

QATzip  
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# Contents

<b>1</b>	<b>Module Index</b>	<b>1</b>
1.1	Modules	1
<b>2</b>	<b>Class Index</b>	<b>3</b>
2.1	Class List	3
<b>3</b>	<b>File Index</b>	<b>5</b>
3.1	File List	5
<b>4</b>	<b>Module Documentation</b>	<b>7</b>
4.1	Data Compression API	7
4.1.1	Detailed Description	8
4.1.2	Macro Definition Documentation	8
4.1.2.1	QZ_OK	8
4.1.2.2	QZ_SKID_PAD_SZ	8
4.1.3	Typedef Documentation	9
4.1.3.1	QzCrcType_T	9
4.1.3.2	QzDataFormat_T	9
4.1.3.3	QzDirection_T	9
4.1.3.4	QzHuffmanHdr_T	9
4.1.3.5	QzSession_T	10
4.1.3.6	QzSessionParams_T	10
4.1.3.7	QzStatus_T	10
4.1.3.8	QzStream_T	10
4.1.4	Enumeration Type Documentation	10
4.1.4.1	PinMem_T	10
4.1.4.2	QzCrcType_E	11
4.1.4.3	QzDataFormat_E	11
4.1.4.4	QzDirection_E	11
4.1.4.5	QzHuffmanHdr_E	11
4.1.5	Function Documentation	12
4.1.5.1	qzClose	12

4.1.5.2	<a href="#">qzCompress</a>	13
4.1.5.3	<a href="#">qzCompressCrc</a>	14
4.1.5.4	<a href="#">qzCompressStream</a>	14
4.1.5.5	<a href="#">qzDecompress</a>	15
4.1.5.6	<a href="#">qzDecompressStream</a>	16
4.1.5.7	<a href="#">qzEndStream</a>	17
4.1.5.8	<a href="#">qzFree</a>	18
4.1.5.9	<a href="#">qzGetDefaults</a>	18
4.1.5.10	<a href="#">qzGetStatus</a>	19
4.1.5.11	<a href="#">qzInit</a>	20
4.1.5.12	<a href="#">qzMalloc</a>	20
4.1.5.13	<a href="#">qzMemFindAddr</a>	21
4.1.5.14	<a href="#">qzSetDefaults</a>	22
4.1.5.15	<a href="#">qzSetupSession</a>	22
4.1.5.16	<a href="#">qzTeardownSession</a>	23
<b>5</b>	<b>Class Documentation</b>	<b>25</b>
5.1	<a href="#">QzSession_S Struct Reference</a>	25
5.1.1	<a href="#">Detailed Description</a>	25
5.1.2	<a href="#">Member Data Documentation</a>	25
5.1.2.1	<a href="#">hw_session_stat</a>	25
5.1.2.2	<a href="#">internal</a>	25
5.1.2.3	<a href="#">thd_sess_stat</a>	25
5.1.2.4	<a href="#">total_in</a>	25
5.1.2.5	<a href="#">total_out</a>	26
5.2	<a href="#">QzSessionParams_S Struct Reference</a>	26
5.2.1	<a href="#">Detailed Description</a>	26
5.2.2	<a href="#">Member Data Documentation</a>	26
5.2.2.1	<a href="#">comp_algorithm</a>	26
5.2.2.2	<a href="#">comp_lvl</a>	26
5.2.2.3	<a href="#">data_fmt</a>	26
5.2.2.4	<a href="#">direction</a>	26
5.2.2.5	<a href="#">huffman_hdr</a>	27
5.2.2.6	<a href="#">hw_buff_sz</a>	27
5.2.2.7	<a href="#">input_sz_thrshold</a>	27
5.2.2.8	<a href="#">max_forks</a>	27
5.2.2.9	<a href="#">poll_sleep</a>	27
5.2.2.10	<a href="#">req_cnt_thrshold</a>	27
5.2.2.11	<a href="#">strm_buff_sz</a>	27
5.2.2.12	<a href="#">sw_backup</a>	27

5.2.2.13	wait_cnt_thrshold	27
5.3	QzStatus_S Struct Reference	27
5.3.1	Detailed Description	28
5.3.2	Member Data Documentation	28
5.3.2.1	algo_hw	28
5.3.2.2	algo_sw	28
5.3.2.3	hw_session_status	28
5.3.2.4	memory_allocated	28
5.3.2.5	qat_hw_count	28
5.3.2.6	qat_instance_attach	28
5.3.2.7	qat_mem_drvr	28
5.3.2.8	qat_service_stated	28
5.3.2.9	using_huge_pages	29
5.4	QzStream_S Struct Reference	29
5.4.1	Detailed Description	29
5.4.2	Member Data Documentation	29
5.4.2.1	crc_32	29
5.4.2.2	crc_64	29
5.4.2.3	crc_type	29
5.4.2.4	in	29
5.4.2.5	in_sz	30
5.4.2.6	opaque	30
5.4.2.7	out	30
5.4.2.8	out_sz	30
5.4.2.9	pending_in	30
5.4.2.10	pending_out	30
5.4.2.11	reserved	30
<b>6</b>	<b>File Documentation</b>	<b>31</b>
6.1	include/qatzip.h File Reference	31
6.1.1	Macro Definition Documentation	33
6.1.1.1	MIN	33
6.1.1.2	QZ_BUF_ERROR	33
6.1.1.3	QZ_COMP_ALGOL_DEFAULT	33
6.1.1.4	QZ_COMP_LEVEL_DEFAULT	33
6.1.1.5	QZ_COMP_THRESHOLD_DEFAULT	33
6.1.1.6	QZ_COMP_THRESHOLD_MINIMUM	33
6.1.1.7	QZ_DATA_ERROR	33
6.1.1.8	QZ_DATA_FORMAT_DEFAULT	33
6.1.1.9	QZ_DEFLATE	33

6.1.1.10	QZ_DIRECTION_DEFAULT	33
6.1.1.11	QZ_DUPLICATE	33
6.1.1.12	QZ_FAIL	33
6.1.1.13	QZ_FORCE_SW	33
6.1.1.14	QZ_HUFF_HDR_DEFAULT	34
6.1.1.15	QZ_HW_BUFF_MAX_SZ	34
6.1.1.16	QZ_HW_BUFF_MIN_SZ	34
6.1.1.17	QZ_HW_BUFF_SZ	34
6.1.1.18	QZ_LOW_MEM	34
6.1.1.19	QZ_LZ4	34
6.1.1.20	QZ_MAX_ALGORITHMS	34
6.1.1.21	QZ_MAX_FORK_DEFAULT	34
6.1.1.22	QZ_MEMCPY	34
6.1.1.23	QZ_NO_HW	34
6.1.1.24	QZ_NO_INST_ATTACH	34
6.1.1.25	QZ_NO_MDRV	34
6.1.1.26	QZ_NONE	34
6.1.1.27	QZ_NOSW_LOW_MEM	34
6.1.1.28	QZ_NOSW_NO_HW	34
6.1.1.29	QZ_NOSW_NO_INST_ATTACH	34
6.1.1.30	QZ_NOSW_NO_MDRV	34
6.1.1.31	QZ_PARAMS	35
6.1.1.32	QZ_POLL_SLEEP_DEFAULT	35
6.1.1.33	QZ_REQ_THRESHOLD_DEFAULT	35
6.1.1.34	QZ_REQ_THRESHOLD_MAXINUM	35
6.1.1.35	QZ_REQ_THRESHOLD_MINIMUM	35
6.1.1.36	QZ_SNAPPY	35
6.1.1.37	QZ_STRM_BUFF_MAX_SZ	35
6.1.1.38	QZ_STRM_BUFF_MIN_SZ	35
6.1.1.39	QZ_STRM_BUFF_SZ_DEFAULT	35
6.1.1.40	QZ_SW_BACKUP_DEFAULT	35
6.1.1.41	QZ_WAIT_CNT_THRESHOLD_DEFAULT	35
6.1.2	Function Documentation	35
6.1.2.1	qzMaxCompressedLength	35

# Chapter 1

## Module Index

### 1.1 Modules

Here is a list of all modules:

Data Compression API . . . . .	7
--------------------------------	---





## Chapter 2

# Class Index

### 2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

<a href="#">QzSession_S</a> . . . . .	25
<a href="#">QzSessionParams_S</a> . . . . .	26
<a href="#">QzStatus_S</a> . . . . .	27
<a href="#">QzStream_S</a> . . . . .	29



## Chapter 3

# File Index

### 3.1 File List

Here is a list of all files with brief descriptions:

include/ <a href="#">qatzip.h</a> . . . . .	31
---	----



## Chapter 4

# Module Documentation

### 4.1 Data Compression API

#### Classes

- struct [QzSessionParams\\_S](#)
- struct [QzSession\\_S](#)
- struct [QzStatus\\_S](#)
- struct [QzStream\\_S](#)

