



API Reference

SDN Agent to KMS API

API Version: 2.1.0

Messages the SDN sends to the KMS

CONTACT

URL: <https://github.com/ait-crypto/kms-sdn-agent-interface-specification/discussions>

INDEX

1. API	4
1.1 GET /version	4
2. CONTROL	5
2.1 PUT /control/status	5
2.2 PUT /control/qkd-device/{device_id}	6
2.3 POST /control/qkd-device/{device_id}	7
2.4 DELETE /control/qkd-device/{device_id}	8
3. LINK	10
3.1 GET /link/performance/{link_id}	10
3.2 PUT /link/relay/{key_stream_id}	11
3.3 POST /link/relay/{key_stream_id}	12
3.4 DELETE /link/relay/{key_stream_id}	13
4. MONITOR	15
4.1 GET /monitor/capabilities	15
4.2 GET /monitor/device-info	16
4.3 GET /monitor/status	17
4.4 GET /monitor/log	18
4.5 GET /monitor/qkd-device	19

Security and Authentication

SECURITY SCHEMES

KEY	TYPE	DESCRIPTION
https	mutualTLS	Connections must use TLS 1.3. The server enforces this at the transport layer.

API

1. API

Generic endpoints related with this API

1.1 GET /version

Get this API version

QUICKS API version number which is implemented and supported by the KMS

REQUEST

No request parameters

RESPONSE

STATUS CODE - 200: Provided API version

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
version*	string	PATTERN: ^(0 [1-9]\d*)\.(0 [1-9]\d*)\.(0 [1-9]\d*)(?:-((?:0 [1-9]\d* \d*[a-zA-Z-][0-9a-zA-Z-]*) (?:\.[0-9a-zA-Z-]*)))?(?:\.[0-9a-zA-Z-]*)*\$ Version number in semantic versioning

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

2. CONTROL

Generic control endpoints

2.1 PUT /control/status

Modify state of the KMS

Modify state of the KMS, it can be online, stopped or offline.

REQUEST

REQUEST BODY - application/json

NAME	TYPE	DESCRIPTION
state*	enum	ALLOWED:stopped, offline, online Target state of the KMS.

RESPONSE

STATUS CODE - 200: changing state successful

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 403: Forbidden, client does not have the required rights.

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem

NAME	TYPE	DESCRIPTION
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

2.2 PUT /control/qkd-device/{device_id}

Update an existing QKD device

Update mutable fields of a known QKD device.

REQUEST

PATH PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
*device_id	uuid		

REQUEST BODY - application/json

NAME	TYPE	DESCRIPTION
link_id	string	The ID of the link this device is associate to.
label	string	Human readable label, for example vendor name and model number.
state	enum	ALLOWED:online, stopped, offline Current or target state after successful operation
interface	enum	ALLOWED:etsi_004, etsi_014, skip Interface type of the QKD device
protocol	string	Transport protocol used, for ETSI GS QKD 014 typically https.
peer_kms	string	to which peer is this device connected, does not have to be UUID format, but unique in network
server_address	string	URI of the QKD device server. Specify domain (or IP) and port.
etsi_014	object	
primary_id*	string	In ETSI GS QKD 014 also called Master SAE ID
secondary_id*	string	In ETSI GS QKD 014 also called Slave SAE ID
etsi_004	object	
source*	string	source URI
destination*	string	source URI
key_chunk_size	integer	length of key chunks in Byte.
max_bps	integer	
min_bps	integer	
jitter	integer	
priority	integer	
timeout	integer	
ttl	integer	
metadata_mimetype	string	

RESPONSE

STATUS CODE - 200: QKD device updated successfully

STATUS CODE - 400: Invalid input (missing device_id or malformed update object)

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 404: Not found. This corresponds to the endpoint not found, as 404s can also be generated by the webserver. Use 400 if the device ID string was unknown to KMS

STATUS CODE - 500: Server-side error while updating the device

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

2.3 POST /control/qkd-device/{device_id}

Register a new QKD device

Create/register a new QKD device in the KMS instance.

REQUEST

PATH PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
*device_id	uuid		

REQUEST BODY - application/json

NAME	TYPE	DESCRIPTION
link_id*	string	The ID of the link this device is associate to.
label*	string	Human readable label, for example vendor name and model number.
state*	enum	ALLOWED:online, stopped, offline Current or target state after successful operation
interface*	enum	ALLOWED:etsi_004, etsi_014, skip Interface type of the QKD device
protocol*	string	Transport protocol used, for ETSI GS QKD 014 typically https.
peer_kms*	string	to which peer is this device connected, does not have to be UUID format, but unique in network
server_address*	string	URI of the QKD device server. Specify domain (or IP) and port.
etsi_014	object	
primary_id*	string	In ETSI GS QKD 014 also called Master SAE ID

NAME	TYPE	DESCRIPTION
secondary_id*	string	In ETSI GS QKD 014 also called Slave SAE ID
etsi_004	object	
source*	string	source URI
destination*	string	source URI
key_chunk_size	integer	length of key chunks in Byte.
max_bps	integer	
min_bps	integer	
jitter	integer	
priority	integer	
timeout	integer	
ttl	integer	
metadata_mimetype	string	

RESPONSE

STATUS CODE - 201: QKD device successfully created

STATUS CODE - 400: Invalid input (missing fields or malformed body)

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 409: Device already exists (conflict on device_id)

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 500: Server-side error while creating the device

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

2.4 DELETE /control/qkd-device/{device_id}

Delete QKD device

Remove connected QKD device, KMS will no longer try to obtain keys from it.

