
ESP RainMaker Programming Guide

Espressif

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ESP RainMaker is a platform that allows developers to build connected devices with Espressif's ESP32-S2 SoC without hassle of managing the infrastructure. It provides a device SDK, self-adapting phone apps, transparent cloud middleware and host utilities to reduce complexity in development of connected devices.

This is the C API (for firmware) and Python API (for host tools) documentation for ESP RainMaker. All other documentation can be found at <http://rainmaker.espressif.com>

C API REFERENCE

1.1 RainMaker Core

1.1.1 Core

Header File

- `esp_rainmaker/include/esp_rmaker_core.h`

Functions

const char *`esp_rmaker_device_cb_src_to_str`(*esp_rmaker_req_src_t src*)

Convert device callback source to string

Device read/write callback can be via different sources. This is a helper API to give the source in string format for printing.

Example Usage:

```
static esp_err_t write_cb(const esp_rmaker_device_t *device, const esp_rmaker_
↳param_t *param,
    const esp_rmaker_param_val_t val, void *priv_data, esp_rmaker_write_ctx_t *ctx)
{
    if (ctx) {
        ESP_LOGI(TAG, "Received write request via : %s", esp_rmaker_device_cb_src_
↳to_str(ctx->src));
    }
}
```

Return NULL terminated source string on success

Return NULL on failure

Parameters

- [in] `src`: The src field as received in the callback context.

esp_rmaker_param_val_t **esp_rmaker_bool** (bool *bval*)

Initialise a Boolean value

Return Value structure.

Parameters

- [in] `bval`: Initialising value.

esp_rmaker_param_val_t **esp_rmaker_int** (int *ival*)

Initialise an Integer value

Return Value structure.

Parameters

- [in] *ival*: Initialising value.

esp_rmaker_param_val_t **esp_rmaker_float** (float *fval*)

Initialise a Float value

Return Value structure.

Parameters

- [in] *fval*: Initialising value.

esp_rmaker_param_val_t **esp_rmaker_str** (const char *sval*)

Initialise a String value

Return Value structure.

Parameters

- [in] *sval*: Initialising value.

esp_rmaker_param_val_t **esp_rmaker_obj** (const char *val*)

Initialise a json object value

param[in] *val* initialising value

Note the object will not be validated internally. it is the application's responsibility to ensure that the object is a valid json object. eg. `esp_rmaker_obj("{\"name\":\"value\"}");`

return value structure

esp_rmaker_param_val_t **esp_rmaker_array** (const char *val*)

Initialise a json array value

param[in] *val* initialising value

Note the array will not be validated internally. it is the application's responsibility to ensure that the array is a valid json array. eg. `esp_rmaker_array("[1,2,3]");`

return value structure

esp_rmaker_node_t **esp_rmaker_node_init** (const *esp_rmaker_config_t* *config*, const char *name*, const char *type*)

Initialize ESP RainMaker Node

This initializes the ESP RainMaker agent and creates the node. The model and firmware version for the node are set internally as per the project name and version. These can be overridden (but not recommended) using the `esp_rmaker_node_add_fw_version()` and `esp_rmaker_node_add_model()` APIs.

Note This should be the first call before using any other ESP RainMaker API.

Return Node handle on success.

Return NULL in case of failure.

Parameters

- [in] *config*: Configuration to be used by the ESP RainMaker.

- [in] name: Name of the node.
- [in] type: Type of the node.

`esp_err_t esp_rmaker_start` (void)
Start ESP RainMaker Agent

This call starts the actual ESP RainMaker thread. This should preferably be called after a successful Wi-Fi connection in order to avoid unnecessary failures.

Return ESP_OK on success.

Return error in case of failure.

`esp_err_t esp_rmaker_stop` (void)
Stop ESP RainMaker Agent

This call stops the ESP RainMaker Agent instance started earlier by `esp_rmaker_start()`.

Return ESP_OK on success.

Return error in case of failure.

`esp_err_t esp_rmaker_node_deinit` (const *esp_rmaker_node_t* *node)
Deinitialize ESP RainMaker Node

This API deinitializes the ESP RainMaker agent and the node created using `esp_rmaker_node_init()`.

@return ESP_OK on success.

Note This should be called after rainmaker has stopped.

Return error in case of failure.

Parameters

- [in] node: Node Handle returned by `esp_rmaker_node_init()`.

`const esp_rmaker_node_t *esp_rmaker_get_node` (void)
Get a handle to the Node

This API returns handle to a node created using `esp_rmaker_node_init()`.

Return Node handle on success.

Return NULL in case of failure.

`char *esp_rmaker_get_node_id` (void)
Get Node Id

Returns pointer to the NULL terminated Node ID string.

Return Pointer to a NULL terminated Node ID string.

`esp_rmaker_node_info_t *esp_rmaker_node_get_info` (const *esp_rmaker_node_t* *node)
Get Node Info

Returns pointer to the node info as configured during initialisation.

Return Pointer to the node info on success.

Return NULL in case of failure.

Parameters

- node: Node handle.

`esp_err_t esp_rmaker_node_add_attribute (const esp_rmaker_node_t *node, const char *attr_name, const char *val)`

Add Node attribute

Adds a new attribute as the metadata for the node. For the sake of simplicity, only string values are allowed.

Return ESP_OK on success.

Return error in case of failure.

Parameters

- node: Node handle.
- [in] attr_name: Name of the attribute.
- [in] val: Value for the attribute.

`esp_err_t esp_rmaker_node_add_fw_version (const esp_rmaker_node_t *node, const char *fw_version)`

Add FW version for a node (Not recommended)

FW version is set internally to the project version. This API can be used to override that version.

Return ESP_OK on success.

Return error in case of failure.

Parameters

- node: Node handle.
- [in] fw_version: New firmware version.

`esp_err_t esp_rmaker_node_add_model (const esp_rmaker_node_t *node, const char *model)`

Add model for a node

Model is set internally to the project name. This API can be used to override that name, now that a new field “project” has also been added internally to the node info.

Return ESP_OK on success.

Return error in case of failure.

Parameters

- node: Node handle.
- [in] model: New model string.

`esp_err_t esp_rmaker_node_add_subtype (const esp_rmaker_node_t *node, const char *subtype)`

Add subtype for a node

Return ESP_OK on success.

Return error in case of failure.

Parameters

- node: Node handle.

- [in] subtype: Subtype string.

```
esp_rmaker_device_t *esp_rmaker_device_create (const char *dev_name, const char *type, void
                                              *priv_data)
```

Create a Device

This API will create a virtual “Device”. This could be something like a Switch, Lightbulb, etc.

Note The device created needs to be added to a node using `esp_rmaker_node_add_device()`.

Return Device handle on success.

Return NULL in case of any error.

Parameters

- [in] *dev_name*: The unique device name.
- [in] *type*: Optional device type. Can be kept NULL.
- [in] *priv_data*: (Optional) Private data associated with the device. This will be passed to call-backs. It should stay allocated throughout the lifetime of the device.

```
esp_rmaker_device_t *esp_rmaker_service_create (const char *serv_name, const char *type,
                                              void *priv_data)
```

Create a Service

This API will create a “Service”. It is exactly same like a device in terms of structure and so, all APIs for device are also valid for a service. A service could be something like OTA, diagnostics, etc.

Note Name of a service should not clash with name of a device.

Note The service created needs to be added to a node using `esp_rmaker_node_add_device()`.

Return Device handle on success.

Return NULL in case of any error.

Parameters

- [in] *serv_name*: The unique service name.
- [in] *type*: Optional service type. Can be kept NULL.
- [in] *priv_data*: (Optional) Private data associated with the service. This will be passed to callbacks. It should stay allocated throughout the lifetime of the device.

```
esp_err_t esp_rmaker_device_delete (const esp_rmaker_device_t *device)
```

Delete a Device/Service

This API will delete a device created using `esp_rmaker_device_create()`.

Note The device should first be removed from the node using `esp_rmaker_node_remove_device()` before deleting.

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] *device*: Device handle.

```
esp_err_t esp_rmaker_device_add_cb (const      esp_rmaker_device_t      *device,
                                     esp_rmaker_device_write_cb_t      write_cb,
                                     esp_rmaker_device_read_cb_t read_cb)
```

Add callbacks for a device/service

Add read/write callbacks for a device that will be invoked as per requests received from the cloud (or other paths as may be added in future).

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] device: Device handle.
- [in] write_cb: Write callback.
- [in] read_cb: Read callback.

```
esp_err_t esp_rmaker_node_add_device (const      esp_rmaker_node_t      *node,      const
                                     esp_rmaker_device_t *device)
```

Add a device to a node

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] node: Node handle.
- [in] device: Device handle.

```
esp_err_t esp_rmaker_node_remove_device (const      esp_rmaker_node_t      *node,      const
                                     esp_rmaker_device_t *device)
```

Remove a device from a node

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] node: Node handle.
- [in] device: Device handle.

```
esp_rmaker_device_t *esp_rmaker_node_get_device_by_name (const esp_rmaker_node_t *node,
                                                         const char *device_name)
```

Get device by name

Get handle for a device based on the name.

Return Device handle on success.

Return NULL in case of failure.

Parameters

- [in] node: Node handle.
- [in] device_name: Device name to search.

```
esp_err_t esp_rmaker_device_add_attribute (const esp_rmaker_device_t *device, const char
                                         *attr_name, const char *val)
```

Add a Device attribute

Note Device attributes are reported only once after a boot-up as part of the node configuration. Eg. Serial Number

Return ESP_OK if the attribute was added successfully.

Return error in case of failure.

Parameters

- [in] device: Device handle.
- [in] attr_name: Name of the attribute.
- [in] val: Value of the attribute.

```
esp_err_t esp_rmaker_device_add_subtype (const esp_rmaker_device_t *device, const char
                                         *subtype)
```

Add a Device subtype

This can be something like esp.subtype.rgb-light for a device of type esp.device.lightbulb. This would primarily be used by the phone apps to render different icons for the same device type.

Return ESP_OK if the subtype was added successfully.

Return error in case of failure.

Parameters

- [in] device: Device handle.
- [in] subtype: String describing the sub type.

```
esp_err_t esp_rmaker_device_add_model (const esp_rmaker_device_t *device, const char
                                       *model)
```

Add a Device model

This would primarily be used by the phone apps to render different icons for the same device type.

Return ESP_OK if the model was added successfully.

Return error in case of failure.

Parameters

- [in] device: Device handle.
- [in] model: String describing the model.

```
char *esp_rmaker_device_get_name (const esp_rmaker_device_t *device)
Get device name from handle
```

Return NULL terminated device name string on success.

Return NULL in case of failure.

Parameters

- [in] device: Device handle.

char ***esp_rmaker_device_get_type** (const *esp_rmaker_device_t* *device)

Get device type from handle

Return NULL terminated device type string on success.

Return NULL in case of failure, or if the type wasn't provided while creating the device.

