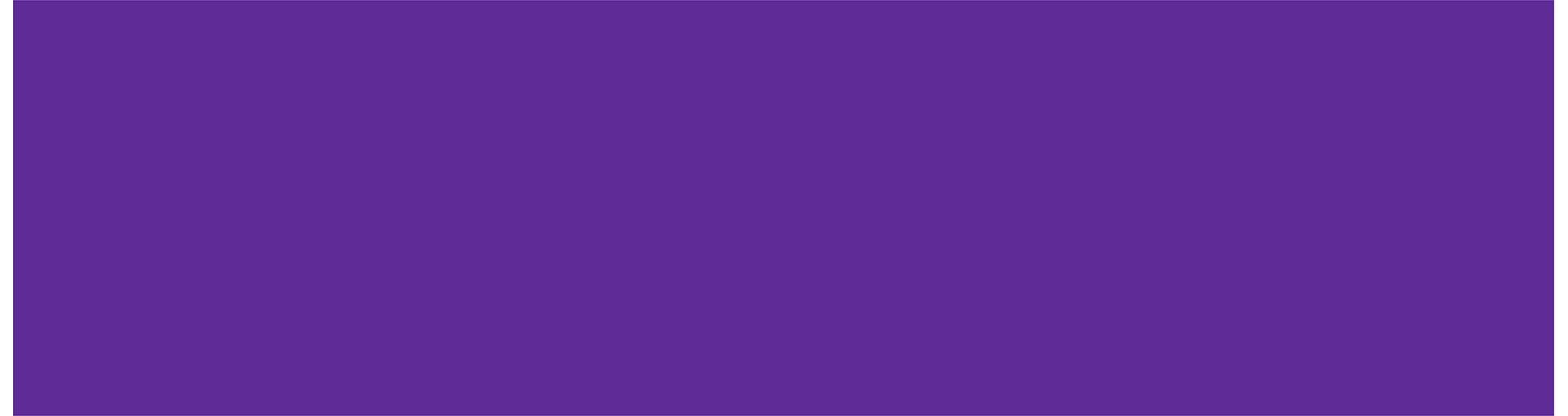


Requirement Feasibility Check

On Music Relay

For Desert FOX Golf



Listing the Main Key Requirements

- 1) 400m to 500m distance range in open space with uneven topology.
- 2) Broadcasting Audio through BLE 5.2 Audio

1) Analysis on Range

- 1) To get 400m to 500m range in uneven open field, we need to consider a distance of at least 500m to 700m distance theoretically.
- 2) To get that, we have control over few parameters such as Data speed (receiver sensitivity), output RF power, Transmitting Antenna gain & Receiving Antenna gain.
- 3) The better result of range by maximum modification of those parameters are provided in next slide.

The Bluetooth Range Estimator

Calculate the expected range between two Bluetooth devices

Receiver Sensitivity (dBm) ⓘ ↻

select a Bluetooth PHY to see how it influences typical receiver sensitivity

EDR 3M

EDR 2M

BR 1M

LE 2M

LE 1M

LE 500K
(CODED)

LE 125K
(CODED)



Path Loss ⓘ

select a representative environment



Outdoor



Industrial



Office



Home

Transmit Power (dBm) ⓘ ↻



Transmitter Antenna Gain (dBi) ⓘ ↻



Receiver Antenna Gain (dBi) ⓘ ↻



Estimated Range

507 to 718 meters

LAUNCHXL-CC1352P

Overview

Description & features

What's included

Supported products

This LaunchPad speeds development on devices with integrated power amplifier and multi-band radio support for concurrent Sub-1GHz and 2.4-GHz operation. Protocols supported include Bluetooth® Low Energy, Sub-1 GHz, Thread, Zigbee®, 802.15.4, and proprietary RF with the compatible CC13x2-CC26x2 SDK. Available variations feature different RF matching networks and power levels.

LAUNCHXL-CC1352P1: 868/915 MHz up to 20 dBm, 2.4 GHz up to 5 dBm

LAUNCHXL-CC1352P-2*: 868/915 MHz up to 14 dBm, 2.4 GHz up to 20 dBm

LAUNCHXL-CC1352P-4*: 433 MHz up to 14 dBm, 2.4 GHz up to 10 dBm

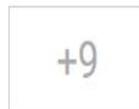
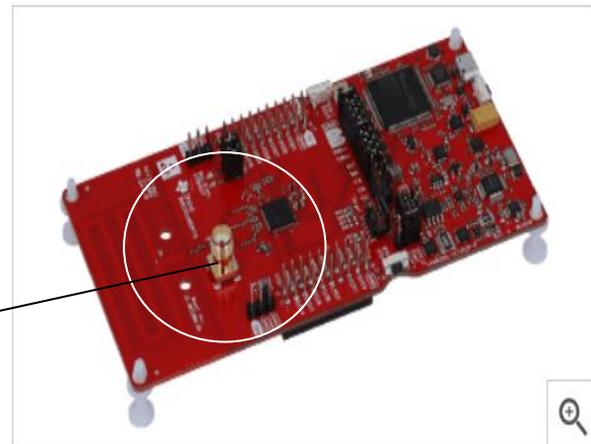
*Also supports CC2652P devices

Supports external antenna



2.4GHz 5dBi Omni
Booster SMA Male
Antenna

Product Code: EC-5957
Availability: 30



Approach

- 1) As per the calculator, we need to move to minimum data speed of 125kbps with maximum of +20dbm output power & +3dbi of antenna gain.
 - i) Selection of MCU need to proceed with +20dbm power which is available in most all manufacturers of BLE. **It is Feasible.**
 - ii) External antenna need to used which should have minimum of +3dbi gain. **It is Feasible.**

2) Analysis on Broadcasting Audio through BLE 5.2 Audio

- 1) Bluetooth 5.2 LE audio should supports broadcasting mode.
- 2) We have adopt best coding technique to achieve this.
- 3) Data rate vs range?
- 4) Connection between Mobile to device 1 & Device 1 to device 2 can establish at the same time with two different data rates?

For Audio BLE - LC3 codec

Bluetooth Audio Codec Demonstration

Select Codec & Bitrate ⁱ

Headphones encouraged



No Encoding

1,536 kbps

SBC

248 kbps

192 kbps

LC3

248 kbps

192 kbps

128 kbps

96 kbps

64 kbps

Encoded audio streams provided by [T2 Labs](#).

Approach

- 1) Bluetooth 5.2 LE audio supports broadcasting mode.

It is Feasible.

- 2) We have adopt best coding technique to achieve this. The best codec solution for LE audio is LC3.

It is Feasible.

- 3) As per specification required to improve range, the maximum speed we can use is 125kbps coded mode.

- a) We have check whether 125kbps with LC3 coded mode is possible to transmit.

It is Feasible.

- b) There will be a reduction in audio quality, we have to confirm that particular quality is fine or not.

Need to check practically.

Approach

4) Connection between Mobile to device 1 & Device 1 to device 2 can establish at the same time with two different data rates?

Two options are

i) Connection between Mobile to device 1 & Device 1 to device 2 can establish at the same time with two different data rates with **Single Launchpad**.

Incase (i) fails, then

ii) **One launchpad** used for connection between Mobile to device 1 & **one more launchpad** used for connection between Device 1 to device 2.

Conclusion

According to the analysis & approach,

The requirement is '**Feasible**' with few considerations such as audio quality & slight variation in distance range (based on manufacturer part).