<CRLF>3<CRLF>1,2,3<CRLF>"URI1...", "URI2...", "URI3..."<CRLF>

## 3) TIM Meta ID TEDS request:

http://<host>:<port>/<path>?<parameters>

<host>: "xxx.xx.x.xx" host IPAddress

<port>: 1451

<path>: IEEE1451/TEDSManager/ReadTeds

<parameters>:

- UInt16 ncapId
- UInt16 timId: (1)
- UInt16 channelId: (0)- TIM itself
- TimeDuration timeout: (sec=1, nsec=1)
- UInt8 tedsType: (2) -TIMMetaIDTEDS
- \_String responseFormat: (text)
- **HTTP methods: "GET"**

**HTTPRequest: (URLConnection)**

<http://xxx.xx.x.xx:1451/1451/TEDSManager/ReadTeds?ncapId=1&timId=1&channelId=0&sec=1&nsec=1&tedsType=2&responseFormat=text>

**HTTPResponse:**

- UInt16 errorCode
- UInt16 ncapId
- UInt16 timId
- UInt16 channelId
- UInt8 tedsType
- StringArray timMetaIDteds

Example:

http://oidemo.mbari.org:1451/1451/TEDSManager/ReadTeds?ncapId=1&timId=4&channelId=0&timeoutSec=10&timeoutNsec=0&tedsType=2&responseFormat=text

HTTP response:

1<CRLF>1<CRLF>4<CRLF>0<CRLF>2<CRLF>"Seabird Electronics","SBE37-SM","UNKNOWN","2765","October 22, 2008",3,"NONE","Seabird CTD"<CRLF>

#### 4) TIM Geolocation TEDS request:

```
htt http://<host>:<port>/<path>?<parameters>
<host>: "xxx.xx.x.xx" host IPAddress
<port>: 1451
<path>: IEEE1451/TEDSManager/ReadTeds/ReadTeds
<parameters>:
  • UInt16 ncapId
  • UInt16 timId: (1)
  • UInt16 channelId: (0)- TIM itself
  • TimeDuration timeout: (sec=1, nsec=1)
  • UInt8 tedsType: (14) -TIMGeoLocationTEDS
  • _String responseFormat: (text)
HTTP methods: "GET"
```

HTTPRequest: (URLConnection)

<http://xxx.x.xx.xx:1451/1451/ReadTeds?ncapId=1&timId=1&channelId=0&timeoutSec=1&timeoutNsec=1&tedsType=14&responseFormat=text>

HTTPResponse:

- UInt16 errorCode
- UInt16 ncapId
- UInt16 timId
- UInt16 channelId
- UInt8 tedsType
- StringArray timGeoLocationTeds (x, y, z) **Note: Longitude, Latitude, Altitude**

example:

```
http://oidemo.mbari.org:1451/1451/TEDSManager/
ReadTeds?ncapId=1&timId=4&channelId=0&timeoutSec=10&timeoutNsec=0&tedsType=14&responseFormat=text
```

HTTP response: (the last three parameters are  
1<CRLF>1<CRLF>4<CRLF>0<CRLF>14<CRLF>-108.0,36.5,10.0<CRLF>

#### 5) Read transducer data request:

```
http://<host>:<port>/<path>?<parameters>
  • <host>: "xxx.xx.x.xx" host IPAddress
```

- **<port>: 1451**
- **<path>: 1451/TransducerAccess/ReadData**
- **<parameters>:**
  - UInt16 ncapId (1)
  - UInt16 timId: (1)
  - UInt16 channelId: (1)
  - TimeDuration timeout: (sec=1, nsec=1)
  - UInt8 SamplingMode: (5) - immediate
  - \_String responseFormat: (text)
- **HTTP methods: "GET"**

**HTTPRequest: (URLConnection)**

<http://xxx.xx.x.xx:1451/1451/TransducerAccess/ReadData?ncapId=1&timId=1&channelId=1&sec=1&nsec=1&samplingMode=5&responseFormat=text>

**HTTPResponse:**

- **UInt16 errorCode**
- **UInt16 ncapId**
- **UInt16 timId**
- **UInt16 channelId**
- **StringArray transducerData (seconds,nanoSecond,value)**