#### Macros

- `#define QZ\_OK (0)`
- `#define QZ\_SKID\_PAD\_SZ 48`

#### Typedefs

- typedef enum [QzHuffmanHdr\\_E](#) [QzHuffmanHdr\\_T](#)
- typedef enum [QzDirection\\_E](#) [QzDirection\\_T](#)
- typedef enum [QzDataFormat\\_E](#) [QzDataFormat\\_T](#)
- typedef enum [QzCrcType\\_E](#) [QzCrcType\\_T](#)
- typedef struct [QzSessionParams\\_S](#) [QzSessionParams\\_T](#)
- typedef struct [QzSession\\_S](#) [QzSession\\_T](#)
- typedef struct [QzStatus\\_S](#) [QzStatus\\_T](#)
- typedef struct [QzStream\\_S](#) [QzStream\\_T](#)

#### Enumerations

- enum [QzHuffmanHdr\\_E](#) { [QZ\\_DYNAMIC\\_HDR](#) = 0, [QZ\\_STATIC\\_HDR](#) }
- enum [PinMem\\_T](#) { [COMMON\\_MEM](#) = 0, [PINNED\\_MEM](#) }
- enum [QzDirection\\_E](#) { [QZ\\_DIR\\_COMPRESS](#) = 0, [QZ\\_DIR\\_DECOMPRESS](#), [QZ\\_DIR\\_BOTH](#) }
- enum [QzDataFormat\\_E](#) { [QZ\\_DEFLATE\\_RAW](#) = 0, [QZ\\_DEFLATE\\_GZIP](#), [QZ\\_DEFLATE\\_GZIP\\_EXT](#), [QZ\\_FMT\\_NUM](#) }
- enum [QzCrcType\\_E](#) { [QZ\\_CRC32](#) = 0, [QZ\\_CRC64](#), [QZ\\_ADLER](#), [NONE](#) }

## Functions

- int [qzInit](#) ([QzSession\\_T](#) \*sess, unsigned char sw\_backup)
- int [qzSetupSession](#) ([QzSession\\_T](#) \*sess, [QzSessionParams\\_T](#) \*params)
- int [qzCompress](#) ([QzSession\\_T](#) \*sess, const unsigned char \*src, unsigned int \*src\_len, unsigned char \*dest, unsigned int \*dest\_len, unsigned int last)
- int [qzCompressCrc](#) ([QzSession\\_T](#) \*sess, const unsigned char \*src, unsigned int \*src\_len, unsigned char \*dest, unsigned int \*dest\_len, unsigned int last, unsigned long \*crc)
- int [qzDecompress](#) ([QzSession\\_T](#) \*sess, const unsigned char \*src, unsigned int \*src\_len, unsigned char \*dest, unsigned int \*dest\_len)
- int [qzTeardownSession](#) ([QzSession\\_T](#) \*sess)
- int [qzClose](#) ([QzSession\\_T](#) \*sess)
- int [qzGetStatus](#) ([QzSession\\_T](#) \*sess, [QzStatus\\_T](#) \*status)
- int [qzSetDefaults](#) ([QzSessionParams\\_T](#) \*defaults)
- int [qzGetDefaults](#) ([QzSessionParams\\_T](#) \*defaults)
- void \* [qzMalloc](#) (size\_t sz, int numa, int force\_pinned)
- void [qzFree](#) (void \*m)
- int [qzMemFindAddr](#) (unsigned char \*a)
- int [qzCompressStream](#) ([QzSession\\_T](#) \*sess, [QzStream\\_T](#) \*strm, unsigned int last)
- int [qzDecompressStream](#) ([QzSession\\_T](#) \*sess, [QzStream\\_T](#) \*strm, unsigned int last)
- int [qzEndStream](#) ([QzSession\\_T](#) \*sess, [QzStream\\_T](#) \*strm)

### 4.1.1 Detailed Description

These functions specify the API for Data Compression operations.

Remarks

### 4.1.2 Macro Definition Documentation

#### 4.1.2.1 #define QZ\_OK (0)

QATZIP Session Status definitions and function return codes

This list identifies valid values for session status and function return codes. Success

#### 4.1.2.2 #define QZ\_SKID\_PAD\_SZ 48

Get the max compressed output length

Get the max compressed output length

This function shall not be called in an interrupt context. None None Yes No Yes

Parameters

in	src_sz	Input data length in byte.
----	--------	----------------------------

Return values

dest_sz	Max compressed data output length in byte. When src_sz equal to 0, the return value is 0.
---------	---

**Precondition**

None

**Postcondition**

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None

**4.1.3 Typedef Documentation****4.1.3.1 typedef enum QzCrcType\_E QzCrcType\_T**

Supported checksum type

This enumerated list identifies the checksum type for input/output data. A format can be CRC32, CRC64, Adler or none.

**4.1.3.2 typedef enum QzDataFormat\_E QzDataFormat\_T**

Streaming API input and output format

This enumerated list identifies the data format supported by QATzip streaming API. A format can be raw deflate data block, deflate block wrapped by GZip header and footer, or deflate data block wrapped by GZip extension header and footer.

**4.1.3.3 typedef enum QzDirection\_E QzDirection\_T**

Compress or decompress setting

This enumerated list identifies the session directions supported by QATzip. A session can be compress, decompress or both.

**4.1.3.4 typedef enum QzHuffmanHdr\_E QzHuffmanHdr\_T**

This API provides access to underlying compression functions in QAT hardware. The API supports an implementation that provides compression service in software if not all of the required resources are not available to execute the compression service in hardware.

The API supports threaded applications. Applications can create threads and each of these threads can invoke the API defined herein.

For simplicity, initializations and setup function calls are not required to obtain compression services. If the initialization and setup functions are not called before compression or decompression requests, then they will be called with default arguments from within the compression or decompression functions. This results in several legal calling scenarios, described below.

Scenario 1 - all functions explicitly invoked by caller, with all arguments provided

```
qzInit(&sess_c, sw_backup); qzSetupSession(&sess_c, &params); qzCompress(&sess, src, &src_len, dest, &dest_len, 1); qzDecompress(&sess, src, &src_len, dest, &dest_len); qzTeardownSession(&sess); qzClose(&sess);
```

Scenario 2 - initialization function called, setup function not invoked by caller. This scenario can be used to specify the `sw_backup` argument to `qzInit`.

```
qzInit(&sess, sw_backup); qzCompress(&sess, src, &src_len, dest, &dest_len, 1); calls qzSetupSession(sess, NULL); qzTeardownSession(&sess); qzClose(&sess);
```

Scenario 3 - calling application simply invokes the actual `qzCompress` functions

```
qzCompress(&sess, src, &src_len, dest, &dest_len, 0); calls qzInit sess, 1); calls qzSetupSession(sess, NULL); qzCompress(&sess, src, &src_len, dest, &dest_len, 1);
```

Notes: Invoking `qzSetupSession` with `NULL` for params sets up a session with default session attributed, detailed in the function description below.

If an application terminates with out invoking tear down and close functions, process termination will invoke memory and hardware instance cleanup.

If a thread terminates without invoking tear down and close functions, memory and hardware are not cleanup until the application exits.

#### Supported Huffman Headers

This enumerated list identifies the Huffman header types supported by QATZip

#### 4.1.3.5 typedef struct QzSession\_S QzSession\_T

QATZIP Session opaque data storage

This structure contains a pointer to a structure with session state

#### 4.1.3.6 typedef struct QzSessionParams\_S QzSessionParams\_T

QATZIP Session Initialization parameters

This structure contains data for initializing a session

#### 4.1.3.7 typedef struct QzStatus\_S QzStatus\_T

QATZIP status structure

This structure contains data relating to the stat usof QAT on the platform

#### 4.1.3.8 typedef struct QzStream\_S QzStream\_T

QATZIP Stream data storage

This structure contains metadata needed for stream operation

### 4.1.4 Enumeration Type Documentation

#### 4.1.4.1 enum PinMem\_T

##### Supported memory types

This enumerated list identifies memory types supported by QATZip.

##### Enumerator

**COMMON\_MEM** Allocate non-continous memory

**PINNED\_MEM** Allocate continous memory



#### 4.1.4.2 enum QzCrcType\_E

Supported checksum type

This enumerated list identifies the checksum type for input/output data. A format can be CRC32, CRC64, Adler or none.

##### Enumerator

**QZ\_CRC32** CRC32 checksum  
**QZ\_CRC64** CRC64 checksum  
**QZ\_ADLER** Adler checksum  
**NONE** No checksum

#### 4.1.4.3 enum QzDataFormat\_E

Streaming API input and output format

This enumerated list identifies the data format supported by QATZip streaming API. A format can be raw deflate data block, deflate block wrapped by GZip header and footer, or deflate data block wrapped by GZip extension header and footer.