Parameters

- [in] device: Device handle.

esp_err_t **esp_rmaker_device_add_param** (const *esp_rmaker_device_t* *device, const *esp_rmaker_param_t* *param)

Add a parameter to a device/service

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] device: Device handle.
- [in] param: Parameter handle.

esp_rmaker_param_t ***esp_rmaker_device_get_param_by_type** (const *esp_rmaker_device_t* *device, const char *param_type)

Get parameter by type

Get handle for a parameter based on the type.

Note If there are multiple parameters with the same type, this will return the first one. The API `esp_rmaker_device_get_param_by_name()` can be used to get a specific parameter, because the parameter names in a device are unique.

Return Parameter handle on success.

Return NULL in case of failure.

Parameters

- [in] device: Device handle.
- [in] param_type: Parameter type to search.

esp_rmaker_param_t ***esp_rmaker_device_get_param_by_name** (const *esp_rmaker_device_t* *device, const char *param_name)

Get parameter by name

Get handle for a parameter based on the name.

Return Parameter handle on success.

Return NULL in case of failure.

Parameters

- [in] device: Device handle.
- [in] param_name: Parameter name to search.

```
esp_err_t esp_rmaker_device_assign_primary_param(const esp_rmaker_device_t *device,
                                                const esp_rmaker_param_t *param)
```

Assign a primary parameter

Assign a parameter (already added using `esp_rmaker_device_add_param()`) as a primary parameter, which can be used by clients (phone apps specifically) to give prominence to it.

Return ESP_OK if the parameter was assigned as the primary successfully.

Return error in case of failure.

Parameters

- [in] device: Device handle.
- [in] param: Parameter handle.

```
esp_rmaker_param_t *esp_rmaker_param_create(const char *param_name, const char *type,
                                             esp_rmaker_param_val_t val, uint8_t properties)
```

Create a Parameter

Parameter can be something like Temperature, Outlet state, Lightbulb brightness, etc.

Any changes should be reported using the `esp_rmaker_param_update_and_report()` API. Any remote changes will be reported to the application via the device callback, if registered.

Note The parameter created needs to be added to a device using `esp_rmaker_device_add_param()`. Parameter name should be unique in a given device.

Return Parameter handle on success.

Return NULL in case of failure.

Parameters

- [in] param_name: Name of the parameter. a*
- [in] type: Optional parameter type. Can be kept NULL.
- [in] val: Value of the parameter. This also specifies the type that will be assigned to this parameter. You can use `esp_rmaker_bool()`, `esp_rmaker_int()`, `esp_rmaker_float()` or `esp_rmaker_str()` functions as the argument here. Eg, `esp_rmaker_bool(true)`.
- [in] properties: Properties of the parameter, which will be a logical OR of flags in `esp_param_property_flags_t`.

```
esp_err_t esp_rmaker_param_add_ui_type(const esp_rmaker_param_t *param, const char
                                       *ui_type)
```

Add a UI Type to a parameter

This will be used by the Phone apps (or other clients) to render appropriate UI for the given parameter. Please refer the RainMaker documentation for supported UI Types.

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] param: Parameter handle.
- [in] ui_type: String describing the UI Type.

```
esp_err_t esp_rmaker_param_add_bounds (const esp_rmaker_param_t *param,
                                       esp_rmaker_param_val_t min, esp_rmaker_param_val_t
                                       max, esp_rmaker_param_val_t step)
```

Add bounds for an integer/float parameter

This can be used to add bounds (min/max values) for a given integer parameter. Eg. brightness will have bounds as 0 and 100 if it is a percentage. Eg. `esp_rmaker_param_add_bounds(brightness_param, esp_rmaker_int(0), esp_rmaker_int(100), esp_rmaker_int(5));`

Note The RainMaker core does not check the bounds. It is upto the application to handle it.

Return ESP_OK on success. return error in case of failure.

Parameters

- [in] param: Parameter handle.
- [in] min: Minimum allowed value.
- [in] max: Maximum allowed value.
- [in] step: Minimum stepping (set to 0 if no specific value is desired).

```
esp_err_t esp_rmaker_param_add_valid_str_list (const esp_rmaker_param_t *param, const
                                              char *strs[], uint8_t count)
```

Add a list of valid strings for a string parameter

This can be used to add a list of valid strings for a given string parameter.

Eg.

```
static const char *valid_strs[] = {"None","Yes","No","Can't Say"};
esp_rmaker_param_add_valid_str_list(param, valid_strs, 4);
```

Note The RainMaker core does not check the values. It is upto the application to handle it.

Return ESP_OK on success. return error in case of failure.

Parameters

- [in] param: Parameter handle.
- [in] strs: Pointer to an array of strings. Note that this memory should stay allocated throughout the lifetime of this parameter.
- [in] count: Number of strings in the above array.

```
esp_err_t esp_rmaker_param_add_array_max_count (const esp_rmaker_param_t *param, int
                                              count)
```

Add max count for an array parameter

This can be used to put a limit on the maximum number of elements in an array.

Note The RainMaker core does not check the values. It is upto the application to handle it.

Return ESP_OK on success. return error in case of failure.

Parameters

- [in] param: Parameter handle.
- [in] count: Max number of elements allowed in the array.

```
esp_err_t esp_rmaker_param_update (const esp_rmaker_param_t *param, esp_rmaker_param_val_t
                                  val)
```



```
esp_err_t esp_rmaker_param_update_and_report (const esp_rmaker_param_t *param,
                                              esp_rmaker_param_val_t val)
```

Update and report a parameter

Calling this API will update the parameter and report it to ESP RainMaker cloud. This should be used whenever there is any local change.

Return ESP_OK if the parameter was updated successfully.

Return error in case of failure.

Parameters

- [in] param: Parameter handle.
- [in] val: New value of the parameter.

```
esp_err_t esp_rmaker_param_update_and_notify (const esp_rmaker_param_t *param,
                                              esp_rmaker_param_val_t val)
```

Update and notify a parameter

Calling this API will update the parameter and report it to ESP RainMaker cloud similar to `esp_rmaker_param_update_and_report()`. However, additionally, it will also trigger a notification on the phone apps (if enabled).

Alternatively, the `esp_rmaker_raise_alert()` API can also be used to trigger notification on the phone apps with pre-formatted text.

Note This should be used only when some local change requires explicit notification even when the phone app is in background, not otherwise. Eg. Alarm got triggered, temperature exceeded some threshold, etc.

Return ESP_OK if the parameter was updated successfully.

Return error in case of failure.

Parameters

- [in] param: Parameter handle.
- [in] val: New value of the parameter.

```
esp_err_t esp_rmaker_raise_alert (const char *alert_str)
```

Trigger an alert on the phone app

This API will trigger a notification alert on the phone apps (if enabled) using the formatted text provided. Note that this does not send a notification directly to the phone, but reports the alert to the ESP RainMaker cloud which then uses the Notification framework to send notifications to the phone apps. The value does not get stored anywhere, nor is it linked to any node parameters.

Note This should be used only if some event requires explicitly alerting the user even when the phone app is in background, not otherwise. Eg. "Motion Detected", "Fire alarm triggered"

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] alert_str: NULL terminated pre-formatted alert string. Maximum length can be ESP_RMAKER_MAX_ALERT_LEN, excluding NULL character.

```
char *esp_rmaker_param_get_name (const esp_rmaker_param_t *param)
```

Get parameter name from handle

Return NULL terminated parameter name string on success.

Return NULL in case of failure.

Parameters

- [in] param: Parameter handle.

char ***esp_rmaker_param_get_type** (const *esp_rmaker_param_t* *param)
Get parameter type from handle

Return NULL terminated parameter type string on success.

Return NULL in case of failure, or if the type wasn't provided while creating the parameter.

Parameters

- [in] param: Parameter handle.

esp_rmaker_param_val_t ***esp_rmaker_param_get_val** (*esp_rmaker_param_t* *param)
Get parameter value

This gives the parameter value that is stored in the RainMaker core.

Note This does not call any explicit functions to read value from hardware/driver.

Return Pointer to parameter value on success.

Return NULL in case of failure.

Parameters

- [in] param: Parameter handle

esp_err_t **esp_rmaker_report_node_details** (void)
Report the node details to the cloud

This API reports node details i.e. the node configuration and values of all the parameters to the ESP RainMaker cloud. Eg. If a new device is created (with some parameters and attributes), then this API should be called after that to send the node details to the cloud again and the changes to be reflected in the clients (like phone apps).

Note Please use this API only if you need to create or delete devices after `esp_rmaker_start()` has already been called, for use cases like bridges or hubs.

Return ESP_OK if the node details are successfully queued to be published.

Return error in case of failure.

esp_err_t **esp_rmaker_timezone_service_enable** (void)
Enable Timezone Service

This enables the ESP RainMaker standard timezone service which can be used to set timezone, either in POSIX or location string format. Please refer the specifications for additional details.

Return ESP_OK on success

Return error on failure

esp_err_t **esp_rmaker_system_service_enable** (*esp_rmaker_system_serv_config_t* *config)
Enable System Service

This enables the ESP RainMaker standard system service which can be used for operations like reboot, factory reset and Wi-Fi reset.

Please refer the specifications for additional details.

Return ESP_OK on success

Return error on failure

Parameters

- [in] config: Configuration for the system service.

bool **esp_rmaker_local_ctrl_service_started** (void)

Check if local_ctrl service has started

Return true if service has started

Return false if the service has not started

esp_err_t **esp_rmaker_ota_enable_default** (void)

Enable Default RainMaker OTA Firmware Upgrade

This enables the default recommended RainMaker OTA Firmware Upgrade, which is “Using the Topics”, which allows performing OTA from Dashboard. This OTA can be triggered by Admin Users only. On Public RainMaker deployment, for nodes using “Self Claiming”, since there is no associated admin user, the Primary user will automatically become the admin and can perform OTA from dashboard.

Return ESP_OK on success

Return error on failure

esp_err_t **esp_rmaker_test_cmd_resp** (const void *cmd, size_t cmd_len, void *priv_data)

esp_err_t **esp_rmaker_node_auth_sign_msg** (const void *challenge, size_t inlen, void **response, size_t *outlen)

This API signs the challenge with RainMaker private key.

Return ESP_OK on success. response is dynamically allocated, free the response on success.

Return Apt error on failure.

