Intel® RSP SW Toolkit - Gateway

Application Interface (API)

Document Number: 338971-001
Document Revision: 2019.06.04

Revision History

Version	Revision	Description
338971-001	2019.05.16	Initial draft for review.
	2019.06.04	Updated to reflect refactored upstream API

Table of Contents

1 Introduction

This document defines the Application Interfaces (API) formats used by the Intel® RSP SW Toolkit – Gateway. The features and functionality included are intended to showcase the capabilities of the Intel® RFID Sensor Platform (Intel® RSP) by demonstrating the use of the API to collect and process RFID tag data. THE SOFTWARE IS NOT INTENDED TO BE A COMPLETE END-TO-END INVENTORY MANAGEMENT SOLUTION.

1.1 Terminology

Term	Description
RSP	RFID Sensor Platform
NFC	Near Field Communications
GPIO	General Purpose Input / Output

1.2 Reference Documents

Document	Document Number
RFID Sensor Platform – Hx000 Installation & User Guide	338088
RRS-Hx000_Message_API	338178
Intel® RSP SW Toolkit – Gateway, Installation & User Guide	338443
Intel® RSP SW Toolkit – Sensor NFC App, Installation & User Guide	338454
Intel® RSP SW Toolkit – Gateway, Application Interface	338971

2 System Description

The Intel® RSP SW Toolkit – Gateway is a Reference Design intended to showcase the capabilities of the Intel® RFID Sensor Platform (Intel® RSP) by demonstrating the use of the API to collect and process RFID tag data as well as highlighting various features and functionality commonly used by inventory management systems. THIS SOFTWARE IS NOT INTENDED TO BE A COMPLETE END-TO-END INVENTORY MANAGEMENT SOLUTION.

A goal of the Intel® RSP is to be as “zero-config" as possible. To achieve this, the system architecture makes use of existing technologies such as DHCP, mDNS Service Discovery and MQTT. Also, each Intel® RSP can be optionally provisioned via NFC to support mutual authentication and identification to the Gateway. The figure below illustrates this messaging.

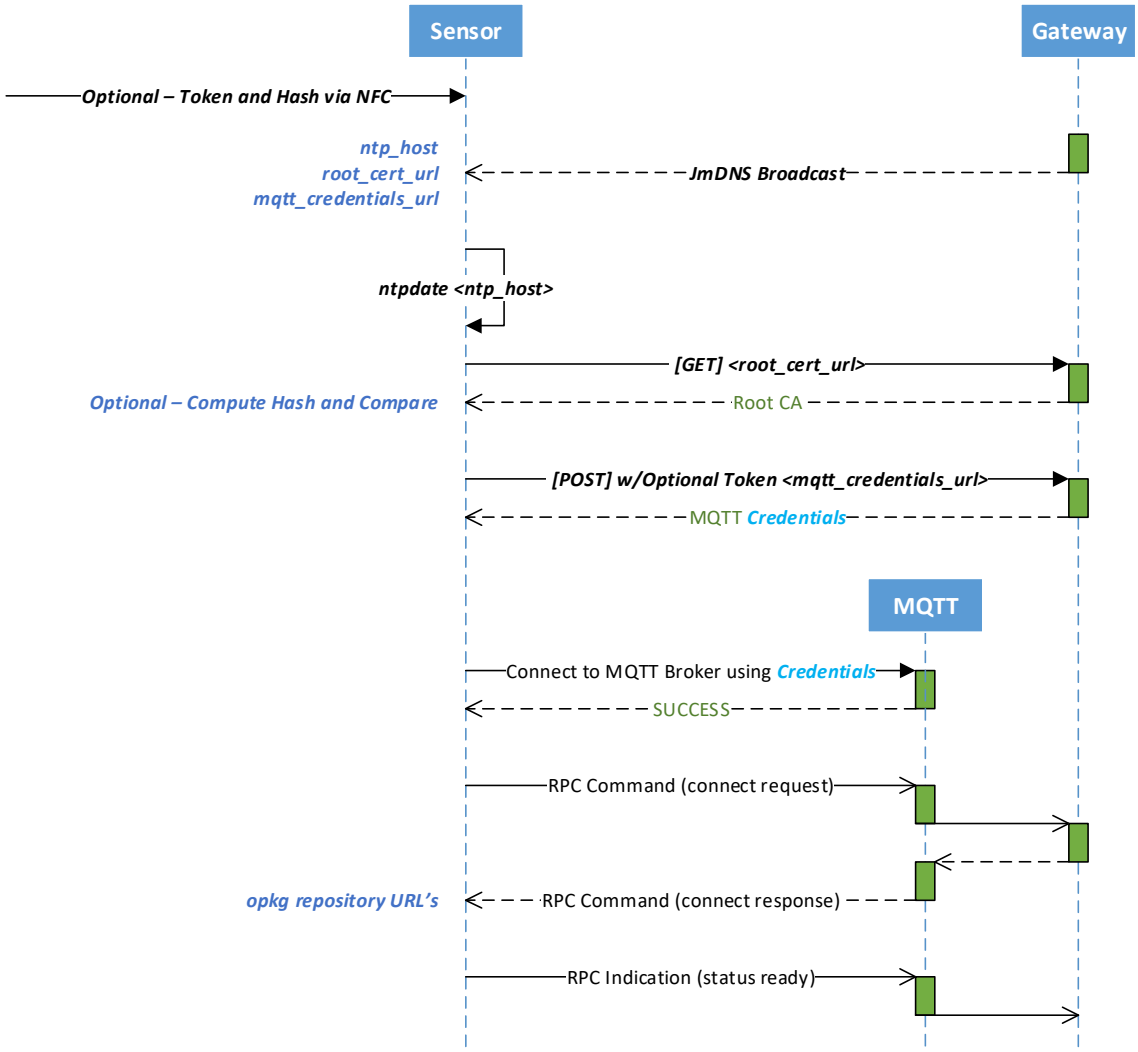

Figure 1: Zero-Config Data Flow

The Intel® RSP SW Toolkit – Gateway utilizes three types of data interfaces…

1. mDNS Service Discovery announcements
2. REST interfaces
3. JSON RPC over MQTT

The figure below illustrates the type of data exchanged across these interfaces.

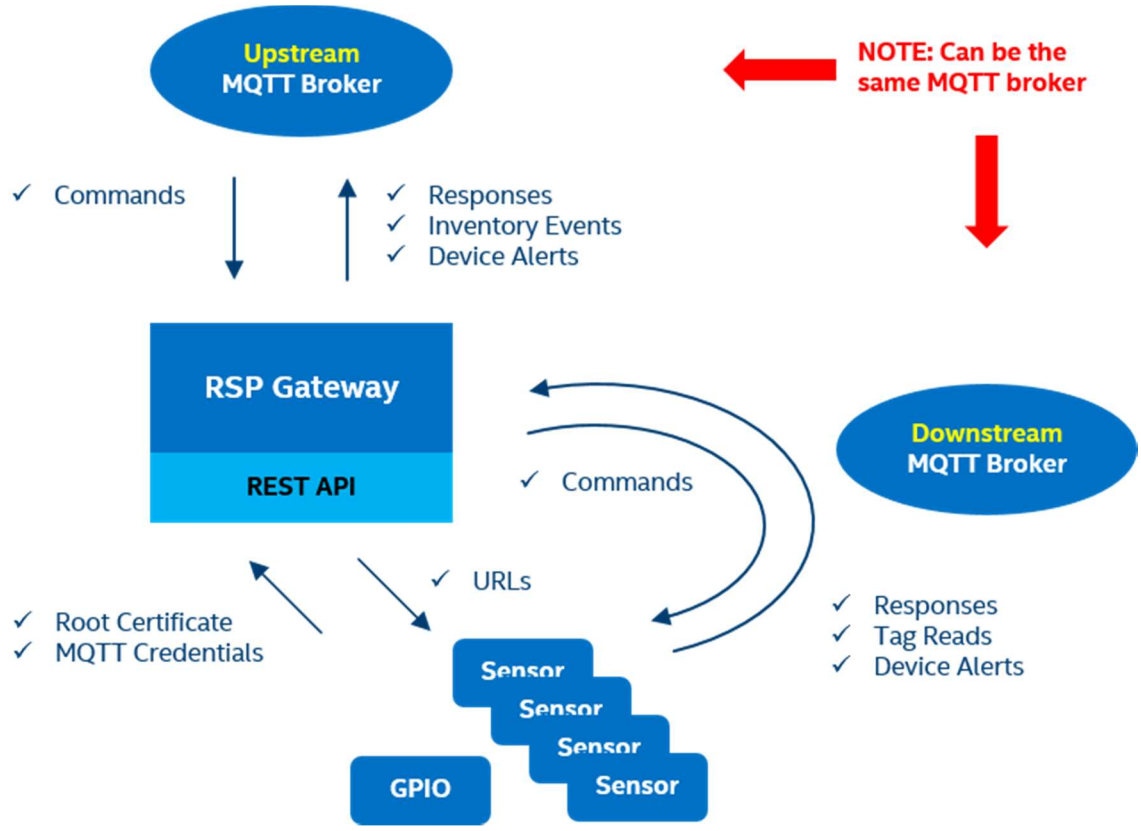

Figure 2: Data Interfaces

2.1 mDNS Service Discovery

The Gateway announces basic Gateway Services (Root Certificate, MQTT Credential and NTP Time Server URL using a DNS service announcement.

2.2 REST Endpoints

2.2.1 Root Cert Endpoint

The Root Certificate Endpoint returns the CA Root certificate (in one-line PEM format) used for this installation of the Intel® RSP.

2.2.2 MQTT Credentials Endpoint

The MQTT Credentials Endpoint returns a JSON object containing broker URL, topic and password information needed to connect to the MQTT broker.

2.3 JSON RPC

JSON RPC over MQTT is used to command and control the RFID and GPIO devices on the "downstream" channels. It is also used to command and control the Gateway itself on the "upstream" channels. This exchange of information follows the JSON RPC 2.0 specification. JSON-RPC is a stateless, lightweight protocol that is transport agnostic.

2.3.1 Request Object

The Request object has the following members:

- **jsonrpc**
  - A String specifying the version of the JSON-RPC protocol.
- **method**
  - A String containing the name of the method to be invoked.
- **params**
  - A Structured value that holds the parameter values to be used during the invocation of the method.
  - This member may be omitted.
- **id**
  - An identifier containing a String or Number value (if included).
  - This member is used to correlate the context between requests and responses.

2.3.2 Response Object

The Response is expressed as a single JSON Object, with the following members:

- **jsonrpc**
  - A String specifying the version of the JSON-RPC protocol.
- **result**
  - The presence of this member indicates successful execution of the corresponding method.
  - This member is not present when the execution of the method resulted in an error.
- **error**
  - The presence of this member indicates unsuccessful execution of the corresponding method.
  - This member is not present when the execution of the method was successful.
  - When present, the error Object contains the following members:
    - **code**
      - An integer that indicates the error type that occurred.
    - **message**
      - A String providing a short description of the error.
    - **data**
      - A Primitive or Structured value that contains additional information about the error (optional).
  - See table below for supported error codes.
- **id**
  - This member is always present on a response and contains the same value as the id member in the corresponding Request Object.
  - This member is not present on indications.

2.3.3 Error Codes

The RSP provides one of the following error codes when an error occurs.

Table 1 JSON RPC Error Code Fields

Code	Message	Meaning
-32001	Wrong State	Cannot be executed in the current state
-32002	Function not supported	The requested functionality is not supported
-32100	No facility assigned	The RSP has no Facility ID assigned yet
-32601	Method not found	The method does not exist
-32602	Invalid Parameter	Out of range or invalid format
-32603	Internal Error	RSP application error
-32700	Parse error	Invalid JSON Object

2.3.4 Notification Object

A Notification is a Request object without an "id" member. A Request object that is a Notification signifies that a corresponding Response object is not expected.

