JSIQA

(Jessica)

JavaScript
IQ Processing
AARONIA

General

This document matches the Aaronia RTSA Suite Pro Built number 8953 and above.

Additional Datatypes

JSIQA extends the common JavaScript numeric type into the complex realm. Numbers can be real, imaginary or a combination. An imaginary number may be the result of a numeric operation, such as the square root of minus one, or a literal with the ending character “I”, such as “123i” or “3.4e5i”.

System Objects

System objects are provided by the runtime system, and need not be imported before use.

IQ Array Processing – IQ

The IQ library/object provides optimized routines for manipulating typed and untyped arrays of real and complex numbers in a vector style.

```
const a = [1, 2, 3, 4, 5];
let b = IQ.add(a, 4);
```

The returned array is usually similar to the provided array typed or untyped.

IQ.abs(data)

data	Array, TypedArray, Number	Source data

Returns an array with the absolute values of the source data array.

IQ.phi(data)

data	Array, TypedArray, Number	Source data

Returns an array with the angle to the real value axis for the complex values of the source data array.

IQ.exp(data)

Data	Array, TypedArray, Number	Source data

Returns an array with the natural exponentiation of the source array.

IQ.log(data)

data	Array, TypedArray, Number	Source data

Returns an array with the natural logarithm of the source array.

IQ.i(data)

data	Array, TypedArray, Number	Source data

Returns the in phase (real) component of the complex values

IQ.q(data)

data	Array, TypedArray, Number	Source data

Returns the out of phase (imaginary) component of the complex values.

IQ.dphi(data)

data	Array, TypedArray	Source data

Returns an array with the change of angle to the real value axis for the complex values of the source data array.

IQ.fft(data)

data	Array, TypedArray	Source data

Forward Fourier-transformation of a complex array.

IQ.ifft(data)

data	Array, TypedArray	Source data

Inverse Fourier-transformation of a complex array.

IQ.sum(data)

data	Array, TypedArray	Source data

Returns the sum of all elements in the array

IQ.min(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns an array with the smaller elements of the two source arrays

IQ.max(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns an array with the larger elements of the two source arrays

IQ.conj(data)

data	Array, TypedArray, Number	Source data

Returns the complex conjugated values in an array or typed array

IQ.add(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the elementwise sum of the two source arrays

IQ.sub(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise difference of the two source arrays

IQ.mul(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise product of the two source arrays

IQ.div(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise quotient of the two source arrays

IQ.and(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise binary and of the two source arrays

IQ.or(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise binary or of the two source arrays

IQ.xor(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise binary exclusive or of the two source arrays

IQ.andnot(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise binary and of the first and the inverted second array

IQ.eq(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise comparison for equal of the two source arrays

IQ.ne(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise comparison for not equal of the two source arrays

IQ.lt(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise comparison for less than of the two source arrays

IQ.gt(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise comparison for greater than of the two source arrays

IQ.le(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise comparison for less than or equal of the two source arrays

IQ.ge(data1, data2)

data1	Array, TypedArray, Number	Source data
data2	Array, TypedArray, Number	Source data

Returns the element wise comparison for greater than or equal of the two source arrays

IQ.if(cond, if, else)

cond	Array, TypedArray, Number	Condition
if	Array, TypedArray, Number	Values for true condition
else	Array, TypedArray, Number	Values for false condition

Returns an array with the elements of either the “if” or the “else” source argument, based on the contents of the “cond” argument.

IQ.gather(data, index)

data	Array, TypedArray	Source data
index	Array, TypedArray	Index data

Returns an array with the size of the “index” argument and the values of the “data” argument indexed by the values of the “index” argument.

IQ.modulate(data, phi, dphi)

data	Array, TypedArray	Source data
phi	Complex	Phase offset
dphi	Complex	Phase shift

Returns an array with the source values multiplied by phi and the powers of dphi.

IQ.resample(data, offset, step)

data	Array, TypedArray	Source data
offset	Number	Start offset
step	Number	Offset step

Returns an array with resampled values at the starting offset and offset plus integer multiples of the sept value. Offset and step may be non integer values.

IQ.rankIndex(data, count, down)

data	Array, TypedArray	Source data
count	Integer	Number of elements to return
down	Boolean	Sort from highest to lowest

Returns an array with the indices of the sorted smallest (or highest) elements on a float array.

IQ.nth(data, n);

data	Array, TypedArray	Source data
n	Number	Element index

Returns the n-th element from the sorted source data array.

IQ.zcross(data, [thresh])

data	Array, TypedArray	Source data
thresh	Number	Optional threshold value

Returns an array of the indices of all elements in the source data array, that cross the threshold value.

IQ.zfcross(data, [thresh])

data	Array, TypedArray	Source data
thresh	Number	Optional threshold value

Returns an array of the of the linear interpolated positions where the values of the data array cross the threshold value.

XML Parser – XML

Parsing and manipulating XML documents.

XML.parse(text)

text	String	XML Format

Returns an xml document as a tree of XML objects.

XML.**prototype**.**node**(tag)

tag	String	Name of an XML element

Returns the first child element with the given tag.

XML.**prototype**.**nodes**(tag)

tag	String	Name of an XML element

Returns an array of child elements with the given tag.

XML.**prototype**.**text**()

Returns the text of the XML object

XML.tag

Tag of the XML element

XML.attributes

Object with the XML element attributes

XML.elements

Array of the XML child elements.

System / Application log – syslog

Writing into the application log.

syslog.debug(value, …)

value	Value	Values to log

Send a debug message to the log file

syslog.warning(value, …)

value	Value	Values to log

Send a warning message to the log file

syslog.info(value, …)

value	Value	Values to log

Send an info message to the log file

syslog.critical(value, …)

value	Value	Values to log

Send a critical message to the log file

UTF8 Encoding – UTF8

Formatting and parsing of UTF8 data to and from string objets.

UTF8.encode(string, [zero])

string	String	Source string
zero	Boolean	Append a zero byte to the characters in the buffer

Encodes a string into an array buffer using UTF8 encoding

UTF8.decode(data)

data	ArrayBuffer	UTF8 encoded string

Decodes the UTF8 encoded string in the given array buffer.

Libraries

Promises and Callbacks – "promise.js"

Promises are structured way to avoid callbacks. A function that would normally accept a callback returns a promise object if no callback is provided. The promise object can the be used to continue processing when the asynchronous component of the function completes.

Most library function are asynchronous, they either accept a callback function that is called with the result of the function or return a promise, if no callback function is provided.

Promise(resolver)

resolver	function(resolve, reject)	Resolver function

Creates a new Promise object with a given resolver function. The resolver function is called with two functions, a resolve and a reject function. The resolver must call one of those two functions when the asynchronous call completes.

Promise.**callback**(resolve, reject)

resolve	function(value)	Function to be called if successful
reject	function(err)	Function to be called if failed

Creates a node.js style callback function from the given promise callbacks. This function can be used to provide a promise compatible implementation for a function that normally uses node.js callback style completion.

Promise.**resolve**(value)

value		Result

Create an already resolved promised with the given value as return value.

Promise.**reject**(err)

err	Error	Failure reason

Create an already rejected promise with the given error reason

Promise.**all**(coll)

coll	Array or Object	Collection of promises

Creates a promise for a collection of promises that is resolved when all promises of the collection are resolved or rejected when at least one of the promises is rejected.

Promise.**prototype**.**done**(value)

value		Result

Resolve the given promise, like calling the resolve function in the resolver.

Promise.**prototype**.**fail**(err)

err	Error	Failure reason

Reject the given promise, like calling the reject function in the resolver.

Promise.**prototype**.**then**(cbdone, [cbfail])

cbdone	function(value)	Function to be called when the promise is resolved
cbfail	function(err)	Function to be called when the promise is rejected

This method is the final client part of a promise. The callback functions will be executed immediately if the promise is already resolved or rejected. Otherwise they will be called when the promise is resolved or rejected. The function returns a promise itself, which can be used to chain promises. The returned promise is considered resolved, when the callback functions return with a normal value. The callback functions may also provide a promise as a return value, which will then decide the fate of the initially retuned promise.

Promise.**prototype**.**catch**(cbfail)

cbfail	function(err)	Function to be called when the promise is rejected

This method is like the "then" method but provides only a fail callback.

Promise.**prototype**.**finally**(cb)

cbfail	function()	Function to be called when the promise is rejected or resolved

This method is like the "then" method but uses the same callback for success and failure.

Asynchronous Processing – "async.js"

Async.**each**(coll, iteratee, [cb])

coll	Array	Collection

iteratee	function(value, cb)	Iterator function called for each element
cb	function(err)	Optional callback

Call the iterator function for each element of the collection. The iterator must call the provided callback when finished. The optional callback will be called, when all iterations are completed. The callback will receive the error message of the first iteration that returned an error in its callback.

Async.**eachOf**(coll, iteratee, [cb])

coll	Array	Collection
iteratee	function(value, index, cb)	Iterator function called for each element
cb	function(err)	Optional callback

Call the iterator function for each element of the collection. The iterator must call the provided callback when finished. The optional callback will be called, when all iterations are completed. The callback will receive the error message of the first iteration that returned an error in its callback.

Async.**every**(coll, iteratee, [cb])

coll	Array	Collection
iteratee	function(value, cb)	Iterator function called for each element
cb	function(err, value)	Optional callback

Call the iterator function for each element of the collection. The iterator must call the provided callback when finished, providing an additional Boolean value. The optional callback will be called, when all iterations are completed. The callback will receive the error message of the first iteration that returned an error in its callback. The final return value will be true, if all iterations returned true.

Async.**some**(coll, iteratee, [cb])

coll	Array	Collection
iteratee	function(value, cb)	Iterator function called for each element
cb	function(err, value)	Optional callback

Call the iterator function for each element of the collection. The iterator must call the provided callback when finished, providing an additional Boolean value. The optional callback will be called, when all iterations are completed. The callback will receive the error message of the first iteration that returned an error in its callback. The final return value will be true, if at least one iteration returned true.

Async.**filter**(coll, iteratee, [cb])

coll	Array	Collection
iteratee	function(value, cb)	Iterator function called for each element
cb	function(err, value)	Optional callback

Call the iterator function for each element of the collection. The iterator must call the provided callback when finished, providing an additional Boolean value. The optional callback will be called, when all iterations are completed. The callback will receive the error message of the first iteration that returned an error in its callback. The final return value will be an array with all elements of the original collection, for which the iteratee return true.

