Topic:

Web-IO programming using binary sockets

Polling and setting IO-signals using binary structures

Here we show the basic sequence and a brief configuration guide for accessing our Web-IO products using binary sockets over TCP or UDP. Which programming language is used does not matter, since the overall principles are the same. At the end you will find a manual for configuring Web-IOs for binary access as well as information about the construction and structure of binary structures.

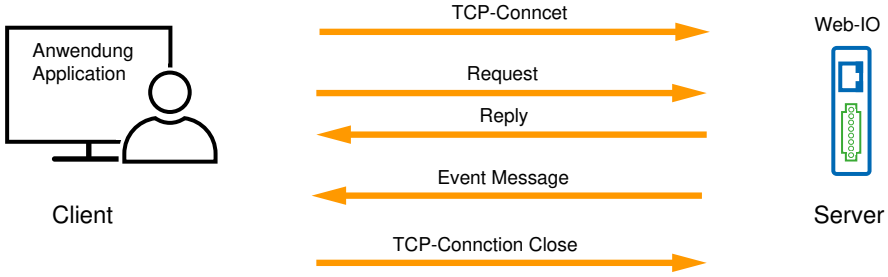
Detailed examples for various high level languages are linked below.

Access via TCP/UDP

Access via TCP

Similar to a telephone conversation, TCP requires that first a connection be opened before information can be exchanged.

The client opens the connection, which is then received by the server. In applications for Web-IO with binary sockets the Web-IO can operated either as server or client depending on the configuration. In most cases the application assumes the role of the client and the Web-IO is the server.



The Web-IO as server
When used as a server the Web-IO has a TCP port open for receiving connections (port 49153 unless otherwise configured). The client, i.e. the application, opens a connection to the IP address of the server on this port. The client also opens a TCP port (dynamically changing) on which it can receive data from the server, i.e. the Web-IO.

As soon as the connection is open, the application can send data to the Web-IO (Request), which are then replied to by the Web-IO (Reply). If so configured the Web-IO can report the status of the inputs (Event Message) without a request by the application.

The application generally handles closing of the TCP connection. The Web-IO closes the connection only in case of errors.

In TCP binary socket mode the Web-IO can at the same time receive exactly one connection on the opened TCP port. Any attempt to open a connection from another client is rejected (similar to a busy telephone).

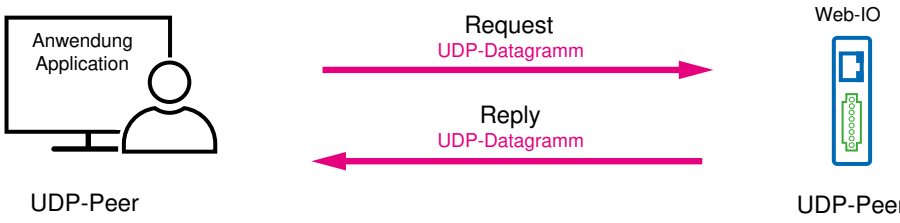
The Web-IO as client
When used as a client the Web-IO handles opening the connection. Triggered by a signal change on the inputs, the connection to a preconfigured server is opened.

As soon as the connection is open, the status of the inputs is transmitted. As long as the connection is open, data can be exchanged just as if the Web-IO were being used as a server.

Opening the connection is triggered by an *Inactivity Timeout*, i.e. a time limit. If during the set time there is no change on the inputs, the Web-IO closes the connection.

Access via UDP

Unlike a telephone conversation, with UDP there is no connection. Similar to radiotelephony the information is simply sent. UDP uses no client and server, rather what are called UDP peers which are all equally permitted to send their datagrams.