Parameters

- [in] challenge: Pointer to the data to be signed
- [in] inlen: Length of the challenge
- [out] response: Pointer to the signature.
- [out] outlen: Length of the signature

esp_err_t **esp_rmaker_local_ctrl_enable** (void)

esp_err_t **esp_rmaker_local_ctrl_disable** (void)

Unions

union esp_rmaker_val_t

#include <esp_rmaker_core.h> ESP RainMaker Value

Public Members

bool **b**

Boolean

int **i**

Integer

float **f**

Float

char ***s**

NULL terminated string

Structures

struct esp_rmaker_node_info_t

ESP RainMaker Node information

Public Members

char ***name**

Name of the Node

char ***type**

Type of the Node

char ***fw_version**

Firmware Version (Optional). If not set, PROJECT_VER is used as default (recommended)

char ***model**

Model (Optional). If not set, PROJECT_NAME is used as default (recommended)

char ***subtype**

Subtype (Optional).

char ****secure_boot_digest**

An array of digests read from efuse. Should be freed after use

struct esp_rmaker_config_t

ESP RainMaker Configuration

Public Members

bool **enable_time_sync**

Enable Time Sync Setting this true will enable SNTP and fetch the current time before attempting to connect to the ESP RainMaker service

struct esp_rmaker_param_val_t

ESP RainMaker Parameter Value

Public Members

esp_rmaker_val_type_t **type**

Type of Value

esp_rmaker_val_t **val**

Actual value. Depends on the type

struct esp_rmaker_write_ctx_t

Write request Context

Public Members

esp_rmaker_req_src_t **src**

Source of request

struct esp_rmaker_read_ctx_t

Read request context

Public Members

esp_rmaker_req_src_t **src**

Source of request

struct esp_rmaker_system_serv_config_t

System service configuration

Public Members

uint16_t **flags**

Logical OR of system service flags (SYSTEM_SERV_FLAG_REBOOT, SYSTEM_SERV_FLAG_FACTORY_RESET, SYSTEM_SERV_FLAG_WIFI_RESET) as required or SYSTEM_SERV_FLAGS_ALL.

int8_t **reboot_seconds**

Time in seconds after which the device should reboot. Value of zero would trigger an immediate reboot if a write is received for the Reboot parameter. Recommended value: 2

int8_t **reset_seconds**

Time in seconds after which the device should reset (Wi-Fi or factory). Value of zero would trigger an immediate action if a write is received for the Wi-Fi reset or Factory reset parameter. Recommended value: 2

int8_t **reset_reboot_seconds**

Time in seconds after which the device should reboot after it has been reset. Value of zero would mean that there won't be any reboot after the reset. Recommended value: 2

Macros

ESP_RMAKER_CONFIG_VERSION

ESP_RMAKER_MAX_ALERT_LEN

SYSTEM_SERV_FLAG_REBOOT

System Service Reboot Flag

SYSTEM_SERV_FLAG_FACTORY_RESET

System Service Factory Reset Flag

SYSTEM_SERV_FLAG_WIFI_RESET

System Service Wi-Fi Reset Flag

SYSTEM_SERV_FLAGS_ALL

System Service All Flags

Type Definitions

typedef size_t **esp_rmaker_handle_t**

Generic ESP RainMaker handle

typedef *esp_rmaker_handle_t* **esp_rmaker_node_t**

ESP RainMaker Node Handle

typedef *esp_rmaker_handle_t* **esp_rmaker_device_t**

ESP RainMaker Device Handle

typedef *esp_rmaker_handle_t* **esp_rmaker_param_t**

ESP RainMaker Parameter Handle

typedef esp_err_t (***esp_rmaker_device_write_cb_t**) (**const** *esp_rmaker_device_t* *device,
const *esp_rmaker_param_t* *param,
const *esp_rmaker_param_val_t* val,
void *priv_data, *esp_rmaker_write_ctx_t* *ctx)

Callback for parameter value write requests.

The callback should call the `esp_rmaker_param_update_and_report()` API if the new value is to be set and reported back.

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] device: Device handle.
- [in] param: Parameter handle.
- [in] param: Pointer to *esp_rmaker_param_val_t*. Use appropriate elements as per the value type.
- [in] priv_data: Pointer to the private data passed while creating the device.
- [in] ctx: Context associated with the request.

typedef esp_err_t (***esp_rmaker_device_read_cb_t**) (**const** *esp_rmaker_device_t* *device,
const *esp_rmaker_param_t* *param, void
*priv_data, *esp_rmaker_read_ctx_t* *ctx)

Callback for parameter value changes

The callback should call the `esp_rmaker_param_update_and_report()` API if the new value is to be set and reported back.

Note Currently, the read callback never gets invoked as the communication between clients (mobile phones, CLI, etc.) and node is asynchronous. So, the read request does not reach the node. This callback will however be used in future.

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] device: Device handle.
- [in] param: Parameter handle.
- [in] priv_data: Pointer to the private data passed while creating the device.
- [in] ctx: Context associated with the request.

Enumerations

enum esp_rmaker_event_t

ESP RainMaker Events

Values:

RMaker_EVENT_INIT_DONE = 1
RainMaker Core Initialisation Done

RMaker_EVENT_CLAIM_STARTED
Self Claiming Started

RMaker_EVENT_CLAIM_SUCCESSFUL
Self Claiming was Successful

RMaker_EVENT_CLAIM_FAILED
Self Claiming Failed

RMaker_EVENT_USER_NODE_MAPPING_DONE
Node side communication for User-Node mapping done. Actual mapping state will be managed by the ESP RainMaker cloud based on the user side communication. Associated data is the NULL terminated user id.

RMaker_EVENT_LOCAL_CTRL_STARTED
Local control started. Associated data is the NULL terminated Service Name

RMaker_EVENT_USER_NODE_MAPPING_RESET

RMaker_EVENT_LOCAL_CTRL_STOPPED
Local control stopped.

enum esp_rmaker_val_type_t

ESP RainMaker Parameter Value type

Values:

RMaker_VAL_TYPE_INVALID = 0
Invalid

RMaker_VAL_TYPE_BOOLEAN
Boolean

RMAKER_VAL_TYPE_INTEGER

Integer. Mapped to a 32 bit signed integer

RMAKER_VAL_TYPE_FLOAT

Floating point number

RMAKER_VAL_TYPE_STRING

NULL terminated string

RMAKER_VAL_TYPE_OBJECT

NULL terminated JSON Object string Eg. {"name": "value"}

RMAKER_VAL_TYPE_ARRAY

NULL terminated JSON Array string Eg. [1,2,3]

enum esp_param_property_flags_t

Param property flags

Values:

PROP_FLAG_WRITE = (1 << 0)

PROP_FLAG_READ = (1 << 1)

PROP_FLAG_TIME_SERIES = (1 << 2)

PROP_FLAG_PERSIST = (1 << 3)

PROP_FLAG_SIMPLE_TIME_SERIES = (1 << 4)

enum esp_rmaker_req_src_t

Parameter read/write request source

Values:

ESP_RMAKER_REQ_SRC_INIT

Request triggered in the init sequence i.e. when a value is found in persistent memory for parameters with PROP_FLAG_PERSIST.

ESP_RMAKER_REQ_SRC_CLOUD

Request received from cloud

ESP_RMAKER_REQ_SRC_SCHEDULE

Request received when a schedule has triggered

ESP_RMAKER_REQ_SRC_SCENE_ACTIVATE

Request received when a scene has been activated

ESP_RMAKER_REQ_SRC_SCENE_DEACTIVATE

Request received when a scene has been deactivated

ESP_RMAKER_REQ_SRC_LOCAL

Request received from a local controller

ESP_RMAKER_REQ_SRC_MAX

This will always be the last value. Any value equal to or greater than this should be considered invalid.

1.1.2 User Mapping

Header File

- `esp_rainmaker/include/esp_rmaker_user_mapping.h`

Functions

esp_rmaker_user_mapping_state_t **esp_rmaker_user_node_mapping_get_state** (void)

Get User-Node mapping state

This returns the current user-node mapping state.

Return user mapping state

`esp_err_t` **esp_rmaker_user_mapping_endpoint_create** (void)

Create User Mapping Endpoint

This will create a custom provisioning endpoint for user-node mapping. This should be called after `wifi_prov_mgr_init()` but before `wifi_prov_mgr_start_provisioning()`

Return ESP_OK on success

Return error on failure

`esp_err_t` **esp_rmaker_user_mapping_endpoint_register** (void)

Register User Mapping Endpoint

This will register the callback for the custom provisioning endpoint for user-node mapping which was created with `esp_rmaker_user_mapping_endpoint_create()`. This should be called immediately after `wifi_prov_mgr_start_provisioning()`.

Return ESP_OK on success

Return error on failure

`esp_err_t` **esp_rmaker_start_user_node_mapping** (char **user_id*, char **secret_key*)

Add User-Node mapping

This call will start the user-node mapping workflow on the node. This is automatically called if you have used `esp_rmaker_user_mapping_endpoint_register()`. Use this API only if you want to trigger the user-node mapping after the Wi-Fi provisioning has already been done.

Return ESP_OK if the workflow was successfully triggered. This does not guarantee success of the actual mapping. The mapping status needs to be checked separately by the clients.

Return error on failure.

Parameters

- [in] *user_id*: The User identifier received from the client (Phone app/CLI)
- [in] *secret_key*: The Secret key received from the client (Phone app/CLI)

Enumerations

enum esp_rmaker_user_mapping_state_t
User-Node Mapping states

Values:

ESP_RMAKER_USER_MAPPING_RESET = 0
Mapping does not exist or is not initialized

ESP_RMAKER_USER_MAPPING_STARTED
Mapping has started

ESP_RMAKER_USER_MAPPING_REQ_SENT
Mapping request sent to cloud

ESP_RMAKER_USER_MAPPING_DONE
Mapping is done

1.1.3 Scheduling

Header File

- [esp_rainmaker/include/esp_rmaker_schedule.h](#)

Functions

esp_err_t esp_rmaker_schedule_enable (void)
Enable Schedules

This API enables the scheduling service for the node. For more information, check [here](#)

It is recommended to set the timezone while using schedules. Check [here](#) for more information on timezones

Note This API should be called after `esp_rmaker_node_init()` but before `esp_rmaker_start()`.

Return ESP_OK on success.

Return error in case of failure.

1.1.4 Scenes

Header File

- [esp_rainmaker/include/esp_rmaker_scenes.h](#)

Functions

`esp_err_t esp_rmaker_scenes_enable` (void)
Enable Scenes

This API enables the scenes service for the node. For more information, check [here](#)

Note This API should be called after `esp_rmaker_node_init()` but before `esp_rmaker_start()`.

Return ESP_OK on success.

Return error in case of failure.