Async.**map**(coll, iteratee, [cb])

coll	Array	Collection
iteratee	function(value, cb)	Iterator function called for each element
cb	function(err, value)	Optional callback

Call the iterator function for each element of the collection. The iterator must call the provided callback when finished, providing a mapped version of the input value. The optional callback will be called, when all iterations are completed. The callback will receive the error message of the first iteration that returned an error in its callback. The final return value will be an array with all elements returned by the iterator functions.

Async.**mapValues**(coll, iteratee, [cb])

coll	Array	Collection
iteratee	function(value, index, cb)	Iterator function called for each element
cb	function(err, value)	Optional callback

Call the iterator function for each element of the collection. The iterator must call the provided callback when finished, providing a mapped version of the input value. The optional callback will be called, when all iterations are completed. The callback will receive the error message of the first iteration that returned an error in its callback. The final return value will be an array with all elements returned by the iterator functions.

Async.**parallel**(tasks, [cb])

tasks	Array of function(cb)	Collection of functions
cb	function(err, value)	Optional callback

Call all functions of the tasks collection in parallel. The final callback will be invoked, when all tasks have completed or at least one failed. The result is an array of all the values generated and returned by the tasks.

Async.**whilst**(test, iteratee, [cb])

test	function()	Check for condition
iteratee	function(value, index, cb)	Iterator function called for each iteration
cb	function(err, value)	Optional callback

Calls the test function and the iteratee function as long as test returns true. The callback will be made with the final results of the iteratee callback.

Async.**until**(test, iteratee, [cb])

test	function()	Check for condition
iteratee	function(value, index, cb)	Iterator function called for each iteration
cb	function(err, value)	Optional callback

Calls the iteratee function and the test function as long as test returns true. The callback will be made with the final results of the iteratee callback.

Async.**forever**(iteratee, [cb])

iteratee	function(cb)	Iterator function called for each iteration
cb	function(err, value)	Optional callback

Calls the iterate function with a callback as argument. The iterate calls the callback when finished to start the next iteration. The iteration stops, if a non null argument is passed to the callback as an error.

File System – "fs.js"

The file system library provides access to system files in an asynchronous way. Files operate on byte buffers or typed arrays. The result of the file operation can be received by either a callback or a promise.

File.**read**(fname, [cb])

fname	String	Path to the file
cb	function(err, buffer)	Optional callback

Read the content of the file with the given name into an ArrayBuffer.

Example writing the content of a text file to the console using a promise as the result.

```
import { File } from "fs.js"
File.read("e:/tmp/test.txt").then(d => {
```

```
      console.log(UTF8.decode(d));
});
```

File.**write**(fname, buffer, [cb])

fname	String	Path to the file
buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Writes the content of the buffer into the file. Creates a new file or truncates an existing file before writing.

```
import { File } from "fs.js"
let d = new Float32Array(1000);
for(let i=0; i<d.length; i++)
      d[i] = Math.cos(i);
File.write("e:/tmp/floats.bin", d);
```

File.**append**(fname, buffer, [cb])

fname	String	Path to the file
buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Writes the content of the buffer into the file. Creates a new file or appends the data to an existing.

File.**exists**(fname, [cb])

fname	String	Path to the file
cb	function(err, bool)	Optional callback

Returns true if the given file (or folder) exists

File.**mkdir**(path, [cb])

path	String	Path to the directory
cb	function(err)	Optional callback

Creates a the complete path for the given directory name

File.**delete**(path, [cb])

path	String	Path to the file to delete
cb	function(err)	Optional callback

Delete a file

File.**rename**(path, target, [cb])

Path	String	Path to the file to rename
Target	String	Target path of the file to rename
cb	function(err)	Optional callback

Rename a file

File.**files**(path, pattern, recursive, [cb])

path	String	Path to the directory
pattern	String	Pattern to match
recursive	Bool	Search all child folders recursive
cb	function(err, files)	Optional callback

Returns an array of objects describing the matching files

File.**list**(path, pattern, recursive, [cb])

path	String	Path to the directory
pattern	String	Pattern to match
recursive	Bool	Search all child folders recursive
cb	function(err, files)	Optional callback

Returns an array of matching file paths

File.**open**(fname, [cb])

fname	String	Path to the file
cb	function(err, file)	Optional callback

Open an existing file for reading and create a file object.

File.**create**(fname, [cb])

fname	String	Path to the file
cb	function(err, file)	Optional callback

Create a new file or truncate an existing file for writing and create a file object.

File.**prototype**.**close**([cb])

cb	function(err)	Optional callback

Close a file object and commit pending writes to storage.

File.**prototype**.**seek**(offset, [cb])

offset	Number	Offset in file
cb	function(err)	Optional callback

w

Move file read / write pointer to the given byte offset in the file.

File.**prototype**.**read**(size, [cb])

size	Number	Size in bytes
cb	function(err, buffer)	Optional callback

Read the number of bytes from the file into an ArrayBuffer. The resulting buffer may be smaller than the given size. The result will be an empty ArrayBuffer when reaching then end of the file.

Iterating over a file is best done using an async function.

```
import { File } from "fs.js"
async function sumFile(name) {
      let f = await File.open(name);
      let a, sum = 0;
      while ((a = await f.read(4)).byteLength == 4) {
            sum += new DataView(a).getFloat32(0, true);
      }
      return sum;
}
sumFile("e:/tmp/floats.bin").then(sum => {
      console.log("sum", sum);
}).catch(err => {
      console.log("Error", err);
```

```
});
```

File.**prototype**.**write**(buffer, [cb])

buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Write the data from the buffer into the file.

TCP Client Sockets – "tcp.js"

TCP.**adapters**([cb])

cb	function(err, socket)	Optional callback

Returns a list of all local host addresses for all network adapters.

TCP.**connect**(host, port, [cb])

host	String	Hostname or IP of server
port	Number	Port to connecto to
cb	function(err, socket)	Optional callback

Connect to a TCP server socket.

TCP.**prototype**.**shutdown**([cb])

cb	function(err)	Optional callback

Shutdown a TCP connection

TCP.**prototype**.**receive**(timeout, [cb])

timeout	Undefined or Number	Timeout duration in milliseconds or undefined for infinite
cb	function(err, buffer)	Optional callback

Receive data from a TCP socket. An empty buffer is returned if no data is received in the optional timeout interval. The value null is returned if the other side closed the connection while waiting.

TCP.**prototype**.**send**(buffer, [cb])

buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Write data to a TCP socket.

TCPServer.**listen**(host, port, [cb])

host	String	Optional hostname or IP of client
port	Number	Port to listen on
cb	function(err, socket)	Optional callback

Create a TCP server object that listens on the given port number for incoming connections. A non null host argument will restrict the incoming connections to the given address.

TCPServer.**prototype**.**close**([cb])

cb	function(err)	Optional callback

Close an open TCPServer.

TCPServer.**prototype**.**accept**([cb])

cb	function(err, socket)	Optional callback

Accept an incoming connection. Provides a TCP object as a socket response.

Creating a TCP server, waiting for a connection and sending “Hello World”. Creating a TCP client and reading from the connection.

```
import { TCP, TCPServer } from "tcp.js"
import { Async } from "async.js"
const Port = 50872;
TCPServer.listen(null, Port).then(server => {
      Async.forever(cb => {
            server.accept().then(s => {
                  cb();
                  s.send(UTF8.encode("Hello World"));
            });
```

```
      });
      return TCP.connect("localhost", Port);
}).then(client => {
      return client.receive();
}).then(data => {
      console.log(UTF8.decode(data));
});
```

UDP Client Sockets – "udp.js"

UDP.bind(host, port, [cb])

host	String	Hostname or local server or null
port	Number	Port to bind with
cb	function(err, socket)	Optional callback

Create a UDP socket and bind it to the given local port

UDP.**prototype**.**connect**(host, port, [cb])

host	String	Hostname or IP of server
port	Number	Port to connect to
cb	function(err, socket)	Optional callback

Connect to a UDP server socket.

UDP.**prototype**.**shutdown**([cb])

Cb	function(err)	Optional callback

Shutdown a UDP connection

UDP.**prototype**.**receive**([timeout, [cb]])

timeout	Undefined or Number	Timeout duration in milliseconds or undefined for infinite
cb	function(err, buffer)	Optional callback

Receive a datagram, from a UDP socket. The value null is returned if no data is received in the optional timeout interval

UDP.**prototype**.**send**(buffer, [cb])

buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Write a datagram to a UDP socket.

HTTP Client Requests – "http.js"

Request.**get**(url, params, [cb])

url	String	URL of the request
params	Object	Optional arguments for the request
cb	function(err, head, body)	Callback with the head and body of the result

Issue an http get request. The optional arguments are provided as an object:

path	String	Optional path component for the request
query	Object	Optional query parameters for the request
header	Object	Optional set of http headers

Request.**head**(url, params, [cb])

url	String	URL of the request
params	Object	Optional arguments for the request
cb	function(err, head, body)	Callback with the head of the result

Issue an http head request. The optional arguments are provided as an object (see get)

Request.**post**(url, params, [cb])

url	String	URL of the request
params	Object	Optional arguments for the request
buffer	ArrayBuffer	Body of the request

cb	function(err, head, body)	Callback with the head and body of the result

Issue an http post request. The optional arguments are provided as an object (see get)

Request.**put**(url, params, [cb])

url	String	URL of the request
params	Object	Optional arguments for the request
buffer	ArrayBuffer	Body of the request
cb	function(err, head, body)	Callback with the head and body of the result

Issue an http put request. The optional arguments are provided as an object (see get)

Request.**patch**(url, params, [cb])

url	String	URL of the request
params	Object	Optional arguments for the request
buffer	ArrayBuffer	Body of the request
cb	function(err, head, body)	Callback with the head and body of the result

Issue an http patch request. The optional arguments are provided as an object (see get)

Request.**delete**(url, params, [cb])

url	String	URL of the request
params	Object	Optional arguments for the request
cb	function(err, head, body)	Callback with the head of the result

Issue an http delete request. The optional arguments are provided as an object (see get)

Request.**authenticate**(host, user, password, [cb])

host	String	Host of the requests
user	String	Username
password	String	Password
cb	function(err)	Optional callback

Provide a user and password for the given host, to be used on further requests.

HTTP Server “httpserver.js”

HTTPServer(cb)

cb	function(request, response)	Server callback for incoming requests

Create a http server object. The callback will be invoked with an **HTTPRequest** and **HTTPResponse** object and is expected to return a promise.

async HTTPServer.prototype.listen(port)

port	Number	Port to listen for incoming connections

Start listening on the incoming port.