2.3.5 MQTT Topics

2.3.5.1 Upstream

The following MQTT Topics are used to communicate with the Gateway.

```
rfid/gw/alerts
rfid/gw/events
rfid/gw/command
rfid/gw/response
rfid/gw/notification
```

2.3.5.2 Downstream (Sensor)

The following MQTT Topics are used to communicate with RFID Sensor Platforms.

```
rfid/rsp/connect
rfid/rsp/command
rfid/rsp/response
rfid/rsp/data
rfid/rsp/rsp_status
```

2.3.5.3 Downstream (GPIO Device)

The following MQTT Topics are used to communicate with GPIO Devices.

```
rfid/gpio/connect
rfid/gpio/command
rfid/gpio/response
rfid/gpio/status
```

3 Data Definitions

This section defines the messages associated with each of the Gateway interfaces.

3.1 mDNS Service Announcement

The Gateway (or its proxy) announces basic Gateway Services using the JmDNS service announcement.

3.1.1.1 JmDNS ServiceInfo Parameters

Table 2 JmDNS ServiceInfo Parameters

Parameter	Definition
type	A string value defined as "_rfid._tcp.local."
name	A string value defined as "RFID-Gateway"
port	An integer value defined as 0.
text	A string value defined as a JSON Object (see below)

3.1.1.2 JmDNS Text Field

The following JSON Object is an example "text" string.

```
{
   "sensor_token_required":true,
   "root_cert_url":"http://some-server.com/endpoint",
   "mqtt_credentials_url":"https://some-server.com/endpoint",
   "ntp_host":"RFID-Gateway-01.local"
}
```

Table 3 JSON Text Field Parameters

Parameter	Definition
sensor_token_required	Boolean to indicate the use of a provisioning tag
root_cert_url	The URL for accessing the cloud CA root certificate
mqtt_credentials_url	The URL for accessing the mqtt credentials
ntp_host	The address or hostname of the local NTP server.

3.2 REST Endpoints

3.2.1 Root Certificate Endpoint

3.2.1.1 GET

N/A

3.2.1.2 Response

The Root Certificate Endpoint returns the CA Root certificate (in one-line PEM format)


```
{
  "one_line_pem":"-----BEGIN CERTIFICATE-----
\nMIIEKzCCAxOgAwIBAgIJAOCJFM85pZzDMA0GCSqGSIb3DQEBCwUAMIGrMQswCQYD\nVQQGEwJVUzETMBEGA1UECAwKQ2FsaW
Zvcm5pYTERMA8GA1UEBwwIQ2FybHNiYWQx\nHzAdBgNVBAoMFkVuY2luaXRhcyBMYWJvcmF0b3JpZXMxDTALBgNVBAsMBFJGSU
Qx\nGjAYBgNVBAMMEWVuY2luaXRhc2xhYnMuY29tMSgwJgYJKoZIhvcNAQkBFhljb250\nYWN0QGVuY2luaXRhc2xhYnMuY29t
MB4XDTE2MTAzMDIyNDY0NVoXDTE3MTAzMDIy\nNDY0NVowgasxCzAJBgNVBAYTAlVTMRMwEQYDVQQIDApDYWxpZm9ybmlhMREw
DwYD\nVQQHDAhDYXJsc2JhZDEfMB0GA1UECgwWRW5jaW5pdGFzIExhYm9yYXRvcmllczEN\nMAsGA1UECwwEUkZJRDEaMBgGA1
UEAwwRZW5jaW5pdGFzbGFicy5jb20xKDAmBgkq\nhkiG9w0BCQEWGWNvbnRhY3RAZW5jaW5pdGFzbGFicy5jb20wggEiMA0GCS
qGSIb3\nDQEBAQUAA4IBDwAwggEKAoIBAQDgB+m9NQyd4pcqfYSi++DmO2aCmXoNPmfJzAFZ\nxsgjIIlKweDujpt3At3Zk3og
ZNPQTkaYCVdwnABs3tMmjiGOhqgHEmXXsDUUtFiR\nkObtehBc6khqIrE/eRR94P0B/NXHvuKrgeQxIO2nv9Q6E16H/mlV1udT
tPHQrQ4w\n91gkShWjmXe7LfBh/mdEPM9F1TbG9CgV46QBN2Fl0ouFvC89t88IqcKlBVNr3xvx\niCwaWQs0wWcHinF+rDtX2m
jRYLV4ItfLd5AYiuVk1id24KowMgVDofgLLtBU7NJK\nq9ojUBIcaSgPfUATKrqegyVUImUSlS6M9R9oIYFujxPcJyW/AgMBAA
GjUDBOMB0G\nA1UdDgQWBBRdbPlmWZ8X9ofsz5kWXHAgqtVnizAfBgNVHSMEGDAWgBRdbPlmWZ8X\n9ofsz5kWXHAgqtVnizAM
BgNVHRMEBTADAQH/MA0GCSqGSIb3DQEBCwUAA4IBAQAk\n8o41WUQjleryN/aGStX8zj8cF6XA9Hnb4+HAPUAry4Q2cfdGu9uL
HVBy2DQ46m3D\nUomVMXd+Q8EG09Iq6PHMlWVbYnkh2+fTiQkZaRM5BBC7lpQZcVi/ka7giklEv78y\nYGx9RoRgWVFWUhANdp
RByWIVBuVxLiStrjOzqIF1X/uCXw8XHb48Ip6tDlfOa+rs\noTlw32CgDQBI5iM397zPoPcB71xXwBC4JaQr0Uk4nePGRarZKq
Y8/CYcBYlQEkbJ\nT/1NbXO2T4ixVjjvysw8blFedx1QqZ2ijAVXYBnLDqFoOF6uuaSmazuJ/gSQc9cv\nle28t5HuKhIAq4CR
9c/k\n-----END CERTIFICATE-----\n"
}
```


Table 4 Root Certificate Endpoint Response

Parameter	Definition
one_line_pem	The Root CA Certificate in one-line PEM format.

3.2.2 MQTT Credentials Endpoint

3.2.2.1 POST

```
{
  "username": "RSP-958a7b",
  "sensor_token":"123456789ABCDEF0123456789ABCDEF0"
}
```

Table 5 MQTT Credentials Endpoint POST

Parameter	Definition
username	A username string (typically the hostname of the device)
sensor_token	A hexadecimal string representation of a 256-bit token

3.2.2.2 Response

```
{
   "mqtt_uri":"ssl://RFID-Gateway-01.local:8883",
   "mqtt_topic_prefix":"rfid/rsp",
   "mqtt_password":"lu1qamFVhBdlVIbKfzdGuOCulPuS1bcY"
}
```

Table 6 MQTT Credentials Endpoint Response

Parameter	Definition
mqtt_uri	The URI containing the protocol, address or hostname and port of the MQTT broker
mqtt_topic_prefix	The MQTT topic prefix is prepended to the sub-topics used between the GW and Intel® RSP. The valid topics are... < mqtt_topic_prefix >/connect < mqtt_topic_prefix >/connect/< device_id > < mqtt_topic_prefix >/command/< device_id > < mqtt_topic_prefix >/response/< device_id > < mqtt_topic_prefix >/rsp_status/< device_id > < mqtt_topic_prefix >/data/< device_id> < mqtt_topic_prefix >/gw_status
mqtt_password	The password used when connecting to the MQTT broker

3.3 JSON RPC

3.3.1 Upstream

The following messages are sent via the upstream data broker.

Table 7 Gateway Upstream API

Command	Type
behavior_get_all	Request / Response
behavior_get	Request / Response
behavior_put	Request / Response
cluster_get_config	Request / Response
cluster_set_config	Request / Response
downstream_get_mqtt_status	Request / Response
downstream_mqtt_status	Notification
gpio_clear_mappings	Request / Response
gpio_set_mapping	Request / Response
inventory_event	Notification
inventory_get_tag_info	Request / Response
inventory_get_tag_stats_info	Request / Response
inventory_read_rate_per_second	Notification
inventory_summary	Notification
inventory_unload	Request / Response
oem_cfg_update_status	Notification
remove_device	Request / Response
scheduler_get_run_state	Request / Response
scheduler_run_state	Notification
scheduler_set_run_state	Request / Response
sensor_config_notification	Notification
sensor_connection_state_notification	Notification
sensor_get_basic_info	Request / Response
sensor_get_bist_results	Request / Response
sensor_get_device_ids	Request / Response
sensor_get_geo_region	Request / Response
sensor_get_state	Request / Response
sensor_get_versions	Request / Response
sensor_read_state_notification	Notification
sensor_set_geo_region	Request / Response
sensor_set_led	Request / Response
sensor_state_summary	Notification
sensor_update_software	Request / Response
upstream_get_mqtt_status	Request / Response
upstream_mqtt_status	Notification

3.3.1.1 Behavior Get All

3.3.1.1.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "2",
  "method" : "behavior_get_all"
}
```

3.3.1.1.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "2",
  "result" : [ {
    "id" : "ClusterAllOn_PORTS_1",
    "operation_mode" : "NonContinuous",
    "link_profile" : 1,
    "power_level" : 30.5,
    "selected_state" : "Any",
    "session_flag" : "S1",
    "target_state" : "A",
    "q_algorithm" : "Dynamic",
    "fixed_q_value" : 10,
    "start_q_value" : 7,
    "min_q_value" : 3,
    "max_q_value" : 15,
    "retry_count" : 0,
    "threshold_multiplier" : 2,
    "dwell_time" : 4000,
    "inv_cycles" : 0,
    "toggle_target_flag" : true,
    "repeat_until_no_tags" : false,
    "perform_select" : false,
    "perform_post_match" : false,
    "filter_duplicates" : false,
    "auto_repeat" : false,
    "delay_time" : 0,
    "toggle_mode" : "OnInvCycle"
  }, { ... }, {
    "id" : "Manual_WITH_TID",
    "operation_mode" : "NonContinuous",
    "link_profile" : 1,
    "power_level" : 30.5,
    "selected_state" : "Any",
    "session_flag" : "S2",
    "target_state" : "A",
    "q_algorithm" : "Fixed",
    "fixed_q_value" : 10,
    "start_q_value" : 7,
    "min_q_value" : 3,
    "max_q_value" : 15,
    "retry_count" : 0,
    "threshold_multiplier" : 2,
    "dwell_time" : 4000,
    "inv_cycles" : 50,
    "toggle_target_flag" : false,
    "repeat_until_no_tags" : true,
    "perform_select" : false,
    "perform_post_match" : false,
    "filter_duplicates" : false,
    "auto_repeat" : false,
    "delay_time" : 0,
    "toggle_mode" : "OnInvCycle"
  } ]
}
```

3.3.1.2 Behavior Get

3.3.1.2.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "0",
  "method" : "behavior_get",
  "params" : {
    "behavior_id" : "ClusterAllSeq_Ports_1"
  }
}
```

3.3.1.2.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "2",
  "result" : [{
    "id" : " ClusterAllSeq_PORTS_1",
    "operation_mode" : "NonContinuous",
    "link_profile" : 1,
    "power_level" : 30.5,
    "selected_state" : "Any",
    "session_flag" : "S1",
    "target_state" : "A",
    "q_algorithm" : "Dynamic",
    "fixed_q_value" : 10,
    "start_q_value" : 7,
    "min_q_value" : 3,
    "max_q_value" : 15,
    "retry_count" : 0,
    "threshold_multiplier" : 2,
    "dwell_time" : 4000,
    "inv_cycles" : 0,
    "toggle_target_flag" : true,
    "repeat_until_no_tags" : false,
    "perform_select" : false,
    "perform_post_match" : false,
    "filter_duplicates" : false,
    "auto_repeat" : false,
    "delay_time" : 0,
    "toggle_mode" : "OnInvCycle"
  }]
}
```