##### Enumerator

**QZ\_DEFLATE\_RAW** Data is in raw deflate format  
**QZ\_DEFLATE\_GZIP** Data is in deflate wrapped by GZip header and footer  
**QZ\_DEFLATE\_GZIP\_EXT** Data is in deflate wrapped by GZip extension header and footer  
**QZ\_FMT\_NUM**

#### 4.1.4.4 enum QzDirection\_E

Compress or decompress setting

This enumerated list identifies the session directions supported by QATZip. A session can be compress, decompress or both.

##### Enumerator

**QZ\_DIR\_COMPRESS** Session will be used for compression  
**QZ\_DIR\_DECOMPRESS** Session will be used for decompression  
**QZ\_DIR\_BOTH** Session will be used for both compression and decompression

#### 4.1.4.5 enum QzHuffmanHdr\_E

This API provides access to underlying compression functions in QAT hardware. The API supports an implementation that provides compression service in software if not all of the required resources are not available to execute the compression service in hardware.

The API supports threaded applications. Applications can create threads and each of these threads can invoke the API defined herein.

For simplicity, initializations and setup function calls are not required to obtain compression services. If the initialization and setup functions are not called before compression or decompression requests, then they will be called with default arguments from within the compression or decompression functions. This results in several legal calling scenarios, described below.

Scenario 1 - all functions explicitly invoked by caller, with all arguments provided

```
qzInit(&sess_c, sw_backup); qzSetupSession(&sess_c, &params); qzCompress(&sess, src, &src_len, dest, &dest_len, 1); qzDecompress(&sess, src, &src_len, dest, &dest_len); qzTeardownSession(&sess); qzClose(&sess);
```

Scenario 2 - initialization function called, setup function not invoked by caller. This scenario can be used to specify the `sw_backup` argument to `qzInit`.

```
qzInit(&sess, sw_backup); qzCompress(&sess, src, &src_len, dest, &dest_len, 1); calls qzSetupSession(sess, NULL); qzTeardownSession(&sess); qzClose(&sess);
```

Scenario 3 - calling application simply invokes the actual `qzCompress` functions

```
qzCompress(&sess, src, &src_len, dest, &dest_len, 0); calls qzInit sess, 1); calls qzSetupSession(sess, NULL); qzCompress(&sess, src, &src_len, dest, &dest_len, 1);
```

Notes: Invoking `qzSetupSession` with `NULL` for `params` sets up a session with default session attributed, detailed in the function description below.

If an application terminates with out invoking tear down and close functions, process termination will invoke memory and hardware instance cleanup.

If a thread terminates without invoking tear down and close functions, memory and hardware are not cleanup until the application exits.

#### Supported Huffman Headers

This enumerated list identifies the Huffman header types supported by QATZip

#### Enumerator

***QZ\_DYNAMIC\_HDR*** Full Dynamic Huffman Trees

***QZ\_STATIC\_HDR*** Static Huffman Trees

### 4.1.5 Function Documentation

#### 4.1.5.1 int qzClose ( QzSession\_T \* sess )

terminates a QATZip session

This function closes the connection with QAT

This function shall not be called in an interrupt context. None None Yes No Yes

#### Parameters

in	sess	pointer to session data
----	------	-------------------------

#### Return values

<i>QZ_OK</i>	Function executed successfully.
<i>QZ_FAIL</i>	Function did not succeed.
<i>QZ_PARAMS</i>	*sess is NULL or member of params is invalid

#### Precondition

None

#### Postcondition

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None

**4.1.5.2** `int qzCompress ( QzSession_T * sess, const unsigned char * src, unsigned int * src_len, unsigned char * dest, unsigned int * dest_len, unsigned int last )`

*compress a buffer*

This function will compress a buffer if either a hardware based session or a software based session is available. If no session has been established - as indicated by the contents of \*sess - then this function will attempt to set up a session using qzInit and qzSetupSession.

The resulting compressed block of data will be composed of one or more gzip blocks per RFC 1952.

This function will place completed compression blocks in the output buffer.

The caller must check the updated src\_len. This value will be the number of consumed bytes on exit. The calling API may have to process the destination buffer and call again.

The parameter dest\_len will be set to the number of bytes produced in the destination buffer. This value may be zero if no data was produced which may occur if the consumed data is retained internally. A possible reason for this may be small amounts of data in the src buffer.

This function shall not be called in an interrupt context. None None Yes No Yes

**Parameters**

in	sess	Session handle
in	src	point to source buffer
in, out	src_len	length of source buffer. Modified to number of bytes consumed
in	dest	point to destination buffer
in, out	dest_len	length of destination buffer. Modified to length of compressed data when function returns
in	last	1 for 'No more data to be compressed' 0 for 'More data to be compressed'

**Return values**

QZ_OK	Function executed successfully.
QZ_FAIL	Function did not succeed.
QZ_PARAMS	*sess is NULL or member of params is invalid

**Precondition**

None

**Postcondition**

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None

#### 4.1.5.3 int qzCompressCrc ( QzSession\_T \* sess, const unsigned char \* src, unsigned int \* src\_len, unsigned char \* dest, unsigned int \* dest\_len, unsigned int last, unsigned long \* crc )

compress a buffer and return the CRC checksum

This function will compress a buffer if either a hardware based session or a software based session is available. If no session has been established - as indicated by the contents of \*sess - then this function will attempt to set up a session using qzInit and qzSetupSession.

The resulting compressed block of data will be composed of one or more gzip blocks per RFC 1952.

This function will place completed compression blocks in the output buffer and put CRC32 checksum for compressed input data in user provided bufer \*crc.

The caller must check the updated src\_len. This value will be the number of consumed bytes on exit. The calling API may have to process the destination buffer and call again.

The parameter dest\_len will be set to the number of bytes produced in the destination buffer. This value may be zero if no data was produced which may occur if the consumed data is retained internally. A possible reason for this may be small amounts of data in the src buffer.

This function shall not be called in an interrupt context. None None Yes No Yes

##### Parameters

in	sess	Session handle
in	src	point to source buffer
in, out	src_len	length of source buffer. Modified to number of bytes consumed
in	dest	point to destination buffer
in, out	dest_len	length of destination buffer. Modified to length of compressed data when function returns
in	last	1 for 'No more data to be compressed' 0 for 'More data to be compressed'
in, out	crc	point to CRC32 checksum buffer

##### Return values

QZ_OK	Function executed successfully.
QZ_FAIL	Function did not succeed.
QZ_PARAMS	*sess is NULL or member of params is invalid

##### Precondition

None

##### Postcondition

None

##### Note

Only a synchronous version of this function is provided.

##### See Also

None

#### 4.1.5.4 int qzCompressStream ( QzSession\_T \* sess, QzStream\_T \* strm, unsigned int last )

compress data in stream and return checksum

This function will compress data in stream buffer if either a hardware based session or a software based session is available. If no session has been established - as indicated by the contents of *\*sess* - then this function will attempt to set up a session using *qzInit* and *qzSetupSession*. The function will start to compress the data when receiving sufficient number of bytes - as defined by *hw\_buf\_sz* in *QzSessionParams\_T* - or reaching the end of input data - as indicated by last parameter.

The resulting compressed block of data will be composed of one or more gzip blocks per RFC 1952 or deflate blocks per RFC 1951.

This function will place completed compression blocks in the *\*out* of *QzStream\_T* structure and put checksum for compressed input data in *crc32/crc64* of *QzStream\_T* structure.

The caller must check the updated *in\_sz* of *QzStream\_T*. This value will be the number of consumed bytes on exit. The calling API may have to process the destination buffer and call again.

The parameter *out\_sz* in *QzStream\_T* will be set to the number of bytes produced in the destination buffer. This value may be zero if no data was produced which may occur if the consumed data is retained internally. A possible reason for this may be small amounts of data in the *src* buffer.

The caller must check the updated *pending\_in* of *QzStream\_T*. This value will be the number of unprocessed bytes held in *QATZip*. The calling API may have to feed more input data or indicate reaching the end of input and call again.

The caller must check the updated *pending\_out* of *QzStream\_T*. This value will be the number of processed bytes held in *QATZip*. The calling API may have to process the destination buffer and call again.

This function shall not be called in an interrupt context. None None Yes No Yes

#### Parameters

<i>in</i>	<i>sess</i>	Session handle
<i>in, out</i>	<i>strm</i>	Stream handle
<i>in</i>	<i>last</i>	1 for 'No more data to be compressed' 0 for 'More data to be compressed'

#### Return values

<i>QZ_OK</i>	Function executed successfully.
<i>QZ_FAIL</i>	Function did not succeed.
<i>QZ_PARAMS</i>	<i>*sess</i> is NULL or member of params is invalid

#### Precondition

None

#### Postcondition

None

#### Note

Only a synchronous version of this function is provided.