HTTPServer.prototype.close()

Close the http server for incoming connections

HTTPRequest

url	String	Complete url of the request
method	String	Method of the request, such as “get” or “post”
path	String	Path component of the URL
protocol	String	Protocol HTTP 1.0 or 1.1
headers	Object	Object with the key value pairs of the request headers
params	Object	Object with the query params as key value pairs

async HTTPRequest.prototype.read()

Read a chunk of date from the incoming request body. Returns null when all data has been read.

async HTTPRequest.prototype.body()

Read the complete body of a request.

HTTPResponse.prototype.setHeader(name, value)

name	String	Name of the http header
value	String	Value for the header

Set one header parameter in the response

HTTPResponse.prototype.setHead(status, headers)

status	Number	Response status e.g. 200 for ok
headers	Object	Object with the header parameters

Set one header parameter in the response

HTTPResponse.prototype.writeHead(status, headers)

status	Number	Response status e.g. 200 for ok
headers	Object	Object with the header parameters

Write the response header, returns a promise for completion.

HTTPResponse.prototype.sendHead()

Send the previously set header, returns a promise for completion.

HTTPResponse.prototype.write(chunk)

chunk	ArrayBuffer, String, TypedArray	Chunk of response body

Write one chunk of response data. Sends the header if it was not sent before.

HTTPResponse.prototype.end(chunk)

chunk	ArrayBuffer, String, TypedArray	Body or final chunk of response body

Write the body or final chunk of response data. Sends the header if it was not sent before.

Example for an http server that returns the query arguments as a json document.

```
import { HTTPServer } from "httpserver.js"

async function serve(req, res) {

      res.setHead(200, {"content-type": "application/json"});
      res.end(req.params);
}

new HTTPServer(serve).listen(4080);
```

Serial Port Communication – "serialport.js"

SerialPort.list([cb])

cb	function(err)	Optional callback

List the available serial ports of the system.

SerialPort.**open**(device, rate, protocol, [cb])

device	String	Device name of the serial port to open
rate	Number	Baud rate for the connection
protocol	String	Optional protocol parameters
cb	function(err, socket)	Optional callback

Opens a serial port connection. The protocol string consists of four characters. The first denotes the handshake mechanism, X for software and H for hardware. The second character sets the byte length to either 7 or 8 bits. The third character specifies the number of stop bits and the final character sets and enables the parity check.

SerialPort.**prototype**.**close**([cb])

cb	function(err)	Optional callback

Shutdown a serial port connection

SerialPort.**prototype**.**receive**([cb])

cb	function(err, buffer)	Optional callback

Receive data from a serial port connection.

SerialPort.**prototype**.**send**(buffer, [cb])

buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Write data to a serial port connection.

Invoking an external Process – "process.js"

Process.**create**(path, params, [cb])

path	String	Path to the process executable
params	Array of String	Command line parameters
cb	function(err, socket)	Optional callback

Create a process with the given path and command line arguments.

Process.**prototype**.**terminate**([cb])

cb	function(err)	Optional callback

Terminate a process

Process.**prototype**.**read**([cb])

cb	function(err, buffer)	Optional callback

Receive data from the standard output of a process

Process.**prototype**.**write**(buffer, [cb])

buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Write data to the standard input of the process

Process.**prototype**.**wait**([cb])

cb	function(err)	Optional callback

Wait for process completion

Dynamic link library plugin – "plugin.js"

Plugin.**open**(path, service, index, params, [cb])

path	String	Path to the library
service	String	Optional string parameter passed to the plugin open call. E.g. a secondary file name
index	Number	Optional index parameter
params	String	Optional configuration string
cb	function(err, socket)	Optional callback

Load a dynamic link library and call the exported open function with the additional parameters.

Plugin.**prototype**.**close**([cb])

cb	function(err)	Optional callback

Close the handle to the plugin library

Plugin.**prototype**.**read**(size, [cb])

size	Number	Number of bytes to read
cb	function(err, buffer)	Optional callback

Receive data from the plugin library

Plugin.**prototype**.**write**(buffer, [cb])

buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Write data to the plugin library

Plugin.**prototype**.**control**(command, buffer, [cb])

command	String	Command string passed to the plugin
buffer	ArrayBuffer / Array / TypedArray	Data to write
cb	function(err)	Optional callback

Call the exported control function of the plugin library and return the result buffer.

Plugin.**prototype**.**bind**(name, [cb])

name	String	Name of the function to bind to
cb	function(err)	Optional callback

Bind to a function of the plugin. The bound functions are called directly on the thread of the JSIQA execution block and may not wait or take a long time for processing. The signature of the exported function is provided by the exported bind function of the plugin.

Mission, Block and Config Items – "mission.js"

Block Configuration

Mission.**addConfig**(path, items, [cb])

path	String	Main path for the config items
items	Array / Object	Config items
cb	function(err, paths)	Optional callback

Add config items to the script config section. Each item may contain the following members:

title	String	User facing title of config item
title2	String	Alternate title for two state buttons

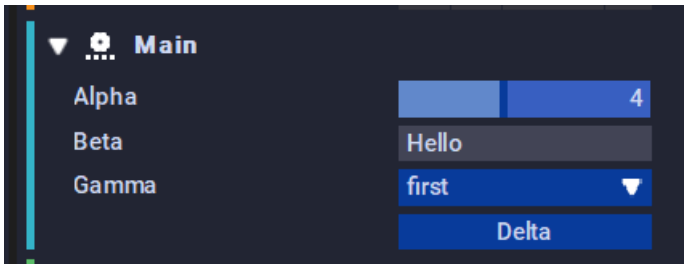
name	String	Internal unique name of config item
short	String	Short title for e.g. Ribbon
icon	String	Icon for buttons
icon2	String	Alternative icon for two state buttons
type	String	Type of config item (group, string, bool, button, number, float, integer, enum, colormap, frequencyProfile)
value	Number / String	Start value of config item
min	Number	Minimum value of numeric config item
max	Number	Maximum value of numeric config item
step	Number	Step of numeric config item
page	Number	Page step
pattern	String, Array of Strings	Path / File pattern, names of enum values
unit	String	Unit of numeric config item
titles	Array of Strings	Titles of enum values
mode	String	Type dependent mode (file, newfile, path, button, slider, logslider)
ephemeral	Bool	The config item value is not retained between mission loads
invisible	Bool	The config item is not visible
ribbonHeight	Number	Required ribbon height (1 or 2)
ribbonWidth	Number	Required ribbon width (1, 2 or 3)
ribbonPriority	Number	Ribbon retainment priority -2 to 2
ribbonTop	Bool	Force the element into the top slot in the ribbon
ribbonReorder	Bool	Disable the ribbon reorder for layout if set to false
ribbonPopUpSticky	Bool	Keep the popup in the ribbon open when selected
items	Array	List of child items for a group

The following icons are available: play, pause, stop, left, right, up, down, radar, record, add, sub

Creating for configuration items and moving them into the “Main” configuration area of the block.

```
import { Mission } from "mission.js"
var Config;
Mission.addConfig(null, {
      alpha: {title: "Alpha", type: "number", value: 4, mode: "slider",
              min: 0, max: 10, step: 1},
      beta:  {title: "Beta",  type: "string", value: "Hello"},
      gamma: {title: "Gamma", type: "enum",   value: 0,
              pattern: ["first", "second", "third"]},
      delta: {title: "Delta", type: "button"}
}).then(c => {
```

```
	Config = c;
	return Mission.mapConfig([
		{path: Config.alpha, target: "main"},
		{path: Config.beta,  arget: "main"},
		{path: Config.gamma, target: "main"},
		{path: Config.delta, target: "main"},
	]);
});
```



Configuration items are always created in the "Script Config" section of the block, but can be mapped into other areas of the configuration section.

Mission.**getConfig**(block, path, [cb])

block	String	Mission Block
path	String, Array, Object	Path of the config items
cb	function(err, paths)	Optional callback

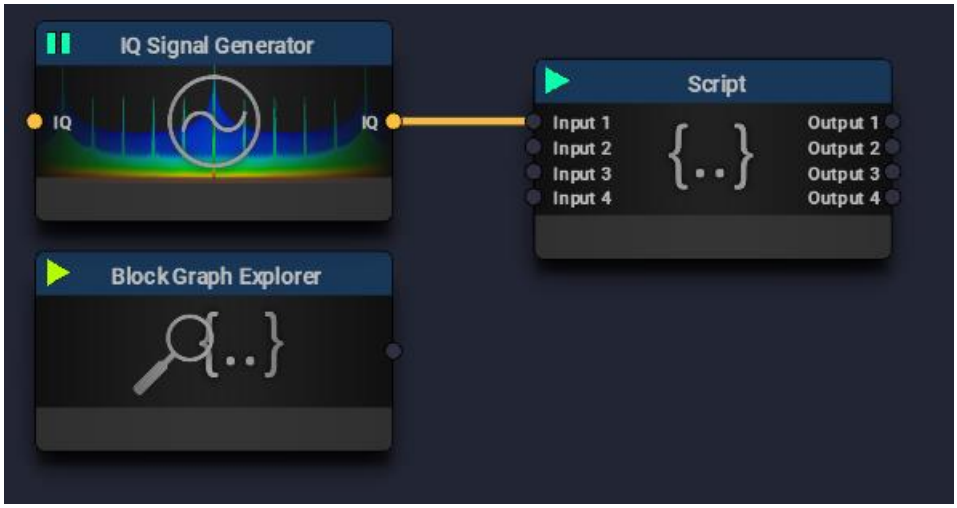
Get the config value and settings of one or more config items. Using an object to specify the paths will return an object with the matching results.

```
	return Mission.getConfig(null, {
		a: Config.alpha,
		b: Config.beta
	});
```

