Waylen Allen

WAP-3-090
Session Sharing

Version 1.0
10th April 2025

Date	Change	Author	Description	Version
10th April 2025	Creation	Tom Hao	Initial draft	1.0

1. Introduction

This document describes the process of sharing sessions between users, for reference of firmware and app development.
To support session sharing, device firmware must be upgraded to support multiple BLE connections: a user could scan and connect to a device when it's being connected by another user. The original user who connected to device and created a session is considered owner of the device. Session sharing happens with new user sending a request to device and device pass the request to owner for permission. There are two general cases of the request: join a session or take over ownership of a device.

2. Definitions

- device: the OneBase device with Windsor board
- app: the OneBase mobile app
- user: user of the app, identified by userId(40bit unsigned integer)
- device owner: the user who has ownership of a device, only the owner can perform feature requests or create sessions on a device
- ownerId: the userId of owner, stored in RAM of device
- session sharing: users other than the device owner to join a session on device and get session data logs, without controlling the session
- sharedUserIds: an array of userIds of users who are allowed to share a session on a device with the owner, stored in RAM of device

3. Verbs

We introduce new verbs in communication between app and device for session sharing, which will be described in "WAP-2-021 Communication Protocol v3.2" for reference of firmware development and implemented in @onebase/ble v3.2.x for use of app development.

3.1 Take Ownership

For user to take ownership of a device
- Request: 0x40 [App to Device]
- Response: 0x41 [Device to App]

3.2 Release Ownership

For user to release ownership of device
- Request: 0x42 [App to Device]
- Response: 0x43 [Device to App]

3.3 Relinquish Ownership

For device to ask owner to give up the ownership
- Request: 0x44 [Device to App]

- Response: 0x45 [App to Device]

3.4 Join Session

For user to send to device, and device pass to owner.
- Request: 0x70 [Bidirectional]
- Response: 0x71 [Bidirectional]

3.5 Quit Session

For user to quit a session they previously joined.
- Request: 0x72 [App to Device]
- Response: 0x73 [Device to App]

4. Advertised Session State

As defined in "WAP-2-021 Wireless Communication Protocol v3.1" and implemented in @onebase/ble v3.1.x, a device would include session state in its BLE advertisement, so the app can know about it before connected:

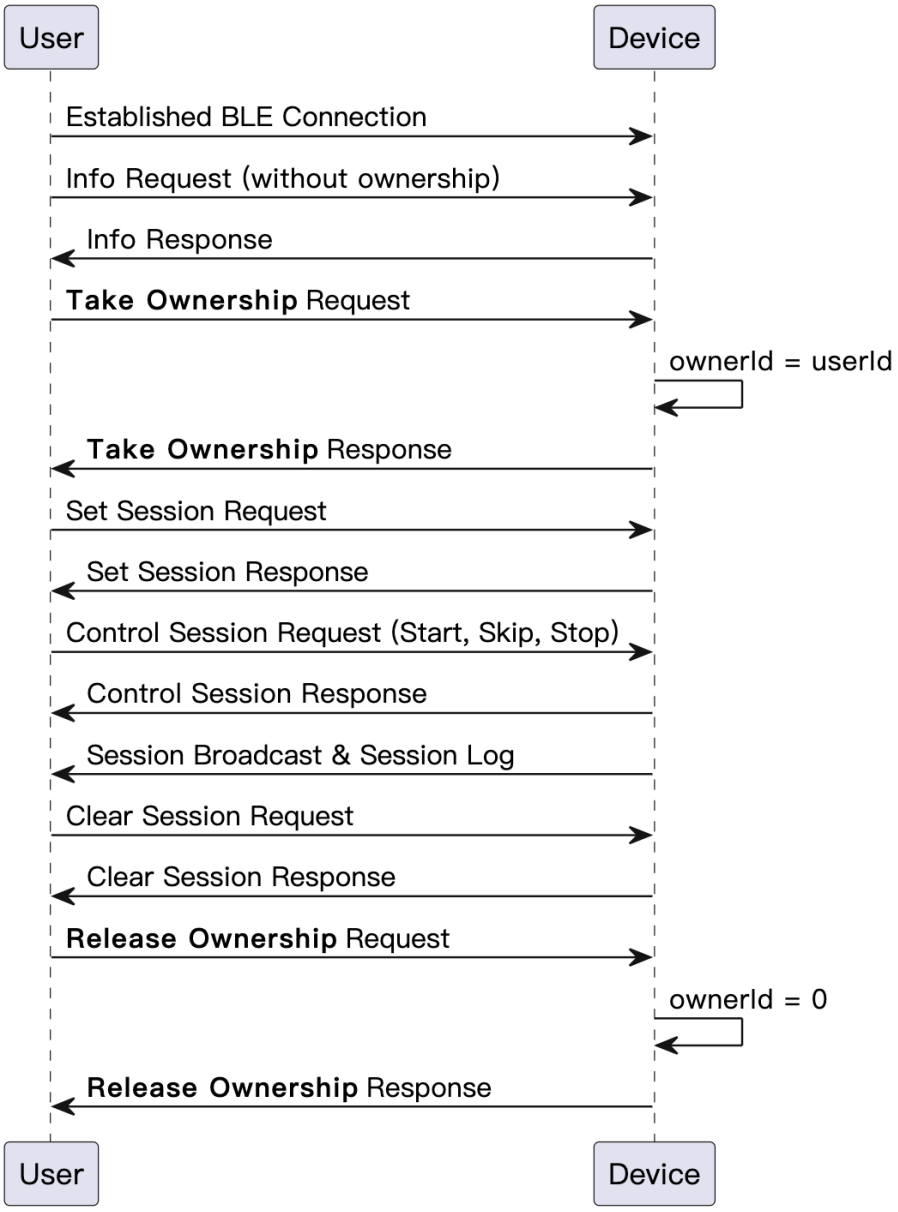
```
0: ready(not configured),
1: configured(have a session, not started)
2: preparation,
3: running,
4: stopped
```

