Client-Server Communication Model

Between sensor and base station

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Contents

[Packet format 3](#_Toc118918879)

[Packet types 5](#_Toc118918880)

[Send Data 6](#_Toc118918881)

[Water Sensor 6](#_Toc118918882)

[Smoke Detector 6](#_Toc118918883)

[Communication examples 8](#_Toc118918884)

[Connection establishment 8](#_Toc118918885)

[New Connection 8](#_Toc118918886)

[Existing Connection 8](#_Toc118918887)

[Disconnect 9](#_Toc118918888)

[Connection available (PING) 9](#_Toc118918889)

[Sending Data 9](#_Toc118918890)

# Packet format

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **idSensor** | **idBase** | **packetID** | **packetType** | **Data** | **End identifier** |
| uint8\_t | uint8\_t | uint8\_t | uint8\_t | variable | ~ |

idSensor - unique id for sensor

isBase - unique id for Base Station

packetID - unique packet id for when a message is answered

packetType - The type of data being sent

Data - Packet data

End identifier - Indicates end of package

# Packet types

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Packettype** | **idSensor** | **idBase** | **packetID** | **packetType** | **Data** |
| CONNECT | 0 | 0 | n | 1 | Sensor Type\* |
| CONNACK | 0 | uint8\_t | n | 2 | Id for Sensor+ |
|  |  |  |  | 3 |  |
| ACK | uint8\_t | uint8\_t | m | 4 | - |
| SEND | uint8\_t | uint8\_t | k | 5 | See [Send Data](#_Send_Data) |
| PING | uint8\_t | uint8\_t | i | 6 | - |
| DISCONNECT | uint8\_t | uint8\_t | g | 7 | - |

+Id for Sensor (uint8\_t)

\*Sensor Type (uint8\_t):

1 – Water sensor

2 – Smoke detector

3 –

# Send Data

First part is uint8\_t with type of sensor

## Water Sensor

The Raspberry pi Pico have temperature sensors, the conversion must be done base station side.

|  |  |  |  |
| --- | --- | --- | --- |
| Sensor type (uint8\_t) | Humidity (uint16\_t) | Submerged (uint8\_t) | Temperature (uint16\_t) |
| 1 | n | 0 or 1 | n |