3.3.1.3 Behavior Put

3.3.1.3.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "1",
  "method" : "behavior_put",
  "params" : {
    "id" : "Default",
    "operation_mode" : "NonContinuous",
    "link_profile" : 1,
    "power_level" : 30.5,
    "selected_state" : "Any",
    "session_flag" : "S1",
    "target_state" : "A",
    "q_algorithm" : "Dynamic",
    "fixed_q_value" : 10,
    "start_q_value" : 7,
    "min_q_value" : 3,
    "max_q_value" : 15,
    "retry_count" : 0,
    "threshold_multiplier" : 2,
    "dwell_time" : 10000,
    "inv_cycles" : 0,
    "toggle_target_flag" : true,
    "repeat_until_no_tags" : false,
    "perform_select" : false,
    "perform_post_match" : false,
    "filter_duplicates" : false,
    "auto_repeat" : true,
    "delay_time" : 0,
    "toggle_mode" : "OnInvCycle"
  }
}
```

3.3.1.3.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "2",
  "result" : [{
    "id" : "Default",
    "operation_mode" : "NonContinuous",
    "link_profile" : 1,
    "power_level" : 30.5,
    "selected_state" : "Any",
    "session_flag" : "S1",
    "target_state" : "A",
    "q_algorithm" : "Dynamic",
    "fixed_q_value" : 10,
    "start_q_value" : 7,
    "min_q_value" : 3,
    "max_q_value" : 15,
    "retry_count" : 0,
    "threshold_multiplier" : 2,
    "dwell_time" : 10000,
    "inv_cycles" : 0,
    "toggle_target_flag" : true,
    "repeat_until_no_tags" : false,
    "perform_select" : false,
    "perform_post_match" : false,
    "filter_duplicates" : false,
    "auto_repeat" : true,
    "delay_time" : 0,
    "toggle_mode" : "OnInvCycle"
  }]
}
```

Table 8 Behavior Parameters

Parameter	Definition
id	The ID string assigned to this behavior
operation_mode	The embedded RFID module transmit operation mode. The valid values are "Continuous" and "NonContinuous". The default value is "NonContinuous".
inventory_mode	The embedded RFID module inventory mode. The valid values are "EPConly" and "EPCplusTID". The default value is "EPConly".
link_profile	The RF Link Profile to be used for this behavior. (see Table 48 Link Profile Parameters) The valid range is 0 – 4.
power_level	The power output level in dBm to be used for this behavior. The valid range is 0 – 31.5.
dwell_time	The maximum amount of time (ms) spent on a particular virtual port before switching to the next virtual port during an inventory cycle. If this parameter is zero, the “inv_cycles" parameter may not be zero. The valid range is 0 – 65535.
inv_cycles	The maximum amount of inventory cycles to attempt on a particular virtual port before switching to the next virtual port during an inventory cycle. If this parameter is zero, the “dwell_time" parameter may not be zero. The valid range is 0 – 65535.
selected_state	Specifies the state of the “SL" flag to be used for this behavior when specifying a select protocol operation. The valid values are: “Any", “Deasserted" and “Asserted".
session_flag	Specifies which inventory session flag is matched against the state specified by “target_state". The valid values are “S0", “S1", “S2", “S3”.
target_state	Specifies the state of the inventory session flag specified by “session_flag" that are to apply the subsequent tag protocol operation. The valid values are “A" and “B".
q_algorithm	The specific Q algorithm being configured. The valid values are “Fixed" and “Dynamic". When using a “Fixed" algorithm, the number of time slots is 2^Q. When using a “Dynamic" algorithm, the Smart Sensor Platform’s embedded module will vary the number of slots dynamically based on the number of tags responding.
fixed_q_value	The fixed Q value to use (valid when q_algorithm = Fixed). The valid range of this parameter is 0 – 15.
repeat_until_no_tags	Specifies whether or not the singulation algorithm should continue until no more tags are singulated. The valid values are “true" or “false".
start_q_value	The initial Q value to use at the beginning of an inventory round (valid when q_algorithm = Dynamic). The valid range of this parameter is 0 – 15.
min_q_value	The minimum Q value that would ever be used during an inventory round (valid when q_algorithm = Dynamic). The valid range of this parameter is 0 – 15.
max_q_value	The maximum Q value that would ever be used during an inventory round (valid when q_algorithm = Dynamic). The valid range of this parameter is 0 – 15.

threshold_multiplier	A 4X multiplier applied to the Q-adjustment threshold as part of the dynamic-Q algorithm. The valid range of this parameter is 0 – 255.
retry_count	The number of times to try another execution of the singulation algorithm before either toggling the target flag or terminating the operation. The valid range of this parameter is 0 – 255.
toggle_target_flag	Specifies whether or not to toggle the targeted flag. The valid values are “true" or “false".
toggle_mode	When toggle_target_flag is true, this value specifies when to toggle the targeted flag. The valid values are “None”, “OnInvCycle", OnInvRound”, or “OnReadRate".
perform_select	Specifies whether or not to perform a select command based on the previously configured criteria. The valid values are “true" and “false".
perform_post_match	Specifies whether or not to perform a post singulation match based on the previously configured criteria. The valid values are “true" and “false".
filter_duplicates	Specifies whether or not the Intel® RFID Sensor Platform should filter out duplicate tag information before sending to the Gateway. The valid values are “true" or “false".

Table 9 Link Profile Parameters

Parameter / Profile Index	0	1	2	3	4
Modulation Type	DSB-ASK	PR-ASK	PR-ASK	DSB-ASK	DSB-ASK
Tari Duration (us)	25	25	25	6.25	6.25
Data 0/1 Difference	1	0.5	0.5	0.5	0.5
Pulse Width (us)	12.5	12.5	12.5	3.13	3.13
R-T Calculation (us)	75	62.5	62.5	15.63	15.63
T-R Calculation (us)	200	85.33	71.11	20	33.33
Divide Ratio	8	21.33	21.33	8	21.33
Data Encoding	FM0	Miller-4	Miller-4	FM0	FM0
Pilot Tone	1	1	1	1	1
Link Frequency (kHz)	40	250	300	400	640
Data Rate (kbps)	40	62.5	75	400	640

Table 10 Session Flag Persistence Values

Session	Tag Energized	Tag Not Energized
S0	Indefinite	None
S1	500 ms < persistence < 5 s	2 s < persistence
S2	Indefinite	2 s < persistence
S3	Indefinite	2 s < persistence

3.3.1.4 Cluster Get Config

3.3.1.4.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "3",
  "method" : "cluster_get_config"
}
```

3.3.1.4.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "3",
  "result" : {
    "id" : "RetailUseCaseClusterConfigExample",
    "clusters" : [ {
      "id" : "BackStockCluster",
      "personality" : null,
      "facility_id" : "BackStock",
      "aliases" : [ ],
      "behavior_id" : "ClusterDeepScan_PORTS_1",
      "sensor_groups" : [ [ "RSP-150005" ] ],
      "tokens" : [ ]
    }, {
      "id" : "SalesFloorCluster",
      "personality" : null,
      "facility_id" : "SalesFloor",
      "aliases" : [ ],
      "behavior_id" : "ClusterMobility_PORTS_1",
      "sensor_groups" : [ [ "RSP-150000" ] ],
      "tokens" : [ ]
    }, {
      "id" : "SalesFloorExitCluster",
      "personality" : "EXIT",
      "facility_id" : "SalesFloor",
      "aliases" : [ ],
      "behavior_id" : "ClusterExit_PORTS_1",
      "sensor_groups" : [ [ "RSP-150004" ] ],
      "tokens" : [ ]
    } ]
  }
}
```

3.3.1.5 Cluster Set Config

3.3.1.5.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "4",
  "method" : "cluster_set_config",
  "params" : {
    "id" : "RetailUseCaseClusterConfigExample",
    "clusters" : [ {
      "id" : "BackStockCluster",
      "personality" : null,
      "facility_id" : "BackStock",
      "aliases" : [ ],
      "behavior_id" : "ClusterDeepScan_PORTS_1",
      "sensor_groups" : [ [ "RSP-150005" ] ],
      "tokens" : [ ]
    }, {
      "id" : "SalesFloorCluster",
      "personality" : null,
      "facility_id" : "SalesFloor",
      "aliases" : [ ],
      "behavior_id" : "ClusterMobility_PORTS_1",
      "sensor_groups" : [ [ "RSP-150000" ] ],
      "tokens" : [ ]
    }, {
      "id" : "SalesFloorExitCluster",
      "personality" : "EXIT",
      "facility_id" : "SalesFloor",
      "aliases" : [ ],
      "behavior_id" : "ClusterExit_PORTS_1",
      "sensor_groups" : [ [ "RSP-150004" ] ],
      "tokens" : [ ]
    } ]
  }}
```

3.3.1.5.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "4",
  "result" : {
    "id" : "RetailUseCaseClusterConfigExample",
    "clusters" : [ {
        ...
    }, {
        ...
    }, {
        ...
    } ]
  }
}
```

Table 11 JSON Cluster Parameters

Parameter	Definition
id	A string identifier for this cluster configuration.
clusters	A list of cluster objects (see below).
id	A string identifier for this particular cluster.
personality	The personality assigned to all sensors in this cluster. Valid values are: NONE, EXIT, POS, FITTING_ROOM
facility_id	The facility name assigned to all sensors in this cluster.
behavior_id	The behavior name assigned to all sensors in this cluster.
aliases	The aliases assigned to all sensors in this cluster. This is an array of strings (maximum of 4) that are used to alias the default location string of "RSP-xxxxxx-y" where xxxxxx is the last 6 characters of the MAC address and y is the antenna port (0 – 3).
sensor_groups	A two-dimensional array of sensor device ids. All sensors in the same row will transmit at the same time. Each row will take turns transmitting in round-robin fashion.

3.3.1.6 Downstream Get MQTT Status

3.3.1.6.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "5",
  "method" : "downstream_get_mqtt_status"
}
```

3.3.1.6.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "5",
  "result" : {
    "connection_state" : "DISCONNECTED",
    "broker_uri" : "tcp://debian-vbox.local:1883",
    "subscribes" : ["rfid/rsp/connect",
                    "rfid/rsp/response/#"
                    "rfid/rsp/rsp_status/#",
                    "rfid/rsp/data/#",
                    "rfid/gpio/connect",
                    "rfid/gpio/response/#",
                    "rfid/gpio/status/#"],
    "publishes" : [ "rfid/rsp/command", "rfid/rsp/gw_status" ]
  }
}
```

Table 12 MQTT Status Parameters

Parameter	Definition
result	The MQTT information summary object (see below).
connection_state	The state of the upstream MQTT connection. Valid values are: DISCONNECTED, CONNECTED
broker_uri	The URI containing the protocol, address/hostname and port of the Downstream MQTT broker
subscribes	A list of strings representing the list of MQTT topics currently subscribed to.
publishes	A list of strings representing the list of MQTT topics currently publishing to.

3.3.1.7 Downstream MQTT Status

3.3.1.7.1 JSON RPC Notification

```
{
  "jsonrpc" : "2.0",
  "method" : "downstream_mqtt_status"
  "params" : {
    "connection_state" : "DISCONNECTED",
    "broker_uri" : "tcp://debian-vbox.local:1883",
    "subscribes" : ["rfid/rsp/connect",
                    "rfid/rsp/response/#"
                    "rfid/rsp/rsp_status/#",
                    "rfid/rsp/data/#",
                    "rfid/gpio/connect",
                    "rfid/gpio/response/#",
                    "rfid/gpio/status/#"],
    "publishes" : ["rfid/rsp/command", "rfid/rsp/gw_status"]
  }
}
```

Table 13 MQTT Status Parameters

Parameter	Definition
params	The MQTT information summary object (see below).
connection_state	The state of the upstream MQTT connection. Valid values are: DISCONNECTED, CONNECTED
broker_uri	The URI containing the protocol, address/hostname and port of the Downstream MQTT broker
subscribes	A list of strings representing the list of MQTT topics currently subscribed to.
publishes	A list of strings representing the list of MQTT topics currently publishing to.