1.2 RainMaker Standard Types

1.2.1 Standard Types

Header File

- `esp_rainmaker/include/esp_rmaker_standard_types.h`

Macros

`ESP_RMAKER_UI_TOGGLE`

`ESP_RMAKER_UI_SLIDER`

`ESP_RMAKER_UI_DROPDOWN`

`ESP_RMAKER_UI_TEXT`

`ESP_RMAKER_UI_HUE_SLIDER`

`ESP_RMAKER_UI_HUE_CIRCLE`

`ESP_RMAKER_UI_PUSHBUTTON`

`ESP_RMAKER_UI_TRIGGER`

`ESP_RMAKER_UI_HIDDEN`

`ESP_RMAKER_PARAM_NAME`

`ESP_RMAKER_PARAM_POWER`

`ESP_RMAKER_PARAM_BRIGHTNESS`

`ESP_RMAKER_PARAM_HUE`

`ESP_RMAKER_PARAM_SATURATION`

`ESP_RMAKER_PARAM_INTENSITY`

`ESP_RMAKER_PARAM_CCT`

`ESP_RMAKER_PARAM_SPEED`

`ESP_RMAKER_PARAM_DIRECTION`

`ESP_RMAKER_PARAM_TEMPERATURE`

`ESP_RMAKER_PARAM_OTA_STATUS`

ESP_RMAKER_PARAM_OTA_INFO
ESP_RMAKER_PARAM_OTA_URL
ESP_RMAKER_PARAM_TIMEZONE
ESP_RMAKER_PARAM_TIMEZONE_POSIX
ESP_RMAKER_PARAM_SCHEDULES
ESP_RMAKER_PARAM_SCENES
ESP_RMAKER_PARAM_REBOOT
ESP_RMAKER_PARAM_FACTORY_RESET
ESP_RMAKER_PARAM_WIFI_RESET
ESP_RMAKER_PARAM_LOCAL_CONTROL_POP
ESP_RMAKER_PARAM_LOCAL_CONTROL_TYPE
ESP_RMAKER_PARAM_TOGGLE
ESP_RMAKER_PARAM_RANGE
ESP_RMAKER_PARAM_MODE
ESP_RMAKER_PARAM_BLINDS_POSITION
ESP_RMAKER_PARAM_GARAGE_POSITION
ESP_RMAKER_PARAM_LIGHT_MODE
ESP_RMAKER_PARAM_AC_MODE
ESP_RMAKER_DEVICE_SWITCH
ESP_RMAKER_DEVICE_LIGHTBULB
ESP_RMAKER_DEVICE_FAN
ESP_RMAKER_DEVICE_TEMP_SENSOR
ESP_RMAKER_DEVICE_LIGHT
ESP_RMAKER_DEVICE_OUTLET
ESP_RMAKER_DEVICE_PLUG
ESP_RMAKER_DEVICE_SOCKET
ESP_RMAKER_DEVICE_LOCK
ESP_RMAKER_DEVICE_BLINDS_INTERNAL
ESP_RMAKER_DEVICE_BLINDS_EXTERNAL
ESP_RMAKER_DEVICE_GARAGE_DOOR
ESP_RMAKER_DEVICE_GARAGE_LOCK
ESP_RMAKER_DEVICE_SPEAKER
ESP_RMAKER_DEVICE_AIR_CONDITIONER
ESP_RMAKER_DEVICE_THERMOSTAT
ESP_RMAKER_DEVICE_TV
ESP_RMAKER_DEVICE_WASHER

```

ESP_RMAKER_DEVICE_OTHER
ESP_RMAKER_SERVICE_OTA
ESP_RMAKER_SERVICE_TIME
ESP_RMAKER_SERVICE_SCHEDULE
ESP_RMAKER_SERVICE_SCENES
ESP_RMAKER_SERVICE_SYSTEM
ESP_RMAKER_SERVICE_LOCAL_CONTROL

```

1.2.2 Standard Parameters

Header File

- `esp_rainmaker/include/esp_rmaker_standard_params.h`

Functions

esp_rmaker_param_t ***esp_rmaker_name_param_create** (**const** char **param_name*, **const** char **val*)

Create standard name param

This will create the standard name parameter. This should be added to all devices for which you want a user customisable name. The value should be same as the device name.

All standard device creation APIs will add this internally. No application registered callback will be called for this parameter, and changes will be managed internally.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] *param_name*: Name of the parameter

esp_rmaker_param_t ***esp_rmaker_power_param_create** (**const** char **param_name*, **bool** *val*)

Create standard Power param

This will create the standard power parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] *param_name*: Name of the parameter
- [in] *val*: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_brightness_param_create** (**const** char **param_name*, **int** *val*)

Create standard Brightness param

This will create the standard brightness parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_hue_param_create** (const char *param_name, int val)
Create standard Hue param

This will create the standard hue parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_saturation_param_create** (const char *param_name, int val)
Create standard Saturation param

This will create the standard saturation parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_intensity_param_create** (const char *param_name, int val)
Create standard Intensity param

This will create the standard intensity parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_cct_param_create** (const char *param_name, int val)
Create standard CCT param

This will create the standard cct parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_direction_param_create** (const char *param_name, int val)

Create standard Direction param

This will create the standard direction parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_speed_param_create** (const char *param_name, int val)

Create standard Speed param

This will create the standard speed parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_temperature_param_create** (const char *param_name, float
val)

Create standard Temperature param

This will create the standard temperature parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

esp_rmaker_param_t ***esp_rmaker_ota_status_param_create** (const char *param_name)

Create standard OTA Status param

This will create the standard ota status parameter. Default value is set internally.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter

esp_rmaker_param_t ***esp_rmaker_ota_info_param_create** (const char *param_name)

Create standard OTA Info param

This will create the standard ota info parameter. Default value is set internally.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter

esp_rmaker_param_t ***esp_rmaker_ota_url_param_create** (const char *param_name)

Create standard OTA URL param

This will create the standard ota url parameter. Default value is set internally.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter

esp_rmaker_param_t ***esp_rmaker_timezone_param_create** (const char *param_name, const char *val)

Create standard Timezone param

This will create the standard timezone parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter (Eg. "Asia/Shanghai"). Can be kept NULL.

esp_rmaker_param_t ***esp_rmaker_timezone_posix_param_create** (const char *param_name, const char *val)

Create standard POSIX Timezone param

This will create the standard posix timezone parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter (Eg. "CST-8"). Can be kept NULL.

esp_rmaker_param_t ***esp_rmaker_schedules_param_create** (const char *param_name, int max_schedules)

Create standard Schedules param

This will create the standard schedules parameter. Default value is set internally.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] max_schedules: Maximum number of schedules allowed

```
esp_rmaker_param_t *esp_rmaker_scenes_param_create(const char *param_name, int max_scenes)
```

Create standard Scenes param

This will create the standard scenes parameter. Default value is set internally.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] max_scenes: Maximum number of scenes allowed

```
esp_rmaker_param_t *esp_rmaker_reboot_param_create(const char *param_name)
```

Create standard Reboot param

This will create the standard reboot parameter. Set value to true (via write param) for the action to trigger.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter

```
esp_rmaker_param_t *esp_rmaker_factory_reset_param_create(const char *param_name)
```

Create standard Factory Reset param

This will create the standard factory reset parameter. Set value to true (via write param) for the action to trigger.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter

```
esp_rmaker_param_t *esp_rmaker_wifi_reset_param_create(const char *param_name)
```

Create standard Wi-Fi Reset param

This will create the standard Wi-Fi Reset parameter. Set value to true (via write param) for the action to trigger.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter

```
esp_rmaker_param_t *esp_rmaker_local_control_pop_param_create (const char
                                                                *param_name, const
                                                                char *val)
```

Create standard Local Control POP param

This will create the standard Local Control POP parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter (Eg. “abcd1234”). Can be kept NULL.

```
esp_rmaker_param_t *esp_rmaker_local_control_type_param_create (const char
                                                                *param_name, int
                                                                val)
```

Create standard Local Control Type param

This will create the standard Local Control security type parameter.

Return Parameter handle on success.

Return NULL in case of failures.

Parameters

- [in] param_name: Name of the parameter
- [in] val: Default Value of the parameter

Macros

ESP_RMAKER_DEF_NAME_PARAM

ESP_RMAKER_DEF_POWER_NAME

ESP_RMAKER_DEF_BRIGHTNESS_NAME

ESP_RMAKER_DEF_HUE_NAME

ESP_RMAKER_DEF_SATURATION_NAME

ESP_RMAKER_DEF_INTENSITY_NAME

ESP_RMAKER_DEF_CCT_NAME

ESP_RMAKER_DEF_DIRECTION_NAME

ESP_RMAKER_DEF_SPEED_NAME

ESP_RMAKER_DEF_TEMPERATURE_NAME

ESP_RMAKER_DEF_OTA_STATUS_NAME

ESP_RMAKER_DEF_OTA_INFO_NAME

ESP_RMAKER_DEF_OTA_URL_NAME

ESP_RMAKER_DEF_TIMEZONE_NAME

ESP_RMAKER_DEF_TIMEZONE_POSIX_NAME

`ESP_RMAKER_DEF_SCHEDULE_NAME`
`ESP_RMAKER_DEF_SCENES_NAME`
`ESP_RMAKER_DEF_REBOOT_NAME`
`ESP_RMAKER_DEF_FACTORY_RESET_NAME`
`ESP_RMAKER_DEF_WIFI_RESET_NAME`
`ESP_RMAKER_DEF_LOCAL_CONTROL_POP`
`ESP_RMAKER_DEF_LOCAL_CONTROL_TYPE`

1.2.3 Standard Devices

Header File

- `esp_rainmaker/include/esp_rmaker_standard_devices.h`

Functions

esp_rmaker_device_t ***esp_rmaker_switch_device_create**(**const** char **dev_name*, void **priv_data*, bool *power*)

Create a standard Switch device

This creates a Switch device with the mandatory parameters and also assigns the primary parameter. The default parameter names will be used. Refer `esp_rmaker_standard_params.h` for default names.

Return Device handle on success.

Return NULL in case of failures.

Parameters

- [in] *dev_name*: The unique device name
- [in] *priv_data*: (Optional) Private data associated with the device. This should stay allocated throughout the lifetime of the device #
- [in] *power*: Default value of the mandatory parameter “power”

esp_rmaker_device_t ***esp_rmaker_lightbulb_device_create**(**const** char **dev_name*, void **priv_data*, bool *power*)

Create a standard Lightbulb device

This creates a Lightbulb device with the mandatory parameters and also assigns the primary parameter. The default parameter names will be used. Refer `esp_rmaker_standard_params.h` for default names.

Return Device handle on success.

Return NULL in case of failures.

Parameters

- [in] *dev_name*: The unique device name
- [in] *priv_data*: (Optional) Private data associated with the device. This should stay allocated throughout the lifetime of the device
- [in] *power*: Default value of the mandatory parameter “power”

esp_rmaker_device_t ***esp_rmaker_fan_device_create**(const char *dev_name, void *priv_data, bool power)

Create a standard Fan device

This creates a Fan device with the mandatory parameters and also assigns the primary parameter. The default parameter names will be used. Refer esp_rmaker_standard_params.h for default names.

Return Device handle on success.

Return NULL in case of failures.

Parameters

- [in] dev_name: The unique device name
- [in] priv_data: (Optional) Private data associated with the device. This should stay allocated throughout the lifetime of the device
- [in] power: Default value of the mandatory parameter “power”

esp_rmaker_device_t ***esp_rmaker_temp_sensor_device_create**(const char *dev_name, void *priv_data, float temperature)

Create a standard Temperature Sensor device

This creates a Temperature Sensor device with the mandatory parameters and also assigns the primary parameter. The default parameter names will be used. Refer esp_rmaker_standard_params.h for default names.

Return Device handle on success.

Return NULL in case of failures.