**Example:**

http://oidemo.mbari.org:1451/1451/TransducerAccess/ReadData?ncapId=1&timId=4&channelId=1&timeoutSec=10&timeoutNsec=0&samplingMode=5&responseFormat=text

HTTP response:

1<CRLF>1<CRLF>4<CRLF>1<CRLF>"seconds","nanoseconds","28.90"<CRLF>

For timestamp, IEEE 1451.0 defines it as follow:

```
struct TimeRepresentation {
  UInt32 secs;
  UInt32 nsecs;
};
```

**Demo Additional Specification:**

**Proposed by NIST**

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## 1) IEEE 1451.0 HTTP interface

### (1) TIM ManufacturerDefinedTEDS request:

http://<host>:<port>/<path>?<parameters>

<host>: "xxx.xx.x.xx" host IPAddress

<port>: 1451

<path>: IEEE1451/TEDSManager/ReadTeds/ReadTeds

<parameters>:

- UInt16 ncapId
- UInt16 timId: (1)
- UInt16 channelId: (0)- TIM itself
- TimeDuration timeout: (sec=10, nsec=0)
- UInt8 tedsType: (16) - ManufacturerDefinedTEDS
- \_String responseFormat: (text)

HTTP methods: "GET"

HTTPRequest: (URLConnection)

<http://xxx.x.xx.xx::1451/1451/ReadTeds?ncapId=1&timId=1&channelId=0&timeoutSec=10&timeoutNsec=0&tedsType=16&responseFormat=text>

HTTPResponse:

- UInt16 errorCode
- UInt16 ncapId
- UInt16 timId
- UInt16 channelId
- UInt8 tedsType
- **ArgumentArray** manufacturerDefinedTEDS

example:

http://oidemo.mbari.org:1451/1451/TEDSManager/

ReadTeds?ncapId=1&timId=4&channelId=0&timeoutSec=10&timeoutNsec=0&tedsType=16&responseFormat=text

HTTP response: (the last three parameters are

0<CRLF>1<CRLF>4<CRLF>0<CRLF>16<CRLF>xxx,xxx,...,xxx<CRLF>

## (2) ChannelIDTEDS request:

http://<host>:<port>/<path>?<parameters>

<host>: "xxx.xx.x.xx" host IPAddress

<port>: 1451

<path>: IEEE1451/TEDSManager/ReadTeds

<parameters>:

- UInt16 ncapId
- UInt16 timId: (1)
- UInt16 channelId: (1,2,...)- channel No.
- TimeDuration timeout: (sec=10, nsec=0)
- UInt8 tedsType: (4) -ChannelIDTEDS
- \_String responseFormat: (text)
- HTTP methods: "GET"

HTTPRequest: (URLConnection)

http://xxx.xx.x.xx:1451/1451/TEDSManager/ReadTeds?ncapId=1&timId=1&channelId=1&sec=10&nsec=0&tedsType=4&responseFormat=text

HTTPResponse:

- UInt16 errorCode
- UInt16 ncapId
- UInt16 timId
- UInt16 channelId
- UInt8 tedsType
- ArgumentArray channelIDteds

Example:

http://oidemo.mbari.org:1451/1451/TEDSManager/ReadTeds?ncapId=1&timId=4&channelId=1&timeoutSec=10&timeoutNsec=0&tedsType=4&responseFormat=text

HTTP response:

0<CRLF>1<CRLF>4<CRLF>1<CRLF>4<CRLF>"Seabird Electronics", "SBE37-SM", "UNKNOWN", "2765", "Seabird CTD"<CRLF>