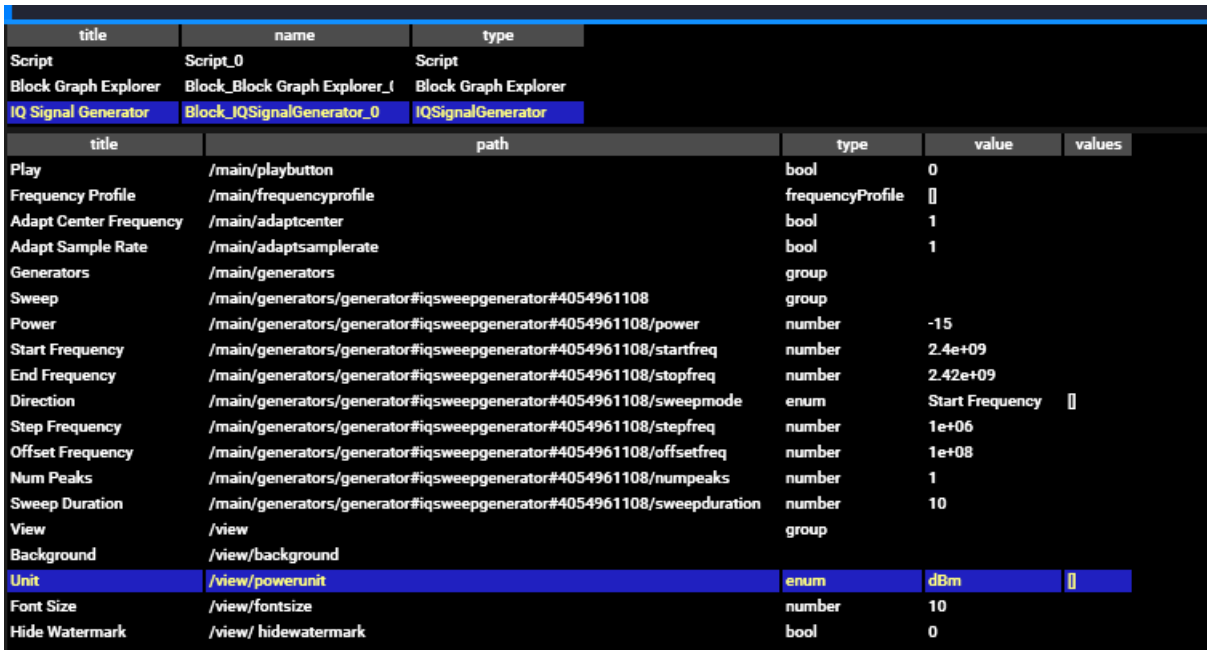
The result in the debug view shows all members of the requested config items.

```
▼c
 ▼.a
   .unit                ''
   .title               'Alpha'
   .value               4
   .visible             true
   .max                 10
   .type                'number'
   .name                'alpha'
   .enabled             true
   .step                1
   .min                 0
 ▼.b
   .enabled             true
   .title               'Beta'
   .value               'Hello'
   .visible             true
   .type                'string'
   .name                'beta'
```

It is possible to query the configuration items of a different block in the mission. The “Block Graph Explorer” block provides an easy way to inspect the other blocks of the mission, and find the appropriate config items.



The explorer tables show the blocks and the available config items for each block:



title	name	type
Script	Script_0	Script
Block Graph Explorer	Block_Block Graph Explorer_(	Block Graph Explorer
IQ Signal Generator	Block_IQSignalGenerator_0	IQSignalGenerator

title	path	type	value	values
Play	/main/playbutton	bool	0	
Frequency Profile	/main/frequencyprofile	frequencyProfile	[]	
Adapt Center Frequency	/main/adaptcenter	bool	1	
Adapt Sample Rate	/main/adaptsamplerate	bool	1	
Generators	/main/generators	group		
Sweep	/main/generators/generator#iqsweepgenerator#4054961108	group		
Power	/main/generators/generator#iqsweepgenerator#4054961108/power	number	-15	
Start Frequency	/main/generators/generator#iqsweepgenerator#4054961108/startfreq	number	2.4e+09	
End Frequency	/main/generators/generator#iqsweepgenerator#4054961108/stopfreq	number	2.42e+09	
Direction	/main/generators/generator#iqsweepgenerator#4054961108/sweepmode	enum	Start Frequency	[]
Step Frequency	/main/generators/generator#iqsweepgenerator#4054961108/stepfreq	number	1e+06	
Offset Frequency	/main/generators/generator#iqsweepgenerator#4054961108/offsetfreq	number	1e+08	
Num Peaks	/main/generators/generator#iqsweepgenerator#4054961108/numpeaks	number	1	
Sweep Duration	/main/generators/generator#iqsweepgenerator#4054961108/sweepduration	number	10	
View	/view	group		
Background	/view/background			
Unit	/view/powerunit	enum	dBm	[]
Font Size	/view/fontsize	number	10	
Hide Watermark	/view/ hidewatermark	bool	0	

```
return Mission.getConfig("Block_IQSignalGenerator_0", {
      rate: "main/samplerate"
});
```

Mission.**setConfig**(block, values, [cb])

block	String	Mission Block
values	Array	List of “path”, “value”, “enabled” and “pattern” item objects
cb	function(err, paths)	Optional callback

Set the config items to the given values.

Mission.mapConfig(mappings, [cb])

mappings	Array	List of “path”,“target” and “ribbon” item objects
cb	function(err, paths)	Optional callback

Maps the config items with given the path to the new target location.

Mission.chainConfig(config, source, [cb])

config	String	Path to target config item
source	String	Path to source config item
cb	function(err, paths)	Optional callback

Chains a source config item to a target config item. The source item will then mirror the target item changes.

Mission.**listenConfig**(cb)

cb	function(path, value, user)	Callback for config item changes

Add a callback for configuration changes.

Mission.**dialog**(title, items, [cb])

Title	String	Title of the dialog
items	Array / Object	Config items
cb	function(err, paths)	Optional callback

Display a modal dialog with the given list of config items, and return an object/array of the results if the user accepts the dialog – null, if the dialog is canceled.

Mission.**getFrequencyProfile**(id, [cb])

id	String	ID of the frequency profile
cb	function(err, paths)	Optional callback

Return a recursive object of the frequency profile.

start	Number	Start frequency
stop	Number	End frequency
id	String	ID of the profile
title	String	Title of the profile
children	Array	Array of child frequency profiles
channels	Array	List of individual channels in the profile
ranges	Array	List of ranges of channels

Graph Messages

Graph messages are sent from one block to all blocks up and/or downstream. A specific receiver can be selected using its name or UUID.

Mission.**receiveGraphMessages**(cb)

cb	function(msg)	Callback for graph messages

Receive graph messages that are sent by other blocks.

Graph message objects have the following fields (not all fields are present or valid for all messages):

type	String	Type of graph message, see below for a list of available message type names
startFrequency	Number	Start frequency
endFrequency	Number	End frequency
stepFrequency	Number	Step frequency or sample rate
rbwFrequency	Number	RBW Frequency
offsetFrequency	Number	Frequency relative to center
startTime	Number	Start time in seconds since the epoch
endTime	Number	End time in seconds since the epoch
poiDuration	Number	Requested 100% POI detection duration
startPower	Number	Lower power range limit
endPower	Number	Upper power range limit
sampleSize	Number	Size of a sample
attenuation	Number	Signal attenuation in dB
shortPulse	String	Short pulse modes time/frequency/default
antennaSegment	Number	Index of the segment in a multi segment antenna
latitude	Number	Geo location latitude
longitude	Number	Geo location longitude
altitude	Number	Geo location altitude / elevation
referenceLevel	Number	Reference level for a measurement in dBm
receiverUUID	String	Optional UUID of the receiver block
receiverName	String	Optional name of the receiver block
azimuth	Number	Geo location/direction azimuth
declination	Number	Geo location/direction declination
aperture	Number	Aperture of a camera
frequencyProfile	Array, String	Name of frequency profile
mode	Number	Mode configuration
pattern	Array of Number	Sequence of numbers representing a pattern of e.g. frequency jumps
upstream	Bool	Send the message upstream if true
downstream	Bool	Send the message downstream if true
mirror	Bool	Mirror the message at the end of a chain
global	Bool	Send the message to all blocks
antennaUUID	String	UUID of the antenna
filename	String	Filename for load or save of data
streamnane	String	Name of the stream
config	Object	Config Items

The following message types are supported:

- **CURSOR_CHANGED** The cursor has changed
- **CENTER_AT_FREQUENCY** Center the receiver at the frequency
- **SET_FREQUENCY_RANGE** Set the frequency range
- **SET_TIME_RANGE** Set the time range
- **REPLAY_TIME_RANGE** Replay the given time range
- **REPLAY_STEADY_RANGE** Replay the given range in steady mode
- **ANTENNA_SEGMENT_CHANGED** The antenna segment has changed
- **ANTENNA_CHANGED** The antenna has changed
- **PASS_TOKEN**
- **STREAM_STARTING** The stream is starting
- **STREAM_STOPPED** The stream has stopped
- **HF_PATH_CHANGED** The HF path has changed
- **CHANGE_ANTENNA_POS** Change the antenna position
- **REQUEST_ANTENNA** Request an antenna changed message
- **COLLECT_CONFIG** Collect configuration data
- **GET_CONFIG** Get configuration data
- **SET_CONFIG** Set configuration data
- **NOTIFY_FREQUENCY_PROFILE** Frequency profile has changed
- **START_STREAMING** Start streaming
- **STOP_STREAMING** Stop streaming
- **NETWORK_CONNECT** Connect to an upstream network node
- **NETWORK_DISCONNECT** Disconnect an upstream network node
- **START_ROTATION** Start antenna rotation
- **STOP_ROTATION** Stop antenna rotation
- **LOCATION_CHANGED** Location as changed
- **PROCESSING_CHANGED** Processing has changed
- **COLLECT_FEATURES** Collect upstream features
- **START_GENERATOR** Start signal generator
- **STOP_GENERATOR** Stop signal generator
- **SET_GENERATOR_FREQUENCY** Set frequency of signal generator
- **START_RECORDING** Start recording
- **STOP_RECORDING** Stop recording
- **JAMMER_ACTIVATE** Activate a jammer
- **JAMMER_DEACTIVATE** Deactivate a jammer
- **JAMMER_POWER_ON** Turn jammer power on
- **JAMMER_POWER_OFF** Turn jammer power off
- **CAMERA_START** Start a camera
- **CAMERA_STOP** Stop a camera
- **CAMERA_TARGET** Set camera target
- **CAMERA_WIPER** Clean camera using wiper
- **REQUEST_HEALTH_STATUS** Request health status

- **HEALTH_STATUS** Health status notification
- **REQUEST_REMOTE_CONFIG** Request remote config items
- **REMOTE_CONFIG** Remote config item notification
- **SET_REMOTE_CONFIG** Set remote config items
- **REMOTE_SAVE_MISSION** Save remote mission
- **REMOTE_RELOAD_MISSION** Reload remote mission
- **ROUTE_STREAM** Route stream though a multiplexer
- **SET_HIGHLIGHT** Set highlight sector

Mission.**sendGraphMessage** (msg, cb)

msg	Object	Graph message object
cb	function(err, msg)	Optional callback

Send a graph message up- or downstream through the graph. Returns the response message with the optional callback.

```
Mission.sendGraphMessage({
      upstream: true,
      type: "START_STREAMING"
});
```

Mission.**sendGraphMessageBy** (con, msg, cb)

con	String	Connector name to send from
msg	Object	Graph message object
cb	function(err, msg)	Optional callback

Send a graph message up- or downstream through the graph. Returns the response message with the optional callback.