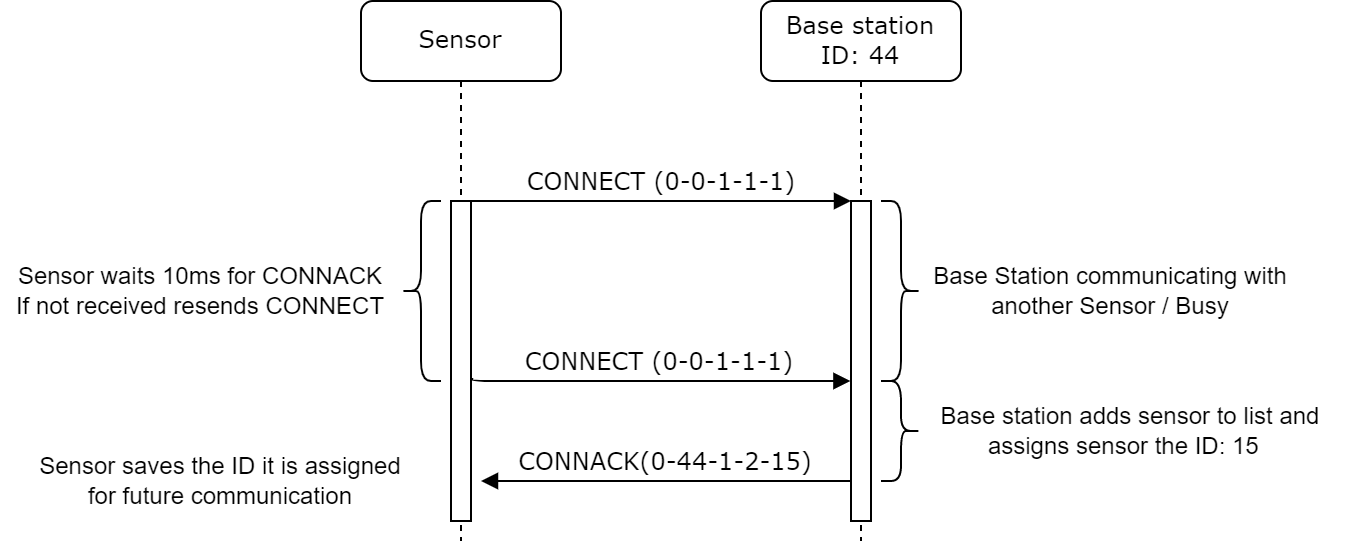
## Smoke Detector

|  |  |  |  |
| --- | --- | --- | --- |
| Sensor type (uint8\_t) | Smoke / CO2 detection | CO detection | Temperature (uint16\_t) |
| 2 | Not sure if can discern the difference | Not sure if can discern the difference | n |

# Communication examples

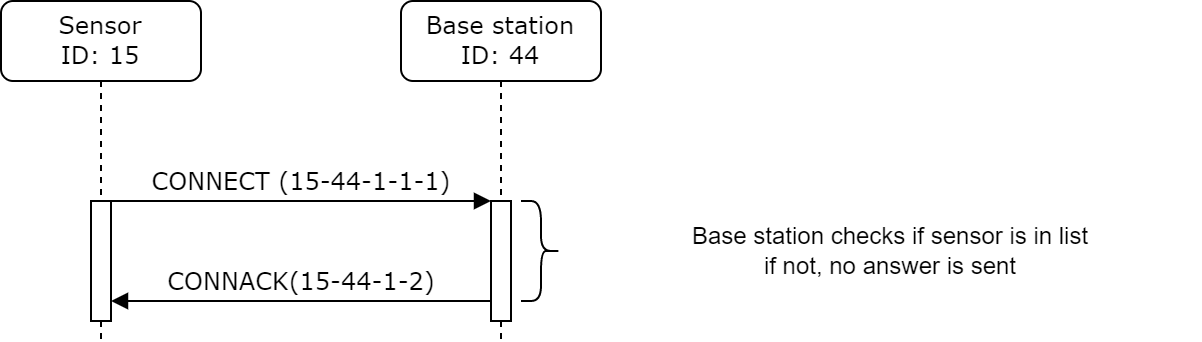
## Connection establishment

### New Connection

Sensor has no ID (Default: 0) meaning it needs one assigned

If sensor doesn’t receive a CONNACK after 10 tries, it shutsdown.

### Existing Connection

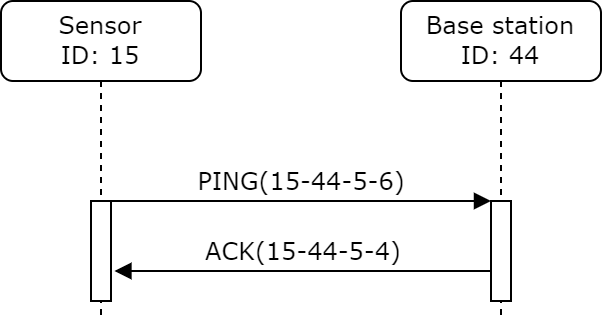
Sensor has ID: 15

If no CONNACK is received within 1s (every 10ms retry) the sensor resets its id and retries a new connection (to a possibly different base station).

See [New Connection](#_New_Connection).

## Disconnect

## Connection available (PING)

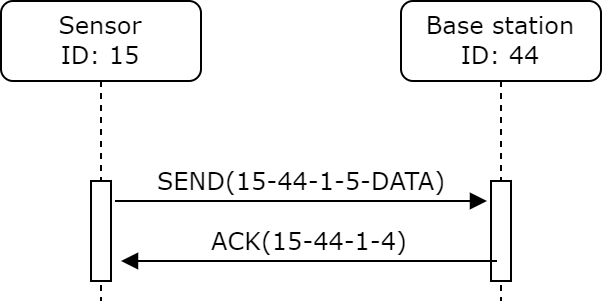


The sensor must send a PING Packet ever 2min to the Base station to indicate it is still active. If the base station does not receive a packet after 4min, it sets the sensor status to offline/error.

If the sensor does not get an ACK after 10 tries, it shuts down.

This must only happen if nothing was sent in the 2min span.

## Sending Data



Data is sent until an acknowledge is received (every 10ms up to 10 tries)

Base station sends ACK back to sensor.

Base station must ignore duplicate messages (with previous and current states maybe)