#### See Also

None

**4.1.5.5** `int qzDecompress ( QzSession_T * sess, const unsigned char * src, unsigned int * src_len, unsigned char * dest, unsigned int * dest_len )`

decompress a buffer

This function will decompress a buffer if either a hardware based session or a software based session is available. If no session has been established - as indicated by the contents of *\*sess* - then this function will attempt to set up a session using *qzInit* and *qzSetupSession*.

The input compressed block of data will be composed of one or more gzip blocks per RFC1952.

This function shall not be called in an interrupt context. None None Yes No Yes

#### Parameters

<i>in</i>	<i>sess</i>	Session handle
<i>in</i>	<i>src</i>	point to source buffer
<i>in</i>	<i>src_len</i>	length of source buffer. Modified to length of processed compressed data when function returns
<i>in</i>	<i>dest</i>	point to destination buffer
<i>in, out</i>	<i>dest_len</i>	length of destination buffer. Modified to length of decompressed data when function returns

#### Return values

<i>QZ_OK</i>	Function executed successfully.
<i>QZ_FAIL</i>	Function did not succeed.
<i>QZ_PARAMS</i>	<i>*sess</i> is NULL or member of params is invalid

#### Precondition

None

#### Postcondition

None

#### Note

Only a synchronous version of this function is provided.

#### See Also

None

#### 4.1.5.6 `int qzDecompressStream ( QzSession_T * sess, QzStream_T * strm, unsigned int last )`

decompress data in stream and return checksum

This function will decompress data in stream buffer if either a hardware based session or a software based session is available. If no session has been established - as indicated by the contents of *\*sess* - then this function will attempt to set up a session using *qzInit* and *qzSetupSession*. The function will start to decompress the data when receiving sufficient number of bytes - as defined by *hw\_buf\_sz* in *QzSessionParams\_T* - or reaching the end of input data - as indicated by last parameter.

The input compressed block of data will be composed of one or more gzip blocks per RFC 1952 or deflate blocks per RFC 1951.

This function will place completed uncompression blocks in the *\*out* of *QzStream\_T* structure and put checksum for uncompressed data in *crc32/crc64* of *QzStream\_T* structure.

The caller must check the updated *in\_sz* of *QzStream\_T*. This value will be the number of consumed bytes on exit. The calling API may have to process the destination buffer and call again.

The parameter *out\_sz* in *QzStream\_T* will be set to the number of bytes produced in the destination buffer. This value may be zero if no data was produced which may occur if the consumed data is retained internally. A possible reason for this may be small amounts of data in the *src* buffer.

The caller must check the updated `pending_in` of `QzStream_T`. This value will be the number of unprocessed bytes held in `QATZip`. The calling API may have to feed more input data or indicate reaching the end of input and call again.

The caller must check the updated `pending_out` of `QzStream_T`. This value will be the number of processed bytes held in `QATZip`. The calling API may have to process the destination buffer and call again.

This function shall not be called in an interrupt context. None None Yes No Yes

#### Parameters

<code>in</code>	<code>sess</code>	Session handle
<code>in, out</code>	<code>strm</code>	Stream handle
<code>in</code>	<code>last</code>	1 for 'No more data to be compressed' 0 for 'More data to be compressed'

#### Return values

<code>QZ_OK</code>	Function executed successfully.
<code>QZ_FAIL</code>	Function did not succeed.
<code>QZ_PARAMS</code>	* <code>sess</code> is NULL or member of params is invalid
<code>QZ_NEED_MORE</code>	* <code>last</code> is set but end of block is absent

#### Precondition

None

#### Postcondition

None

#### Note

Only a synchronous version of this function is provided.

#### See Also

None

#### 4.1.5.7 `int qzEndStream ( QzSession_T * sess, QzStream_T * strm )`

terminates a `QATZip` stream

This function disconnect stream handle from session handle then reset stream flag and release stream memory.

This function shall not be called in an interrupt context. None None Yes No Yes

#### Parameters

<code>in</code>	<code>sess</code>	pointer to session data
-----------------	-------------------	-------------------------

#### Return values

<code>QZ_OK</code>	Function executed successfully.
<code>QZ_FAIL</code>	Function did not succeed.
<code>QZ_PARAMS</code>	* <code>sess</code> is NULL or member of params is invalid

#### Precondition

None

**Postcondition**

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None

**4.1.5.8 void qzFree ( void \* *m* )**

Free allocated memory

Free allocated memory

This function shall not be called in an interrupt context. None None Yes No Yes

**Parameters**

in	<i>m</i>	Memory address to be freed.
----	----------	-----------------------------

**Precondition**

None

**Postcondition**

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None

**4.1.5.9 int qzGetDefaults ( QzSessionParams\_T \* *defaults* )**

Get default QzSessionParams\_T value

Get default QzSessionParams\_T value

This function shall not be called in an interrupt context. None None Yes No Yes

**Parameters**

in	<i>defaults</i>	The pointer to default value.
----	-----------------	-------------------------------



## Return values

<i>QZ_OK</i>	Success on getting default value.
<i>QZ_PARAM</i>	Fail to get default value.

## Precondition

None

## Postcondition

None

## Note

Only a synchronous version of this function is provided.

## See Also

None

4.1.5.10 `int qzGetStatus ( QzSession_T * sess, QzStatus_T * status )`

Get current QAT status

This function retrieves the status of QAT in the platform. The status structure will be filled in as follows: `qat_hw_count` number of discovered QAT devices on PCU bus `qat_service_stated` 1 if `qzInit` has been successfully run, 0 otherwise `qat_mem_drvr` 1 if the QAT memory driver is installed, 0 otherwise `qat_instance_attach` 1 if session has attached to a hardware instance, 0 otherwise `memory_allocated` amount of memory, in kilobytes, from kernel or huge pages allocated by this process/thread. `using_huge_pages` 1 if memory is being allocated from huge pages, 0 if memory is being allocated from standard kernel memory `hw_session_stat` Hw session status: one of: `QZ_OK` `QZ_FAIL` `QZ_NO_HW` `QZ_NO_MDRV` `QZ_NO_INST_ATTACH` `QZ_LOW_MEM` `QZ_NOSW_NO_HW` `QZ_NOSW_MDRV` `QZ_NOSW_NO_INST_ATTACH` `QZ_NOSW_LOW_MEM`

This function shall not be called in an interrupt context. None None Yes No Yes

## Parameters

in	<i>sess</i>	pointer to opaque instance and session data.
in	<i>status</i>	pointer to QATZIP status structure.

## Return values

<i>QZ_OK</i>	Function executed successfully. A hardware based compression session has been created.
<i>QZ_PARAMS</i>	*status is NULL

## Precondition

None

## Postcondition

None

## Note

Only a synchronous version of this function is provided.

## See Also

None

#### 4.1.5.11 `int qzInit ( QzSession_T * sess, unsigned char sw_backup )`

Initialize QAT hardware

This function initializes the QAT hardware. This function is optional in the function calling sequence. If desired, this call can be made to avoid latency impact during the first call to `qzDecompress` or `qzCompress`, or to set the `sw_backup` parameter explicitly. The input parameter `sw_backup` specifies the behavior of the function and that of the functions called with the same session in the event there are insufficient resources to establish a QAT based compression or decompression session.

Required resources include access to the QAT hardware, contiguous pinned memory for mmaping the hardware rings, and contiguous pinned memory for buffers.

This function shall not be called in an interrupt context. None This function will: 1) start the user space driver if necessary 2) allocate all hardware instances available Yes No Yes

##### Parameters

in	<i>sess</i>	pointer to opaque instance and session data.
in	<i>sw_backup</i>	0 for no sw backup, 1 for sw backup

##### Return values

<i>QZ_OK</i>	Function executed successfully. A hardware or sw instance has been allocated to the calling process/thread.
<i>QZ_DUPLICATE</i>	This process/thread already has a hardware instance
<i>QZ_PARAMS</i>	*sess is NULL
<i>QZ_NOSW_NO_HW</i>	No hardware and no sw session being established
<i>QZ_NOSW_NO_MDRV</i>	No memory driver. No software session established
<i>QZ_NOSW_NO_INST_AT-TACH</i>	No instance avail. No software session established
<i>QZ_NOSW_LOW_MEM</i>	Not enough pinned memory available. No software session established

##### Precondition

None

##### Postcondition

None

##### Note

Only a synchronous version of this function is provided.

