

USB JSON Protocol Schema – Luxury Watch Winder Cabinet

Purpose

This document defines the **JSON message schema** for communication between the **Android app** and **Raspberry Pi** over USB serial. It ensures consistency, validation, and safe interpretation of all messages.

Common Structure

All JSON messages shall contain a **type** field, which determines the structure of the **payload**.

```
1 {  
2   "type": "<message_type>",  
3   "payload": { ... }  
4 }  
5
```

Direction: Android → Raspberry Pi

1. state_request

Request permission to change the current system state.

```
1 {  
2   "type": "state_request",  
3   "payload": {  
4     "requested_state": "DELIVER_SLOT_2",  
5     "timestamp": "2025-07-18T18:44:00Z"  
6   }  
7 }  
8
```

2. auth_check

Indicate user interaction is ready; Pi should begin fingerprint scan.

```
1 {  
2   "type": "auth_check",  
3   "payload": {}  
4 }  
5
```

3. library_update

Send the entire current user library after adding/editing a watch.

```
1 {
2   "type": "library_update",
3   "payload": {
4     "library": [
5       {
6         "slot": 1,
7         "brand": "Rolex",
8         "model": "Submariner",
9         "ref": "116610LN",
10        "winding_mode": "CW_600",
11        "image": "base64string"
12      },
13      {
14        "slot": 2,
15        "brand": "Omega",
16        "model": "Seamaster",
17        "ref": "210.30.42.20.01.001",
18        "winding_mode": "CCW_650",
19        "image": "base64string"
20      }
21    ]
22  }
23 }
24
```

Direction: Raspberry Pi → Android

1. state_ack

Reply to a state change request.

```
1 {
2   "type": "state_ack",
3   "payload": {
4     "status": "in_progress", // in_queue, done, failed
5     "current_state": "DELIVER_SLOT_2"
6   }
7 }
8
```

2. auth_result

Result of a fingerprint authentication check.

```
1 {
2   "type": "auth_result",
3   "payload": {
4     "status": "success" // or "fail"
5   }
6 }
7
```

3. error

An error has occurred; notify Android.

```
1 {  
2   "type": "error",  
3   "payload": {  
4     "error_code": "MOTOR_JAM",  
5     "message": "Mechanical failure in winder slot 2"  
6   }  
7 }  
8
```

4. state_update

Push the current state and queue info.

```
1 {  
2   "type": "state_update",  
3   "payload": {  
4     "current_state": "IDLE",  
5     "queue": ["DELIVER_SLOT_2"]  
6   }  
7 }  
8
```

Validation Rules

- All messages must be valid UTF-8 JSON.
 - `type` is required in all messages.
 - `payload` is required; may be empty `{}` if no data is needed.
 - Optional: include `message_id` for tracking responses.
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