We are adding a new state in v3.2 of the communication protocol and BLE library:

```
5: free(ownership has not been taken, ownerId == 0)
```

5. Create a session

When a device is up, it's in 'free' state, no ownerId is set. When a user connects to a device, it sends 'Take Ownership' command to device, the device saves userId of this user as ownerId and responds with success, the user becomes owner. Only owner can perform feature request or create a session on device. After a session is stopped, the user should send a 'Release Ownership' command to device, then ownerId will be cleared on the device.
A user without ownership to a device can only send request of "Info"(0x20), "Take Ownership"(0x40), "Join Session"(0x70) to the device, other requests will fail.



Sequence Diagram 1 – Create Session

6. Join a session

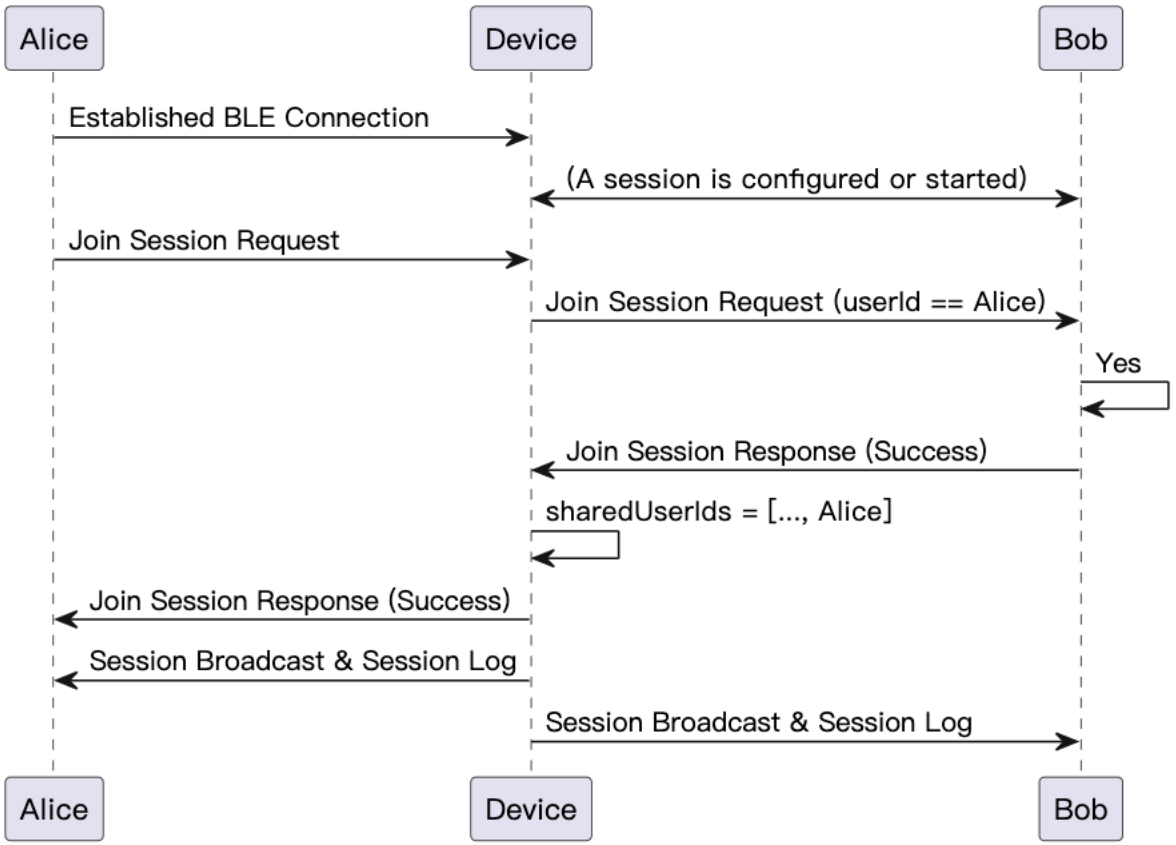
When user Alice connects to a device and there is already a session configured or started by user Bob (the device owner), Alice can send a 'Join Session' request to device. The device would send 'Join Session' request to Bob and wait for Bob's answer.