Parameters

- [in] dev_name: The unique device name
- [in] priv_data: (Optional) Private data associated with the device. This should stay allocated throughout the lifetime of the device
- [in] temperature: Default value of the mandatory parameter “temperature”

1.2.4 Standard Services

Header File

- esp_rainmaker/include/esp_rmaker_standard_services.h

Functions

esp_rmaker_device_t ***esp_rmaker_ota_service_create**(const char *serv_name, void *priv_data)

Create a standard OTA service

This creates an OTA service with the mandatory parameters. The default parameter names will be used. Refer esp_rmaker_standard_params.h for default names.

Return service_handle on success.

Return NULL in case of any error.

Parameters

- [in] `serv_name`: The unique service name
- [in] `priv_data`: (Optional) Private data associated with the service. This should stay allocated throughout the lifetime of the service.

```
esp_rmaker_device_t *esp_rmaker_time_service_create(const char *serv_name, const char
                                                    *timezone, const char *timezone_posix,
                                                    void *priv_data)
```

Create a standard OTA service

This creates an OTA service with the mandatory parameters. The default parameter names will be used. Refer `esp_rmaker_standard_params.h` for default names.

Return `service_handle` on success.

Return NULL in case of any error.

Parameters

- [in] `serv_name`: The unique service name
- [in] `timezone`: Default value of timezone string (Eg. "Asia/Shanghai"). Can be kept NULL.
- [in] `timezone_posix`: Default value of posix timezone string (Eg. "CST-8"). Can be kept NULL.
- [in] `priv_data`: (Optional) Private data associated with the service. This should stay allocated throughout the lifetime of the service.

```
esp_rmaker_device_t *esp_rmaker_create_schedule_service(const char *serv_name,
                                                         esp_rmaker_device_write_cb_t
                                                         write_cb,
                                                         esp_rmaker_device_read_cb_t
                                                         read_cb, int max_schedules, void
                                                         *priv_data)
```

Create a standard Schedule service

This creates a Schedule service with the mandatory parameters. The default parameter names will be used. Refer `esp_rmaker_standard_params.h` for default names.

Return `service_handle` on success.

Return NULL in case of any error.

Parameters

- [in] `serv_name`: The unique service name
- [in] `write_cb`: Write callback.
- [in] `read_cb`: Read callback.
- [in] `max_schedules`: Maximum number of schedules supported.
- [in] `priv_data`: (Optional) Private data associated with the service. This should stay allocated throughout the lifetime of the service.

```
esp_rmaker_device_t *esp_rmaker_create_scenes_service (const      char      *serv_name,  
                                                    esp_rmaker_device_write_cb_t  
                                                    write_cb,  
                                                    esp_rmaker_device_read_cb_t  
                                                    read_cb, int max_scenes, bool deactivation_support, void *priv_data)
```

Create a standard Scenes service

This creates a Scenes service with the mandatory parameters. The default parameter names will be used. Refer `esp_rmaker_standard_params.h` for default names.

Return `service_handle` on success.

Return NULL in case of any error.

Parameters

- [in] `serv_name`: The unique service name
- [in] `write_cb`: Write callback.
- [in] `read_cb`: Read callback.
- [in] `max_scenes`: Maximum number of scenes supported.
- [in] `deactivation_support`: Deactivation callback support.
- [in] `priv_data`: (Optional) Private data associated with the service. This should stay allocated throughout the lifetime of the service.

```
esp_rmaker_device_t *esp_rmaker_create_system_service (const  char  *serv_name,   void  
                                                    *priv_data)
```

Create a standard System service

This creates an empty System service. Appropriate parameters should be added by the caller.

Return `service_handle` on success.

Return NULL in case of any error.

Parameters

- [in] `serv_name`: The unique service name
- [in] `priv_data`: (Optional) Private data associated with the service. This should stay allocated throughout the lifetime of the service.

```
esp_rmaker_device_t *esp_rmaker_create_local_control_service (const  char  *serv_name,  
                                                                const  char  *pop,   int  
                                                                sec_type, void *priv_data)
```

Create a standard Local Control service

This creates a Local Control service with the mandatory parameters. The default parameter names will be used. Refer `esp_rmaker_standard_params.h` for default names.

Return `service_handle` on success.

Return NULL in case of any error.

Parameters

- [in] `serv_name`: The unique service name
- [in] `pop`: Proof of possession

- [in] `sec_type`: Security type
- [in] `priv_data`: (Optional) Private data associated with the service. This should stay allocated throughout the lifetime of the service.

1.3 RainMaker MQTT

1.3.1 Header File

- `esp_rainmaker/include/esp_rmaker_mqtt.h`

1.3.2 Functions

`esp_rmaker_mqtt_conn_params_t *esp_rmaker_mqtt_get_conn_params` (void)

`esp_err_t esp_rmaker_mqtt_init` (`esp_rmaker_mqtt_conn_params_t *conn_params`)
Initialize ESP RainMaker MQTT

Return ESP_OK on success.

Return error in case of any error.

Parameters

- [in] `config`: The MQTT configuration data

void `esp_rmaker_mqtt_deinit` (void)

`esp_err_t esp_rmaker_mqtt_connect` (void)
MQTT Connect

Starts the connection attempts to the MQTT broker as per the configuration provided during initializing. This should ideally be called after successful network connection.

Return ESP_OK on success.

Return error in case of any error.

`esp_err_t esp_rmaker_mqtt_disconnect` (void)
MQTT Disconnect

Disconnects from the MQTT broker.

Return ESP_OK on success.

Return error in case of any error.

`esp_err_t esp_rmaker_mqtt_publish` (`const char *topic`, void `*data`, `size_t data_len`, `uint8_t qos`, int `*msg_id`)
Publish MQTT Message

Return ESP_OK on success.

Return error in case of any error.

Parameters

- [in] `topic`: The MQTT topic on which the message should be published.

- [in] `data`: Data to be published
- [in] `data_len`: Length of the data
- [in] `qos`: Quality of Service for the Publish. Can be 0, 1 or 2. Also depends on what the MQTT broker supports.

`esp_err_t esp_rmaker_mqtt_subscribe(const char *topic, esp_rmaker_mqtt_subscribe_cb_t cb, uint8_t qos, void *priv_data)`

Subscribe to MQTT topic

Return `ESP_OK` on success.

Return error in case of any error.

Parameters

- [in] `topic`: The topic to be subscribed to.
- [in] `cb`: The callback to be invoked when a message is received on the given topic.
- [in] `priv_data`: Optional private data to be passed to the callback
- [in] `qos`: Quality of Service for the Subscription. Can be 0, 1 or 2. Also depends on what the MQTT broker supports.

`esp_err_t esp_rmaker_mqtt_unsubscribe(const char *topic)`

Unsubscribe from MQTT topic

Return `ESP_OK` on success.

Return error in case of any error.

Parameters

- [in] `topic`: Topic from which to unsubscribe.

`esp_err_t esp_rmaker_mqtt_setup(esp_rmaker_mqtt_config_t mqtt_config)`

`void esp_rmaker_create_mqtt_topic(char *buf, size_t buf_size, const char *topic_suffix, const char *rule)`
Creates appropriate MQTT Topic String based on `CONFIG_ESP_RMAKER_MQTT_USE_BASIC_INGEST_TOPICS`

Parameters

- [out] `buf`: Buffer to hold topic string
- [in] `buf_size`: Size of buffer
- [in] `topic_suffix`: MQTT Topic suffix
- [in] `rule`: Basic Ingests Rule Name

`bool esp_rmaker_mqtt_is_budget_available(void)`

Check if budget is available to publish an mqtt message.

Return `true` if budget is available

Return `false` if budget is exhausted

Note `esp_rmaker_mqtt_publish` API already does this check. In addition to that, some use-cases might still need to check for this.

bool **esp_rmaker_is_mqtt_connected**()
 Check if device is connected to MQTT Server.

Return true if device is connected

Return false if device is not connected

1.4 RainMaker OTA

1.4.1 Header File

- `esp_rainmaker/include/esp_rmaker_ota.h`

1.4.2 Functions

esp_err_t **esp_rmaker_ota_enable**(*esp_rmaker_ota_config_t* *ota_config, *esp_rmaker_ota_type_t* type)

Enable OTA

Calling this API enables OTA as per the ESP RainMaker specification. Please check the various ESP RainMaker configuration options to use the different variants of OTA. Refer the documentation for additional details.

Return ESP_OK on success

Return error on failure

Parameters

- [in] ota_config: Pointer to an OTA configuration structure
- [in] type: The OTA workflow type

esp_err_t **esp_rmaker_ota_report_status**(*esp_rmaker_ota_handle_t* ota_handle, *ota_status_t* status, char *additional_info)

Report OTA Status

This API must be called from the OTA Callback to indicate the status of the OTA. The OTA_STATUS_IN_PROGRESS can be reported multiple times with appropriate additional information. The final success/failure should be reported only once, at the end.

This can be ignored if you are using the default internal OTA callback.

Return ESP_OK on success

Return error on failure

Parameters

- [in] ota_handle: The OTA handle received by the callback
- [in] status: Status to be reported
- [in] additional_info: NULL terminated string indicating additional information for the status

`esp_err_t esp_rmaker_ota_default_cb(esp_rmaker_ota_handle_t handle, esp_rmaker_ota_data_t *ota_data)`

Default OTA callback

This is the default OTA callback which will get used if you do not pass your own callback. You can call this even from your callback, in case you want better control on when the OTA can proceed and yet let the actual OTA process be managed by the RainMaker Core.

Return ESP_OK if the OTA was successful

Return ESP_FAIL if the OTA failed.

Parameters

- [in] `handle`: An OTA handle assigned by the ESP RainMaker Core
- [in] `ota_data`: The data to be used for the OTA

`esp_err_t esp_rmaker_ota_fetch(void)`

Fetch OTA Info

For OTA using Topics, this API can be used to explicitly ask the backend if an OTA is available. If it is, then the OTA callback would get invoked.

Return ESP_OK if the OTA fetch publish message was successful.

Return error on failure

`esp_err_t esp_rmaker_ota_fetch_with_delay(int time)`

Fetch OTA Info with a delay

For OTA using Topics, this API can be used to explicitly ask the backend if an OTA is available after a delay (in seconds) passed as an argument.

Return ESP_OK if the OTA fetch timer was created.

Return error on failure

Parameters

- [in] `time`: Delay (in seconds)

`esp_err_t esp_rmaker_ota_mark_valid(void)`

Mark OTA as valid

This should be called if the OTA validation has been kept pending by returning `OTA_DIAG_STATUS_PENDING` in the `ota_diag` callback and then, the validation was eventually successful. This can also be used to mark the OTA valid even before RainMaker core does its own validations (primarily MQTT connection).

Return ESP_OK on success

Return error on failure

`esp_err_t esp_rmaker_ota_mark_invalid(void)`

Mark OTA as invalid

This should be called if the OTA validation has been kept pending by returning `OTA_DIAG_STATUS_PENDING` in the `ota_diag` callback and then, the validation eventually failed. This can even be used to rollback at any point of time before RainMaker core's internal logic and the application's logic mark the OTA as valid.