##### See Also

None

#### 4.1.5.12 `void* qzMalloc ( size_t sz, int numa, int force_pinned )`

Allocate different types of memory

Allocate different types of memory

This function shall not be called in an interrupt context. None None Yes No Yes

**Parameters**

in	<i>sz</i>	Memory size to be allocated.
in	<i>numa</i>	NUMA node from which to allocate memory
in	<i>force_pinned</i>	PINNED_MEM allocate continous memory COMMON_MEM allocate non-continous memory

**Return values**

<i>NULL</i>	Fail to allocate memory
<i>adress</i>	The address to allocated memory

**Precondition**

None

**Postcondition**

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None

**4.1.5.13 int qzMemFindAddr ( unsigned char \* a )**

Check whether the address is available

Check whether the address is available

This function shall not be called in an interrupt context. None None Yes No Yes

**Parameters**

in	<i>a</i>	Address need to be checked
----	----------	----------------------------

**Return values**

<i>1</i>	The Address is available
<i>0</i>	The address is not available

**Precondition**

None

**Postcondition**

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None

#### 4.1.5.14 int qzSetDefaults ( QzSessionParams\_T \* defaults )

Set default QzSessionParams\_T value

Set default QzSessionParams\_T value

This function shall not be called in an interrupt context. None None Yes No Yes

##### Parameters

in	defaults	The pointer to value to be set as default.
----	----------	--

##### Return values

QZ_OK	Success on setting default value.
QZ_PARAM	Fail to set default value.

##### Precondition

None

##### Postcondition

None

##### Note

Only a synchronous version of this function is provided.

##### See Also

None

#### 4.1.5.15 int qzSetupSession ( QzSession\_T \* sess, QzSessionParams\_T \* params )

initialize a QATZip session

This function establishes a QAT session. This involves associating a hardware instance to the session, allocating buffers. If all of these activities can not be completed successfully, then this function will set up a software based session of param->sw\_backup is set to 1.

Before this function is called, the hardware must have been successfully started via qzInit.

If \*sess includes an existing hardware or software session, then this session will be torn down before a new one is attempted.

This function shall not be called in an interrupt context. None None Yes No Yes

##### Parameters

in	sess	Session handle
in	params	Parameters for session

##### Return values

QZ_OK	Function executed successfully. A hardware or sw based compression session has been created.
-------	--

<i>QZ_PARAMS</i>	*sess is NULL or member of params is invalid
<i>QZ_NOSW_NO_HW</i>	No hardware and no sw session being established
<i>QZ_NOSW_NO_MDRV</i>	No memory driver. No software session established
<i>QZ_NOSW_NO_INST_ATTACH</i>	No instance avail. No software session established
<i>QZ_NO_LOW_MEM</i>	Not enough pinned memory available. No software session established

**Precondition**

None

**Postcondition**

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None

**4.1.5.16 int qzTeardownSession ( QzSession\_T \* sess )**

Deinitialize a QATZip session

This function disconnects a session from a hardware instance and deallocates buffers. If no session has been initialized, then no action will take place.

This function shall not be called in an interrupt context. None None Yes No Yes

**Parameters**

in	sess	Session handle
----	------	----------------

**Return values**

<i>QZ_OK</i>	Function executed successfully.
<i>QZ_FAIL</i>	Function did not succeed.
<i>QZ_PARAMS</i>	*sess is NULL or member of params is invalid

**Precondition**

None

**Postcondition**

None

**Note**

Only a synchronous version of this function is provided.

**See Also**

None



## Chapter 5

# Class Documentation

### 5.1 QzSession\_S Struct Reference

```
#include <qatzip.h>
```

#### Public Attributes

- signed long int [hw\\_session\\_stat](#)
- int [thd\\_sess\\_stat](#)
- void \* [internal](#)
- unsigned long [total\\_in](#)
- unsigned long [total\\_out](#)

#### 5.1.1 Detailed Description

QATZIP Session opaque data storage

This structure contains a pointer to a structure with session state

#### 5.1.2 Member Data Documentation

##### 5.1.2.1 signed long int QzSession\_S::hw\_session\_stat

filled in during initialization, session startup and decompression

##### 5.1.2.2 void\* QzSession\_S::internal

session data is opaque to outside world

##### 5.1.2.3 int QzSession\_S::thd\_sess\_stat

note process compression and decompression thread state

##### 5.1.2.4 unsigned long QzSession\_S::total\_in

Total processed input data length in this session

### 5.1.2.5 unsigned long QzSession\_S::total\_out

Total output data length in this session

The documentation for this struct was generated from the following file:

- [include/qatzip.h](#)

## 5.2 QzSessionParams\_S Struct Reference

```
#include <qatzip.h>
```

### Public Attributes

- [QzHuffmanHdr\\_T](#) `huffman_hdr`
- [QzDirection\\_T](#) `direction`
- [QzDataFormat\\_T](#) `data_fmt`
- unsigned int `comp_lvl`
- unsigned char `comp_algorithm`
- unsigned int `poll_sleep`
- unsigned int `max_forks`
- unsigned char `sw_backup`
- unsigned int `hw_buff_sz`
- unsigned int `strm_buff_sz`
- unsigned int `input_sz_thrshold`
- unsigned int `req_cnt_thrshold`
- unsigned int `wait_cnt_thrshold`

### 5.2.1 Detailed Description

QATZIP Session Initialization parameters

This structure contains data for initializing a session

### 5.2.2 Member Data Documentation

#### 5.2.2.1 unsigned char QzSessionParams\_S::comp\_algorithm

Compress/decompression algorithms

#### 5.2.2.2 unsigned int QzSessionParams\_S::comp\_lvl

Compression level 1..9

#### 5.2.2.3 QzDataFormat\_T QzSessionParams\_S::data\_fmt

defalte, deflate with GZip or deflate with GZip ext

#### 5.2.2.4 QzDirection\_T QzSessionParams\_S::direction

compress or decompress



## 5.2.2.5 QzHuffmanHdr\_T QzSessionParams\_S::huffman\_hdr

Dynamic or Static Huffman headers

## 5.2.2.6 unsigned int QzSessionParams\_S::hw\_buff\_sz

default buffer size, Must be a power of 2 4K,8K,16K,32K,64K,128K

## 5.2.2.7 unsigned int QzSessionParams\_S::input\_sz\_threshold

default threshold of compression service's input size for sw failover, if the size of input request less than the threshold, QATZip will route the request to software

## 5.2.2.8 unsigned int QzSessionParams\_S::max\_forks

maximum forks permitted in the current thread. 0 means no forking permitted

## 5.2.2.9 unsigned int QzSessionParams\_S::poll\_sleep

nanosleep between poll [0..1000] 0 means no sleep

## 5.2.2.10 unsigned int QzSessionParams\_S::req\_cnt\_threshold

set between 1 and 4, default 4

## 5.2.2.11 unsigned int QzSessionParams\_S::strm\_buff\_sz

stream buffer size between [1K .. 2M - 5K] default strm\_buf\_sz equals to hw\_buff\_sz

## 5.2.2.12 unsigned char QzSessionParams\_S::sw\_backup

0 means no sw backup, 1 means sw backup

## 5.2.2.13 unsigned int QzSessionParams\_S::wait\_cnt\_threshold

when previous try failed, wait for specific number of call before retry device open. default threshold is 8

The documentation for this struct was generated from the following file:

- [include/qatzip.h](#)

## 5.3 QzStatus\_S Struct Reference

```
#include <qatzip.h>
```

### Public Attributes

- unsigned short int [qat\\_hw\\_count](#)
- unsigned char [qat\\_service\\_stated](#)
- unsigned char [qat\\_mem\\_drvr](#)

- unsigned char [qat\\_instance\\_attach](#)
- unsigned long int [memory\\_allocated](#)
- unsigned char [using\\_huge\\_pages](#)
- signed long int [hw\\_session\\_status](#)
- unsigned char [algo\\_sw](#) [QZ\_MAX\_ALGORITHMS]
- unsigned char [algo\\_hw](#) [QZ\_MAX\_ALGORITHMS]

### 5.3.1 Detailed Description

QATZIP status structure

This structure contains data relating to the stat usof QAT on the platform

### 5.3.2 Member Data Documentation

#### 5.3.2.1 unsigned char QzStatus\_S::algo\_hw[QZ\_MAX\_ALGORITHMS]

count of hardware devices supporting algorithms

#### 5.3.2.2 unsigned char QzStatus\_S::algo\_sw[QZ\_MAX\_ALGORITHMS]

support software algorithms

#### 5.3.2.3 signed long int QzStatus\_S::hw\_session\_status

One of QATZIP Session Status

#### 5.3.2.4 unsigned long int QzStatus\_S::memory\_allocated

Amount of memory allocated by this thread/process

#### 5.3.2.5 unsigned short int QzStatus\_S::qat\_hw\_count

from PCI scan

#### 5.3.2.6 unsigned char QzStatus\_S::qat\_instance\_attach

Is this thread/g\_process properly attached to an Instance?