(Not going to be implemented for now) On Bob's side, the app might check if he is 'friend' with Alice in database and prompt different messages to Bob:

- Alice is a friend: ask if Alice can join the session or not
- Alice is not a friend: ask if add Alice as a friend

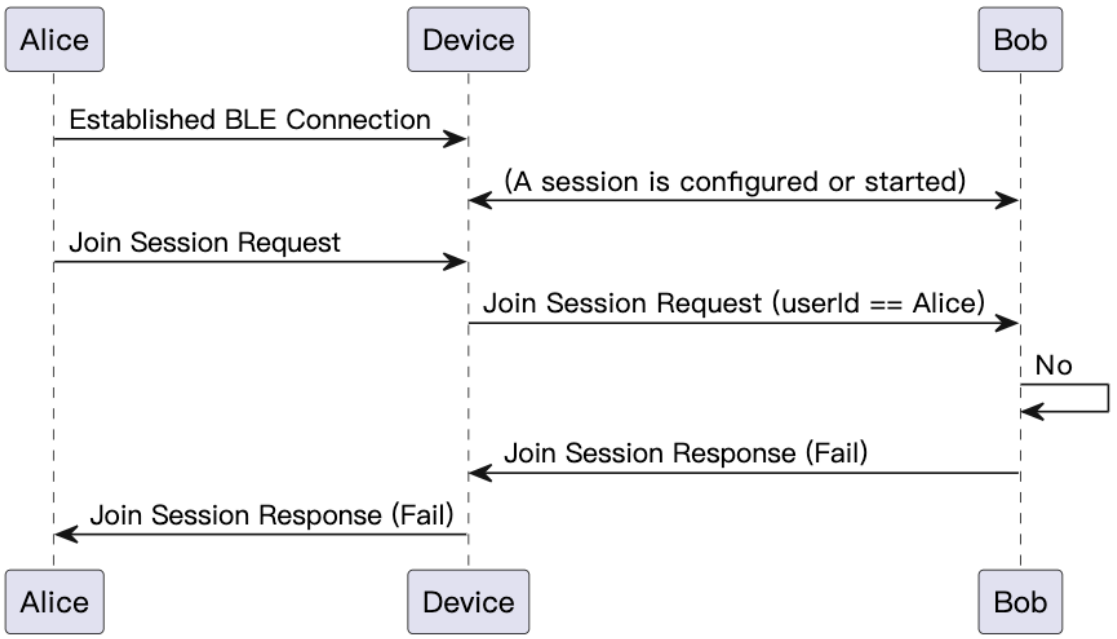
A) Bob says **Yes**: The device sends 'Join Session' response with success to Alice, save Alice's userId in sharedUserIds, start sending session broadcast and session log to both

Alice and Bob. Note that Alice only gets the data and has no permission to control session.