REQUEST

PATH PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
*device_id	uuid		

RESPONSE

STATUS CODE - 204: QKD device correctly deleted

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 404: Not found, API endpoint does not exist.

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

3. LINK

Monitoring and control related with the link

3.1 GET /link/performance/{link_id}

Get performance data for link

Get the performance data for the link with the given link id. Query parameter for entries is optional.

REQUEST

PATH PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
*link_id	uuid		link's UUID

QUERY PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
entries	integer		Optional. Number of history records requested. If not specified maximal available history is returned. If 0, only current value is transmitted.

RESPONSE

STATUS CODE - 200: The response contains KMS performance data

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
current*	object	
timestamp*	string	ISO 8601 format
delta_t*	integer	DEFAULT:10 Time period over which keys are counted for the rate calculation. The unit is milliseconds.
IKR*	integer	Internal Key Rate = amount of key material reserved for internal use during a delta_t period divided by delta_t. Given in Byte/sec
EXKR*	integer	External Key Rate = amount of key material reserved for external use during a delta_t period divided by delta_t. Given in Byte/sec
SKR*	integer	Secret Key Rate = amount of key material received from QKD devices during a delta_t period divided by delta_t. Given in Byte/sec
KAV*	integer	Key Availability = amount of key material in Byte available to Applications during a delta_t period
history	array	
timestamp*	string	ISO 8601 format
delta_t*	integer	DEFAULT:10 Time period over which keys are counted for the rate calculation. The unit is milliseconds.

NAME	TYPE	DESCRIPTION
IKR*	integer	Internal Key Rate = amount of key material reserved for internal use during a delta_t period divided by delta_t. Given in Byte/sec
EXKR*	integer	External Key Rate = amount of key material reserved for external use during a delta_t period divided by delta_t. Given in Byte/sec
SKR*	integer	Secret Key Rate = amount of key material received from QKD devices during a delta_t period divided by delta_t. Given in Byte/sec
KAV*	integer	Key Availability = amount of key material in Byte available to Applications during a delta_t period

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 404: Not found, API endpoint does not exist, probably invalid link_id given.

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

3.2 PUT /link/relay/{key_stream_id}

Update a link relay configuration

Replace a link relay configuration with the data in the request, using the given key_stream_id as an identifier. Only the data to be changed should be included in data body, supporting partial updates.

REQUEST

PATH PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
*key_stream_id	uuid		key_stream_id's UUID

REQUEST BODY - application/json

NAME	TYPE	DESCRIPTION
source	string	Source APP's URI or UUID
destination	array	

NAME	TYPE	DESCRIPTION
next_node_info	array	
qos_request	object	

RESPONSE

STATUS CODE - 200: The relay configuration associated with the given key_stream_id has been replaced by the data in the request

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 404: Not found, API endpoint does not exist, probably invalid key_stream_id given.

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

3.3 POST /link/relay/{key_stream_id}

Create link relay configuration

Create a link relay configuration record with the data in the request, using the given key_stream_id as an identifier

REQUEST

PATH PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
*key_stream_id	uuid		key_stream_id's UUID

REQUEST BODY - application/json

NAME	TYPE	DESCRIPTION
source*	string	URI or UUID of the source APP
destination*	array	
next_node_info*	array	

NAME	TYPE	DESCRIPTION
qos_request	{recursive}	qos-data

RESPONSE

STATUS CODE - 201: A new relay configuration has been created with the given key_stream_id as an identifier, from the data in the request

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

3.4 DELETE /link/relay/{key_stream_id}

Delete relay configuration

Delete the relay configuration associated with the given key_stream_id

REQUEST

PATH PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
*key_stream_id	uuid		key stream's UUID

RESPONSE

STATUS CODE - 204: Forward table row deleted

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem

NAME	TYPE	DESCRIPTION
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 404: Not found, API endpoint does not exist, probably invalid key_stream_id given.

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

4. MONITOR

Generic monitoring endpoints

4.1 GET /monitor/capabilities

Get KMS capabilities

Query which essential features are supported by this instance.

REQUEST

No request parameters

RESPONSE

STATUS CODE - 200: The response states different KMS API capabilities.

