

Murata UWB module Type2BP Multi DUT connection DEMO guide

- Multicast
- Multi Session

v04.04.03

Jun. 28th, 2023 RevB

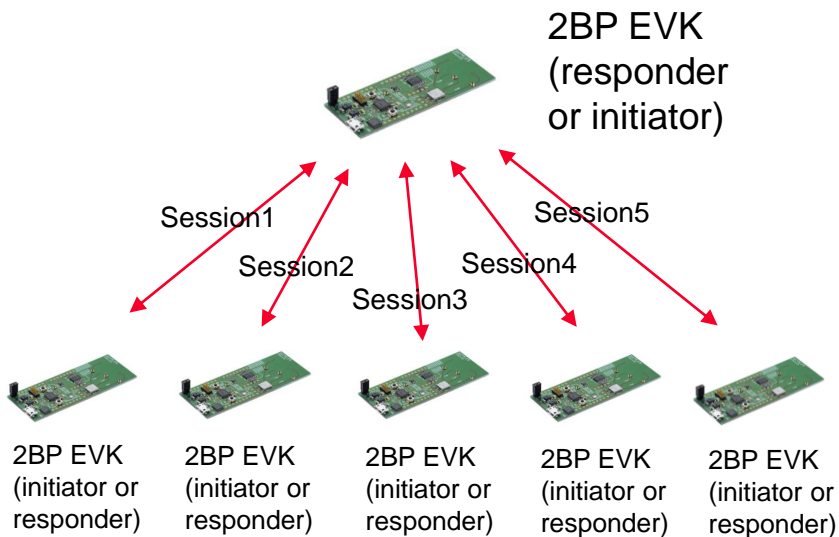
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Multi DUT connection method

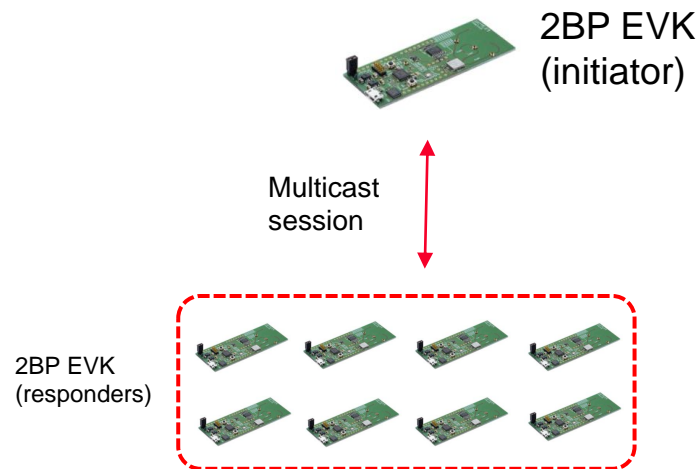
Multi session



*One responder(or initiator) can open multiple sessions with initiators(or responders) (**MAX 5 unit**)

*This guide shows “1 responder vs 5 initiators” case.

Multicast



*One initiator can communicate with multiple responders (**MAX 8 responders**) using multicast packet.

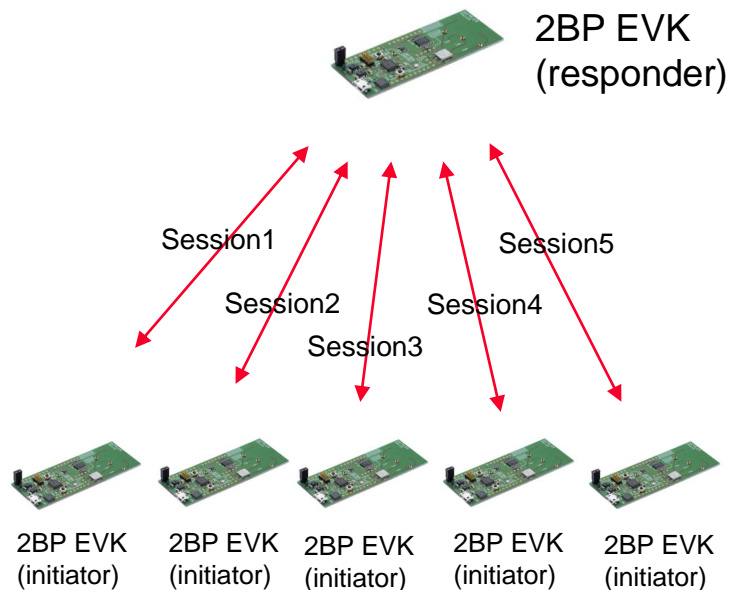
Before trying demo

*Sample script (Python script) works with PnP mode binary.
Please refer to PnP test guide (MTD-APN-007) and install PnP binary on Type2BP EVK

*Sample script is designed to work with
Multisession : 1 responder vs 5 initiator
Multicast : 1 initiator vs 8 responder

To run the demo with less Q'ty for Multisession (example, 1 responder vs 2 initiator for Multisession), Python script need to be modified.