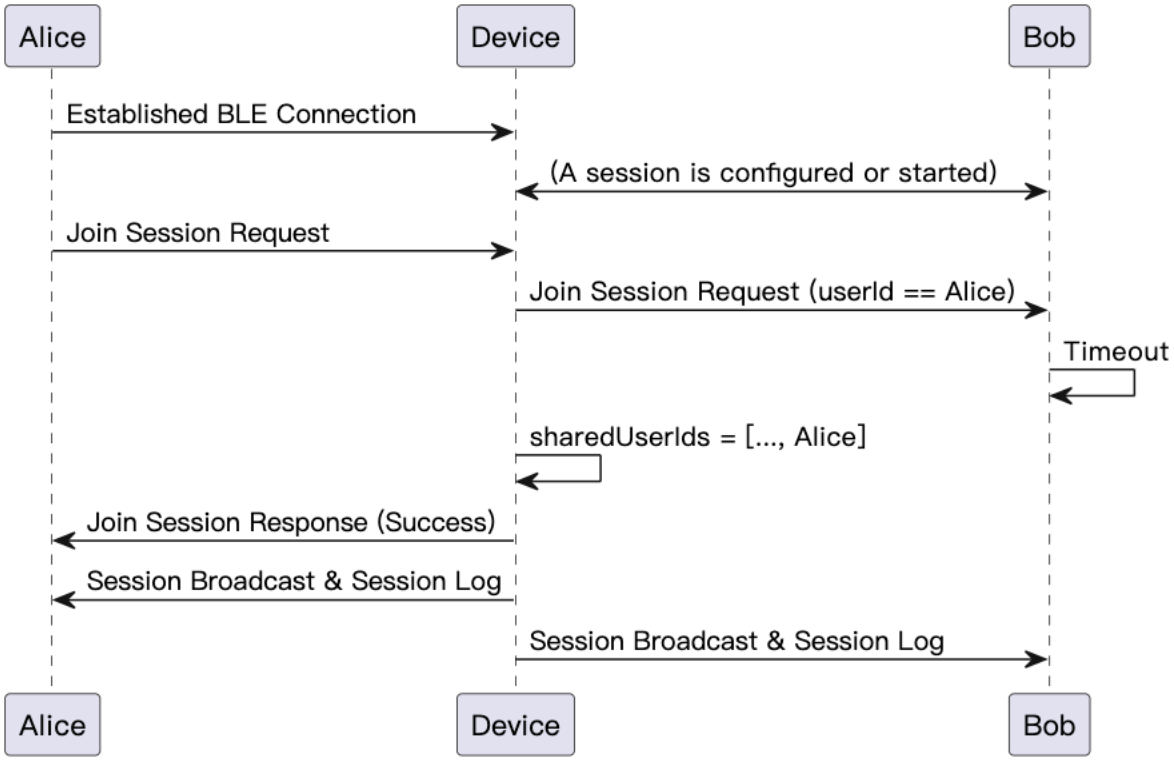
Sequence Diagram 2.1 – Join Session (Yes)

B) Bob says **No**: The device sends 'Join Session' response with fail to Alice.



Sequence Diagram 2.2 – Join Session (No)

C) **Default Yes**: If Bob is not connected or does not respond in 5 seconds, the device sends 'Join Session' response with success to Alice, save Alice's userId in sharedUserIds, start sending session broadcast and session log to both Alice and Bob.