Mission.**realtimeGraphMessenger** (cb)

cb	function(err, msg)	Optional callback

Creates a realtime graph messenger function that can be used to sends graph message on the script block thread. The function accepts a message and an optional timeout in milliseconds to wait for the global graph mutex.

```
var messenger = await Mission.realtimeGraphMessenger();

messenger ({
```

```
      upstream: true,
      type: "SET_FREQUENCY_RANGE"
      startFrequency: 1000.0e6,
      endFrequency:   1100.0e6,
}, 1000);
```

Mission.**filterGraphMessages** (msgs, cb)

msgs	Array of Strings	Graph message types to filter
cb	function(err, msg)	Optional callback

Blocks the up- and downstream graph messages with the given types from propagating through the block to other blocks of the graph.

Logging

Mission.**logInfoCenter**(cb)

msg	String or Array of Strings	Messages to log
cb	function(err, msg)	Optional callback

Log messages at info level in the info center

Mission.**logInfoCenterWarning**(cb)

msg	String or Array of Strings	Messages to log
cb	function(err, msg)	Optional callback

Log messages at warning level in the info center

Mission.**logInfoCenterError**(cb)

msg	String or Array of Strings	Messages to log
cb	function(err, msg)	Optional callback

Log messages at error level in the info center

Graph and Block management

Mission.**block**([cb])

cb	function(err, block)	Optional callback

Returns the info of the current block.

Mission.**blocks**([cb])

cb	function(err, blocks)	Optional callback

Returns an array with the structure of all blocks in the mission.

uuid	String	UUID of the block
name	String	Name of the block
title	String	Title of the block
description	String	Description of the block
inputs	Array	Array of inputs
outputs	Array	Array of outputs

The connection objects in the inputs and outputs array contain the following information:

name	String	Name of the connector
title	String	Title of the connector
type	String	Type of the connector
output	Object	Name of block and connector of the output that is connected to this input

Mission.**setHealthState**(state, [config], [cb])

state	String	Name of the current module health state: unknown, idle, booting, ready, starting, operational, running, warning, critical
config	Object	Config item object with the health state
cb	function(err)	Optional callback

Set the current script health state. The “Show Health Status” checkbox has to be checked for this to show up in the block graph.

Charts and User Interface

Mission.**initGrid**(columns, rows, [cb])

columns	Number	Number of columns

rows	Number	Number of rows
cb	function(err)	Optional callback

Initialize the view grid of the script block to the number of columns and rows

Mission.**addChart**(name, type, x, y, width, height, params, [cb])

name	String	Name of the chart element
type	String	Type of the chart element
x	Number	Starting column
y	Number	Starting row
width	Number	Number of columns to cover
height	Number	Number of rows to cover
params	Object	Parameters of the chart element
cb	function(err, chart)	Optional callback

Create a chart element in the view grid. The following chart elements and matching parameters are available.

padding	Number	Padding around chart element
priority	Number	Depth priority of elements. Higher priority elements will be drawn in front of lower priority elements in the same grid cell

statictext – static text element

text	String	Text to display
fscale	Number	Relative scale factor to the user selected font size
color	Object / String	Text color (an object with r, g, b elements)
background	Object / String	Background color
hover	Object / String	Hover color
click	Object / String	Click color
hoverchecked	Object / String	Hover and checked color
checked	Object / String	Checked color
align	String	Horizontal alignment (left, right, center)
valign	String	Vertical alignment (top, bottom, center)
rounded	Number	Radius of rounded corners
input	String	Config item that is triggered by this text field

grid – sub grid

width	Number	Number of grid columns
height	Number	Number of grid rows
background	Object / String	Background color (an object with r, g, b elements)
relayout	Bool	Force a re-layout of the grid if the visibility of its elements change

spacer – spacer element for layout

width	Number	Requested width in pixel
height	Number	Requested height in pixel
minWidth	Number	Minimum width in pixel
minHeight	Number	Minimum height in pixel
maxWidth	Number	Maximum width in pixel
maxHeight	Number	Maximum height in pixel
expandWidth	Number	Usable width in pixel
expandHeight	Number	Usable height in pixel
background	Object / String	Background color (an object with r, g, b elements)

widget – interactive element based on config item

config	String	Configuration element

texttable – table of text elements

columns	Array of Strings	Names of the table columns
	Array of Objects	Name (name) and alignment (align) data for the table columns
cells	Array	List of the table cell entries. This can either be a one-dimensional array for all cells, or an array of arrays or an array of objects
pattern	String	Reference string for the cells
rows	Array of Objects	Background (background) and text color (color) values for each row of the table
selected	Number	Index of the row to select/highlight or -1 for none
cell	Object	Changing a single cell, providing the row, column and value

Data elements:

	Array	List of the table cell entries. This can either be a one-dimensional array for all cells, or an array of arrays or an array of objects

statuslist – list of textual name value pairs

values	Object	Object with the name value pairs
fields	Array of string	List of the names of the entries

statustimechart – simple xy chart of timed measurements

unit	String	Unit of measurement
min	Number	Minimum value
max	Number	Maximum value
scale	Number	Scale factor
duration	Number	Duration of measurement in seconds

Data elements:

time	Number	Time of measurement
value	Number	Value of measurement

statusxychart – simple xy chart of 2d measurements

unitX	String	Unit of measurement
minX	Number	Minimum value
maxX	Number	Maximum value
scaleX	Number	Scale factor
unitY	String	Unit of measurement
minY	Number	Minimum value
maxY	Number	Maximum value
scaleY	Number	Scale factor

Data elements:

x	Number	X Value
y	Number	Y Value

xychart – xy chart of 2d measurements

unitX	String	Unit of measurement
minX	Number	Minimum value
maxX	Number	Maximum value
unitY	String	Unit of measurement
minY	Number	Minimum value

maxY	Number	Maximum value
cursorX	Number	Current cursor X position
cursorY	Number	Current cursor Y position
markX	Number	Current mark X position
markY	Number	Current mark Y position
cursor	Boolean	Is cursor visible
items	Array of Objects	Array of data elements (empty array to clear chart)

Data elements:

name	String	Name of the data set
title	String	Optional title displayed
info	String	Optional info for tooltips
priority	Number	Priority for z ordering
lineColor	Object / String	Color of line elements
markColor	Object / String	Color of mark elements
lineWidth	Number	Width of the lines connecting the values
markWidth	Number	Width of the marks at the values
values	Array of Objects	Array of the values comprised of objects with x and y elements.

waterfall – waterfall view of spectrum data

source	String	Name of the source DSP block providing the data
output	String	Output of the source block
colormap	String	Name of the colormap config item
compressor	String	Name of an optional time compressor block
inverttime	Bool	Invert vertical orientation

histogram – histogram view of spectrum data

source	String	Name of the source DSP block providing the data
output	String	Output of the source block
colormap	String	Name of the colormap config item
interpolation	Bool	Interpolate the values between the bins of the histogram
unit	String	Unit of the bin values, either “percentage” for a histogram or “dbm” for multi spectral

spectrum – spectrum view of spectrum data

source	String	Name of the source DSP block providing the data
output	String	Output of the source block
source2	String	Name of the second optional source DSP block providing the data
output2	String	Output of the second source block
colormap	String	Name of the colormap config item
legend	String	Name of the trace legend config item
traces	Array of Strings / Objects	List of the traces to be displayed in the chart, any of “average”, “maxhold”, “minhold”, “quasimaxhold”, “maxfall”, “outline”, “pulsedshape”, “histogram”, “samplehold”, “clearwrite”
markers	Array of Objects	

Traces Objects

title	String	User facing name of the trace
type	String	Type of the trace (see above)
name	String	Application facing name of the trace
ephemeral	Bool	Do not store or remember the configuration of this trace
config	Object	Base configuration of the trace

Markers Objects

title	String	User facing name of the trace
source	String	Name of the source trace for the marker
name	String	Application facing name of the marker
ephemeral	Bool	Do not store or remember the configuration of this marker
config	Object	Base configuration of the marker

Marker Configuration

color	Object or String	Color of symbol/bar
textcolor	Object or String	Color of text
showname	Bool	Show the name
showindex	Bool	Show the index
showxpos	Bool	Show the horizontal value
showypos	Bool	Show the vertical value
showzpos	Bool	Show additional value

showfunct	Bool	Show the function value
rotatetext	Bool	Rotate the text in dense settings
msize	Number	Size of the symbol
msymbolvv	String	Marker shape for value/value, can be “None”, “Circle”, “X-Cross”, “Circle X”, “Cross”, “Box”, “Disk”, “Quad” or “Triangle”
msymbolvr	String	Marker shape for value/range, can be “None”, “Lines”, “Bar” or “Flags”
msymbolvf	String	Marker shape for value, can be “None”, “Lines”, “Dotted”
msymvolrr	String	Marker shape for range/range, can be “None”, “Box”, “Border”, “Corners”
msymbolrf	String	Marker shape for range, can be “None”, “Box”, “Border”, “Corners” or “Flags”
showxline	Bool	Show a line for the horizontal location
showyline	Bool	Show a line for the vertical location
showzline	Bool	Show a line for the additional location
mode	String	Mode can be “Samples”, “Frequencies”, “Bands, “Peaks”
accumulate	String	Accumulation mode/function, can be “Minimum”, “Maximum”, “Average”, ”Sum” or “Ch.Power”, “Spectral Density” or “Spike”
sortorderpeaks	String	Sort order in “Peaks” mode, either “Power”, “Frequency” or “Time”
sourcepeaks	String	Name of the source trace
name	String	Name of the markers
count	Number	Number of markers in the series
symmetric	Bool	Place markers symmetric around center
harmonics	Bool	Place markers in harmonic series
modefreq	String	Frequency mode, “RTBW”, “Center”, “Area”, “Custom”
basefreq	Number	Base frequency
stepfreq	Number	Step frequency in series
spanfreq	Number	Frequency width in band mode
deltafreq	Number	Frequency offset in depended markers
excursion	Number	Excursion in peak mode
threshold	Number	Threshold in peak mode
separation	Number	Separation in peak mode

Parameters

markers	Object of Objects	Configuration objects for the markers
traces	Object of Objects	Configuration objects for the markers

stream	Object	Meta information for the incoming sample stream

timeshift – timeshift view

source	String	Name of the source DSP block providing the data
colormap	String	Name of the colormap config item

geomap – geographic map

source	String	Name of the source DSP block providing the location
output	String	Name of the output of the source DSP block
colormap	String	Name of the colormap config item
latitude	Number	Latitude of map center
longitude	Number	Longitude of map center
markers	Array of Objects	List of marker objects to show on maps