Return ESP_OK on success

Return error on failure

1.4.3 Structures

struct esp_rmaker_ota_data_t
OTA Data

Public Members

char *url
The OTA URL received from ESP RainMaker Cloud

int filesize
Size of the OTA File. Can be 0 if the file size isn't received from the ESP RainMaker Cloud

char *fw_version
The firmware version of the OTA image

char *ota_job_id
The OTA Job ID received from cloud

const char *server_cert
The server certificate passed in esp_rmaker_enable_ota()

char *priv
The private data passed in esp_rmaker_enable_ota()

char *metadata
OTA Metadata. Applicable only for OTA using Topics. Will be received (if applicable) from the backend, along with the OTA URL

struct esp_rmaker_ota_diag_priv_t

Public Members

esp_rmaker_ota_diag_state_t **state**
OTA diagnostic state

bool rmaker_ota
Flag to indicate whether the OTA which has triggered the Diagnostics checks for rollback was triggered via RainMaker or not. This would be useful only when your application has some other mechanism for OTA too.

struct esp_rmaker_ota_config_t
ESP RainMaker OTA Configuration

Public Members

esp_rmaker_ota_cb_t **ota_cb**

OTA Callback. The callback to be invoked when an OTA Job is available. If kept NULL, the internal default callback will be used (Recommended).

esp_rmaker_post_ota_diag_t **ota_diag**

OTA Diagnostics Callback. A post OTA diagnostic handler to be invoked if app rollback feature is enabled. If kept NULL, the new firmware will be assumed to be fine, and no rollback will be performed.

const char *server_cert

Server Certificate. The certificate to be passed to the OTA callback for server authentication. This is mandatory, unless you have disabled it in ESP HTTPS OTA config option. If you are using the ESP RainMaker OTA Service, you can just set this to ESP_RMAKER_OTA_DEFAULT_SERVER_CERT.

void *priv

Private Data. Optional private data to be passed to the OTA callback.

1.4.4 Type Definitions

typedef void *esp_rmaker_ota_handle_t

The OTA Handle to be used by the OTA callback

typedef esp_err_t (*esp_rmaker_ota_cb_t) (esp_rmaker_ota_handle_t handle, esp_rmaker_ota_data_t *ota_data)

Function prototype for OTA Callback

This function will be invoked by the ESP RainMaker core whenever an OTA is available. The `esp_rmaker_report_ota_status()` API should be used to indicate the progress and success/fail status.

Return ESP_OK if the OTA was successful

Return ESP_FAIL if the OTA failed.

Parameters

- [in] `handle`: An OTA handle assigned by the ESP RainMaker Core
- [in] `ota_data`: The data to be used for the OTA

typedef esp_rmaker_ota_diag_status_t (*esp_rmaker_post_ota_diag_t) (esp_rmaker_ota_diag_priv_t *ota_diag_priv, void *priv)

Function Prototype for Post OTA Diagnostics

If the Application rollback feature is enabled, this callback will be invoked as soon as you call `esp_rmaker_ota_enable()`, if it is the first boot after an OTA. You may perform some application specific diagnostics and report the status which will decide whether to roll back or not.

This will be invoked once again after MQTT has connected, in case some additional validations are to be done later.

If `OTA state == OTA_DIAG_STATE_INIT`, then return `OTA_DIAG_STATUS_FAIL` to indicate failure and rollback. return `OTA_DIAG_STATUS_SUCCESS` or `OTA_DIAG_STATUS_PENDING` to tell internal OTA logic to continue further.

If `OTA state == OTA_DIAG_STATE_POST_MQTT`, then return `OTA_DIAG_STATUS_FAIL` to indicate failure and rollback. return `OTA_DIAG_STATUS_SUCCESS` to indicate validation was successful and mark OTA as valid return `OTA_DIAG_STATUS_PENDING` to indicate that some additional validations will

be done later and the OTA will eventually be marked valid/invalid using `esp_rmaker_ota_mark_valid()` or `esp_rmaker_ota_mark_invalid()` respectively.

Return `esp_rmaker_ota_diag_status_t` as applicable

1.4.5 Enumerations

enum esp_rmaker_ota_event_t

ESP RainMaker Events

Values:

RMaker_OTA_EVENT_INVALID = 0

RMaker_OTA_EVENT_STARTING

RainMaker OTA is Starting

RMaker_OTA_EVENT_IN_PROGRESS

RainMaker OTA has Started

RMaker_OTA_EVENT_SUCCESSFUL

RainMaker OTA Successful

RMaker_OTA_EVENT_FAILED

RainMaker OTA Failed

RMaker_OTA_EVENT_REJECTED

RainMaker OTA Rejected

RMaker_OTA_EVENT_DELAYED

RainMaker OTA Delayed

RMaker_OTA_EVENT_REQ_FOR_REBOOT

OTA Image has been flashed and active partition changed. Reboot is requested. Applicable only if Auto reboot is disabled

enum ota_status_t

OTA Status to be reported to ESP RainMaker Cloud

Values:

OTA_STATUS_IN_PROGRESS = 1

OTA is in Progress. This can be reported multiple times as the OTA progresses.

OTA_STATUS_SUCCESS

OTA Succeeded. This should be reported only once, at the end of OTA.

OTA_STATUS_FAILED

OTA Failed. This should be reported only once, at the end of OTA.

OTA_STATUS_DELAYED

OTA was delayed by the application

OTA_STATUS_REJECTED

OTA rejected due to some reason (wrong project, version, etc.)

enum esp_rmaker_ota_type_t

OTA Workflow type

Values:

OTA_USING_PARAMS = 1

OTA will be performed using services and parameters.

OTA_USING_TOPICS

OTA will be performed using pre-defined MQTT topics.

enum esp_rmaker_ota_diag_status_t

Values:

OTA_DIAG_STATUS_FAIL

OTA Diagnostics Failed. Rollback the firmware.

OTA_DIAG_STATUS_PENDING

OTA Diagnostics Pending. Additional validations will be done later.

OTA_DIAG_STATUS_SUCCESS

OTA Diagnostics Succeeded. Firmware can be considered valid.

enum esp_rmaker_ota_diag_state_t

Values:

OTA_DIAG_STATE_INIT

OTA State: Initialised.

OTA_DIAG_STATE_POST_MQTT

OTA state: MQTT has connected.

1.5 RainMaker Console

1.5.1 Header File

- `esp_rainmaker/include/esp_rmaker_console.h`

1.5.2 Functions

`esp_err_t esp_rmaker_console_init (void)`

Initialize console

Initializes serial console and adds basic commands.

Return ESP_OK on success.

Return error in case of failures.

1.6 RainMaker Common

1.6.1 Utilities

Header File

- `rmaker_common/include/esp_rmaker_utils.h`

Functions

`esp_err_t esp_rmaker_reboot (int8_t seconds)`

Reboot the device after a delay

This API just starts a reboot timer and returns immediately. The actual reboot is triggered asynchronously in the timer callback. This is useful if you want to reboot after a delay, to allow other tasks to finish their operations (Eg. MQTT publish to indicate OTA success). The `RMaker_EVENT_REBOOT` event is triggered when the reboot timer is started.

Return `ESP_OK` on success.

Return error on failure.

Parameters

- `[in] seconds`: Time in seconds after which the device should reboot.

`esp_err_t esp_rmaker_wifi_reset (int8_t reset_seconds, int8_t reboot_seconds)`

Reset Wi-Fi credentials and (optionally) reboot

This will reset just the Wi-Fi credentials and (optionally) trigger a reboot. This is useful when you want to keep all the entries in NVS memory intact, but just change the Wi-Fi credentials. The `RMaker_EVENT_WIFI_RESET` event is triggered when this API is called. The actual reset will happen after a delay if `reset_seconds` is not zero.

Note This reset and reboot operations will happen asynchronously depending on the values passed to the API.

Return `ESP_OK` on success.

Return error on failure.

Parameters

- `[in] reset_seconds`: Time in seconds after which the reset should get triggered. This will help other modules take some actions before the device actually resets. If set to zero, the operation would be performed immediately.
- `[in] reboot_seconds`: Time in seconds after which the device should reboot. If set to negative value, the device will not reboot at all.

`esp_err_t esp_rmaker_factory_reset (int8_t reset_seconds, int8_t reboot_seconds)`

Reset to factory defaults and reboot

This will clear entire NVS partition and (optionally) trigger a reboot. The `RMaker_EVENT_FACTORY_RESET` event is triggered when this API is called. The actual reset will happen after a delay if `reset_seconds` is not zero.

Note This reset and reboot operations will happen asynchronously depending on the values passed to the API.

Return `ESP_OK` on success.

Return error on failure.

Parameters

- `[in] reset_seconds`: Time in seconds after which the reset should get triggered. This will help other modules take some actions before the device actually resets. If set to zero, the operation would be performed immediately.
- `[in] reboot_seconds`: Time in seconds after which the device should reboot. If set to negative value, the device will not reboot at all.

`esp_err_t esp_rmaker_time_sync_init (esp_rmaker_time_config_t *config)`

Initialize time synchronization

This API initializes SNTP for time synchronization.

Return ESP_OK on success

Return error on failure

Parameters

- [in] config: Configuration to be used for SNTP time synchronization. The default configuration is used if NULL is passed.

`bool esp_rmaker_time_check (void)`

Check if current time is updated

This API checks if the current system time is updated against the reference time of 1-Jan-2019.

Return true if time is updated

Return false if time is not updated

`esp_err_t esp_rmaker_time_wait_for_sync (uint32_t ticks_to_wait)`

Wait for time synchronization

This API waits for the system time to be updated against the reference time of 1-Jan-2019. This is a blocking call.

Return ESP_OK on success

Return error on failure

Parameters

- [in] ticks_to_wait: Number of ticks to wait for time synchronization. Accepted values: 0 to portMAX_DELAY.

`esp_err_t esp_rmaker_time_set_timezone_posix (const char *tz_posix)`

Set POSIX timezone

Set the timezone (TZ environment variable) as per the POSIX format specified in the [GNU libc documentation](#). Eg. For China: “CST-8” For US Pacific Time (including daylight saving information): “PST8PDT,M3.2.0,M11.1.0”

Return ESP_OK on success

Return error on failure

Parameters

- [in] tz_posix: NULL terminated TZ POSIX string

`esp_err_t esp_rmaker_time_set_timezone (const char *tz)`

Set timezone location string

Set the timezone as a user friendly location string. Check [here](#) for a list of valid values.

Eg. For China: “Asia/Shanghai” For US Pacific Time: “America/Los_Angeles”

Note Setting timezone using this API internally also sets the POSIX timezone string.

Return ESP_OK on success

Return error on failure

Parameters

- [in] tz: NULL terminated Timezone location string

char ***esp_rmaker_time_get_timezone_posix**(void)

Get the current POSIX timezone

This fetches the current timezone in POSIX format, read from NVS.

Return Pointer to a NULL terminated POSIX timezone string on success. Freeing this is the responsibility of the caller.

Return NULL on failure.

char ***esp_rmaker_time_get_timezone**(void)

Get the current timezone

This fetches the current timezone in POSIX format, read from NVS.