Multi Session



Responder : During ranging, if one of the initiators lost connection, responder will wait the initiator's signal and other session will stop, all of sessions must be alive to run the demo script.



Session ID : Need to assign unique session ID for each sessions.



Initiator : The same with single session.

Transmit timing is not synchronized between initiators, to minimize connection lost by packet confliction, "hopping" mode can be used.

Multi Session : DEMO

1. Check COM port numbers for each EVKs
2. Start responder by running command below
 - python DS-TWR_SR150_Multisession_v04.04.03.py COM10
3. Start initiator 1 ~ 5 by running command below
 - python DS-TWR_SR150_session1_v04.04.03.py COM11
 - python DS-TWR_SR150_session2_v04.04.03.py COM12
 - python DS-TWR_SR150_session3_v04.04.03.py COM13
 - python DS-TWR_SR150_session4_v04.04.03.py COM14
 - python DS-TWR_SR150_session5_v04.04.03.py COM15

Note :

*Need to run all of 5 initiators at the same time, or modify responder script to reduce number of initiators.

*COM port number may different based on environment, please assign proper COM port for devices.

[In this demo script, COM10 assigned for responder, COM11~15 assigned for initiators]

Code modification example

LNE 121~ of DS-TWR_SR150_Multisession_v04.04.03.py

1 vs 5 code example (default)

```
# Session ID
SESSION_ID = [0x01, 0x00, 0x00, 0x00]
SESSION_ID2 = [0x02, 0x00, 0x00, 0x00]
SESSION_ID3 = [0x03, 0x00, 0x00, 0x00]
SESSION_ID4 = [0x04, 0x00, 0x00, 0x00]
SESSION_ID5 = [0x05, 0x00, 0x00, 0x00]
sessionID = [SESSION_ID, SESSION_ID2, SESSION_ID3, SESSION_ID4, SESSION_ID5]
#sessionID = [SESSION_ID, SESSION_ID2]
```

1 vs 2 code example

```
# Session ID
SESSION_ID = [0x01, 0x00, 0x00, 0x00]
SESSION_ID2 = [0x02, 0x00, 0x00, 0x00]
SESSION_ID3 = [0x03, 0x00, 0x00, 0x00]
SESSION_ID4 = [0x04, 0x00, 0x00, 0x00]
SESSION_ID5 = [0x05, 0x00, 0x00, 0x00]
#sessionID = [SESSION_ID, SESSION_ID2, SESSION_ID3, SESSION_ID4, SESSION_ID5]
sessionID = [SESSION_ID, SESSION_ID2]
```