Marker objects may contain the following elements

name	String	Name of the marker
latitude	Number	Latitude of marker
longitude	Number	Longitude of marker
azimuth	Number	Direction of marker
shape	String	Shape of the marker, any of “circle”, “cross”, “arrow”, “beam”, “line”, “arrowcircle”
radius	Number	Radius of marker in meter
size	Number	Radius of marker in pixel
width	Number	Width of radius outline in pixel
color	Object / String	Outline color of marker
fill	Object / String	Fill color of marker

canvas2d – two dimensional canvas element

width	Number	Expected width in pixel
height	Number	Expected height in pixel
aspectRatio	String	Aspect ratio control if the element has a different than expected size, can be

		"free", "width", "height", "stretch" or "shrink"
items	Array of Objects	Array of items to draw

Items can be provided by the construction parameter, using setParams or with addData. Each item is identified by its unique name.

name	String	Name of the data set
title	String	Optional title displayed
info	String	Optional info for tooltips
priority	Number	Priority for z ordering
alignX	Number	Alignment of the title relative to the first coordinate, can be 0 to 1
alignY	Number	Alignment of the title relative to the first coordinate, can be 0 to 1
lineColor	Object / String	Color of line elements
markColor	Object / String	Color of mark elements
fillColor	Object / String	Color of fill
lineWidth	Number	Width of the lines connecting the values
markWidth	Number	Width of the marks at the values
fill	Bool	Fill the polygon
close	Bool	Close the lines to form a polygon
coords	Array of Objects	Array of the coordinates comprised of objects with x and y elements.

```
let canvas = await Mission.addChart("Area", "canvas2d", 0, 0, 1, 1, {items: [
      {name: "tri",
       coords: [{x: 80, y: 20}, {x: 140, y: 140}, {x: 20, y: 140}],
       close: true, fill: true, lineColor: "#ffffff"},
      {name: "title", title: "Triangle",
       coords: [{x: 80, y: 141}], alignX: 0.5}
]});
```

hsplitter – horizontal splitter

vsplitter – vertical splitter

Chart.**prototype**.**setParams**(params, cb)

params	Object	Object containing the named parameters
cb	function(err)	Optional callback

Set parameters for an existing chart

Chart.**prototype**.g**etParams**(params, cb)

params	Array	Array of parameter names
cb	function(err)	Optional callback

Set parameters for an existing chart

Chart.**prototype**.**addData**(data, cb)

data	Array or Object	Data to add to the chart
cb	function(err)	Optional callback

Add data to a chart.

Chart.**prototype**.**remove**(params, cb)

cb	function(err)	Optional callback

Remove a chart from the grid

Chart.**prototype**.**show**(show, cb)

show	Boolean	Show or Hide
cb	function(err)	Optional callback

Show or hide an existing chart

Chart.**prototype**.**addChart**(name, type, x, y, width, height, params, [cb])

name	String	Name of the new chart element
type	String	Type of the new chart element
x	Number	Starting column
y	Number	Starting row

width	Number	Number of columns to cover
height	Number	Number of rows to cover
params	Object	Parameters of the chart element
cb	function(err, chart)	Optional callback

Add additional chart elements in the grid of an existing chart element

Streaming of IQ and other Measurement data – "dspstream.js"

DSPStream.**sendPacket**(stream, packet, cb)

stream	Number	Stream index 0..3
packet	Stream Packet Object	Packet to send
cb	function(err)	Optional callback

Send a packet to the dsp block output with index "stream".

The packet should / may contain the following members:

size	Number	Size of a single sample
depth	Number	Depth of a single sample (e.g. bins in a histogram)
payload	String	Name of the payload type
unit	String	Name of the sample units
startTime	Number	Start time in seconds since the epoch
endTime	Number	End Time in seconds since the epoch
startFrequency	Number	Start of frequency range
endFrequency	Number	End of frequency range
stepFrequency	Number	IQ Sample Rate / Size of FFT Spectrum bin
minValue	Number	Minimum value in range
maxValue	Number	Maximum value in range
start	Boolean	Start of segment indicator
end	Boolean	End of segment indicator
antenna	Antenna Object	Antenna Information
categories	Array	List of category names
samples	Array / TypedArray / Object	Sample data

Spectrum samples should be provided as an array of typed arrays, IQ data as a typed array of complex values.

The antenna object has the following members:

uuid	String	UUID of the antenna
latitude	Number	Latitude of the antenna
longitude	Number	Longitude of the antenna

azimuth	Number	Azimuth of the antenna
declination	Number	Declination of the antenna
segments	Array	Array of antenna segments

DSPStream.**receivePackets**(stream, cb)

stream	Number	Stream index 0..3
cb	function(flags, meta, [samples])	Optional callback

Install a callback to be invoked when a stream packet is received by the dsp block input with index "stream". The callback function can receive the following arguments:

flags	Number	Name of the payload type
meta	Object	Name of the sample units
samples	function([index])	Start time in seconds since the epoch

The meta data element receives an object similar to the object required for the sendPacket function. The samples can be retrieved by calling the samples function with an integer index, or no index for the complete data.

DSPStream.**streamTimer**(cb)

cb	function(err, data)	Optional callback

Create a stream timer. Returns a function that provides the high precision stream time of the DSP graph.

DSPStream.**addBlocks**(blocks, cb)

blocks	Array / Object	Block specifications
cb	function(err, data)	Optional callback

Install a series of dsp processing block into the dsp processing child graph of the script block.

The block specifications are provided as either an array or an object of the following objects.

type	String	Type of DSP block
name	String	Optional name of the DSP block
config	Array	Optional array of path / value pairs for initial configuration

DSPStream.**connectBlocks**(connections, cb)

connections	Array	Connection specifications
cb	function(err, data)	Optional callback

Connect a series of blocks in the dsp child graph of the script block. Each connection specification is an object with the following members:

source	String	Name of source DSP Block
output	String	Optional name of the DSP output
drain	String	Name of target DSP Block
input	String	Optional name of the DSP input

The input DSP blocks for the inbound connections are named “in0”, “in1”, “in2” and “in3” the names of the outbound connections are “out0”, “out1”, “out2” and “out3”. The script DSP block name is “script” and it has the inputs “in0”, “in1”, “in2” and “in3” and the outputs “out0”, “out1”, “out2” and “out3”.

The inbound connectors are connected to the input connections of the DSP script block and the output connectors of the DSP script block are connected to the outbound connections. You may freely reroute this connections.

Plugin Dynamic Link Library

Dynamic link libraries can be used to extend the functionality of the JSIQA system. Communication with the library can be implemented with asynchronous invocation using function call and a callback function or synchronous with direction function calls and an immediate return value.

One type of callback function is used for all asynchronous library calls:

```
typedef void (* PluginCalllback)(
        void * context,
        int64_t data,
        const void * buffer);
```

The callback function and the context parameter are provided by the caller of the library function, the data value and the buffer are the function return. A negative value for data designates an error.

The library should export the following functions:

```
void RTSA_PluginOpen(
        const char16_t * name,
        int64_t index,
        const char16_t * params,
        PluginCalllback callback,
        void * context);
```

Called initially after loading the library. The name, index and params value may be used by the library to provide different resources. The returned value is used as a handle for all further calls.

```
void RTSA_PluginClose(
        int64_t handle,
        PluginCalllback callback,
```

```
        void * context);
```

Called when the plugin is closed by the javascript code. There is no guarantee that this function will be called (e.g. it will not be called if the object representing the handle is destroyed by the garbage collector). Resource management must therefore also be handled by the terminate function.

```
void RTSA_PluginTerminate(
        int64_t handle,
        PluginCalllback callback,
        void * context);
```

Called before the plugin is unloaded. The plugin may not call any other pending plugins or access buffers after completing this call by calling the callback function. This function will be called regardless of the way the javascript object is destroyed.

```
void RTSA_PluginRead(
        int64_t handle,
        int64_t size,
        PluginCalllback callback,
        void * context);
```

Reads an amount of binary data from the library into a javascript ArrayBuffer. The library may use the provided size parameter as an indication for the requested amount. The buffer provided with the callback remains in the possession of the library.

```
void RTSA_PluginWrite(
        int64_t handle,
        int64_t size,
        const void * buffer,
        PluginCalllback callback,
        void * context);
```

Write an amount of binary data from the javacript code to the library. The buffer pointer remains valid until the library is closed or the call is completed using the close function. The amount of data written can be signaled using the data parameter of the callback.

```
void RTSA_PluginControl(
        int64_t handle,
        const char16_t * name,
        int64_t size,
        const void * buffer,
        PluginCalllback callback,
        void * context);
```

Invokes a control function in the library. The function is denoted by the name string. Input data is provided using the binary buffer and returned using a buffer with the callback.

```
void RTSA_PluginBind(
        int64_t handle,
        const char16_t * name,
```

```
        PluginCalllback callback,
        void * context);
```

Bind a synchronous library function by name to a javascript function. The function pointer is provided with the data portion of the callback, the signature with a unicode string in the buffer.

The general signature of the call is one of the following, based on the return type:

```
typedef int64_t (* PluginCall)(void * data);
typedef double (* PluginCallD)(void * data);
typedef char16_t * (* PluginCallS)(void * data);
```

Synchronous calls may not delay the execution or wait for a longer period. The layout of the data buffer is specified with one character per parameter. The first character denotes the return type.

s	Zero terminated Unicode string
b	8 bit integer
w	16 bit integer
i	32 bit integer
l	64 bit integer
f	32 bit float
d	64 bit float
*	Array of one of the integral types. Provided as two elements, a 64 bit size and a 64 bit pointer.

Alignment of all elements is on their natural boundary. Return types may be either s, l or d.

Example:

sbb*i

```
int16_t         w1;
int8_t          b1, b2;
int64_t         a1s;
int32_t *       a1p;
```

The memory of a returned string must be valid and thus cannot be placed on the stack of the called function. A guaranteed buffer of 500 bytes is provided at the end of the data object for this purpose. Longer strings must be allocated on the heap and maintained by the plugin.