#### 5.3.2.7 unsigned char QzStatus\_S::qat\_mem\_drvr

1 if /dev/qat\_mem exists 2 if /dev/qat\_mem has been opened 0 otherwise

#### 5.3.2.8 unsigned char QzStatus\_S::qat\_service\_stated

Check if the QAT service is properly running on at least one device

### 5.3.2.9 unsigned char QzStatus\_S::using\_huge\_pages

Are memory slabs coming from huge pages

The documentation for this struct was generated from the following file:

- [include/qatzip.h](#)

## 5.4 QzStream\_S Struct Reference

```
#include <qatzip.h>
```

### Public Attributes

- unsigned int [in\\_sz](#)
- unsigned int [out\\_sz](#)
- unsigned char \* [in](#)
- unsigned char \* [out](#)
- unsigned int [pending\\_in](#)
- unsigned int [pending\\_out](#)
- [QzCrcType\\_T](#) [crc\\_type](#)
- unsigned int [crc\\_32](#)
- unsigned long long [crc\\_64](#)
- unsigned long long [reserved](#)
- void \* [opaque](#)

### 5.4.1 Detailed Description

QATZIP Stream data storage

This structure contains metadata needed for stream operation

### 5.4.2 Member Data Documentation

#### 5.4.2.1 unsigned int QzStream\_S::crc\_32

Checksum value

#### 5.4.2.2 unsigned long long QzStream\_S::crc\_64

Checksum value for 64bit CRC

#### 5.4.2.3 QzCrcType\_T QzStream\_S::crc\_type

Checksum type in Adler, CRC32, CRC64 or none

#### 5.4.2.4 unsigned char\* QzStream\_S::in

Input data pointer set by application

**5.4.2.5 unsigned int QzStream\_S::in\_sz**

Set by application, reset by QATZip to indicate consumed data

**5.4.2.6 void\* QzStream\_S::opaque**

Internal storage managed by QATZip

**5.4.2.7 unsigned char\* QzStream\_S::out**

Output data pointer set by application

**5.4.2.8 unsigned int QzStream\_S::out\_sz**

Set by application, reset by QATZip to indicate processed data

**5.4.2.9 unsigned int QzStream\_S::pending\_in**

Unprocessed bytes held in QATZip

**5.4.2.10 unsigned int QzStream\_S::pending\_out**

Processed bytes held in QATZip

**5.4.2.11 unsigned long long QzStream\_S::reserved**

CRC64 polynomial

The documentation for this struct was generated from the following file:

- [include/qatzip.h](#)

## Chapter 6

# File Documentation

### 6.1 include/qatzip.h File Reference

```
#include <string.h>
```

#### Classes

- struct [QzSessionParams\\_S](#)
- struct [QzSession\\_S](#)
- struct [QzStatus\\_S](#)
- struct [QzStream\\_S](#)

#### Macros

- #define [QZ\\_OK](#) (0)
- #define [QZ\\_DUPLICATE](#) (1)
- #define [QZ\\_FORCE\\_SW](#) (2)
- #define [QZ\\_PARAMS](#) (-1)
- #define [QZ\\_FAIL](#) (-2)
- #define [QZ\\_BUF\\_ERROR](#) (-3)
- #define [QZ\\_DATA\\_ERROR](#) (-4)
- #define [QZ\\_NO\\_HW](#) (11)
- #define [QZ\\_NO\\_MDRV](#) (12)
- #define [QZ\\_NO\\_INST\\_ATTACH](#) (13)
- #define [QZ\\_LOW\\_MEM](#) (14)
- #define [QZ\\_NONE](#) (100)
- #define [QZ\\_NOSW\\_NO\\_HW](#) (-101)
- #define [QZ\\_NOSW\\_NO\\_MDRV](#) (-102)
- #define [QZ\\_NOSW\\_NO\\_INST\\_ATTACH](#) (-103)
- #define [QZ\\_NOSW\\_LOW\\_MEM](#) (-104)
- #define [QZ\\_MAX\\_ALGORITHMS](#) ((int)255)
- #define [QZ\\_DEFLATE](#) ((unsigned char)8)
- #define [QZ\\_SNAPPY](#) ((unsigned char)'S')
- #define [QZ\\_LZ4](#) ((unsigned char)'4')
- #define [MIN](#)(a, b) (((a)<(b))?(a):(b))
- #define [QZ\\_MEMCPY](#)(dest, src, dest\_sz, src\_sz) memcpy((void \*) (dest), (void \*) (src), (size\_t) [MIN](#)(dest\_sz, src\_sz))
- #define [QZ\\_HUFF\\_HDR\\_DEFAULT](#) [QZ\\_DYNAMIC\\_HDR](#)

- `#define QZ_DIRECTION_DEFAULT QZ_DIR_BOTH`
- `#define QZ_DATA_FORMAT_DEFAULT QZ_DEFLATE_GZIP_EXT`
- `#define QZ_COMP_LEVEL_DEFAULT 1`
- `#define QZ_COMP_ALGOL_DEFAULT QZ_DEFLATE`
- `#define QZ_POLL_SLEEP_DEFAULT 10`
- `#define QZ_MAX_FORK_DEFAULT 3`
- `#define QZ_SW_BACKUP_DEFAULT 1`
- `#define QZ_HW_BUFF_SZ (64*1024)`
- `#define QZ_HW_BUFF_MIN_SZ (1*1024)`
- `#define QZ_HW_BUFF_MAX_SZ (512*1024)`
- `#define QZ_STRM_BUFF_SZ_DEFAULT QZ_HW_BUFF_SZ`
- `#define QZ_STRM_BUFF_MIN_SZ (1*1024)`
- `#define QZ_STRM_BUFF_MAX_SZ (2*1024*1024 - 5*1024)`
- `#define QZ_COMP_THRESHOLD_DEFAULT 1024`
- `#define QZ_COMP_THRESHOLD_MINIMUM 128`
- `#define QZ_REQ_THRESHOLD_MINIMUM 1`
- `#define QZ_REQ_THRESHOLD_MAXINUM NUM_BUFF`
- `#define QZ_REQ_THRESHOLD_DEFAULT QZ_REQ_THRESHOLD_MAXINUM`
- `#define QZ_WAIT_CNT_THRESHOLD_DEFAULT 8`
- `#define QZ_SKID_PAD_SZ 48`

## Typedefs

- `typedef enum QzHuffmanHdr_E QzHuffmanHdr_T`
- `typedef enum QzDirection_E QzDirection_T`
- `typedef enum QzDataFormat_E QzDataFormat_T`
- `typedef enum QzCrcType_E QzCrcType_T`
- `typedef struct QzSessionParams_S QzSessionParams_T`
- `typedef struct QzSession_S QzSession_T`
- `typedef struct QzStatus_S QzStatus_T`
- `typedef struct QzStream_S QzStream_T`

## Enumerations

- `enum QzHuffmanHdr_E { QZ_DYNAMIC_HDR = 0, QZ_STATIC_HDR }`
- `enum PinMem_T { COMMON_MEM = 0, PINNED_MEM }`
- `enum QzDirection_E { QZ_DIR_COMPRESS = 0, QZ_DIR_DECOMPRESS, QZ_DIR_BOTH }`
- `enum QzDataFormat_E { QZ_DEFLATE_RAW = 0, QZ_DEFLATE_GZIP, QZ_DEFLATE_GZIP_EXT, QZ_FMT_NUM }`
- `enum QzCrcType_E { QZ_CRC32 = 0, QZ_CRC64, QZ_ADLER, NONE }`

## Functions

- `int qzInit (QzSession_T *sess, unsigned char sw_backup)`
- `int qzSetupSession (QzSession_T *sess, QzSessionParams_T *params)`
- `int qzCompress (QzSession_T *sess, const unsigned char *src, unsigned int *src_len, unsigned char *dest, unsigned int *dest_len, unsigned int last)`
- `int qzCompressCrc (QzSession_T *sess, const unsigned char *src, unsigned int *src_len, unsigned char *dest, unsigned int *dest_len, unsigned int last, unsigned long *crc)`
- `int qzDecompress (QzSession_T *sess, const unsigned char *src, unsigned int *src_len, unsigned char *dest, unsigned int *dest_len)`
- `int qzTeardownSession (QzSession_T *sess)`
- `int qzClose (QzSession_T *sess)`