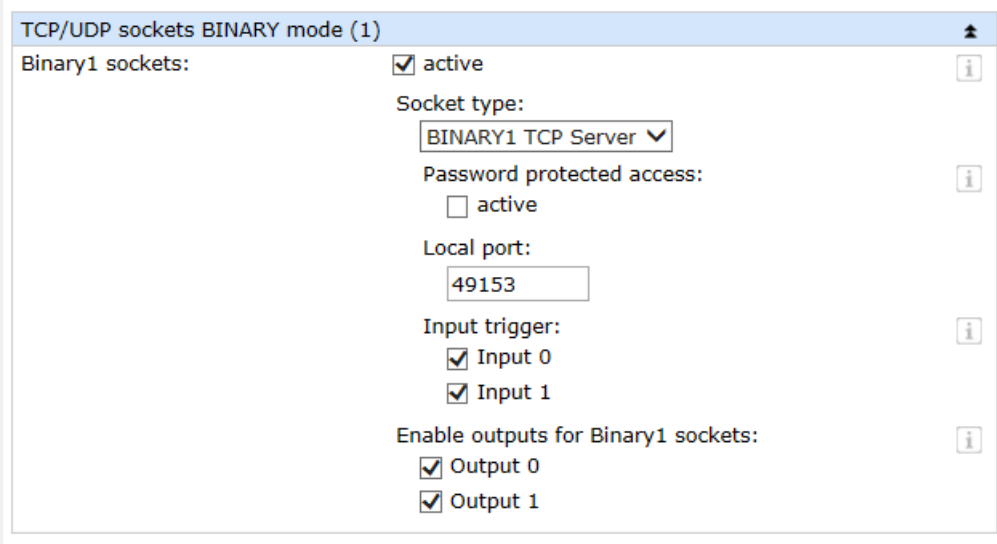
The application sends data to the Web-IO (Request) to which the Web-IO responds accordingly and if necessary sends an answer (Reply). In addition, if correspondingly configured the Web-IO sends a datagram when the status of the inputs changes.

Configuring Web-IO

Configuring Web-IO for binary access

From the menu tree in the web interface, select *Communication channels >> Socket API* and enable *Binary1 sockets*. The remaining configuration depends on which type of socket access is needed.

Web-IO as binary server For *Socket Type* select *BINARY1 TCP server*.

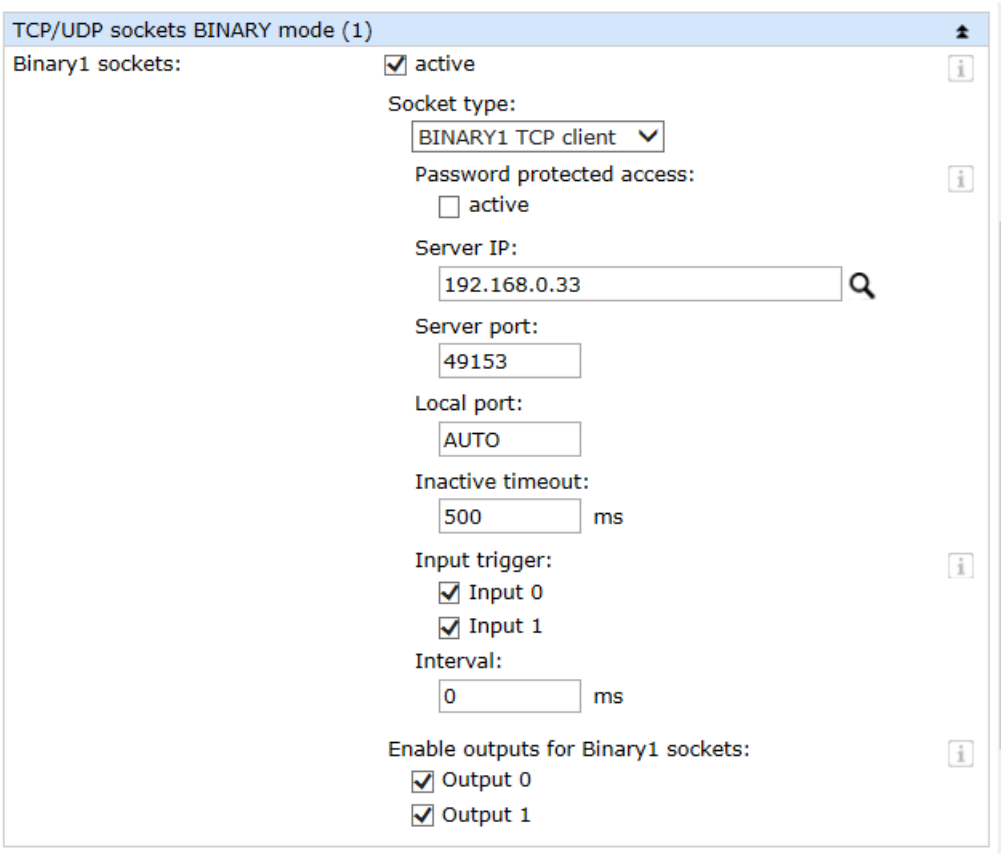


The local port can if necessary be adapted to your own application.

If the Web-IO needs to automatically send the status to the application when the inputs change, check the corresponding boxes under *Input Trigger*.

In addition, outputs which need to be switched by the application must be enabled.

Web-IO as binary client For *Socket Type* select *BINARY1 TCP client*.