DSP Blocks

Storage and Capture

TimeShift

Recording Start	recordstart(datetime) - readonly
Recording End	recordend(datetime) – readonly
Replay Start	replaystart(datetime)

Replay End	replayend(datetime)
Replay Position	replaypos(datetime) – readonly
Replay Speed	replayspeed(number, 1)
Recording	recording(bool, FALSE)
Replaying	replaying(bool, FALSE)
Passthrough	passthrough(bool, FALSE)
Replay No Flush	replaynoflush(bool, FALSE)
Replay Immediate	replayimmediate(bool, FALSE)
Stream Synch	streamsynch(bool, FALSE)
Buffer Size	buffersize(number, 1000000)
Buffer Used	bufferused(number) – readonly

FileWriter

Filename	filename(string)
Record	filerecord(bool, FALSE)
Auto Start	autostart(bool, FALSE)
Add Index	addfileindex(bool, FALSE)
Add Date	addfiledate(bool, FALSE)
Start Index	fileindex(number, 0)
Compression	compression(number, 1)
Previews	previewdist(number, 5.0)

Temporal Processing and Resampling

TimeCompression

Time Compression	compression(number, 1)
Dynamic Full Range	dynamiccompression(bool, FALSE)
Compression Target	compressiontarget(number, 512)
Compression Mode	compressionmode(enum, Max, [Max;Average;Power;First;Min])

TimeResample

Sample Rate	samplerate(number, 1000)
Interpolation	interpolationmode(enum, nearest, [nearest;average;linear;cubic;lanczos;gaussian;maximum;minimum])
Power Domain	powerdomain(bool, FALSE)
Time Offset	timeoffset(number, 0)

TimeErosion

Mode	mode(enum, Erosion, [Erosion;Dilation;Opening;Closing])
Width	width(number, 0)

TimeFIRFilter

Power	powerdomain(bool, FALSE)
Type	type(enum, average, [average;gaussian;sharpen;low pass;high pass])
Deviation	deviation(number, 0)

TimeFFTFilter

Filter Mode	filtermode(enum, Low Pass, [Low Pass;High Pass;Band Pass;Low Reject;High Reject;Band Reject])
FFT Size	fftsize(number, 1024)
Resample Frequency	resamplefreq(number, 10000)
Lower Frequency	lowerfreq(number, 1000)
Upper Frequency	upperfreq(number, 1000)
Transition Frequency	transitionfreq(number, 100)
Pass Response	passresponse(number, 0)
Stop Response	stopresponse(number, -70)

PulsedSegments

Samples	valuesteps(number, 512)
Persistence	persistence(number, 0.8)
Duration	buffertime(number, 0.016)
Jitter	jitter(number, 0)

Arithmetic Processing

LinearTransform

UnaryArithmetic

Offset	offset(bool, false)
Base	base(number, -90)
Mul	mul(number, 1)
Add	add(number, 0)
Min	min(number, -200)
Max	max(number, 2000)

CombiningArithmetic

Power	powerdomain(bool, FALSE)
Combine	combinemode(enum, max, [max;min;avg;add;sub;isub;diff;or;and;andnot;squelch;select])
Condition	condition[enum, C0, [C0;C1;C2;C3;!C0;!C1;!C2;!C3])
Lower Value	lowervalue(number, -120)
Upper Value	uppervalue(number, 20)

SpectrumErosion

Mode	mode(enum, Erosion, [Erosion;Dilation;Opening;Closing])
Width	width(number, 0)

FrequencyFIRFilter

Power	powerdomain(bool, FALSE)
Type	type(enum, average, [average;gaussian;sharpen;low pass;high pass])
Deviation	deviation(number, 0)

SegmentSpectrum

Mode	mode(enum, percent, [percent;frequency;bin])
Start	startratio(number, 0)
Stop	stopratio(number, 1)

SpectrumResample

Accumulation	accu(enum, power, [power;max;min])
Start Frequency	startfreq(number, 0)
End Frequency	endfreq(number, 1)
Bins	bins(number, 1024)

SmoothNoiseFloor

Enable	smoothnoisefloor (bool. false)
Smooth Factor	smoothnoisefloorfactor (number, 0)

PowerUnitConversion

FrequencyUnitConversion

Aggregation and Statistics

MaxHold

Max Samples	maxsamples(number, 0)
Reset	maxreset(trigger)

AntennaMaxHold

Max Samples	maxsamples(number, 1)

MaxFall

Max Samples	maxsamples(number, 0)

MinHold

Max Samples	minholdsamples(number, 0)
Reset	minreset(trigger)

Average

Average Samples	avgsamples(number, 4096)
Average Power	avgpower(bool, FALSE)
Reset	avgreset(trigger)

Utilization

History Duration	historydur(number, 1)
Threshold Power	threshpower(number, -60)

SpectrumOutline

Time Compression	maxsamples(number, 0.1)
Persistence	persistence(number, 0.95)
Sensitivity	sensitivity(number, 0.2)

PulsedSpectrumShape

Histogram Deviation	histdev(number, 16)
Histogram Min Density	histmindens(number, 0.1)
Frequency Span	freqspan(number, 20000000)
Persistence	persistence(number, 0.7)

ChannelPower

Accumulate	accumulate(enum, power, [min;max;average;power;sum;center power])
Time Compression	timecompression(number, 1)
Antenna Segments	antennasegmentmode(enum, individual, [individual;merge;categories;overlap])

DirectionPower

Accumulate	accumulate(enum, power, [min;max;average;power;sum;center power])
Time Compression	timecompression(number, 1)

Histogram

Persistence Factor	persistence(number, 0.75)
Bins	valuesteps(number, 256)
Sampling	sampling(number, 0)
Display Mode	mode(enum, dots, [dots;contiguous;lines;fill;temporal])
Short Pulse Boost	shortboost(bool, false)

SpectralHistogram

Persistence Factor	persistence(number, 0.9)
Bins	valuesteps(number, 256)
Sampling Rate	samplingrate(number, 8000)

Window Function	windowfunction(enum, Hamming, [Hamming;Hann;Uniform;Blackman;Blackman-Harris;Flat-Top;Lanczos])
Eliminate Harmonics	elimharmonics(bool, false)

Detection

PulseDetector

Minimum Power Raise	minraise(number, 10)
Minimum Power	minpower(number, -60)
Minimum Total Power	mintotalpower(number, -40)

IQ Processing

IQNormalize

Auto Adjust Center	autocenter(bool, true)
Auto Adjust Power	autopower(bool, true)
Auto Adjust Circle	autocircle(bool, true)
Auto Adjust IQ Phase	autoiqphase(bool, true)
Target Power	power(number, -15)
Latency	latency(number, 0.5)
Phase Shift	phaseshift(number, 0)
IQ Phase Offset	iqphaseoffset(number, 0)

IQToSpectrumConverter

FFT Size Mode	fftsizemode(enum, FFT, [FFT;Bins;Step Frequency;RBW;RBW FFT;Step Freq. FFT])
FFT Size	fftsize(number, 1024)
FFT Bin Size	fftbinsize(number, 1024)
FFT Step Frequency	fftstepfreq(number, 10000)
FFT RBW Frequency	fftrbwfreq(number, 10000)
FFT Overlap	fftoverlap(number, 0)
FFT Window	fftwindow(enum, Hamming, [Hamming;Hann;Uniform;Blackman;BlackmanHarris;Flat Top;Lanczos])
Power Range	powerrange(number, 90)
Drop Partial	droppartial(bool, true)
FFT Skip Windows	fftskip(number, 0)
Processing Latency	latency(number, 0.006)

IQFrequencyFilter

Filter Type	filtertype(enum, Low Pass, [Low Pass;High Pass;Band Pass;Band Stop;Asymmetric])
Filter Window	filterwindow(enum, Hamming, [Rectangular;Bartlett;Hann;Hamming;Blackman])
Lower Frequency	lowfreq(number, 2000000)
Upper Frequency	highfreq(number, 5000000)
Filter Tabs	filtertabs(number, 7)
Center Frequency	centerfreq(number, 0)
Filter Gain	filtergain(number, 0)

IQDemodulation

Center Frequency	centerfreq(number, 2410000000)
Sample Rate	samplerate(number, 4000000)
Decim. Low Pass	slicelowpass(number, 1)
Span Frequency	spanfreq(number, 2000000)
Processing Latency	latency(number, 0.006)
Bounds Check	boundscheck(bool, true)

IQToTimeSlice

Slice Duration	sclicеduration(number, 0.001)
Slice Low Pass	slicelowpass(number, 1)
Trigger Level	triggerlevel(number, 0)
Trigger Mode	triggermode(enum, free, [free;once;repeat;off])
Trigger Source	triggersource(enum, i, [i;q;r])
Trigger Condition	triggercondition(enum, low, [low;high;rising;falling;both])
Trigger Duration	triggerduration(number, 0.000001)
Trigger Delay	triggerdelay(number, 0)
Trigger Blank	triggerblank(number, 0)

IQHistogram

Persistence Factor	persistence(number, 0.75)
Mode	mode(enum, dots, [dots;contiguous;lines;fill;temporal])
Demodulation	demodmode(enum, none, [none;ofdm;ofdm_diff])
Phase Recovery	modphaserec(enum, none, [none;fixed phase;modulus power])
Modulation Frequency	modfreq(number, 0)
Modulation Phaseshift	modshift(number, 0)
Guard Type	guardtype(enum, blank, [blank;cyclic])

FFT Size	fftsize(number, 32)
Guard Samples	guardsamples(number, 16)
Band Limit Lower	bandlower(number, -4096)
Band Limit Upper	bandupper(number, 4095)
Band Equalization	bandequalization(number, 0)
Symbol Rotation	symbolrotation(number, 0)
Source X	sourcex(enum, i, [i;q;r;rq;phi;dphi;phase;band])
Source Y	sourcey(enum, q, [i;q;r;rq;phi;dphi;phase;band])
Value Bins	valuesteps(number, 256)

IQHistogram3D

Persistence Factor	persistence(number, 0.75)
Mode	mode(enum, dots, [dots;contiguous;lines;fill;temporal])
Demodulation	demodmode(enum, none, [none;ofdm;ofdm_diff])
Phase Recovery	modphaserec(enum, none, [none;fixed phase;modulus power])
Modulation Frequency	modfreq(number, 0)
Modulation Phaseshift	modshift(number, 0)
Guard Type	guardtype(enum, blank, [blank;cyclic])
FFT Size	fftsize(number, 32)
Guard Samples	guardsamples(number, 16)
Band Limit Lower	bandlower(number, -4096)
Band Limit Upper	bandupper(number, 4095)
Band Equalization	bandequalization(number, 0)
Symbol Rotation	symbolrotation(number, 0)
Source X	sourcex(enum, i, [i;q;r;rq;phi;dphi;phase;band])
Source Y	sourcey(enum, q, [i;q;r;rq;phi;dphi;phase;band])
Source Z	sourcez(enum, phase, [i;q;r;rq;phi;dphi;phase;band])
Value Bins	valuesteps(number, 64)

IQCondition

Channel	tchannel(enum, [C0;C1;C2;C3])
Operation	toperation(enum, [Set;Set Not;Or;Or Not;And;And Not])
Hold	thold(number, 0)
Ignore	tignore(number, 0)
Minimum Power	minpower(number, 0.01)