- int [qzGetStatus](#) ([QzSession\\_T](#) \*sess, [QzStatus\\_T](#) \*status)
- unsigned int [qzMaxCompressedLength](#) (unsigned int src\_sz)
- int [qzSetDefaults](#) ([QzSessionParams\\_T](#) \*defaults)
- int [qzGetDefaults](#) ([QzSessionParams\\_T](#) \*defaults)
- void \* [qzMalloc](#) (size\_t sz, int numa, int force\_pinned)
- void [qzFree](#) (void \*m)
- int [qzMemFindAddr](#) (unsigned char \*a)
- int [qzCompressStream](#) ([QzSession\\_T](#) \*sess, [QzStream\\_T](#) \*strm, unsigned int last)
- int [qzDecompressStream](#) ([QzSession\\_T](#) \*sess, [QzStream\\_T](#) \*strm, unsigned int last)
- int [qzEndStream](#) ([QzSession\\_T](#) \*sess, [QzStream\\_T](#) \*strm)

### 6.1.1 Macro Definition Documentation

6.1.1.1 `#define MIN( a, b ) (((a)<(b))?(a):(b))`

6.1.1.2 `#define QZ_BUF_ERROR (-3)`

Insufficient buffer error

6.1.1.3 `#define QZ_COMP_ALGOL_DEFAULT QZ_DEFLATE`

6.1.1.4 `#define QZ_COMP_LEVEL_DEFAULT 1`

6.1.1.5 `#define QZ_COMP_THRESHOLD_DEFAULT 1024`

6.1.1.6 `#define QZ_COMP_THRESHOLD_MINIMUM 128`

6.1.1.7 `#define QZ_DATA_ERROR (-4)`

Input data was corrupted

6.1.1.8 `#define QZ_DATA_FORMAT_DEFAULT QZ_DEFLATE_GZIP_EXT`

6.1.1.9 `#define QZ_DEFLATE ((unsigned char)8)`

6.1.1.10 `#define QZ_DIRECTION_DEFAULT QZ_DIR_BOTH`

6.1.1.11 `#define QZ_DUPLICATE (1)`

Can not process function again. No failure.

6.1.1.12 `#define QZ_FAIL (-2)`

Unspecified error

6.1.1.13 `#define QZ_FORCE_SW (2)`

using SW: Switch to software because of previous block

6.1.1.14 `#define QZ_HUFF_HDR_DEFAULT QZ_DYNAMIC_HDR`

6.1.1.15 `#define QZ_HW_BUFF_MAX_SZ (512*1024)`

6.1.1.16 `#define QZ_HW_BUFF_MIN_SZ (1*1024)`

6.1.1.17 `#define QZ_HW_BUFF_SZ (64*1024)`

6.1.1.18 `#define QZ_LOW_MEM (14)`

using SW: Not enough pinned memory

6.1.1.19 `#define QZ_LZ4 ((unsigned char)'4')`

6.1.1.20 `#define QZ_MAX_ALGORITHMS ((int)255)`

6.1.1.21 `#define QZ_MAX_FORK_DEFAULT 3`

6.1.1.22 `#define QZ_MEMCPY( dest, src, dest_sz, src_sz ) memcpy((void*)(dest), (void*)(src), (size_t)MIN(dest_sz, src_sz))`

6.1.1.23 `#define QZ_NO_HW (11)`

using SW: No QAT HW detected

6.1.1.24 `#define QZ_NO_INST_ATTACH (13)`

using SW: Could not attach to an instance

6.1.1.25 `#define QZ_NO_MDRV (12)`

using SW: No memory driver detected

6.1.1.26 `#define QZ_NONE (100)`

device uninitialized

6.1.1.27 `#define QZ_NOSW_LOW_MEM (-104)`

not using SW: not enough pinned memory

6.1.1.28 `#define QZ_NOSW_NO_HW (-101)`

not using SW: No QAT HW detected

6.1.1.29 `#define QZ_NOSW_NO_INST_ATTACH (-103)`

not using SW: Could not attach to instance

6.1.1.30 `#define QZ_NOSW_NO_MDRV (-102)`

not using SW: No memory driver detected



6.1.1.31 `#define QZ_PARAMS (-1)`

invalid parameter in function call

6.1.1.32 `#define QZ_POLL_SLEEP_DEFAULT 10`

6.1.1.33 `#define QZ_REQ_THRESHOLD_DEFAULT QZ_REQ_THRESHOLD_MAXIMUM`

6.1.1.34 `#define QZ_REQ_THRESHOLD_MAXIMUM NUM_BUFF`

6.1.1.35 `#define QZ_REQ_THRESHOLD_MINIMUM 1`

6.1.1.36 `#define QZ_SNAPPY ((unsigned char)'S')`

6.1.1.37 `#define QZ_STRM_BUFF_MAX_SZ (2*1024*1024 - 5*1024)`

6.1.1.38 `#define QZ_STRM_BUFF_MIN_SZ (1*1024)`

6.1.1.39 `#define QZ_STRM_BUFF_SZ_DEFAULT QZ_HW_BUFF_SZ`

6.1.1.40 `#define QZ_SW_BACKUP_DEFAULT 1`

6.1.1.41 `#define QZ_WAIT_CNT_THRESHOLD_DEFAULT 8`

## 6.1.2 Function Documentation

6.1.2.1 `unsigned int qzMaxCompressedLength ( unsigned int src_sz )`

# Index

algo\_hw  
    QzStatus\_S, 28  
algo\_sw  
    QzStatus\_S, 28  
  
COMMON\_MEM  
    Data Compression API, 10  
comp\_algorithm  
    QzSessionParams\_S, 26  
comp\_lvl  
    QzSessionParams\_S, 26  
crc\_32  
    QzStream\_S, 29  
crc\_64  
    QzStream\_S, 29  
crc\_type  
    QzStream\_S, 29  
  
Data Compression API  
    COMMON\_MEM, 10  
    NONE, 11  
    PINNED\_MEM, 10  
    QZ\_ADLER, 11  
    QZ\_CRC32, 11  
    QZ\_CRC64, 11  
    QZ\_DEFLATE\_GZIP, 11  
    QZ\_DEFLATE\_GZIP\_EXT, 11  
    QZ\_DEFLATE\_RAW, 11  
    QZ\_DIR\_BOTH, 11  
    QZ\_DIR\_COMPRESS, 11  
    QZ\_DIR\_DECOMPRESS, 11  
    QZ\_DYNAMIC\_HDR, 12  
    QZ\_FMT\_NUM, 11  
    QZ\_STATIC\_HDR, 12  
Data Compression API, 7  
    PinMem\_T, 10  
    QZ\_OK, 8  
    QZ\_SKID\_PAD\_SZ, 8  
    qzClose, 12  
    qzCompress, 13  
    qzCompressCrc, 13  
    qzCompressStream, 14  
    QzCrcType\_E, 10  
    QzCrcType\_T, 9  
    QzDataFormat\_E, 11  
    QzDataFormat\_T, 9  
    qzDecompress, 15  
    qzDecompressStream, 16  
    QzDirection\_E, 11  
    QzDirection\_T, 9  
    qzEndStream, 17  
    qzFree, 18  
    qzGetDefaults, 18  
    qzGetStatus, 19  
    QzHuffmanHdr\_E, 11  
    QzHuffmanHdr\_T, 9  
    qzInit, 19  
    qzMalloc, 20  
    qzMemFindAddr, 21  
    QzSession\_T, 10  
    QzSessionParams\_T, 10  
    qzSetDefaults, 21  
    qzSetupSession, 22  
    QzStatus\_T, 10  
    QzStream\_T, 10  
    qzTeardownSession, 23  
data\_fmt  
    QzSessionParams\_S, 26  
direction  
    QzSessionParams\_S, 26  
  
huffman\_hdr  
    QzSessionParams\_S, 26  
hw\_buff\_sz  
    QzSessionParams\_S, 27  
hw\_session\_stat  
    QzSession\_S, 25  
hw\_session\_status  
    QzStatus\_S, 28  
  
in  
    QzStream\_S, 29  
in\_sz  
    QzStream\_S, 29  
include/qatzip.h, 31  
input\_sz\_threshold  
    QzSessionParams\_S, 27  
internal  
    QzSession\_S, 25  
  
MIN  
    qatzip.h, 33  
max\_forks  
    QzSessionParams\_S, 27  
memory\_allocated  
    QzStatus\_S, 28  
  