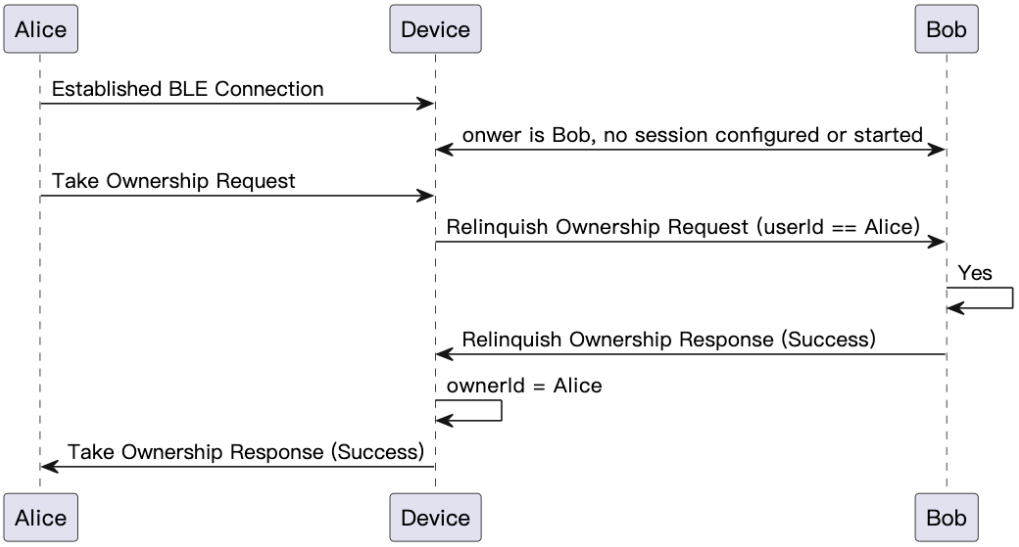


Sequence Diagram 2.3 – Join Session (Timeout)

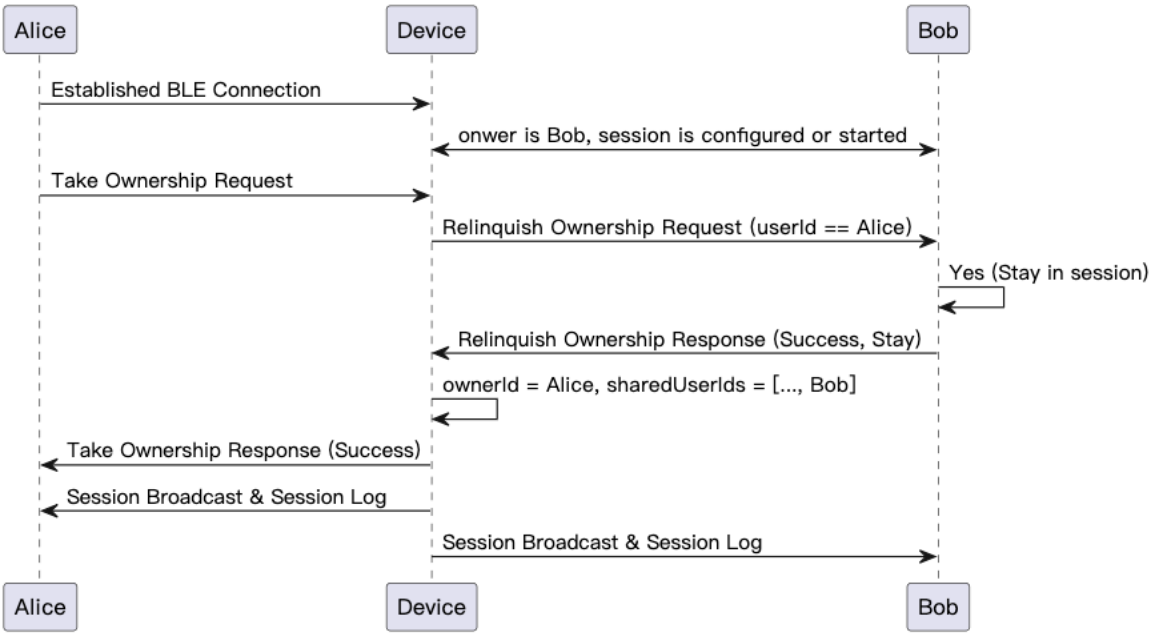
7. Take ownership

When user Alice connects to a device and try to take ownership while the device is already owned by Bob, the device would send 'Relinquish Ownership' command to Bob and wait for Bob's answer.