3.3.1.8 GPIO Clear Mappings

3.3.1.8.1 JSON RPC Request

```
{
   "jsonrpc" : "2.0",
   "method" : "gpio_clear_mappings",
   "id": "1"
}
```

3.3.1.8.2 JSON RPC Response

```
{
   "jsonrpc" : "2.0",
   "result" : null,
   "id" : "1"
}
```

3.3.1.9 GPIO Set Mapping

3.3.1.9.1 JSON RPC Request

```
{
   "jsonrpc" : "2.0",
   "id" : "4",
   "method" : "gpio_set_mapping",
   "params" : {
      "sensor_device_id" : "RSP-150001",
      "gpio_device_id" : "remote-gpio",
      "gpio_info" : {
         "index" : 2,
         "name" : "gpio26",
         "state" : "ASSERTED",
         "direction" : "OUTPUT"
      },
      "function" : "SENSOR_TRANSMITTING"
   }
}
```

Table 14 GPIO Mapping Parameters

Parameter	Definition
sensor_device_id	A string corresponding to the sensor device id.
gpio_device_id	A string corresponding to the remote GPIO device hostname.
gpio_info	A GPIO information object (see below).
index	An integer index for this GPIO assigned by the remote device.
name	A string name for this GPIO assigned by the remote device.
state	The requested state for this GPIO. Valid values are: ASSERTED, DEASSERTED
direction	The direction (assigned by the remote device) of this GPIO. Valid values are: INPUT, OUTPUT
function	The function beign mapped to this GPIO. Valid values are: START_READING, STOP_READING, SENSOR_CONNECTED, SENSOR_DISCONNECTED, SENSOR_TRANSMITTING, SENSOR_READING_TAGS, NOT_ASSIGNED

3.3.1.9.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"4"
}
```

3.3.1.10 Inventory Event

3.3.1.10.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"inventory_event",
   "params":{
      "sent_on":1424976117309,
      "gateway_id":"rsp-gateway-01",
      "data":[
         {
            "facility_id":"Store87",
            "epc_code":"30143639F8419145BEEF065F",
            "tid":"E28011606000020BCEC36DC1",
            "epc_encode_format":"unknown",
            "event_type":"arrival",
            "timestamp":1424976117295,
            "location":"Back-Stock"
         }
      ]
   }
}
```

Table 15 Inventory Event Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
gateway_id	A string corresponding to the Gateway hostname.
data	A list of RFID Item records (see below).
facility_id	The facility assigned to the sensor this tag belongs to.
epc_code	A string corresponding to the EPC of this tag record.
tid	A string corresponding to the TID of this tag record.
epc_encode_format	A string indicating how this EPC value was encoded.
event_type	A string indicating the type of inventory event. Valid values are: arrival, departed, moved, returned, cycle_count
timestamp	The millisecond timestamp of the last event from this tag.
location	The alias assigned to the sensor-port this tag belongs to.

3.3.1.11 Inventory Get Tag Info

3.3.1.11.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "9",
  "method" : "inventory_get_tag_info",
  "params" : {
    "filter_pattern" : "*"
  }
}
```

Table 16 Request Parameters

Parameter	Definition
filter_pattern	A regular expression (regex) used to filter on the EPC value.

3.3.1.11.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "9",
  "result" : [ {
    "epc" : "EPC000001",
    "tid" : "TID000001",
    "state" : "PRESENT",
    "location" : "RSP-150005-0",
    "last_read_on" : 1559685170392,
    "facility_id" : "BackStock"
  }, {
    "epc" : "EPC000002",
    "tid" : "TID000002",
    "state" : "PRESENT",
    "location" : "RSP-150005-0",
    "last_read_on" : 1559685170392,
    "facility_id" : "BackStock"
  }, {
    "epc" : "EPC000003",
    "tid" : "TID000003",
    "state" : "PRESENT",
    "location" : "RSP-150005-0",
    "last_read_on" : 1559685170392,
    "facility_id" : "BackStock"
  } ]
}
```

Table 17 Tag Info Parameters

Parameter	Definition
epc	A string corresponding to the EPC of this tag record.
tid	A string corresponding to the TID of this tag record.
state	The current state of this tag. Valid values are: UNKNOWN, PRESENT, EXITING, DEPARTED_EXIT, DEPARTED_POS
location	A string corresponding to the hostname/port or alias of the sensor this tag is associated with.
last_read_on	A millisecond timestamp of when this tag was last read.
facility_id	The facility assigned to the sensor this tag belongs to.

3.3.1.12 Inventory Get Tag Stats Info

3.3.1.12.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "9",
  "method" : "inventory_get_tag_stats_info",
  "params" : {
    "filter_pattern" : "*"
  }
}
```

Table 18 Request Parameters

Parameter	Definition
filter_pattern	A regular expression (regex) used to filter on the EPC value.

3.3.1.12.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "10",
  "result" : {
    "source_aliases" : [ "RSP-150000-0", "RSP-150005-0"],
    "epc_map" : {
      "EPC000001" : [ {
        "source_alias" : "RSP-150000-0",
        "is_location" : false,
        "last_read" : 1559685170392,
        "n" : 2,
        "mean" : -95.0,
        "std_dev" : "-Infinity",
        "min" : -95.0,
        "max" : -95.0
      }, {
        "source_alias" : "RSP-150005-0",
        "is_location" : true,
        "last_read" : 1559685168392,
        "n" : 1,
        "mean" : -95.0,
        "std_dev" : "-Infinity",
        "min" : -95.0,
        "max" : -95.0
      } ],
      "EPC000003" : [ {
        "source_alias" : "RSP-150000-0",
        "is_location" : false,
        "last_read" : 1559685170392,
        "n" : 2,
        "mean" : -95.0,
        "std_dev" : "-Infinity",
        "min" : -95.0,
        "max" : -95.0
      }, {
        "source_alias" : "RSP-150005-0",
        "is_location" : true,
        "last_read" : 1559685168392,
        "n" : 1,
        "mean" : -95.0,
        "std_dev" : "-Infinity",
        "min" : -95.0,
        "max" : -95.0
      } ],
      "EPC000002" : [ {
        "source_alias" : "RSP-150000-0",
        "is_location" : false,
        "last_read" : 1559685170392,
```

```
      "n" : 2,
      "mean" : -95.0,
      "std_dev" : "-Infinity",
      "min" : -95.0,
      "max" : -95.0
    }, {
      "source_alias" : "RSP-150005-0",
      "is_location" : true,
      "last_read" : 1559685168392,
      "n" : 1,
      "mean" : -95.0,
      "std_dev" : "-Infinity",
      "min" : -95.0,
      "max" : -95.0
    } ]
  }
}}
```


Table 19 Tag Stats Info Parameters

Parameter	Definition
source_aliasess	A list of all the source aliases that are included in this response. A tag read's source alias corresponds to the Alias that has been assigned the sensor device's antenna port that read the tag. By default it is the sensor device id and corresponding antenna port id.
epc_map	A map, keyed by EPC (String) with a value that is a list of tag read statistics for each sensor that has read the tag.
source_alias	A string corresponding to the source alias of the tag read.
is_location	A Boolean that indicates if the tag is located at this device.
last_read	A long Integer millisecond timestamp of when this tag was last read.
n	A long Integer number of tag reads in this distribution.
mean	A double representing the average RSSI from this device.
std_dev	A double representing the standard deviation of RSSI from this device.
min	A double representing the minimum RSSI from this device.
max	A double representing the maximum RSSI from this device.

3.3.1.13 Inventory Read-Rate per-Second

3.3.1.13.1 JSON RPC Notification

```
{
  "jsonrpc" : "2.0",
  "method" : "inventory_read_rate_per_second",
  "params" : {
    "read_rate_per_second" : 154
  }}
```

Table 20 Read-Rate per-Second Parameters

Parameter	Definition
read_rate_per_second	The cumulative number of tag reads per second averaged over the last 3 second period.

3.3.1.14 Inventory Summary

3.3.1.14.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"inventory_summary",
   "params":{
      "tag_state_summary":{
         "PRESENT": 1260,
         "EXITING": 21,
         "DEPARTED_EXIT": 44,
         "DEPARTED_POS": 2278
      },
      "tag_read_summary":{
         "reads_per_second": 1102,
         "within_last_01_min": 1100,
         "from_01_to_05_min": 80,
         "from_05_to_30_min": 40,
         "from_30_to_60_min": 30,
         "from_60_min_to_24_hr": 30,
         "more_than_24_hr": 1
      }
   }
}
```

Table 21 Inventory Summary Parameters

Parameter	Definition
params	A params object (see below).
tag_state_summary	A Tag State Summary object (see below).
PRESENT	An integer number tags that are in the PRESENT state.
EXITING	An integer number tags that are in the DEPARTED state.
DEPARTED_EXIT	An integer number tags that are in the DEPARTED_EXIT state.
DEPARTED_POS	An integer number tags that are in the DEPARTED_POS state.
tag_read_summary	A Tag Read Summary object (see below).
reads_per_second	A long integer representing the cumulative read rate of all sensors connected to the Gateway.
within_last_01_min	An integer representing the number of unique tags that were read in the last 1 minute.
from_01_to_05_min	An integer representing the number of unique tags that were last seen between 1 and 5 minutes ago.
from_05_to_30_min	An integer representing the number of unique tags that were last seen between 5 and 30 minutes ago.
from_30_to_60_min	An integer representing the number of unique tags that were last seen between 30 and 60 minutes ago.
from_60_min_to_24_hr	An integer representing the number of unique tags that were last seen between 60 minutes and 24 hours ago.
more_than_24_hr	An integer representing the number of unique tags that were last seen more than 24 hours ago.

3.3.1.15 Inventory Unload

3.3.1.15.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "11",
  "method" : "inventory_unload"
}
```

3.3.1.15.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "11",
  "result" : null
}
```

3.3.1.16 OEM Configuration Update Status

3.3.1.16.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"oem_cfg_update_status",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSP-5a778d",
      "region":"ETSI_UPPER",
      "file":"ETSI_UPPER.freq.plan.txt",
      "status":"IN_PROGRESS",
      "current_line_num":120,
      "total_lines":137,
      "message":null
   }
}
```

Table 22 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
device_id	A string corresponding to the sensor device id
region	A string representing the currently configured geographic region of operation. Valid values are: AUSTRALIA, BRAZIL, CHINA, ETSI, ETSI_UPPER, HONG_KONG, INDIA, INDONESIA, JAPAN, KOREA, MALAYSIA, NEW_ZEALAND, RUSSIA, SINGAPORE, TAIWAN, THAILAND, USA, VIETNAM, UNKNOWN
file	The OEM Configuration filename currently being loaded.
status	A status string. Valid values are: IN_PROGRESS, RESET_RADIO, COMPLETE, ERROR, FAIL
current_line_num	The Integer line number currently being loaded.
total_lines	The Integer number of lines in the OEM Configuration file.
message	A human readable message string.

3.3.1.17 Remove Device

3.3.1.17.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "12",
  "method" : "remove_device",
  "params" : {
    "device_id" : "RSP-150000"
  }
}
```

3.3.1.17.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "12",
  "result" : {
    "device_id" : "RSP-150000"
  }
}
```

Table 23 Remove Device Parameters

Parameter	Definition
device_id	A string representing the device id to be removed.