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
key_relay_support*	enum	ALLOWED: true, false Is this KMS instance capable of relaying keying material? If true, key relay supported, if false it isn't.
app_api_support*	array	
etsi_014_info	object	
KME_ID	string	This KMS instance ID
key_size*	integer	>=0 Number in bit stating the default key size of this KMS, all other parameters use this for calculations.
stored_key_count*	integer	>=0 Number of stored keys which are available and could be delivered to the application. Number of keys is based on number of entries of the default key size. Sum of all Links, per link data available via link performance endpoint.
max_key_count*	integer	>=0 Number stating this KMS instance maximum key store. This assumes above default key size.
max_key_per_request*	integer	>=0 Number stating this KMS instance maximum key entries, which can be handled at once. For example number of keys which can be requested via ETSI GS QKD 014 at once or forwarded through this instance at once.
max_key_size*	integer	>=0 Number in bit stating the biggest key size this KMS can handle.
min_key_size*	integer	>=0 Number in bit stating the smallest key size this KMS can handle.
max_SAE_ID_count*	integer	>=0 Number stating if this KMS supports group keys and if so with how many participants. 0 means no group keys, 1 is one additional slave SAE etc.
status_extension	object	

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

4.2 GET /monitor/device-info

Get vendor, model and version

Publish KMS instance vendor, model and version

REQUEST

No request parameters

RESPONSE

STATUS CODE - 200: The response contains the vendor, device and version

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
vendor*	string	Vendor of the KMS
model*	string	Device brand name (model)
version*	string	PATTERN: <code>^(0 [1-9]\d*)\.(0 [1-9]\d*)\.(0 [1-9]\d*)(?:-((?:0 [1-9]\d* \d*[a-zA-Z-][0-9a-zA-Z-]*)?(?:\.(?:0 [1-9]\d* \d*[a-zA-Z-][0-9a-zA-Z-]*)*)?)?(?:\+([0-9a-zA-Z-]+(?:\.[0-9a-zA-Z-]+)*)?)?\$</code> Version number in semantic versioning

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

4.3 GET /monitor/status

Get KMS status

Get the status from the KMS, it can be online or stopped.

REQUEST

QUERY PARAMETERS

NAME	TYPE	EXAMPLE	DESCRIPTION
new_operation_state_only	boolean		If true, only consider operational status events since last query. If not given default of "false" is used.

RESPONSE

STATUS CODE - 200: description of the status

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
state*	enum	ALLOWED: online, stopped, offline State of the KMS. "online" if operational, stopped if running but not operational, offline if not operational. If it can't answer it is assumed to be offline, see error below. Stopped is a state, where the KMS is running but not operational, which could for example be a maintenance state or similar.
operation	enum	ALLOWED: normal operation, warnings, errors, critical state if there are any operational issues. This may correlate to entries in the KMS log.

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 404: KMS can't be reached, therefore has to be assumed offline.

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

4.4 GET /monitor/log

Get full logging info

get the log file from the KMS

REQUEST

No request parameters

RESPONSE

STATUS CODE - 200: Log file of the KMS. State the file format in the MIME type notation in the http Content-Type header. Any type can be returned, some examples are given, but it is beyond this specification to specify the log format.

RESPONSE MODEL - */*

EXAMPLE:

```
"[File content of any type]"
```

RESPONSE MODEL - text/plain

RESPONSE MODEL - application/json

RESPONSE MODEL - application/vnd.sqlite3

RESPONSE MODEL - application/octet-stream

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 500: Internal error

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem

NAME	TYPE	DESCRIPTION
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

4.5 GET /monitor/qkd-device

Get known QKD devices and status

Receive QKD device information the KMS instance has.

REQUEST

No request parameters

RESPONSE

STATUS CODE - 200: QKD devices information correctly returned

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
qkd_devices	array	
device_id*	string	
link_id*	string	The ID of the link this device is associate to.
label	string	Human readable label, for example vendor name and model number.
state*	enum	ALLOWED:online, stopped, offline Current or target state after successful operation
interface*	enum	ALLOWED:etsi_004, etsi_014, skip Interface type of the QKD device
protocol*	string	Transport protocol used, for ETSI GS QKD 014 typically https.
peer_kms*	string	to which peer is this device connected, does not have to be UUID format, but unique in network

STATUS CODE - 400: Bad request

RESPONSE MODEL - application/problem+json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code
detail*	string	Information on the problem and hints on how to solve it

STATUS CODE - 500: QKD devices information could not be returned because of a server-side error

RESPONSE MODEL - application/json

NAME	TYPE	DESCRIPTION
OBJECT WITH BELOW STRUCTURE		
type	string	Webpage with information on this problem
title*	string	Brief description of the problem
status*	integer	Response code or status code

NAME	TYPE	DESCRIPTION
detail*	string	Information on the problem and hints on how to solve it