IQSymbolDecoder

Symbol Coding	symcoding(enum, [none; auto; GFSK; BPSK; DBPSK; QPSK; QPSK_C; DQPSK; P4DQPSK; 8DPSK; QAM16; QAM64; QAM256; QAM1024;

	Bluetooth LE; Bluetooth; Bluetooth EDR 2M; Bluetooth EDR 3M; DECT; GSM; WiFi 802.11b; WiFi 802.11g 5MHz; WiFi 802.11g 10MHz; WiFi 802.11g 20MHz; Enhanced Shockburst:SiKRadioMAVLink])
Symbol Frequency	symfreq(number, 1000000)
Power Thresh Percentile	powerpercentile(number, 0.95)
Power Thresh Ratio	powerratio(number, 0.8)

IQSampleDelta

Sample Delta	sampledelta (enum, [bypass,sub,add,mul,rotate])

Sweeping, Stitching and Segmentation

SweepAggregate

Start Frequency	startfreq(number, 1000000)
Stop Frequency	stopfreq(number, 1000000)
Bin Mode	binmode(enum, Size, [Size,Count])
Bin Count	bincount(number, 4096)
Bin Size	stepfreq(number, 100000)
Log Frequency	logfreq(bool, false)
Sample Duration	sampledur(number, 0.03)
Hold Duration	holdduration(number, 0.02)
Aggregate Sweep	aggregate(bool, false)
Overlap Handling	overlap(enum, latest, [latest;max;min;average;floor;range])
Resample Mode	resample(enum, Power, [Power;Max;Min])

SegmentPacker

SpectrumStitcher

Adaptive Sync	adaptsync(bool, true)
Time Step	timestep(enum, any, [min;average;any;max])
Combiner	combindemode(enum, max, [max;min;avg;power;smooth])

MergeCategories

StreamSwitch

Outputs Detached	detached(bool, false)
Input	Input(number, 0, [0;1;2;3])
Outputs	output0(bool, false) output1(bool, false) output2(bool, false) output3(bool, false)

Select

Channel	tchannel(enum, [C0;C1;C2;C3])

SampleHold

Hold	hold(bool, false)

Audio Processing

AudioMonitor

Volume	volume(number, 0.7)
Filter	filter(number, 7200)
Noise Reduction	squelsh(number, 0.1)
Mask Pilot	maskpilot(bool, false)

AudioMergeChannels

Drop Rejected	droprejected(bool, true)

AudioAMFMDecoder

Center Frequency	center(number, 90000000)

Frequency Span	span(number, 130000)
Modulation	modulation(enum, AM, [AM;FM])

AudioMultiAMFMDecode

AudioVoiceFilter

Energy	energybase(number, 1.4)
Persistence	persistence(number, 0.95)
Frequency	frequency(number, 0.375)
Threshold	threshold(number, 0.4)

Video Processing

ImageResize

Crop	crop(enum, none, [none;top left;top;top right;left;center;right;bottom left;bottom;bottom right])
Scale	scale(enum, none, [none;factor;width;height;free])
Crop Width	cropwidth(number, 512)
Crop Height	cropheight(number, 512)
Crop X Offset	cropxoffset(number, 0)
Crop Y Offset	cropyoffset(number, 0)
Scale Width	scalewidth(number, 512)
Scale Height	scaleheight(number, 512)
Scale Factor	scalefactor(number, 1)

ImageGreyscale

Source Channel	sourcechannel(enum, luminance, [luminance;avg;min;max;saturation;red;green;blue;alpha])

ImageContrast

Absolute Value	absvalue(bool, FALSE)
Pre Scale	prescale(number, 1)
Offset	offset(number, 0)
Scale	scale(number, 1)
Threshold	threshold(bool, FALSE)
Lower Limit	lower(number, 0)
Upper Limit	upper(number, 1)

ImageConvolution

Size	filtersize(enum, 3x3, [3x3;5x5])
Filter	filtermode(enum, identity, [identity;inverse;laplace 8+;laplace 8-;laplace 4+;laplace 4-;sharpen;box blur;gauss blur;sobel left;sobel right;sobel top;sobel bottom;mean distance;custom])

ImageMorphologicalOperation

Operation	operation(enum, Erode, [Erode;Dilate;Open;Close;Outline;Median;Lower Bound;Upper Bound;Bound;Offset])
Size	size(number, 1)

VideoGlobalMotionDetection

ImageFFTFilter

Filter Mode	filtermode(enum, Low Pass, [Low Pass;High Pass;Band Pass;Low Reject;High Reject;Band Reject])
Lower Frequency	lowerfreq(number, 1)
Upper Frequency	upperfreq(number, 1)
Transition Frequency	transitionfreq(number, 0.1)
Pass Response	passresponse(number, 0)
Stop Response	stopresponse(number, -70)

ImageFrameDelta

Absolute Value	absolute(bool, FALSE)
Motion Compensation	motioncomp(bool, TRUE)
Expand Previous	expand(number, 0)

ImageRegionLabeling

Min Area	minarea(number, 1)
Max Size	maxsize(number, 2048)

ImageObjectTracking

Neural Network	nnetfile(string,)

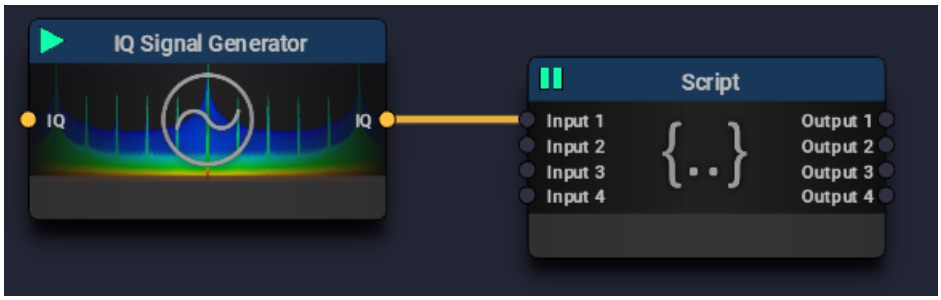
ImageCombining

Combine	combinemode(enum, max, [max;min;avg;add;sub;isub;diff;or;and;andnot;squelch;select;equal; not equal;greater equal;greater;less equal;less])
Condition	condition(enum, C0, [C0;C1;C2;C3;!C0;!C1;!C2;!C3])
Lower Limit	lower(number, 0)
Upper Limit	upper(number, 1)

Samples

Peak Detector

Continuously write the frequency and value of the peak signal in a spectrum to the console.



The data is provided by e.g. the signal generator block.

```
import { DSPStream } from "dspstream.js"

DSPStream.addBlocks({
      fft: {type: "IQToSpectrumConverter", config: {fftsize: 4096}}
}).then(() => {
      return DSPStream.connectBlocks([
            {source: "in0", drain: "fft"},
            {source: "fft", drain: "script", input: "in0"},
      ]);
}).then(() => {
      DSPStream.receivePackets(0, (flags, meta, samples) => {
            if (meta.samples) {
                  let s = samples(0);
                  let r = IQ.rankIndex(s, 1, true)[0];
                  let f = meta.startFrequency + r * meta.stepFrequency;
```

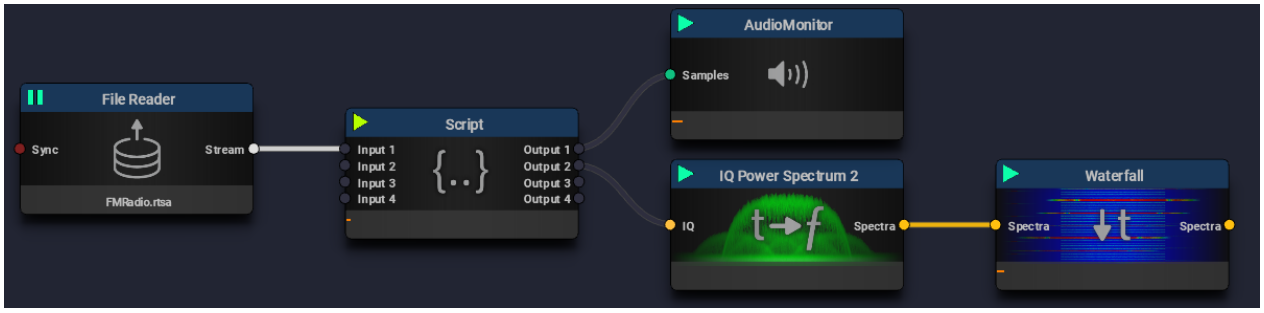
```
                console.log(f, s[r]);
            }
      });
});
```

The script uses an IQ to spectrum converter block that uses an FFT with 4096 bins as a preprocessor. The output of the FFT block is forwarded to the script input connection 0.

The receive packet callback searches for the highest value in the first spectrum of each packet and dumps the frequency and signal strength. Using only the first spectrum reduces the rate of processing.

FM Demodulator

The sample FM demodulator uses the phase change of the demodulated IQ samples as an measurement of the FM modulation.



The data is streamed from a file into the first input, demodulated and converted to audio. The result is displayed in a waterfall view and played as audio.

```
import { DSPStream } from "dspstream.js"

DSPStream.addBlocks({
      demodulator: {type: "IQDemodulation", config: {
            centerfreq: 100.395e6, samplerate: 192000, spanfreq: 48000}},
      sampleDelta: {type: "IQSampleDelta", config: {sampledelta: "rotate"}}
}).then(() => {
      return DSPStream.connectBlocks([
            {source: "in0",         drain: "demodulator"},
            {source: "demodulator", drain: "sampleDelta"},
            {source: "sampleDelta", drain: "script", input: "in0"},
            {source: "demodulator", drain: "out1"},
      ]);
}).then(() => {
      DSPStream.receivePackets(0, (flags, meta, samples) => {
            let s = samples();
```

```
            DSPStream.sendPacket(0, {
                        payload:  "audio",
                        samples:   IQ.mul(IQ.phi(s), 0.25),
                        startTime: meta.startTime,
                        endTime:   meta.endTime
                    });
      });
});
```

The script uses two preprocessing blocks, a demodulator to move the FM signal to the center and reduce the sample rate to audio rate and a sample delta block to convert the IQ samples to relative rotations. Each sample is rotated by the complex conjugate of the previous sample and thus represents the phase change.

The blocks are connected in the second section and attached to the script input 0 and the block output 1 for inspection.

The receivePackets installs a callback, that is called with each incoming IQ packet. The IQ object uses the "phi" to convert all samples to their phase from -pi to +pi and multiplies them by 0.25 to get them into sample range. A new packet, now with audio data, is then sent to the block output 0 and played by the attached Audio Monitor block.