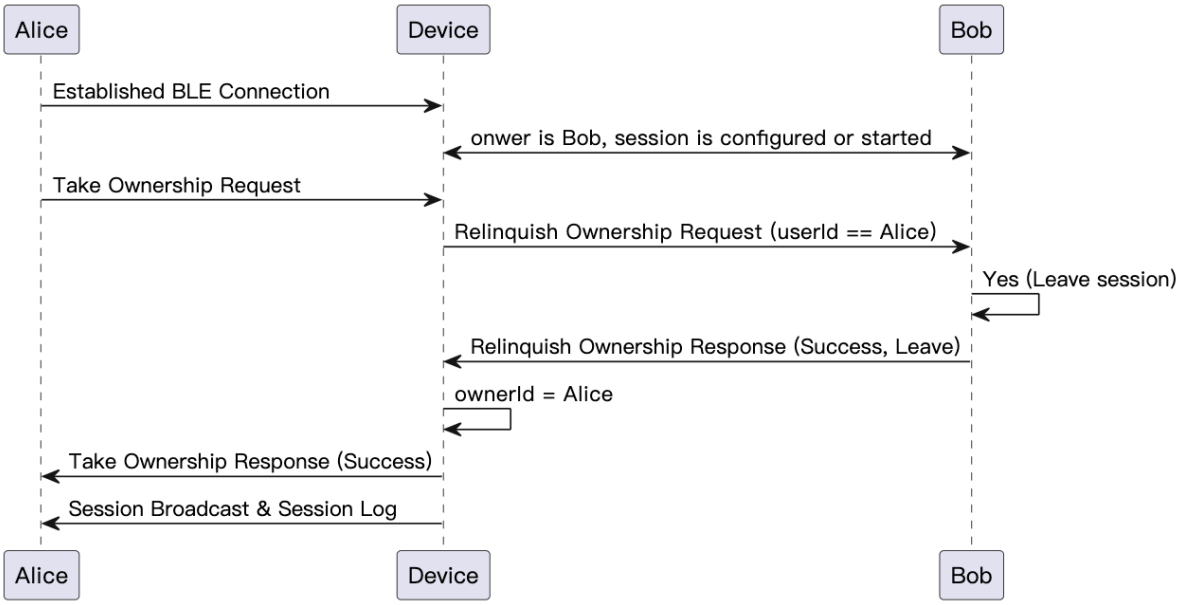
A) Bob says **Yes**: The device sends 'Take Ownership' response with success to Alice and save Alice's userId as ownerId, Alice becomes owner. If Bob is running a session, the app will ask if he wants to stay in the session or leave. If Bob wants to stay, Bob's userId would be added to 'sharedUserIds'. Whether Bob wants to stay or leave, Alice gets session data and permission to control the session: keep it running or stop and clear it.



Sequence Diagram 3.1.1 – Take Ownership (Yes)

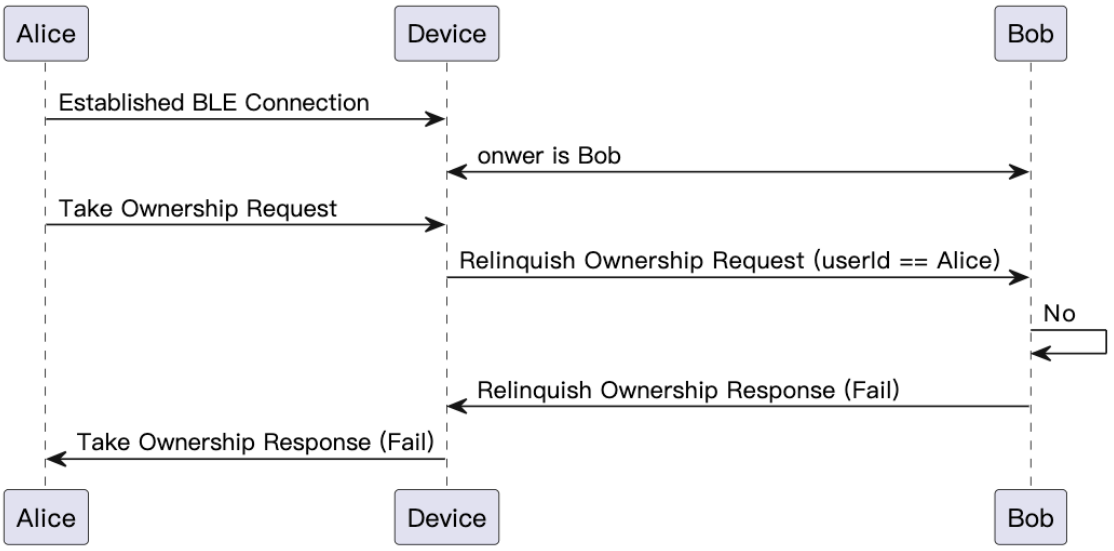


Sequence Diagram 3.1.2 – Take Ownership (Yes, Stay in session)