3.3.1.18 Scheduler Get Run State

3.3.1.18.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "13",
  "method" : "scheduler_get_run_state"
}
```

3.3.1.18.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "13",
  "result" : {
    "run_state" : "FROM_CONFIG",
    "available_states" : [ "INACTIVE", "ALL_ON", "ALL_SEQUENCED", "FROM_CONFIG" ],
    "clusters" : [ {
      "id" : "BackStockCluster",
      "personality" : null,
      "facility_id" : null,
      "aliases" : [ ],
      "behavior_id" : "ClusterDeepScan_PORTS_1",
      "sensor_groups" : [ ],
      "tokens" : [ ]
    }, {
      "id" : "SalesFloorCluster",
      "personality" : null,
      "facility_id" : null,
      "aliases" : [ ],
      "behavior_id" : "ClusterMobility_PORTS_1",
      "sensor_groups" : [ ],
      "tokens" : [ ]
    }, {
      "id" : "SalesFloorExitCluster",
      "personality" : null,
      "facility_id" : null,
      "aliases" : [ ],
      "behavior_id" : "ClusterExit_PORTS_1",
      "sensor_groups" : [ ],
      "tokens" : [ ]
    } ]
  }
}
```

3.3.1.19 Scheduler Run State

3.3.1.19.1 JSON RPC Notification

```
{
  "jsonrpc" : "2.0",
  "id" : "13",
  "result" : {
    "run_state" : "FROM_CONFIG",
    "available_states" : [ "INACTIVE", "ALL_ON", "ALL_SEQUENCED", "FROM_CONFIG" ],
    "clusters" : [ {
      "id" : "BackStockCluster",
      "personality" : null,
      "facility_id" : null,
      "aliases" : [ ],
      "behavior_id" : "ClusterDeepScan_PORTS_1",
      "sensor_groups" : [ ],
      "tokens" : [ ]
    }, { ... }, {
      "id" : "SalesFloorExitCluster",
      "personality" : null,
      "facility_id" : null,
      "aliases" : [ ],
      "behavior_id" : "ClusterExit_PORTS_1",
      "sensor_groups" : [ ],
      "tokens" : [ ]
    } ]
  }
}
```

Table 24 Scheduler Summary Parameters

Parameter	Definition
params	A params object (see below).
run_state	A string run state of the scheduler. Valid values are: INACTIVE, ALL_ON, ALL_SEQUENCED, FROM_CONFIG
available_states	A list of all the valid run states.
clusters	A list of the clusters that the scheduler is using in this particular run state (see below).
id	A string identifier for this cluster.
personality	The personality assigned to all sensors in this cluster. Valid values are: NONE, EXIT, POS, FITTING_ROOM
facility_id	The facility name assigned to all sensors in this cluster.
behavior_id	The behavior name assigned to all sensors in this cluster.
aliases	The aliases assigned to all sensors in this cluster.
sensor_groups	A list of sensor groups where a group is a collection of one or more sensor. Sensors in a group will all read tags at the same time. The scheduler activates one group at a time in sequential order.
tokens	A list of sensor tokens (see below). Sensors that have been programmed with the same token are members of the same group. As describe previously, they will all read tags at the same time. The scheduler activates one (token) group at a time in sequential order.
username	The token user name takes on different values depending on usage context. For a cluster configuration it just identifies a particular token.
token	A 64 character string. Can be random or contain meta-data.
generatedTimestamp	The millisecond timestamp of when this token is valid.

expirationTimestamp	The millisecond timestamp of when this token expires. The value of -1 indicates the token never expires.

3.3.1.20 Scheduler Set Run State

3.3.1.20.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "15",
  "method" : "scheduler_set_run_state",
  "params" : {
    "run_state" : "ALL_ON"
  }
}
```

3.3.1.20.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "13",
  "result" : {
    "run_state" : "FROM_CONFIG",
    "available_states" : [ "INACTIVE", "ALL_ON", "ALL_SEQUENCED", "FROM_CONFIG" ],
    "clusters" : [ {
      "id" : "BackStockCluster",
      "personality" : null,
      "facility_id" : null,
      "aliases" : [ ],
      "behavior_id" : "ClusterDeepScan_PORTS_1",
      "sensor_groups" : [ ],
      "tokens" : [ ]
    }, {
      "id" : "SalesFloorCluster",
      "personality" : null,
      "facility_id" : null,
      "aliases" : [ ],
      "behavior_id" : "ClusterMobility_PORTS_1",
      "sensor_groups" : [ ],
      "tokens" : [ ]
    }, {
      "id" : "SalesFloorExitCluster",
      "personality" : null,
      "facility_id" : null,
      "aliases" : [ ],
      "behavior_id" : "ClusterExit_PORTS_1",
      "sensor_groups" : [ ],
      "tokens" : [ ]
    } ]
  }
}
```

3.3.1.21 Sensor Config

3.3.1.21.1 JSON RPC Notification

```
{
  "jsonrpc" : "2.0",
  "method" : "sensor_config_notification",
  "params" : {
    "device_id" : "RSP-150000",
    "facility_id" : "SalesFloor",
    "personality" : null,
    "aliases" : [ "RSP-150000-0", "RSP-150000-1", "RSP-150000-2", "RSP-150000-3" ]
  }
}
```

Table 25 Sensor Config Parameters

Parameter	Definition
params	A params object (see below).
device_id	A string representing the device id of the sensor.
facility_id	The facility name assigned to this sensor.
personality	The personality assigned to this sensor. Valid values are: NONE, EXIT, POS, FITTING_ROOM
aliases	An array of strings (maximum of 4) that are used to alias "RSP-xxxxxx-y" where xxxxxx is the last 6 characters of the MAC address and y is the antenna port (0 – 3).

3.3.1.22 Sensor Connection State

3.3.1.22.1 JSON RPC Notification

```
{
  "jsonrpc" : "2.0",
  "method" : "sensor_connection_state_notification",
  "params" : {
    "device_id" : "RSP-150000",
    "connection_state" : "DISCONNECTED"
  }
}
```

Table 26 Sensor Config Parameters

Parameter	Definition
params	A params object (see below).
device_id	A string representing the device id of the sensor.
connection_state	The state of the Gateway connection for this sensor. Valid values are: DISCONNECTED, CONNECTED

3.3.1.23 Sensor Get Basic Info

3.3.1.23.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "18",
  "method" : "sensor_get_basic_info",
  "params" : {
    "device_id" : "RSP-150000"
  }
}
```

Table 27 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.

3.3.1.23.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "18",
  "result" : {
    "device_id" : "RSP-150000",
    "connection_state" : "DISCONNECTED",
    "read_state" : "STOPPED",
    "behavior_id" : "Default",
    "facility_id" : "SalesFloor",
    "personality" : null,
    "aliases" : [ "RSP-150000-0", "RSP-150000-1", "RSP-150000-2", "RSP-150000-3" ],
    "alerts" : [ ]
  }
}
```

Table 28 Sensor Basic Info Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.
connection_state	The state of the Gateway connection to this sensor. Valid values are: DISCONNECTED, CONNECTED
read_state	The current read state of this sensor. Valid values are: STOPPED, STARTED, PEND_STOP, PEND_START
behavior_id	A string representing the currently assigned RFID behavior.
facility_id	A string representing the currently assigned Facility ID.
personality	The currently assigned Personality. Valid values are: NONE, EXIT, POS, FITTING_ROOM
aliases	A list of strings representing the aliases assigned to each antenna port. These aliases are used when reporting the location of tag.
alerts	A list of Device Alert Details thrown from this sensor.
sent_on	An integer millisecond timestamp when this alert was thrown.
device_id	A string representing the device id of the sensor.
facility_id	A string representing the Facility assigned to this sensor.
alert_number	An integer alert number (see device_alert for more details).
alert_description	A string representing the description of this alert.
severity	A string representing the severity of this alert. Valid values are: info, warning, urgent, critical, unknown

3.3.1.24 Sensor Get Built-In-Self-Test (BIST) Results

3.3.1.24.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "19",
  "method" : "sensor_get_bist_results",
  "params" : {
    "device_id" : "RSP-150000"
  }
}
```

Table 29 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.

3.3.1.24.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "19",
  "result" : {
    "rf_module_error" : false,
    "rf_status_code" : 0,
    "ambient_temp" : 0,
    "rf_module_temp" : 0,
    "time_alive" : 0,
    "cpu_usage" : 0,
    "mem_used_percent" : 0,
    "mem_total_bytes" : 0,
    "camera_installed" : false,
    "temp_sensor_installed" : false,
    "accelerometer_installed" : false,
    "region" : "USA",
    "rf_port_statuses" : [ {
      "port" : 0,
      "forward_power_dbm10" : 249,
      "reverse_power_dbm10" : 54,
      "connected" : true
    }, {
      "port" : 1,
      "forward_power_dbm10" : 249,
      "reverse_power_dbm10" : 19,
      "connected" : true
    }, {
      "port" : 2,
      "forward_power_dbm10" : 249,
      "reverse_power_dbm10" : 247,
      "connected" : false
    }, {
      "port" : 3,
      "forward_power_dbm10" : 249,
      "reverse_power_dbm10" : 197,
      "connected" : false
    } ],
    "device_moved" : false
  }
}
```

Table 30 BIST Results Parameters

Parameter	Definition
rf_module_error	Error in the Intel® RFID Sensor Platform's embedded RFID module. The valid values are true and false.
rf_status_code	The error status code returned from the RFID module. See Impinj® Indy® MAC Error Code Definitions.
ambient_temp	Temperature in degrees Celsius as measured on the periphery of the Intel® RFID Sensor Platform circuit board.
rf_module_temp	Temperature in degrees Celsius as measured near the power amplifier (PA) of the embedded RFID module.
time_alive	Time in milliseconds since the last Linux boot of the Intel® RFID Sensor Platform.
cpu_usage	Total CPU utilization in percent, averaged over the last one second.
mem_used_percent	Total processor memory utilization (%).
mem_total_bytes	Total memory installed in bytes.
camera_installed	The valid values are true and false.
temp_sensor_installed	The valid values are true and false.
accelerometer_installed	The valid values are true and false.
region	A string representing the currently configured Geographic Region.
device_moved	The pointing angle of the Intel® RFID Sensor Platform has changed. The valid values are "true and false.

A list of up to four RF Port Status Fields.

port	The RF antenna port currently being reported. The valid values are 0 – 3.
forward_power_dbm10	The forward power measured by the embedded module in units of 10ths of a dBm. The valid values range from 0 to 315.
reverse_power_dbm10	The reverse power measured by the embedded module in units of 10ths of a dBm. The valid values range from 0 to 315.
connected	A Boolean value indicating whether or not this antenna port is properly connected. The valid values are "true and false.

3.3.1.25 Sensor Get Device ID's

3.3.1.25.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "20",
  "method" : "sensor_get_device_ids"
}
```

3.3.1.25.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "20",
  "result" : [ "RSP-150000", "RSP-150004", "RSP-150005" ]
}
```

Table 31 Remove Device Parameters

Parameter	Definition
result	A list of strings representing the device ids of the sensors currently known to the Gateway.