Return Pointer to a NULL terminated timezone string on success. Freeing this is the responsibility of the caller.

Return NULL on failure.

esp_err_t **esp_rmaker_get_local_time_str**(char *buf, size_t buf_len)

Get printable local time string

Get a printable local time string, with information of timezone and Daylight Saving. Eg. "Tue Sep 1 09:04:38 2020 -0400[EDT], DST: Yes" "Tue Sep 1 21:04:04 2020 +0800[CST], DST: No"

Return ESP_OK on success

Return error on failure

Parameters

- [out] buf: Pointer to a pre-allocated buffer into which the time string will be populated.
- [in] buf_len: Length of the above buffer.

Structures

struct esp_rmaker_time_config

Public Members

char ***sntp_server_name**

If not specified, then 'CONFIG_ESP_RMAKER_SNTP_SERVER_NAME' is used as the SNTP server.

sntp_sync_time_cb_t **sync_time_cb**

Optional callback to invoke, whenever time is synchronised. This will be called periodically as per the SNTP polling interval (which is 60min by default). If kept NULL, the default callback will be invoked, which will just print the current local time.

Macros

MEM_ALLOC_EXTRAM (size)

MEM_CALLOC_EXTRAM (num, size)

MEM_REALLOC_EXTRAM (ptr, size)

Type Definitions

```
typedef struct esp_rmaker_time_config esp_rmaker_time_config_t
```

1.6.2 Factory Storage

Header File

- `rmaker_common/include/esp_rmaker_factory.h`

Functions

`esp_err_t esp_rmaker_factory_init (void)`

Initialize Factory NVS

This initializes the Factory NVS partition which will store data that should not be cleared even after a reset to factory.

Return ESP_OK on success.

Return error on failure.

`void *esp_rmaker_factory_get (const char *key)`

Get value from factory NVS

This will search for the specified key in the Factory NVS partition, allocate the required memory to hold it, copy the value and return the pointer to it. It is responsibility of the caller to free the memory when the value is no more required.

Return pointer to the value on success.

Return NULL on failure.

Parameters

- [in] `key`: The key of the value to be read from factory NVS.

`size_t esp_rmaker_factory_get_size (const char *key)`

Get size of value from factory NVS

This will search for the specified key in the Factory NVS partition, and return the size of the value associated with the key.

Return size of the value on success.

Return 0 on failure.

Parameters

- [in] `key`: The key of the value to be read from factory NVS.

`esp_err_t esp_rmaker_factory_set (const char *key, void *value, size_t len)`
Set a value in factory NVS

This will write the value for the specified key into factory NVS.

Return ESP_OK on success.

Return error on failure.

Parameters

- [in] `key`: The key for the value to be set in factory NVS.
- [in] `data`: Pointer to the value.
- [in] `len`: Length of the value.

1.6.3 Work Queue

Header File

- `rmaker_common/include/esp_rmaker_work_queue.h`

Functions

`esp_err_t esp_rmaker_work_queue_init (void)`
Initializes the Work Queue

This initializes the work queue, which is basically a mechanism to run tasks in the context of a dedicated thread. You can start queueing tasks after this, but they will get executed only after calling `esp_rmaker_work_queue_start()`.

Return ESP_OK on success.

Return error in case of failure.

`esp_err_t esp_rmaker_work_queue_deinit (void)`
De-initialize the Work Queue

This de-initializes the work queue. Note that the work queue needs to be stopped using `esp_rmaker_work_queue_stop()` before calling this.

Return ESP_OK on success.

Return error in case of failure.

`esp_err_t esp_rmaker_work_queue_start (void)`
Start the Work Queue

This starts the Work Queue thread which then starts executing the tasks queued.

Return ESP_OK on success.

Return error in case of failure.

`esp_err_t esp_rmaker_work_queue_stop (void)`

Stop the Work Queue

This stops a running Work Queue.

Return ESP_OK on success.

Return error in case of failure.

`esp_err_t esp_rmaker_work_queue_add_task (esp_rmaker_work_fn_t work_fn, void *priv_data)`

Queue execution of a function in the Work Queue's context

This API queues a work function for execution in the Work Queue Task's context.

Return ESP_OK on success.

Return error in case of failure.

Parameters

- [in] `work_fn`: The Work function to be queued.
- [in] `priv_data`: Private data to be passed to the work function.

Type Definitions

`typedef void (*esp_rmaker_work_fn_t) (void *priv_data)`

Prototype for ESP RainMaker Work Queue Function

Parameters

- [in] `priv_data`: The private data associated with the work function.

1.6.4 Common Events

Header File

- `rmaker_common/include/esp_rmaker_common_events.h`

Functions

ESP_EVENT_DECLARE_BASE (RMAKER_COMMON_EVENT)

ESP RainMaker Common Event Base

Enumerations

`enum esp_rmaker_common_event_t`

Values:

RMAKER_EVENT_REBOOT

Node reboot has been triggered. The associated event data is the time in seconds (type: `uint8_t`) after which the node will reboot. Note that this time may not be accurate as the events are received asynchronously.

RMAKER_EVENT_WIFI_RESET

Wi-Fi credentials reset. Triggered after calling `esp_rmaker_wifi_reset()`

RMaker_EVENT_FACTORY_RESET

Node reset to factory defaults. Triggered after calling `esp_rmaker_factory_reset()`

RMaker_MQTT_EVENT_CONNECTED

Connected to MQTT Broker

RMaker_MQTT_EVENT_DISCONNECTED

Disconnected from MQTT Broker

RMaker_MQTT_EVENT_PUBLISHED

MQTT message published successfully. Event data will contain the message ID (integer) of published message.

RMaker_EVENT_TZ_POSIX_CHANGED

POSIX Timezone Changed. Associated data would be NULL terminated POSIX Timezone Eg. "PST8PDT,M3.2.0,M11.1.0"

RMaker_EVENT_TZ_CHANGED

Timezone Changed. Associated data would be NULL terminated Timezone. Eg. "America/Los_Angeles"
Note that whenever this event is received, the `RMaker_EVENT_TZ_POSIX_CHANGED` event will also be received, but not necessarily vice versa.

RMaker_MQTT_EVENT_MSG_DELETED

MQTT message deleted from the outbox if the message couldn't have been sent and acknowledged. Event data will contain the message ID (integer) of deleted message. Valid only if `CONFIG_MQTT_REPORT_DELETED_MESSAGES` is enabled.

PYTHON API REFERENCE

2.1 Library

2.1.1 User

class `rmaker_lib.user.User` (*username*)

User class used to instantiate instances of user to perform various user signup/login operations.

Parameters `username` (*str*) – Name of User

forgot_password (*password=None, verification_code=None*)

Forgot password request to reset the password.

Parameters

- **password** (*str*) – Password of user, defaults to *None*
- **verification_code** (*int*) – Verification code received during forgot password request, defaults to *None*

Raises

- **NetworkError** – If there is a network connection issue during password reset
- **Exception** – If there is an HTTP issue during forgot password

Returns True on Success

Return type bool

handle_otp_based_login (*login_session=None*)

OTP based login for ESP RainMaker.

Parameters `login_session` (*str*) – Session param received in first login request

Raises

- **NetworkError** – If there is a network connection issue during login
- **Exception** – If there is an HTTP issue during login or JSON format issue in HTTP response
- **AuthenticationError** – If login failed with the given parameters

Returns `rmaker_lib.session.Session` on Success

Return type Dict

login (*password=None*)

User login to the ESP Rainmaker.

Parameters `password (str)` – Password of user, defaults to *None*

Raises

- **NetworkError** – If there is a network connection issue during login
- **Exception** – If there is an HTTP issue during login or JSON format issue in HTTP response
- **AuthenticationError** – If login failed with the given parameters

Returns `rmaker_lib.session.Session` on Success

Return type object

signup (code)

Sign up of new User for ESP Rainmaker.

Parameters `code (int)` – Verification code received in signup request for user

Raises

- **NetworkError** – If there is a network connection issue during signup
- **Exception** – If there is an HTTP issue during signup

Returns True on Success

Return type bool

signup_request (password)

Sign up request of new User for ESP Rainmaker.

Parameters `password (str)` – Password to set for new user

Raises

- **NetworkError** – If there is a network connection issue during signup request
- **Exception** – If there is an HTTP issue during signup request

Returns True on Success

Return type bool

2.1.2 Session

class `rmaker_lib.session.Session`

Session class for logged in user.

get_mqtt_host ()

Get the MQTT Host endpoint.

Raises

- **NetworkError** – If there is a network connection issue while getting MQTT Host endpoint
- **Exception** – If there is an HTTP issue while getting MQTT host or JSON format issue in HTTP response

Returns MQTT Host on Success, None on Failure

Return type str | None

get_nodes ()

Get list of all nodes associated with the user.

Raises

- **NetworkError** – If there is a network connection issue while getting nodes associated with user
- **Exception** – If there is an HTTP issue while getting nodes

Returns Nodes associated with user on Success

Return type dict

get_user_details ()

Get details of current logged-in user

Raises

- **SSLError** – If there is an SSL issue
- **HTTPError** – If the HTTP response is an HTTPError
- **NetworkError** – If there is a network connection issue
- **Timeout** – If there is a timeout issue
- **RequestException** – If there is an issue during the HTTP request
- **Exception** – If there is an HTTP issue while getting user details or JSON format issue in HTTP response

Returns HTTP response on Success

Return type dict

logout ()

Logout current logged-in user

Raises

- **SSLError** – If there is an SSL issue
- **HTTPError** – If the HTTP response is an HTTPError
- **NetworkError** – If there is a network connection issue
- **Timeout** – If there is a timeout issue
- **RequestException** – If there is an issue during the HTTP request
- **Exception** – If there is an HTTP issue while logging out or JSON format issue in HTTP response

Returns HTTP response on Success

Return type dict

2.1.3 Node

class `rmaker_lib.node.Node (nodeid, session)`

Node class used to instantiate instances of node to perform various node operations.

Parameters

- **nodeid** (*str*) – Node Id of node
- **session** (*object*) – `rmaker_lib.session.Session`

add_user_for_sharing (*data*)

Perform sharing operations -

1. Request to add user for sharing nodes

Parameters *data* (*dict*) – 1. To add nodes - Data containing *user_name* and *nodes* as keys

Raises

- **SSLError** – If there is an SSL issue
- **HTTPError** – If the HTTP response is an HTTPError
- **NetworkError** – If there is a network connection issue
- **Timeout** – If there is a timeout issue
- **RequestException** – If there is an issue during the HTTP request
- **Exception** – If there is an HTTP issue while performing sharing operation or JSON format issue in HTTP response

Returns HTTP response on Success

Return type dict

add_user_node_mapping (*secret_key*)

Add user node mapping.

Parameters *secret_key* (*str*) – The randomly generated secret key that will be used for User-Node mapping

Raises

- **NetworkError** – If there is a network connection issue while adding user node mapping
- **Exception** – If there is an HTTP issue while adding user node mapping or JSON format issue in HTTP response

Returns Request Id on Success, None on Failure

Return type str | None

get_mapping_status (*request_id*)

Check status of user node mapping request.