For *Server-IP* enter the IP address of the network device on which the server application used for connecting the Web-IO is active.

The *Server Port* is the port on which the server application receives the connection. This port can be adjusted if needed.

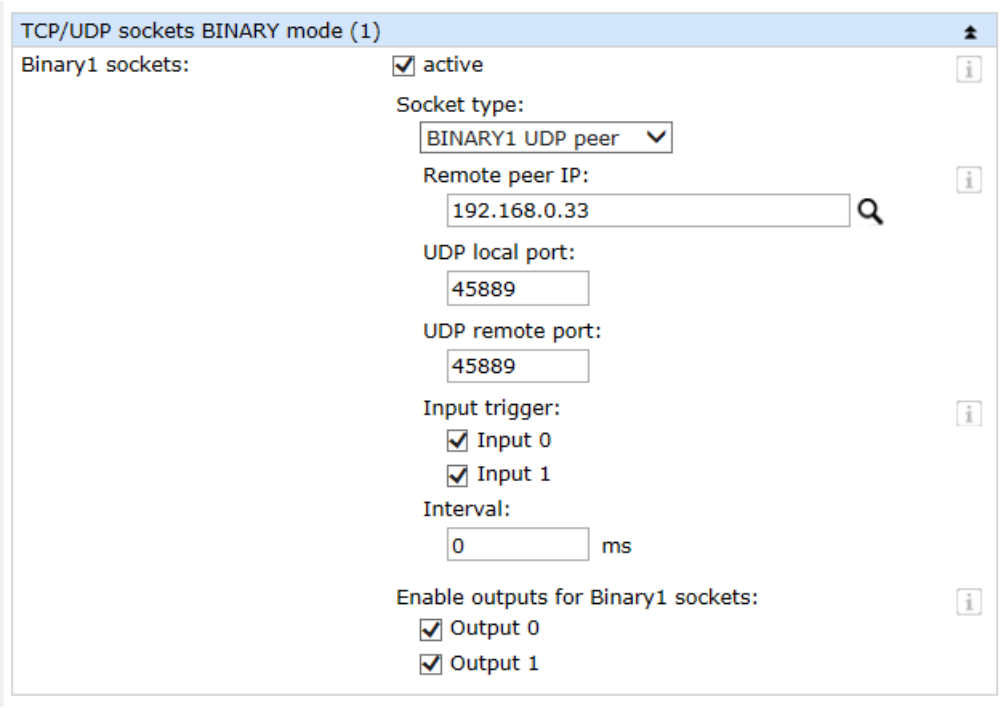
The local port should in normal usage remain set to *AUTO* so that it is dynamically assigned. If the infrastructure requires it, a specific port may however be entered.

Inputs which should trigger opening of a connection when the status changes must be enabled under *Input Trigger*. Once there is a connection, the status conditions are automatically sent to the application.

You may use the *Interval* field to specify whether and at what intervals a connection should be opened.

Finally, outputs which need to be switched by the server application must be enabled.

Web-IO as binary UDP peer For *Socket Type* select *BINARY1 UDP peer*.



For *Remote-Peer-IP* enter the IP address of the network device to which the Web-IO datagrams should be sent.

UDP local port and *UDP remote port* can if needed by adjusted to your own application.

If the Web-IO needs to automatically send the status to the application when the inputs change, check the corresponding boxes under *Input Trigger*.

You may use the *Interval* field to specify whether and at what intervals datagrams should be sent to the application.

Outputs which need to be switched by the application must be correspondingly enabled.

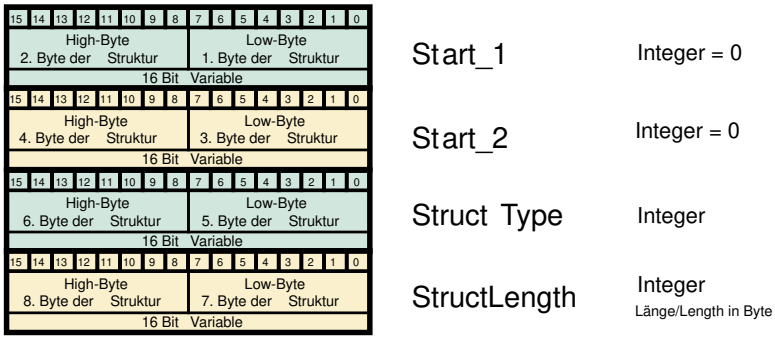
Binary structures

Composition and structure of the binary structures

Regardless of whether TCP or UDP is used for accessing, the structures which are exchanged remain the same.