3.3.1.26 Sensor Get Geographic Region

3.3.1.26.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "21",
  "method" : "sensor_get_geo_region",
  "params" : {
    "device_id" : "RSP-150000"
  }
}
```

Table 32 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.

3.3.1.26.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "21",
  "result" : {
    "region" : "USA"
  }
}
```

Table 33 JSON Request Parameters

Parameter	Definition
params	A params object (see below).
region	A string representing the currently configured geographic region of operation. Valid values are: AUSTRALIA, BRAZIL, CHINA, ETSI, ETSI_UPPER, HONG_KONG, INDIA, INDONESIA, JAPAN, KOREA, MALAYSIA, NEW_ZEALAND, RUSSIA, SINGAPORE, TAIWAN, THAILAND, USA, VIETNAM, UNKNOWN

3.3.1.27 Sensor Get State

3.3.1.27.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "23",
  "method" : "sensor_get_state",
  "params" : {
    "device_id" : "RSP-150000"
  }
}
```

Table 34 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.

3.3.1.27.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "23",
  "result" : {
    "hostname" : "RSP-150000",
    "hwaddress" : "98:4f:ee:15:04:17",
    "app_version" : "19.2.5.14",
    "module_version" : "3.9",
    "num_physical_ports" : 2,
    "motion_sensor" : true,
    "camera" : false,
    "wireless" : false,
    "configuration_state" : "unknown",
    "operational_state" : "unknown"
  }
}
```

Table 35 JSON Response Parameters

Parameter	Definition
hostname	The ID string assigned to this device. Typically corresponds to the device id referenced elsewhere.
hwaddress	The MAC address of the interface in use.
app_version	The version string of the Intel® RFID Sensor Platform application.
module_version	The version string of the embedded RFID module.
num_physical_ports	The number of antenna ports available on this device.
motion_sensor	Whether or not this platform is equipped with a motion sensor. The valid values are true and false.
camera	Whether or not this platform is equipped with a camera. The valid values are true and false.
wireless	Whether or not this platform is equipped with a wireless module. The valid values are true and false
configuration_state	
operational_state	

3.3.1.28 Sensor Get Versions

3.3.1.28.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "24",
  "method" : "sensor_get_versions",
  "params" : {
    "device_id" : "RSP-150000"
  }
}
```

Table 36 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.

3.3.1.28.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "24",
  "result" : {
    "app_version" : "19.2.5.14",
    "module_version" : "3.9",
    "platform_id" : "H3000",
    "platform_support_version" : "19.1.3.26-r0",
    "pkg_manifest_version" : "19.2.5.14",
    "uboot_version" : "2019.04.20190426225448",
    "linux_version" : "4.19.34 #1 SMP PREEMPT Fri Apr 26 23:33:39 UTC 2019"
  }
}
```

Table 37 JSON Response Parameters

Parameter	Definition
app_version	The version string of the Intel® RFID Sensor Platform application.
module_version	The version string of the embedded RFID module.
platform_id	Valid values H1000, H3000, H4000.
platform_support_version	Version of the platform support pkg.
pkg_manifest_version	Version of the package manifest version.
uboot_version	
linux_version	

3.3.1.29 Sensor Read State

3.3.1.29.1 JSON RPC Notification

```
{
  "jsonrpc" : "2.0",
  "id" : "18",
  "params" : {
    "read_state" : "STOPPED"
  }
}
```

Table 38 Sensor Basic Info Parameters

Parameter	Definition
read_state	The current read state of this sensor. Valid values are: STOPPED, STARTED, PEND_STOP, PEND_START

3.3.1.30 Sensor Set Geographic Region

3.3.1.30.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "22",
  "method" : "sensor_set_geo_region",
  "params" : {
    "devicd_id" : "RSP-150000",
    "region" : "USA"
  }
}
```

Table 39 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.
region	A string representing the currently configured geographic region of operation. Valid values are: AUSTRALIA, BRAZIL, CHINA, ETSI, ETSI_UPPER, HONG_KONG, INDIA, INDONESIA, JAPAN, KOREA, MALAYSIA, NEW_ZEALAND, RUSSIA, SINGAPORE, TAIWAN, THAILAND, USA, VIETNAM, UNKNOWN

3.3.1.30.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "21",
  "result" : {
    "region" : "USA"
  }
}
```

3.3.1.31 Sensor Set LED

3.3.1.31.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "25",
  "method" : "sensor_set_led",
  "params" : {
    "device_id" : "RSP-150000",
    "led_state" : "Disabled"
  }
}
```

Table 40 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.
led_state	State of the Intel® RFID Sensor Platform LED indicator. The valid values are “Normal", "Beacon", “Disabled" and "Test".

3.3.1.31.2 JSON RPC Response

```
{
  "jsonrpc":"2.0",
  "id" : "25",
  "result" : {
    "led_state" : "Disabled"
  }
}
```

3.3.1.32 Sensor State Summary

3.3.1.32.1 JSON RPC Notification

```
{
  "jsonrpc" : "2.0",
  "method" : "sensor_state_summary",
  "params" : {
    "reading" : 0,
    "connected" : 0,
    "disconnected" : 3
  }
}
```

Table 41 JSON Notification Parameters

Parameter	Definition
params	A params object (see below).
reading	An integer number of sensors that are currently reading tags.
connected	An integer number of sensors that are currently connected to the Gateway.
disconnected	An integer number of sensors that are no longer connected to the Gateway.

3.3.1.33 Sensor Update Software

3.3.1.33.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "26",
  "method" : "sensor_update_software",
  "params" : {
    "device_id" : "RSP-150000"
  }
}
```

Table 42 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.

3.3.1.33.2 JSON RPC Response

```
{
  "jsonrpc":"2.0",
  "id" : "26",
  "result" : null
}
```

3.3.1.34 Upstream Get MQTT Status

3.3.1.34.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "8",
  "method" : "uptream_get_mqtt_status"
}
```

3.3.1.34.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "8",
  "result" : {
    "connection_state" : "DISCONNECTED",
    "broker_uri" : "tcp://debian-vbox.local:1883",
    "subscribes" : ["rfid/gw/command"],
    "publishes" : ["rfid/gw/alerts","rfid/gw/events","rfid/gw/response","rfid/gw/notification" ]
  }
}
```

Table 43 MQTT Status Parameters

Parameter	Definition
result	The MQTT information summary object (see below).
connection_state	The state of the upstream MQTT connection. Valid values are: DISCONNECTED, CONNECTED
broker_uri	The URI containing the protocol, address/hostname and port of the Downstream MQTT broker
subscribes	A list of strings representing the list of MQTT topics currently subscribed to.
publishes	A list of strings representing the list of MQTT topics currently publishing to.

3.3.1.35 Upstream MQTT Status

3.3.1.35.1 JSON RPC Notification

```
{
  "jsonrpc" : "2.0",
  "method" : "uptream_mqtt_status"
  "params" : {
    "connection_state" : "DISCONNECTED",
    "broker_uri" : "tcp://debian-vbox.local:1883",
    "subscribes" : ["rfid/gw/command"],
    "publishes" : ["rfid/gw/alerts","rfid/gw/events","rfid/gw/response","rfid/gw/notification"]
  }
}
```

Table 44 MQTT Status Parameters

Parameter	Definition
params	The MQTT information summary object (see below).
connection_state	The state of the upstream MQTT connection. Valid values are: DISCONNECTED, CONNECTED
broker_uri	The URI containing the protocol, address/hostname and port of the Downstream MQTT broker
subscribes	A list of strings representing the list of MQTT topics currently subscribed to.
publishes	A list of strings representing the list of MQTT topics currently publishing to.

3.3.2 Downstream (Sensor)

The following messages are sent to the sensor on the downstream broker.

Table 45 Gateway Downstream Sensor API

Command	Type
ack_alert	Request / Response
apply_behavior	Request / Response
connect	Request / Response
device_alert	Notification
get_bist_results	Request / Response
get_geo_region	Request / Response
get_state	Request / Response
get_sw_version	Request / Response
gw_status_update	Notification
heartbeat	Notification
inventory_complete	Notification
inventory_data	Notification
motion_event	Notification
reboot	Request / Response
reset	Request / Response
shutdown	Request / Response
set_device_alert	Request / Response
set_facility_id	Request / Response
set_geo_region	Request / Response
set_led	Request / Response
set_motion_event	Request / Response
software_update	Request / Response
status_update	Notification
oem_cfg_update_status	Notification

3.3.2.1 Acknowledge Alert

3.3.2.1.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"ack_alert",
   "params":{
      "alert_number":103,
      "acknowledge":true,
      "mute":false
   },
   "id":"12345"
}
```

Table 46 JSON Request Parameters

Parameter	Definition
alert_number	The unique number identifying the type of alert. The valid range for the Intel® RFID Sensor Platform is 100 – 199. 100 – RfModuleError (Boolean) 101 – HighAmbientTemp (degrees C) 102 – HighCpuTemp (degrees C) 103 – HighCpuUsage (% utilization) 104 – HighMemoryUsage (% of max memory) 151 – DeviceMoved (Boolean)
acknowledge	Temporarily silence current alerts of this type. The valid values are true and false.
mute	Silence current and future alerts of this type. The valid values are true and false.

3.3.2.1.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"12345"
}
```

3.3.2.2 Apply Behavior

3.3.2.2.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"apply_behavior",
   "params":{
      "action":"START",
      "action_time":1424976117309,
      "behavior":{
         "id":"DefaultBehavior",
         "operation_mode":"NonContinuous",
         "inventory_mode":"EPConly",
         "link_profile":1,
         "power_level":30.5,
         "dwell_time":5000,
         "inv_cycles":0,
         "selected_state":"Any",
         "session_flag":"S1",
         "target_state":"A",
         "q_algorithm":"Dynamic",
         "fixed_q_value":10,
         "repeat_until_no_tags":false,
         "start_q_value":3,
         "min_q_value":3,
         "max_q_value":15,
         "retry_count":1,
         "threshold_multiplier":7,
         "toggle_target_flag":true,
         "toggle_mode":"OnInvCycle",
         "perform_select":false,
         "perform_post_match":false,
         "filter_duplicates":false,
         "auto_repeat":true,
         "delay_time":0
      }
   },
   "id":"12345"
}
```

Table 47 JSON Request Parameters

Parameter	Definition
action	Specifies the action to be taken. The valid values are “START" and “STOP".
action_time	Specifies the millisecond epoch time to apply the behavior. If zero or not included, the behavior is applied immediately.
behavior	Optional set of behavior parameters (see below).
id	The ID string assigned to this behavior
operation_mode	The embedded RFID module transmit operation mode. The valid values are "Continuous" and "NonContinuous". The default value is "NonContinuous".
inventory_mode	The embedded RFID module inventory mode. The valid values are "EPConly" and "EPCplusTID". The default value is "EPConly".
link_profile	The RF Link Profile to be used for this behavior. (see Table 48 Link Profile Parameters) The valid range is 0 – 4.
power_level	The power output level in dBm to be used for this behavior. The valid range is 0 – 31.5.

dwell_time	The maximum amount of time (ms) spent on a particular virtual port before switching to the next virtual port during an inventory cycle. If this parameter is zero, the “inv_cycles" parameter may not be zero. The valid range is 0 – 65535.
inv_cycles	The maximum amount of inventory cycles to attempt on a particular virtual port before switching to the next virtual port during an inventory cycle. If this parameter is zero, the “dwell_time" parameter may not be zero. The valid range is 0 – 65535.
selected_state	Specifies the state of the “SL" flag to be used for this behavior when specifying a select protocol operation. The valid values are: “Any", “Deasserted" and “Asserted".
session_flag	Specifies which inventory session flag is matched against the state specified by “target_state". The valid values are “S0", “S1", “S2", “S3”.
target_state	Specifies the state of the inventory session flag specified by “session_flag" that are to apply the subsequent tag protocol operation. The valid values are “A" and “B".
q_algorithm	The specific Q algorithm being configured. The valid values are “Fixed" and “Dynamic". When using a “Fixed" algorithm, the number of time slots is 2^Q. When using a “Dynamic" algorithm, the Smart Sensor Platform’s embedded module will vary the number of slots dynamically based on the number of tags responding.

fixed_q_value	The fixed Q value to use (valid when q_algorithm = Fixed). The valid range of this parameter is 0 – 15.
repeat_until_no_tags	Specifies whether or not the singulation algorithm should continue until no more tags are singulated. The valid values are “true" or “false".
start_q_value	The initial Q value to use at the beginning of an inventory round (valid when q_algorithm = Dynamic). The valid range of this parameter is 0 – 15.
min_q_value	The minimum Q value that would ever be used during an inventory round (valid when q_algorithm = Dynamic). The valid range of this parameter is 0 – 15.
max_q_value	The maximum Q value that would ever be used during an inventory round (valid when q_algorithm = Dynamic). The valid range of this parameter is 0 – 15.
threshold_multiplier	A 4X multiplier applied to the Q-adjustment threshold as part of the dynamic-Q algorithm. The valid range of this parameter is 0 – 255.
retry_count	The number of times to try another execution of the singulation algorithm before either toggling the target flag or terminating the operation. The valid range of this parameter is 0 – 255.
toggle_target_flag	Specifies whether or not to toggle the targeted flag. The valid values are “true" or “false".
toggle_mode	When toggle_target_flag is true, this value specifies when to toggle the targeted flag. The valid values are “None”, “OnInvCycle", OnInvRound”, or “OnReadRate".
perform_select	Specifies whether or not to perform a select command based on the previously configured criteria (see **Error! Reference source not found.**). The valid values are “true" and “false".
perform_post_match	Specifies whether or not to perform a post singulation match based on the previously configured criteria (see **Error! Reference source not found.**). The valid values are “true" and “false".
filter_duplicates	Specifies whether or not the Intel® RFID Sensor Platform should filter out duplicate tag information before sending to the Gateway. The valid values are “true" or “false".

3.3.2.2.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"12345"
}
```

