Diagram

Description automatically generated

Mesh Advertising Bearer is how the messages are sent on the bearer level the PDU is as follows:

PB-ADV AD PDU is the start of the overall message and shows the BLE devices that it is a

|  |  |  |
| --- | --- | --- |
| AD Length | AD Type(ADV\_NONCONN\_IND) | Message |
| 1 byte | 0b00100000 |  |

The Mesh Message AD type PDU is encompassed in the PB-ADV PDU

|  |  |  |
| --- | --- | --- |
| Length | MeshID | Message |
| 1 byte | 0x2a | NetworkPDU |

Network Layer:

The network layer format that allows lower transport PDUS to be transported to the bearer

Graphical user interface, application, table

Description automatically generated

The AB can both receive and send a message.

The advertiser bearer uses the BLE protocol for advertising which is not in all phones or devices. Since BLE uses both GATT and GAP protocols there is at times a proxy that can convert GATT into the BLE Mesh protocol through a proxy.

For this experiment the GAP protocol will be used.

BLE mesh utilizes GAPP but it also utilizes the GAP protocol which includes both a Broadcaster Role(advertiser) and an Observer Role(scanner).

BLE Mesh Observer Role in an Advertising Mesh Beacon

For the current BLE Mesh specification it states “A device supporting only the advertising bearer should perform passive scanning with a duty cycle as close to 100 percent as possible in order to avoid missing any incoming mesh messages or Provisioning PDUs.”

What this means is that the Observer Role on a BLE device will need to be scanning as close to 100 percent as possible for messages.

BLE Mesh Bearer Role in an Advertising Mesh Beacon

When the message is received it goes through the process outlined below to determine if it should forward the message. If it does want to forward the message the message is relayed to the next device. This would only happen if it receives a message that it needs to relay based on the flow diagram below:

Diagram

Description automatically generated

The retransmit is taking the PDU from the Network layer to the bearer layer and sending via a BLE Mesh Bearer Role in an Advertising Mesh Beacon out as an advertisement for all observers to hear and process. The address UUID is given to each device in provisioning. BLE Mesh works by allowing the node to subscribe to multiple addresses, this allows the message to be read by multiple devices assigned to a group.

Diagram

Description automatically generated

[Bluetooth Mesh: The Ultimate Guide](https://novelbits.io/bluetooth-mesh-networking-the-ultimate-guide/)

The key is that the relay function does not care if it is a group or unicast address it receives it will just verify it and forward it until it reaches the proper destination.

Transmitting PDU

Node should have the following from prov:

* UUID
* Network Key(NetKey)- allows communication on network layer which is a subnet
  + Network Encryption Keys
  + Privacy Keys
  + NetworkID(public)
* Net Key Index
* Key Refresh Flag
* IV Update Flag
* Current IV Index
* Unicast Address

Table

Description automatically generated with medium confidence

* Set IVI field to LSB of the IV index
* Set NID value using the EncryptionKey and Privacy Key derived from the NetKey
* Keep CTL
* TTL field (TTL set by lower transport layer) (should decrement based on diagram?)
* SEQ increment by one
* SRC sent to current node unicast address
* DST set to the address that it was prior
* Set NetMIC
* Secure using managed flooding security credentials 3.9.6.3.1).
* Apply outgoing filter
* Is it local or own device?