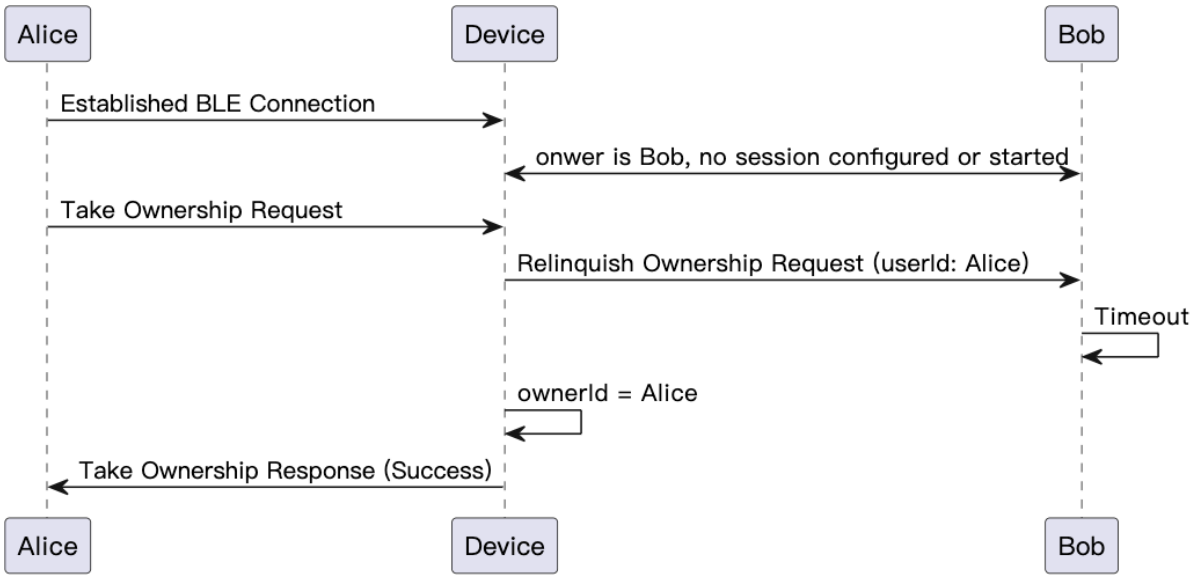
Sequence Diagram 3.1.3 – Take Ownership (Yes, Leave session)

B) Bob says **No**: The device sends 'Take Ownership' response with fail to Bob.

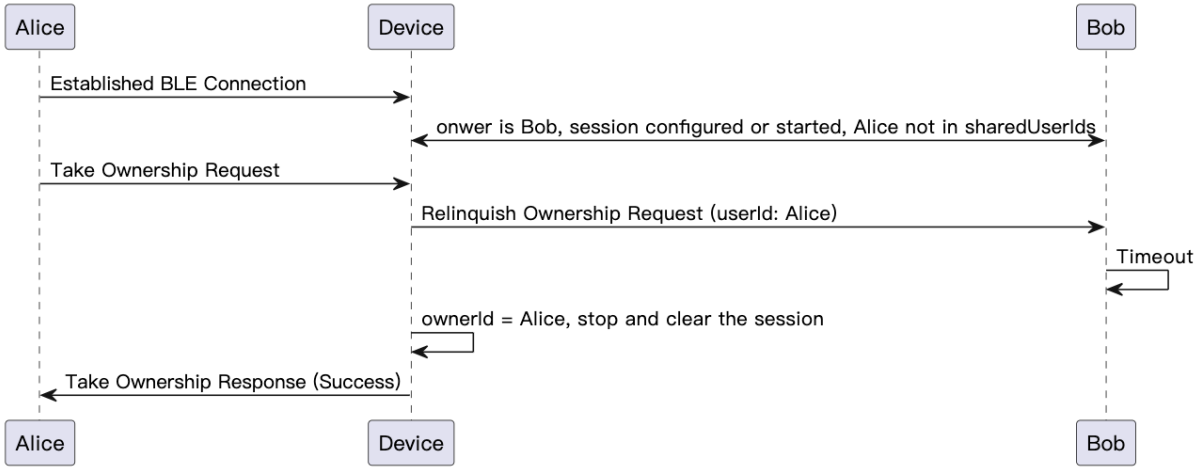


Sequence Diagram 3.2 – Take Ownership (No)