Table 48 Link Profile Parameters

Parameter / Profile Index	0	1	2	3	4
Modulation Type	DSB-ASK	PR-ASK	PR-ASK	DSB-ASK	DSB-ASK
Tari Duration (us)	25	25	25	6.25	6.25
Data 0/1 Difference	1	0.5	0.5	0.5	0.5
Pulse Width (us)	12.5	12.5	12.5	3.13	3.13
R-T Calculation (us)	75	62.5	62.5	15.63	15.63
T-R Calculation (us)	200	85.33	71.11	20	33.33
Divide Ratio	8	21.33	21.33	8	21.33
Data Encoding	FM0	Miller-4	Miller-4	FM0	FM0
Pilot Tone	1	1	1	1	1
Link Frequency (kHz)	40	250	300	400	640
Data Rate (kbps)	40	62.5	75	400	640

Table 49 Session Flag Persistence Values

Session	Tag Energized	Tag Not Energized
S0	Indefinite	None
S1	500 ms < persistence < 5 s	2 s < persistence
S2	Indefinite	2 s < persistence
S3	Indefinite	2 s < persistence

3.3.2.3 Connect to the Gateway (sensor)

3.3.2.3.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"connect",
   "params":{
      "hostname":"RSP-5a778d",
      "hwaddress":"98:4f:ee:5a:77:8d",
      "app_version":"1.2.0",
      "module_version":"1.1.0",
      "num_physical_ports":1,
      "motion_sensor":true,
      "camera":false,
      "wireless":false,
      "configuration_state":"Default",
      "operational_state":"Idle"
   },
   "id":"12345"
}
```

Table 50 JSON Request Parameters

Parameter	Definition
hostname	The Linux* hostname of this device.
hwaddress	The MAC address of the interface in use.
app_version	The version string of the Intel® RFID Sensor Platform application.
module_version	The version string of the embedded RFID module.
num_physical_ports	The number of antenna ports available on this device.
motion_sensor	Whether or not this platform is equipped with a motion sensor. The valid values are true and false.
camera	Whether or not this platform is equipped with a camera. The valid values are true and false
wireless	Whether or not this platform is equipped with a wireless module. The valid values are true and false

3.3.2.3.2 JSON RPC Response


```
{
   "jsonrpc":"2.0",
   "result":{
      "sent_on":1424976117309,
      "facility_id":"Store57"
      "software_repos": [
         "https://rsp-repo.local:80/all",
         "https://rsp-repo.local:80/armv7at2hf-neon",
         "https://rsp-repo.local:80/armv7at2hf-neon-mx6qdl",
         "https://rsp-repo.local:80/hx000"
      ],
      "ssh_public_key": "ecdsa-sha2-nistp521
AAAAE2VjZHNhLXNoYTItbmlzdHA1MjEAAAAIbmlzdHA1MjEAAACFBAH3SaiN50uYdhrYG7hBqpG3PL26FDiyW6/EXFLEhsABoL
ayyM+tAOztaOshQgtlIkJdCBTPmvp6skg9pPQtTrj5bwCOwjTLRr8j7lA+puWp7TOYAxefxHK+ShSXxdX0cT25WUPO+h5OypUT
bHuzAqc5XNpY02j6mP+PzbesyKTQkzcsBQ== tshockley@tshock-U16"
   },
   "id":"12345"
}
```


Table 51 JSON Response Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this response.
facility_id	The ID string if the facility assigned to this RSP.
software_repos	A list of strings representing the software repositories.
ssh_public_key	The public key used for SSH access. This key replaces the manufacturer's public key.

Table 52 JSON Response Parameters

Parameter	Definition
rf_module_error	Error in the Intel® RFID Sensor Platform's embedded RFID module. The valid values are true and false.
rf_status_code	The error status code returned from the RFID module. See Impinj® Indy® MAC Error Code Definitions.
ambient_temp	Temperature in degrees Celsius as measured on the periphery of the Intel® RFID Sensor Platform circuit board.
rf_module_temp	Temperature in degrees Celsius as measured near the power amplifier (PA) of the embedded RFID module.
time_alive	Time in milliseconds since the last Linux boot of the Intel® RFID Sensor Platform.
cpu_usage	Total CPU utilization in percent, averaged over the last one second.
mem_used_percent	Total processor memory utilization (%).
mem_total_bytes	Total memory installed in bytes.
camera_installed	The valid values are true and false.
temp_sensor_installed	The valid values are true and false.
accelerometer_installed	The valid values are true and false.
region	A string representing the currently configured Geographic Region.
device_moved	The pointing angle of the Intel® RFID Sensor Platform has changed. The valid values are "true and false.

A list of four RF Port Status Fields.

port	The RF antenna port currently being reported. The valid values are 0 – 3.
forward_power_dbm10	The forward power measured by the embedded module in units of 10ths of a dBm. The valid values range from 0 to 315.
reverse_power_dbm10	The reverse power measured by the embedded module in units of 10ths of a dBm. The valid values range from 0 to 315.
connected	A Boolean value indicating whether or not this antenna port is properly connected. The valid values are "true and false.

3.3.2.4 Device Alert

3.3.2.4.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"device_alert",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSP-abcdef",
      "facility_id":"CH11",
      "alert_number":100,
      "alert_description":"RfModuleError",
      "severity":"warning",
      "optional":{
         "string":"MTI_Error",
         "number":769
      }
   }
}
```

Table 53 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
device_id	The ID assigned to the reporting Intel® RFID Sensor Platform.
facility_id	The ID assigned to the facility where the reporting Intel® RFID Sensor Platform is located.
alert_number	A unique number identifying the type of alert. The valid range for the Intel® RFID Sensor Platform is 100 – 200. 100 – RfModuleError 101 – HighAmbientTemp 102 – HighCpuTemp 103 – HighCpuUsage 104 – HighMemoryUsage 151 – DeviceMoved
alert_description	A corresponding human readable text description.
severity	A prioritized severity level of the alert. The valid range of values is… "info", "warning", "urgent", and "critical".
optional	A series of optional number or string parameters providing further information about the alert.

3.3.2.5 Get Built-In-Self-Test (BIST) Results

3.3.2.5.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "19",
  "method" : "get_bist_results",
}
```

3.3.2.5.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "19",
  "result" : {
    "rf_module_error" : false,
    "rf_status_code" : 0,
    "ambient_temp" : 0,
    "rf_module_temp" : 0,
    "time_alive" : 0,
    "cpu_usage" : 0,
    "mem_used_percent" : 0,
    "mem_total_bytes" : 0,
    "camera_installed" : false,
    "temp_sensor_installed" : false,
    "accelerometer_installed" : false,
    "region" : "USA",
    "rf_port_statuses" : [ {
      "port" : 0,
      "forward_power_dbm10" : 249,
      "reverse_power_dbm10" : 54,
      "connected" : true
    }, {
      "port" : 1,
      "forward_power_dbm10" : 249,
      "reverse_power_dbm10" : 19,
      "connected" : true
    }, {
      "port" : 2,
      "forward_power_dbm10" : 249,
      "reverse_power_dbm10" : 247,
      "connected" : false
    }, {
      "port" : 3,
      "forward_power_dbm10" : 249,
      "reverse_power_dbm10" : 197,
      "connected" : false
    } ],
    "device_moved" : false
  }
}
```

Table 54 BIST Results Parameters

Parameter	Definition
rf_module_error	Error in the Intel® RFID Sensor Platform's embedded RFID module. The valid values are true and false.
rf_status_code	The error status code returned from the RFID module. See Impinj® Indy® MAC Error Code Definitions.
ambient_temp	Temperature in degrees Celsius as measured on the periphery of the Intel® RFID Sensor Platform circuit board.
rf_module_temp	Temperature in degrees Celsius as measured near the power amplifier (PA) of the embedded RFID module.
time_alive	Time in milliseconds since the last Linux boot of the Intel® RFID Sensor Platform.
cpu_usage	Total CPU utilization in percent, averaged over the last one second.
mem_used_percent	Total processor memory utilization (%).
mem_total_bytes	Total memory installed in bytes.
camera_installed	The valid values are true and false.
temp_sensor_installed	The valid values are true and false.
accelerometer_installed	The valid values are true and false.
region	A string representing the currently configured Geographic Region.
device_moved	The pointing angle of the Intel® RFID Sensor Platform has changed. The valid values are "true and false.

A list of up to four RF Port Status Fields.

port	The RF antenna port currently being reported. The valid values are 0 – 3.
forward_power_dbm10	The forward power measured by the embedded module in units of 10ths of a dBm. The valid values range from 0 to 315.
reverse_power_dbm10	The reverse power measured by the embedded module in units of 10ths of a dBm. The valid values range from 0 to 315.
connected	A Boolean value indicating whether or not this antenna port is properly connected. The valid values are "true and false.

3.3.2.6 Get Geographic Region

3.3.2.6.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"get_geo_region",
   "id":"11"
}
```

3.3.2.6.2 JSON RPC Response

```
{
   "jsonrpc": "2.0",
   "id": "11",
   "result": {
      "region": "USA"
   }
}
```

Table 55 JSON Response Parameters

Parameter	Definition
result	A result object (see below).
region	A string representing the currently configured geographic region of operation. Valid values are: AUSTRALIA, BRAZIL, CHINA, ETSI, ETSI_UPPER, HONG_KONG, INDIA, INDONESIA, JAPAN, KOREA, MALAYSIA, NEW_ZEALAND, RUSSIA, SINGAPORE, TAIWAN, THAILAND, USA, VIETNAM, UNKNOWN

3.3.2.7 Get State

3.3.2.7.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "23",
  "method" : "sensor_get_state",
}
```

3.3.2.7.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "23",
  "result" : {
    "hostname" : "RSP-150000",
    "hwaddress" : "98:4f:ee:15:04:17",
    "app_version" : "19.2.5.14",
    "module_version" : "3.9",
    "num_physical_ports" : 2,
    "motion_sensor" : true,
    "camera" : false,
    "wireless" : false,
    "configuration_state" : "unknown",
    "operational_state" : "unknown"
  }
}
```

Table 56 JSON Response Parameters

Parameter	Definition
hostname	The ID string assigned to this device.
hwaddress	The MAC address of the interface in use.
app_version	The version string of the Intel® RFID Sensor Platform application.
module_version	The version string of the embedded RFID module.
num_physical_ports	The number of antenna ports available on this device.
motion_sensor	Whether or not this platform is equipped with a motion sensor. The valid values are true and false.
camera	Whether or not this platform is equipped with a camera. The valid values are true and false.
wireless	Whether or not this platform is equipped with a wireless module. The valid values are true and false
configuration_state	
operational_state	

3.3.2.8 Get Software Version

3.3.2.8.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"get_sw_version",
   "id":"12"
}
```

3.3.2.8.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "24",
  "result" : {
    "app_version" : "19.2.5.14",
    "module_version" : "3.9",
    "platform_id" : "H3000",
    "platform_support_version" : "19.1.3.26-r0",
    "pkg_manifest_version" : "19.2.5.14",
    "uboot_version" : "2019.04.20190426225448",
    "linux_version" : "4.19.34 #1 SMP PREEMPT Fri Apr 26 23:33:39 UTC 2019"
  }
}
```

Table 57 JSON Response Parameters

Parameter	Definition
app_version	The version string of the Intel® RFID Sensor Platform application.
module_version	The version string of the embedded RFID module.
platform_id	Valid values H1000, H3000, H4000.
platform_support_version	Version of the platform support pkg.
pkg_manifest_version	Version of the package manifest version.
uboot_version	
linux_version	

3.3.2.9 Gateway Status Update

3.3.2.9.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"gw_status_update",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSDGW11",
      "status":"ready"
   }
}
```

Table 58 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication. When reporting a status of "lost", this field is optional.
device_id	The ID assigned to the reporting device.
status	The reported status of the Gateway. The possible values are “ready", “in_reset", “shutting_down", "firmware_update" and “lost".