Data structures are individual variables which are stored in memory one after the other as a byte sequence. In this arrangement they are also sent over the network. All binary structures for the Web-IO consist of four 16-bit values which can be followed by 8-, 16- or 32-bit values depending on the task of the structure.

The structure *I/O driver*



Start_1 and Start_2 These two 16-bit variables always have a value of 0 and as a start sequence represent the start of each structure.

StructType The structure type encodes what the Web-IO should do and to what its reply refers. Structures of a particular type have a type-specific structure.

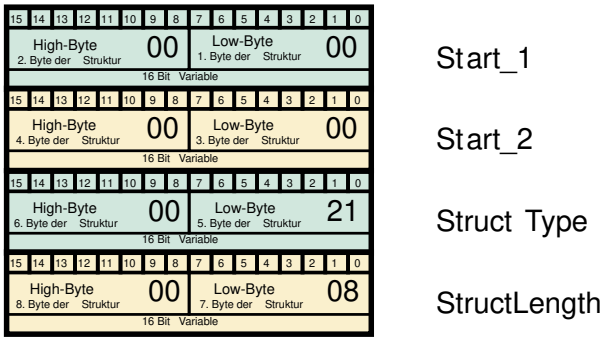
StructLength Indicates the total length of a structure in bytes.

What at first glance may seem complicated actually represents a great advantage: particular information is always in the same location within the structure where it can be immediately found. This means that *parsing* of character strings for certain contents is not necessary.

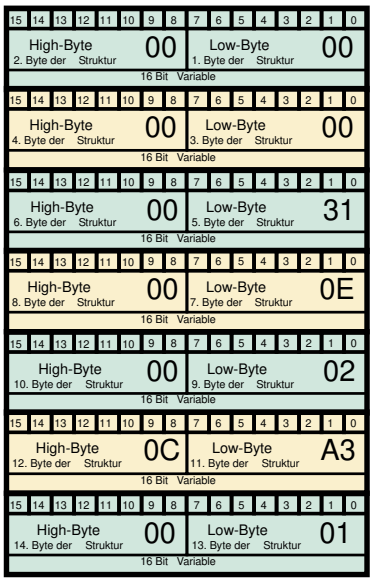
Example: Querying inputs and outputs

In the following example we will show you how to query the status of the inputs and outputs and how the corresponding reply from the Web-IO is constructed.

Structure type RegisterRequest The *RegisterRequest* structure corresponds to the makeup of the basic structure *I/O driver*. For *StructType* insert 0x21 hex (dec 33) and set *StructLength* to 8 (bytes).



The structure type RegisterState In reply the Web-IO sends a type *RegisterState* structure.



Start_1

Start_2

Struct Type

StructLength

DriverID

InputValue

OutputValue

In the case of *RegisterState* structure the first part corresponds to the basic structure *I/O driver*. For *StructType* insert 0x31 hex (dec 49) and set *StructLength* to 0x0E hex (dec 14 bytes).

This is followed by three more 16-bit variables. The variable *DriverID* actually no longer has any meaning, but remains a component of the structure having a value of 2 for reasons of compatibility with older Web-IO models.

The variables *InputValue* and *OutputValue* indicate the switching states of the inputs and outputs. The entered value corresponds to the bit pattern of the inputs and outputs. The coding is simple - here is an example for the 12 inputs of a Web-IO model #57730:

Inputs 0, 1, 5, 7, 10 and 11 are ON. The other inputs are in the OFF state.

And so here `1100 1010 0011`. In hex this corresponds to `0xCA3` or decimal 3235.

In the example above the value for *OutputValue* is 1, so that only Output 0 is ON. All other outputs are in the OFF state.

A detailed description for communication with binary structures can be found in the binary brief overview or in the programming manual for the Web-IO.

Examples in various programming languages

Visual Basic Net

TCP binary client
for Web-IO Digital 4.0

Visual C#

TCP binary client
for Web-IO Digital 4.0

Delphi

TCP binary client
for Web-IO Digital 4.0

Products

Web-IO 4.0 Digital
2xIn, 2xOut

Power via PoE also when needed

Web-IO 4.0 Digital
12xIn, 12xOut

12x outputs (6-30V),
12x inputs (8-30V)

Other Web-IOs

All W&T Web-IO Digital 24V

W&T
www.WuT.de

We are available to you in person:

Wiesemann & Theis GmbH
Porschestr. 12
42279 Wuppertal
Phone: +49 202/2680-110 (Mon.-Fri. 8 a.m. to 5 p.m.)
Fax: +49 202/2680-265
info@wut.de

Data Privacy