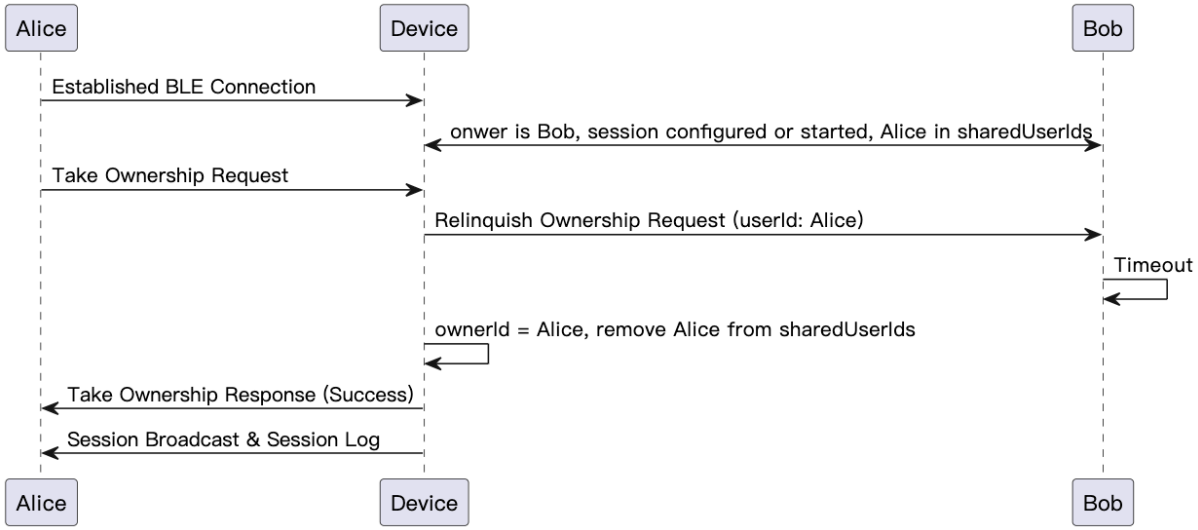
C) **Default Yes**: If Bob is not connected or does not respond in 5 seconds, the device sends 'Take Ownership' response with success to Alice, save Alice's userId as ownerId, Alice becomes owner. If there's a session configured or started by Bob and:
   a) Alice not in sharedUserIds: stop and clear the session
   b) Alice in sharedUserIds: keep the session



Sequence Diagram 3.3.1 – Take Ownership (Timeout, no session)



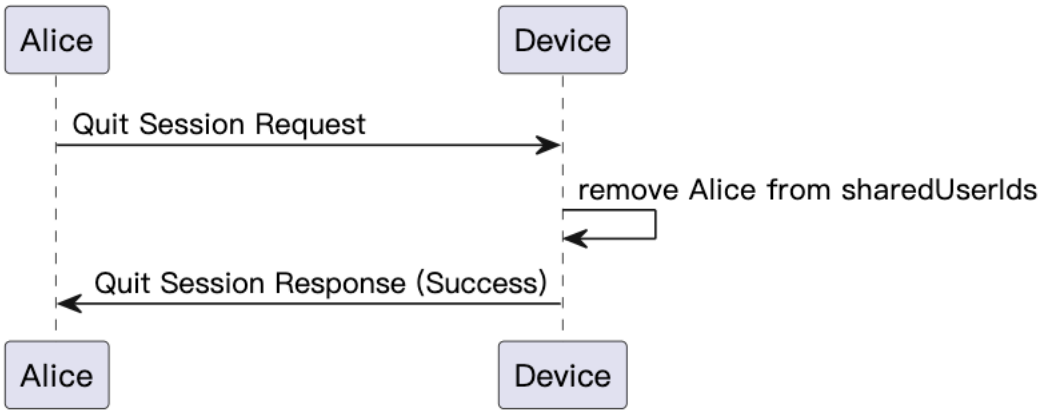
Sequence Diagram 3.3.2 – Take Ownership (Timeout, session not shared)



Sequence Diagram 3.3.3 – Take Ownership (Timeout, session shared)

8. Quit a session

User can leave after they joined a session. Alice sends a 'Quit Session' request to device, device remove Alice from the sharedUserIds array and sends back a response to Alice, stops sending session broadcasts and session logs to Alice. No permission is needed from the owner.



Sequence Diagram 4 – Quit Session

9. Additional notes

The max number of BLE connections supported by device is 8. There might be more than one user to join a session.
The sharedUserIds array is per session, which should be set to empty when a session is cleared.
The sessionId is unique to user. If user joins a session created by other user, the sessionId may conflict with session created by the user themselves. So, to store session data in mobile app database, there should be a flag of "my session" or "shared session", and a field of ownerId. There is no way for shared user to get ownerId from device currently, this needs to be worked out.