The “lost" status message originates from the MQTT Broker. Its contents are registered during power-on as the “Last Will and Testament".

3.3.2.10 Heartbeat

3.3.2.10.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"heartbeat",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSP-abcdef"
      "facility_id":"CH11",
      "location":{},
      "video_url":null
   }
}
```

Table 59 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
device_id	The ID assigned to the reporting Intel® RFID Sensor Platform.
facility_id	The ID assigned to the facility where the reporting Intel® RFID Sensor Platform is located.
location	deprecated
video_url	deprecated

3.3.2.11 Inventory Complete

3.3.2.11.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"inventory_complete",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSP-abcdef",
      "facility_id":"CH11"
   }
}
```

Table 60 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
device_id	The ID assigned to the reporting Intel® RFID Sensor Platform (Intel® RSP).
facility_id	The ID assigned to the facility where the reporting Intel® RFID Sensor Platform (Intel® RSP) is located.

3.3.2.12 Inventory Data

3.3.2.12.1 JSON RPC Notification


```
{
   "jsonrpc":"2.0",
   "method":"inventory_data",
   "params":{
      "sent_on":1424976117309,
      "period":500,
      "device_id":"RSP-abcdef",
      "facility_id":"MainStore",
      "location":{},
      "motion_detected":true,
      "data":[
         {
            "epc":"10000000000000000000002A1",
            "tid":"E28011606000020BCEC36DC1",
            "antenna_id":0,
            "last_read_on":1424976117295,
            "rssi":-582,
            "phase":63,
            "frequency":902750
         }
      ]
   }
}
```


Table 61 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
period	The period in milliseconds over which these tag reads were collected.
device_id	The ID assigned to the reporting Intel® RFID Sensor Platform.
facility_id	The ID assigned to the facility where the reporting Intel® RFID Sensor Platform is located.
location	deprecated
motion_detected	A Boolean field that represents whether or not the Intel® RSP was detecting motion during the period specified above.
data	An array of RFID tag records (see below).
epc	The EPC of the tag associated with this record.
tid	The TID of the tag associated with this record. This field is null when the inventory mode is EPC only.
antenna_id	The physical antenna port used to discover this tag.
last_read_on	The millisecond timestamp of the last measurement.
rssi	A signed value representing the receive signal strength in units of 0.1 dBm of the backscatter signal from the RFID tag.
phase	The signed 7-bit phase offset of the received backscatter signal from the RFID tag. Valid range is from -64 to 63.
frequency	The frequency in kHz of the received backscatter signal from the RFID tag.

3.3.2.13 Motion Event

3.3.2.13.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"motion_event",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSP-5a778d",
      "facility_id":"CH11",
      "image_resolution":null,
      "image_url":null,
      "location": {}
   }
}
```

Table 62 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
device_id	The ID assigned to the reporting Intel® RFID Sensor Platform.
facility_id	The ID assigned to the facility where the reporting Intel® RFID Sensor Platform is located.
image_resolution	deprecated
image_url	deprecated
location	deprecated

3.3.2.14 Reboot

3.3.2.14.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"reboot",
   "id":"1"
}
```

3.3.2.14.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"1"
}
```

3.3.2.15 Reset

3.3.2.15.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"reset",
   "id":"1"
}
```

3.3.2.15.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"1"
}
```

3.3.2.16 Shutdown

3.3.2.16.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"shutdown",
   "id":"1"
}
```

3.3.2.16.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"1"
}
```

3.3.2.17 Set Device Alert

3.3.2.17.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"set_device_alert",
   "params":[
      {
         "alert_number":103,
         "severity":"warning",
         "threshold":80,
         "acknowledge":false,
         "mute":false
      }
   ],
   "id":"12345"
}
```

Table 63 JSON Request Parameters

Parameter	Definition
alert_number	The unique number identifying the type of alert. The valid range is 100 – 199. 100 – RfModuleError (Boolean) 101 – HighAmbientTemp (degrees C) 102 – HighCpuTemp (degrees C) 103 – HighCpuUsage (% utilization) 104 – HighMemoryUsage (% of max memory) 151 – DeviceMoved (Boolean)
severity	The prioritized severity level being configured. The valid range of values is... "info", "warning", "urgent", and "critical".
threshold	The value above/below, which will trigger the alert. If the alert is Boolean, a value of 0 indicates to send the alert when the tested condition is false and a value of 1 indicates to send the alert when the tested condition is true.
acknowledge	Temporarily silence current alerts of this type. The valid values are true and false.
mute	Silence current and future alerts of this type. The valid values are true and false.

3.3.2.17.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"12345"
}
```

3.3.2.18 Set Facility Identifier

3.3.2.18.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"set_facility_id",
   "params":"levi505",
   "id":"12345"
}
```

Table 64 JSON Request Parameters

Parameter	Definition
facility_id	The ID string if the facility that this RSP is assigned to.

3.3.2.18.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"12345"
}
```

3.3.2.20 Set Geographic Region

3.3.2.20.1 JSON RPC Request

```
{
  "jsonrpc" : "2.0",
  "id" : "22",
  "method" : "set_geo_region",
  "params" : {
    "region" : "USA"
  }
}
```

Table 65 Request Parameters

Parameter	Definition
device_id	A string representing the device id of the sensor.
region	A string representing the currently configured geographic region of operation. Valid values are: AUSTRALIA, BRAZIL, CHINA, ETSI, ETSI_UPPER, HONG_KONG, INDIA, INDONESIA, JAPAN, KOREA, MALAYSIA, NEW_ZEALAND, RUSSIA, SINGAPORE, TAIWAN, THAILAND, USA, VIETNAM, UNKNOWN

3.3.2.20.2 JSON RPC Response

```
{
  "jsonrpc" : "2.0",
  "id" : "21",
  "result" : {
    "region" : "USA"
  }
}
```

3.3.2.21 Set LED

3.3.2.21.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"set_led",
   "params":"Disabled",
   "id":"12345"
}
```

Table 66 JSON Request Parameters

Parameter	Definition
params	State of the Intel® RFID Sensor Platform LED indicator. The valid values are “Normal", "Beacon", “Disabled" and "Test".

3.3.2.21.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"12345"
}
```

3.3.2.22 Set Motion Event

3.3.2.22.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"set_motion_event",
   "params":{
      "send_events":true,
      "capture_images":true
   },
   "id":"12345"
}
```

Table 67 JSON Request Parameters

Parameter	Definition
send_events	Specifies whether or not the Intel® RFID Sensor Platform will send the "motion_event" indication when it detects heat in motion. The valid values are true and false. The default value is true.
capture_images	Specifies whether or not the Intel® RFID Sensor Platform will also capture an image (if camera equipped) using the default camera settings. The valid values are true and false. The default value is true.

3.3.2.22.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"12345"
}
```

3.3.2.23 Software Update

3.3.2.23.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"software_update",
   "id":"1"
}
```

3.3.2.23.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"1"
}
```

3.3.2.24 Status Update

3.3.2.24.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"status_update",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSP-abcdef",
      "facility_id":"CH11",
      "status":"ready"
   }
}
```

Table 68 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
device_id	The ID assigned to the reporting Intel® RFID Sensor Platform.
facility_id	The ID assigned to the facility where the reporting Intel® RFID Sensor Platform is located.
status	The reported status of the Intel® RFID Sensor Platform. Valid values are: “ready", “in_reset", “shutting_down", "firmware_update" and “lost".

The “lost" status message originates from the MQTT Broker. It is registered during power-on as the “Last Will and Testament".

3.3.2.25 OEM Configuration Update Status

3.3.2.25.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"oem_cfg_update_status",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSP-5a778d",
      "region":"ETSI_UPPER",
      "file":"ETSI_UPPER.freq.plan.txt",
      "status":"IN_PROGRESS",
      "current_line_num":120,
      "total_lines":137,
      "message":null
   }
}
```

Table 69 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication.
device_id	The ID assigned to the reporting Intel® RFID Sensor Platform.
region	A string representing the currently configured geographic region of operation. Valid values are: AUSTRALIA, BRAZIL, CHINA, ETSI, ETSI_UPPER, HONG_KONG, INDIA, INDONESIA, JAPAN, KOREA, MALAYSIA, NEW_ZEALAND, RUSSIA, SINGAPORE, TAIWAN, THAILAND, USA, VIETNAM, UNKNOWN
file	The OEM Configuration filename currently being loaded.
status	A status string. Valid values are: IN_PROGRESS, RESET_RADIO, COMPLETE, ERROR, FAIL
current_line_num	The Integer line number currently being loaded.
total_lines	The Integer number of lines in the OEM Configuration file.
Message	A human readable message string.

3.3.3 Downstream (GPIO Device)

The following messages are sent to the GPIO Devices on the downstream broker.

Table 70 Gateway Downstream GPIO Device API

Command	Type
gpio_connect	Request / Response
gpio_input	Notification
gpio_set_gpio	Request / Response

3.3.3.1 Connect to the Gateway (gpio device)

3.3.3.1.1 JSON RPC Request

```
{
   "jsonrpc":"2.0",
   "method":"gpio_connect",
   "id":"12345"
}
```

3.3.3.1.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":{
      "sent_on":1424976117309
   }
   "id":"12345"
}
```

Table 71 JSON Response Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this response.

3.3.3.2 GPIO Input

3.3.3.2.1 JSON RPC Notification

```
{
   "jsonrpc":"2.0",
   "method":"gpio_input",
   "params":{
      "sent_on":1424976117309,
      "device_id":"RSDGW11",
      "gpio_info": {
         "index": 2,
         "name": "gpio26",
         "state": "ASSERTED",
         "direction": "OUTPUT"
      }
   }
}
```

Table 72 JSON Notification Parameters

Parameter	Definition
sent_on	The millisecond timestamp of this indication. When reporting a status of "lost", this field is optional.
device_id	The ID assigned to the reporting device.
gpio_info	A GPIO Info object (see below).
index	An integer index for this GPIO assigned by the remote device.
name	A string name for this GPIO assigned by the remote device.
state	The requested state for this GPIO. Valid values are: ASSERTED, DEASSERTED
direction	The direction (assigned by the remote device) of this GPIO. Valid values are: INPUT, OUTPUT

3.3.3.3 Set GPIO

3.3.3.3.1 JSON RPC Request

```
{
   "jsonrpc": "2.0",
   "id": "4",
   "method": "gpio_set_gpio",
   "params": {
      "index": 2,
      "name": "gpio26",
      "state": "ASSERTED",
      "direction": "OUTPUT"
   }
}
```

Table 73 JSON Request Parameters

Parameter	Definition
params	A params object (see below).
index	An integer index for this GPIO assigned by the remote device.
name	A string name for this GPIO assigned by the remote device.
state	The requested state for this GPIO. Valid values are: ASSERTED, DEASSERTED
direction	The direction (assigned by the remote device) of this GPIO. Valid values are: INPUT, OUTPUT

3.3.3.3.2 JSON RPC Response

```
{
   "jsonrpc":"2.0",
   "result":true,
   "id":"4"
}
```