Parameters *requestId* (*str*) – Request Id

Raises

- **NetworkError** – If there is a network connection issue while getting user node mapping status
- **Exception** – If there is an HTTP issue while getting user node mapping status or JSON format issue in HTTP response

Returns Request Status on Success, None on Failure

Type str | None

get_node_config ()

Get node configuration.

Raises

- **NetworkError** – If there is a network connection issue while getting node configuration

- **Exception** – If there is an HTTP issue while getting node config

Returns Configuration of node on Success

Return type dict

get_node_params ()

Get parameters of the node.

Raises

- **NetworkError** – If there is a network connection issue while getting node params
- **Exception** – If there is an HTTP issue while getting node params or JSON format issue in HTTP response

Returns Node Parameters on Success, None on Failure

Return type dict | None

get_node_status ()

Get online/offline status of the node.

Raises

- **NetworkError** – If there is a network connection issue while getting node status
- **Exception** – If there is an HTTP issue while getting node status

Returns Status of node on Success

Return type dict

get_nodeid ()

Get nodeid of device

Returns Node Id of node on Success

Return type str

get_shared_nodes_request (params)

Get request sent to share nodes with user

Parameters **params** (*dict*) – Query parameters containing *request_id* and *primary_user* as keys

Raises

- **SSLError** – If there is an SSL issue
- **HTTPError** – If the HTTP response is an HTTPError
- **NetworkError** – If there is a network connection issue
- **Timeout** – If there is a timeout issue
- **RequestException** – If there is an issue during the HTTP request
- **Exception** – If there is an HTTP issue while getting sharing request or JSON format issue in HTTP response

Returns HTTP response on Success

Return type dict

get_sharing_details_of_nodes ()

Get sharing details of nodes associated with user

Raises

- **SSLError** – If there is an SSL issue
- **HTTPError** – If the HTTP response is an HTTPError
- **NetworkError** – If there is a network connection issue
- **Timeout** – If there is a timeout issue
- **RequestException** – If there is an issue during the HTTP request
- **Exception** – If there is an HTTP issue while getting shared nodes or JSON format issue in HTTP response

Returns HTTP response on Success

Return type dict

remove_shared_nodes_request (*req_id*)

Remove/Cancel request sent to share nodes with user

Parameters *req_id* – Id of sharing request

Raises

- **SSLError** – If there is an SSL issue
- **HTTPError** – If the HTTP response is an HTTPError
- **NetworkError** – If there is a network connection issue
- **Timeout** – If there is a timeout issue
- **RequestException** – If there is an issue during the HTTP request
- **Exception** – If there is an HTTP issue while removing sharing request or JSON format issue in HTTP response

Returns HTTP response on Success

Return type dict

remove_user_from_shared_nodes (*data*)

Remove user from shared nodes

Parameters *data* (*dict*) – Data containing *user_name* and *nodes* as keys

Raises

- **SSLError** – If there is an SSL issue
- **HTTPError** – If the HTTP response is an HTTPError
- **NetworkError** – If there is a network connection issue
- **Timeout** – If there is a timeout issue
- **RequestException** – If there is an issue during the HTTP request
- **Exception** – If there is an HTTP issue while removing shared nodes or JSON format issue in HTTP response

Returns HTTP response on Success

Return type dict

remove_user_node_mapping ()

Remove user node mapping request.

Raises

- **NetworkError** – If there is a network connection issue while removing user node mapping
- **Exception** – If there is an HTTP issue while removing user node mapping or JSON format issue in HTTP response

Returns Request Id on Success, None on Failure

Return type str | None

request_op (*data*)

Perform sharing operations -

1. Accept or decline sharing request

Parameters *data* (*dict*) – 1. Data containing *request_id* and *accept* as keys

Raises

- **SSLError** – If there is an SSL issue
- **HTTPError** – If the HTTP response is an HTTPError
- **NetworkError** – If there is a network connection issue
- **Timeout** – If there is a timeout issue
- **RequestException** – If there is an issue during the HTTP request
- **Exception** – If there is an HTTP issue while performing request operation or JSON format issue in HTTP response

Returns HTTP response on Success

Return type dict

set_node_params (*data*)

Set parameters of the node.

Parameters *data* (*dict*) – Parameters to be set for the node

Raises

- **NetworkError** – If there is a network connection issue while setting node params
- **Exception** – If there is an HTTP issue while setting node params or JSON format issue in HTTP response

Returns True on Success

Return type bool

2.2 Commands

2.2.1 Node

`rmaker_cmd.node.add_user_to_share_nodes (nodes=None, user=None)`

Add user to share nodes

Parameters

- **vars** (*str*) – *nodes* as key - Node Id of the node(s)

- **vars** – *user* as key - User name

Raises Exception – If there is an issue while adding user to share nodes

Returns API response

Return type dict

`rmaker_cmd.node.claim_node (vars=None)`

Claim the node connected to the given serial port (Get cloud credentials)

Parameters vars (*str* | *None*) – *port* as key - Serial Port, defaults to *None*

Raises Exception – If there is an HTTP issue while claiming

Returns None on Success

Return type None

`rmaker_cmd.node.get_mqtt_host (vars=None)`

Returns MQTT Host endpoint

Parameters vars (*dict* | *None*) – No Parameters passed, defaults to *None*

Raises

- **NetworkError** – If there is a network connection issue while getting MQTT Host endpoint
- **Exception** – If there is an HTTP issue while getting MQTT Host endpoint or JSON format issue in HTTP response

Returns MQTT Host endpoint

Return type str

`rmaker_cmd.node.get_node_config (vars=None)`

Shows the configuration of the node.

Parameters vars (*dict* | *None*) – *nodeid* as key - Node ID for the node, defaults to *None*

Raises Exception – If there is an HTTP issue while getting node config

Returns None on Success

Return type None

`rmaker_cmd.node.get_node_status (vars=None)`

Shows the online/offline status of the node.

Parameters vars (*dict* | *None*) – *nodeid* as key - Node ID for the node, defaults to *None*

Raises Exception – If there is an HTTP issue while getting node status

Returns None on Success

Return type None

`rmaker_cmd.node.get_nodes (vars=None)`

List all nodes associated with the user.

Parameters vars (*dict* | *None*) – No Parameters passed, defaults to *None*

Raises Exception – If there is an HTTP issue while getting nodes

Returns None on Success

Return type None

`rmaker_cmd.node.get_params (vars=None)`

Get parameters of the node.

Parameters `vars` (*dict* | *None*) – *nodeid* as key - Node ID for the node, defaults to *None*

Raises **Exception** – If there is an HTTP issue while getting params or JSON format issue in HTTP response

Returns None on Success

Return type None

`rmaker_cmd.node.list_sharing_details (node_id=None, primary_user=False, request_id=None, list_requests=False)`

List sharing details of all nodes associated with user or List pending requests

Parameters

- **vars** (*bool*) – *node_id* as key - Node Id of the node(s) (if not provided, is set to all nodes associated with user)
- **vars** – *primary_user* as key - User is primary or secondary (if provided, user is primary user)
- **vars** – *request_id* as key - Id of sharing request
- **vars** – *list_requests* as key - If True, list pending requests If False, list sharing details of nodes

Raises **Exception** – If there is an issue while listing details

Returns API response

Return type dict

`rmaker_cmd.node.ota_upgrade (vars=None)`

Upload OTA Firmware Image and Set image url returned in response as node params

`rmaker_cmd.node.remove_node (vars=None)`

Removes the user node mapping.

Parameters `vars` (*dict* | *None*) – *nodeid* as key - Node ID for the node, defaults to *None*

Raises

- **NetworkError** – If there is a network connection issue during HTTP request for removing node
- **Exception** – If there is an HTTP issue while removing node or JSON format issue in HTTP response

Returns None on Success

Return type None

`rmaker_cmd.node.remove_sharing (nodes=None, user=None, request_id=None)`

Remove user from shared nodes or Remove sharing request

Parameters

- **vars** (*str*) – *nodes* as key - Node Id for the node
- **vars** – *user* as key - User name
- **vars** – *request_id* as key - Id of sharing request

Raises **Exception** – If there is an issue while remove operation

Returns API response

Return type dict

`rmaker_cmd.node.set_params (vars=None)`

Set parameters of the node.

Parameters **vars** (*dict* | *None*) – *nodeid* as key - Node ID for the node,
data as key - JSON data containing parameters to be set *or*
filepath as key - Path of the JSON file containing parameters to be set,
defaults to *None*

Raises **Exception** – If there is an HTTP issue while setting params or JSON format issue in HTTP response

Returns None on Success

Return type None

`rmaker_cmd.node.sharing_request_op (accept_request=False, request_id=None)`

Accept or decline sharing request

Parameters

- **vars** (*str*) – *accept_request* as key If true, accept sharing request If false, decline sharing request
- **vars** – *request_id* as key - Id of sharing request

Raises **Exception** – If there is an issue accepting or declining request

Returns API response

Return type dict

2.2.2 User

`rmaker_cmd.user.forgot_password (vars=None)`

Forgot password request to reset the password.

Parameters **vars** (*dict*) – *user_name* as key - Email address/ phone number of the user, defaults to *None*

Raises **Exception** – If there is an HTTP issue while changing password for user

Returns None on Success and Failure

Return type None

`rmaker_cmd.user.get_password ()`

Get Password as input and perform basic password validation checks.

Raises **SystemExit** – If there is an issue in getting password

Returns Password for User on Success

Return type str

`rmaker_cmd.user.get_user_details (vars=None)`

Get details of current logged-in user

`rmaker_cmd.user.login (vars=None)`

First time login of the user.

Parameters **vars** (*dict*) – *email* as key - Email address of the user, defaults to *None*

Raises **Exception** – If there is any issue in login for user

Returns None on Success and Failure

Return type None

`rmaker_cmd.user.logout (vars=None)`

Logout of the current session.

Raises **Exception** – If there is any issue in logout for user

Returns None on Success and Failure

Return type None

`rmaker_cmd.user.signup (vars=None)`

User signup to the ESP Rainmaker.

Parameters **vars** (*dict*) – *user_name* as key - Email address/Phone number of the user, defaults to *None*

Raises **Exception** – If there is any issue in signup for user

Returns None on Success

Return type None

2.2.3 Provision

`rmaker_cmd.provision.provision (vars=None)`

Provisioning of the node.

Raises

- **NetworkError** – If there is a network connection issue during provisioning
- **Exception** – If there is an HTTP issue during provisioning

Parameters **vars** (*dict*) – *pop* - Proof of Possession of the node, defaults to *None*

Returns None on Success and Failure

Return type None

2.2.4 Browser Login

`rmaker_cmd.browserlogin.browser_login ()`

Opens browser with login url using Httpd Server.

Raises **Exception** – If there is an HTTP issue while logging in through browser

Returns None on Success and Failure

Return type None

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