## 2) STWS Interface

### (1) ReadManufacturerDefinedTEDS (ReadTimManufacturerDefinedTedsRequest, ReadTimManufacturerDefinedTedsResponse)

```
<operation name="ReadTimManufacturerDefinedTeds">
  <input message="stml:ReadTimManufacturerDefinedTedsRequest"/>
  <output message="stml:ReadTimManufacturerDefinedTedsResponse"/>
</operation>

<message name="ReadTimManufacturerDefinedTedsRequest">
  <part name="requestParameters" element="stml:ReadTimManufacturerDefinedTedsServiceRequest"/>
</message>

<message name="ReadTimManufacturerDefinedTedsResponse">
  <part name="responseParameters" element="stml:ReadTimManufacturerDefinedTedsServiceResponse"/>
</message>

<xs:complexType name="ReadTimManufacturerDefinedTedsServiceRequestType">
  <xs:sequence>
    <xs:element name="timId" type="stml:UInt16"/>
    <xs:element name="transducerId" type="stml:UInt16"/>
    <xs:element name="timeout" type="stml:TimeDurationType"/>
    <xs:element name="tedsType" type="stml:UInt8"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="ReadTimManufacturerDefinedTedsServiceResponseType">
  <xs:sequence>
    <xs:element name="timId" type="stml:UInt16"/>
    <xs:element name="transducerId" type="stml:UInt16"/>
    <xs:element name="tedsType" type="stml:UInt8"/>
    <xs:element name="teds" type="stml:ManufacturerDefinedTedsDataBlockType"/>
  </xs:sequence>
</xs:complexType>
```

The XML schema of IEEE 1451 ManufacturerDefinedTeds is defined in the following:

```
<xs:complexType name="ManufacturerDefinedTedsDataBlockType">
  <xs:sequence>
    <xs:element name="IndividualName" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="OrganizationName" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="PositionName" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="Voice" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="Facsimile" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="DeliveryPoint" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="City" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="AdministrativeArea" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="PostalCode" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="Country" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="ElectronicMailAddress" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="OnlineResource" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="HoursOfService" type="stml:String" minOccurs="0" maxOccurs="255"/>
    <xs:element name="ContactInstructions" type="stml:String" minOccurs="0" maxOccurs="255"/>
  </xs:sequence>
</xs:complexType>
```

## (2) ReadChannelIDTEDS (ReadChannelIDTedsRequest, ReadChannelIDTedsResponse)

```
<operation name="ReadChannelIDTeds">
  <input message="stml:ReadChannelIDTedsRequest"/>
  <output message="stml:ReadChannelIDTedsResponse"/>
</operation>

<message name="ReadChannelIDTedsRequest">
  <part name="requestParameters" element="stml:ReadChannelIDTedsServiceRequest"/>
</message>

<message name="ReadChannelIDTedsResponse">
  <part name="responseParameters" element="stml:ReadChannelIDTedsServiceResponse"/>
</message>

<xs:complexType name="ReadChannelIDTedsServiceRequestType">
  <xs:sequence>
    <xs:element name="ncapId" type="stml:UInt16"/>
    <xs:element name="timId" type="stml:UInt16"/>
  </xs:sequence>
</xs:complexType>
```

```
        <xs:element name="channelId" type="stml:UInt16"/>
        <xs:element name="timeout" type="stml:TimeDurationType"/>
        <xs:element name="tedsType" type="stml:UInt8"/>
    </xs:sequence>
</xs:complexType>

<xs:complexType name="ReadChannelIDTedsServiceResponseType">
    <xs:sequence>
        <xs:element name="ncapId" type="stml:UInt16"/>
        <xs:element name="timId" type="stml:UInt16"/>
        <xs:element name="channelId" type="stml:UInt16"/>
        <xs:element name="tedsType" type="stml:UInt8"/>
        <xs:element name="teds" type="stml:ChannelIDTedsDataBlockType"/>
    </xs:sequence>
</xs:complexType>

<xs:complexType name="ChannelIDTedsDataBlockType">
    <xs:sequence>
        <xs:element name="ManufacturerId" type="stml:_String" minOccurs="0" maxOccurs="255"/>
        <xs:element name="ModelNo" type="stml:_String" minOccurs="0" maxOccurs="255"/>
        <xs:element name="VersionCode" type="stml:_String" minOccurs="0" maxOccurs="255"/>
        <xs:element name="SerialNo" type="stml:_String" minOccurs="0" maxOccurs="255"/>
        <xs:element name="ChannelDescription" type="stml:_String" minOccurs="0" maxOccurs="65535"/>
    </xs:sequence>
</xs:complexType>
```