NONE  
    Data Compression API, 11  
  
opaque

- QzStream\_S, [30](#)
- out
  - QzStream\_S, [30](#)
- out\_sz
  - QzStream\_S, [30](#)
- PINNED\_MEM
  - Data Compression API, [10](#)
- pending\_in
  - QzStream\_S, [30](#)
- pending\_out
  - QzStream\_S, [30](#)
- PinMem\_T
  - Data Compression API, [10](#)
- poll\_sleep
  - QzSessionParams\_S, [27](#)
- QZ\_ADLER
  - Data Compression API, [11](#)
- QZ\_CRC32
  - Data Compression API, [11](#)
- QZ\_CRC64
  - Data Compression API, [11](#)
- QZ\_DEFLATE\_GZIP
  - Data Compression API, [11](#)
- QZ\_DEFLATE\_GZIP\_EXT
  - Data Compression API, [11](#)
- QZ\_DEFLATE\_RAW
  - Data Compression API, [11](#)
- QZ\_DIR\_BOTH
  - Data Compression API, [11](#)
- QZ\_DIR\_COMPRESS
  - Data Compression API, [11](#)
- QZ\_DIR\_DECOMPRESS
  - Data Compression API, [11](#)
- QZ\_DYNAMIC\_HDR
  - Data Compression API, [12](#)
- QZ\_FMT\_NUM
  - Data Compression API, [11](#)
- QZ\_STATIC\_HDR
  - Data Compression API, [12](#)
- QZ\_BUF\_ERROR
  - qatzip.h, [33](#)
- QZ\_DATA\_ERROR
  - qatzip.h, [33](#)
- QZ\_DEFLATE
  - qatzip.h, [33](#)
- QZ\_DIRECTION\_DEFAULT
  - qatzip.h, [33](#)
- QZ\_DUPLICATE
  - qatzip.h, [33](#)
- QZ\_FAIL
  - qatzip.h, [33](#)
- QZ\_FORCE\_SW
  - qatzip.h, [33](#)
- QZ\_HUFF\_HDR\_DEFAULT
  - qatzip.h, [33](#)
- QZ\_HW\_BUFF\_MAX\_SZ
  - qatzip.h, [34](#)
- QZ\_HW\_BUFF\_MIN\_SZ
  - qatzip.h, [34](#)
- QZ\_HW\_BUFF\_SZ
  - qatzip.h, [34](#)
- QZ\_LOW\_MEM
  - qatzip.h, [34](#)
- QZ\_LZ4
  - qatzip.h, [34](#)
- QZ\_MAX\_ALGORITHMS
  - qatzip.h, [34](#)
- QZ\_MAX\_FORK\_DEFAULT
  - qatzip.h, [34](#)
- QZ\_MEMCPY
  - qatzip.h, [34](#)
- QZ\_NO\_HW
  - qatzip.h, [34](#)
- QZ\_NO\_INST\_ATTACH
  - qatzip.h, [34](#)
- QZ\_NO\_MDRV
  - qatzip.h, [34](#)
- QZ\_NONE
  - qatzip.h, [34](#)
- QZ\_NOSW\_LOW\_MEM
  - qatzip.h, [34](#)
- QZ\_NOSW\_NO\_HW
  - qatzip.h, [34](#)
- QZ\_NOSW\_NO\_MDRV
  - qatzip.h, [34](#)
- QZ\_OK
  - Data Compression API, [8](#)
- QZ\_PARAMS
  - qatzip.h, [34](#)
- QZ\_SKID\_PAD\_SZ
  - Data Compression API, [8](#)
- QZ\_SNAPPY
  - qatzip.h, [35](#)
- qat\_hw\_count
  - QzStatus\_S, [28](#)
- qat\_instance\_attach
  - QzStatus\_S, [28](#)
- qat\_mem\_drvr
  - QzStatus\_S, [28](#)
- qat\_service\_stated
  - QzStatus\_S, [28](#)
- qatzip.h
  - MIN, [33](#)
  - QZ\_BUF\_ERROR, [33](#)
  - QZ\_DATA\_ERROR, [33](#)
  - QZ\_DEFLATE, [33](#)
  - QZ\_DUPLICATE, [33](#)
  - QZ\_FAIL, [33](#)
  - QZ\_FORCE\_SW, [33](#)
  - QZ\_HW\_BUFF\_MAX\_SZ, [34](#)
  - QZ\_HW\_BUFF\_MIN\_SZ, [34](#)
  - QZ\_HW\_BUFF\_SZ, [34](#)
  - QZ\_LOW\_MEM, [34](#)
  - QZ\_LZ4, [34](#)
  - QZ\_MAX\_ALGORITHMS, [34](#)

- QZ\_MEMCPY, [34](#)
- QZ\_NO\_HW, [34](#)
- QZ\_NO\_INST\_ATTACH, [34](#)
- QZ\_NO\_MDRV, [34](#)
- QZ\_NONE, [34](#)
- QZ\_NOSW\_LOW\_MEM, [34](#)
- QZ\_NOSW\_NO\_HW, [34](#)
- QZ\_NOSW\_NO\_MDRV, [34](#)
- QZ\_PARAMS, [34](#)
- QZ\_SNAPPY, [35](#)
- qzMaxCompressedLength, [35](#)
- qzClose
  - Data Compression API, [12](#)
- qzCompress
  - Data Compression API, [13](#)
- qzCompressCrc
  - Data Compression API, [13](#)
- qzCompressStream
  - Data Compression API, [14](#)
- QzCrcType\_E
  - Data Compression API, [10](#)
- QzCrcType\_T
  - Data Compression API, [9](#)
- QzDataFormat\_E
  - Data Compression API, [11](#)
- QzDataFormat\_T
  - Data Compression API, [9](#)
- qzDecompress
  - Data Compression API, [15](#)
- qzDecompressStream
  - Data Compression API, [16](#)
- QzDirection\_E
  - Data Compression API, [11](#)
- QzDirection\_T
  - Data Compression API, [9](#)
- qzEndStream
  - Data Compression API, [17](#)
- qzFree
  - Data Compression API, [18](#)
- qzGetDefaults
  - Data Compression API, [18](#)
- qzGetStatus
  - Data Compression API, [19](#)
- QzHuffmanHdr\_E
  - Data Compression API, [11](#)
- QzHuffmanHdr\_T
  - Data Compression API, [9](#)
- qzInit
  - Data Compression API, [19](#)
- qzMalloc
  - Data Compression API, [20](#)
- qzMaxCompressedLength
  - qatzip.h, [35](#)
- qzMemFindAddr
  - Data Compression API, [21](#)
- QzSession\_S, [25](#)
  - hw\_session\_stat, [25](#)
  - internal, [25](#)
  - thd\_sess\_stat, [25](#)
  - total\_in, [25](#)
  - total\_out, [25](#)
- QzSession\_T
  - Data Compression API, [10](#)
- QzSessionParams\_S, [26](#)
  - comp\_algorithm, [26](#)
  - comp\_lvl, [26](#)
  - data\_fmt, [26](#)
  - direction, [26](#)
  - huffman\_hdr, [26](#)
  - hw\_buff\_sz, [27](#)
  - input\_sz\_thrshold, [27](#)
  - max\_forks, [27](#)
  - poll\_sleep, [27](#)
  - req\_cnt\_thrshold, [27](#)
  - strm\_buff\_sz, [27](#)
  - sw\_backup, [27](#)
  - wait\_cnt\_thrshold, [27](#)
- QzSessionParams\_T
  - Data Compression API, [10](#)
- qzSetDefaults
  - Data Compression API, [21](#)
- qzSetupSession
  - Data Compression API, [22](#)
- QzStatus\_S, [27](#)
  - algo\_hw, [28](#)
  - algo\_sw, [28](#)
  - hw\_session\_status, [28](#)
  - memory\_allocated, [28](#)
  - qat\_hw\_count, [28](#)
  - qat\_instance\_attach, [28](#)
  - qat\_mem\_drvr, [28](#)
  - qat\_service\_stated, [28](#)
  - using\_huge\_pages, [28](#)
- QzStatus\_T
  - Data Compression API, [10](#)
- QzStream\_S, [29](#)
  - crc\_32, [29](#)
  - crc\_64, [29](#)
  - crc\_type, [29](#)
  - in, [29](#)
  - in\_sz, [29](#)
  - opaque, [30](#)
  - out, [30](#)
  - out\_sz, [30](#)
  - pending\_in, [30](#)
  - pending\_out, [30](#)
  - reserved, [30](#)
- QzStream\_T
  - Data Compression API, [10](#)
- qzTeardownSession
  - Data Compression API, [23](#)
- req\_cnt\_thrshold
  - QzSessionParams\_S, [27](#)
- reserved
  - QzStream\_S, [30](#)

strm\_buff\_sz  
    QzSessionParams\_S, [27](#)  
sw\_backup  
    QzSessionParams\_S, [27](#)  
  
thd\_sess\_stat  
    QzSession\_S, [25](#)  
total\_in  
    QzSession\_S, [25](#)  
total\_out  
    QzSession\_S, [25](#)  
  
using\_huge\_pages  
    QzStatus\_S, [28](#)  
  
wait\_cnt\_thrshold  
    QzSessionParams\_S, [27](#)