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Multi Session, Responder



```
C:\Windows\System32\cmd.exe - python DS-TWR_MultiSession_Murata_REV3_1E01_file.py.txt COM13

***(27) SessionID: 2  NLos:0  Dist:8  Azimuth:60.0 (FOM:100)  Elevation: 5.000000 (FOM:100)
2021-10-08 16:31:41.602NXPUCIR <= 62 00 00 4d 1c 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 00 3a 00 00 1e 64 ec 16 64 00 00 00 00 00 05 00 00 00 00 00 00 81 74 d2 f7 6d 7e 13 00 0f e5 b8 04 b7 00 00
02 9c b2 41 03 62 05 41 03 04 00 00

***(28) SessionID: 1  NLos:0  Dist:58  Azimuth:60.0 (FOM:100)  Elevation: 45.800000 (FOM:100)
2021-10-08 16:31:41.648NXPUCIR <= 62 00 00 4d 27 00 00 00 04 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 01 23 00 00 1e 64 d4 11 64 00 00 00 00 00 05 00 00 00 00 00 00 81 74 d2 f7 6d 7e 13 00 0f c8 b2 dd b3 00 00
02 ec a7 3e 03 be ff 3f 03 04 00 00

***(39) SessionID: 4  NLos:1  Dist:35  Azimuth:60.0 (FOM:100)  Elevation: 35.700000 (FOM:100)
2021-10-08 16:31:41.789NXPUCIR <= 62 00 00 4d 21 00 00 00 03 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 00 23 00 00 1e 64 00 1e 64 00 00 00 00 00 05 00 00 00 00 00 00 81 74 d2 f7 6d 7e 13 00 0f 58 b6 3d b2 00 00
02 5c b5 3c 03 ca 2c 3c 03 04 00 00

***(33) SessionID: 3  NLos:0  Dist:35  Azimuth:48.0 (FOM:100)  Elevation: 60.000000 (FOM:100)
2021-10-08 16:31:41.896NXPUCIR <= 62 00 00 4d 2f 00 00 00 05 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 01 04 00 00 62 fb 64 00 1e 64 00 00 00 00 00 05 00 00 00 00 00 00 81 74 d2 f7 6d 7e 13 00 0f d1 b4 9e b2 00 00
02 b0 0a 41 03 fe ab 41 03 04 00 00

***(47) SessionID: 5  NLos:1  Dist:4  Azimuth:-9.2 (FOM:100)  Elevation: 60.000000 (FOM:100)
2021-10-08 16:31:42.005NXPUCIR <= 62 00 00 4d 1c 00 00 00 02 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 00 06 00 00 1e 64 1a 01 64 00 00 00 00 00 05 00 00 00 00 00 00 81 74 d2 f7 6d 7e 13 00 0f a0 c4 3d c3 00 00
02 8c af 40 03 b8 f2 40 03 04 00 00


***(28) SessionID: 2  NLos:0  Dist:6  Azimuth:60.0 (FOM:100)  Elevation: 2.200000 (FOM:100)
2021-10-08 16:31:42.098NXPUCIR <= 62 00 00 4d 1d 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 00 39 00 00 1e 64 4e 17 64 00 00 00 00 00 05 00 00 00 00 00 00 81 74 d2 f7 6d 7e 13 00 0f c7 ba 04 b8 00 00
02 0c ae 40 03 d0 05 41 03 04 00 00

***(29) SessionID: 1  NLos:0  Dist:57  Azimuth:60.0 (FOM:100)  Elevation: 46.600000 (FOM:100)
2021-10-08 16:31:42.224NXPUCIR <= 62 00 00 4d 28 00 00 00 04 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 01 25 00 00 1e 64 23 0e 64 00 00 00 00 00 05 00 00 00 00 00 00 81 74 d2 f7 6d 7e 13 00 0f 7d b3 19 b4 00 00
02 88 a7 3e 03 e2 fc 3f 03 04 00 00

***(40) SessionID: 4  NLos:1  Dist:37  Azimuth:60.0 (FOM:100)  Elevation: 28.300000 (FOM:100)
```

Multi Session File Output

- Responder script 5 csv files to store measurement result.


 - log_20230622-131407_[1, 0, 0, 0].csv
 - log_20230622-131407_[2, 0, 0, 0].csv
 - log_20230622-131407_[3, 0, 0, 0].csv
 - log_20230622-131407_[4, 0, 0, 0].csv
 - log_20230622-131407_[5, 0, 0, 0].csv
- This output happens very frequently (5 times per ranging interval).
 - PC may miss some measurement results because of the load to output.
 - Set data_log False if some measurements are missing, and parse the log on the command prompt instead.

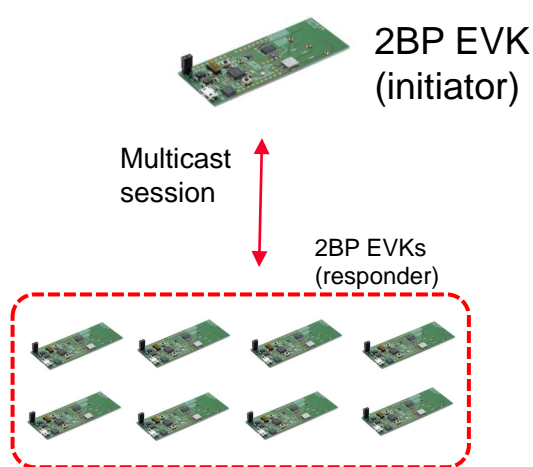
data_log = False

Enabling Hopping Mode

- Hopping mode is disabled (0x00)

0x2C, 0x01, 0x00,	# HOPPING_MODE
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- Change from 0x00 to 0x01 to enable hopping mode.



Initiator : Need to set number of devices and DST MAC address of responders before starting UWB session. UWB stack assign when the responder send reply packet.

See below parameters in python script*

```
# NUMBER_OF_CONTROLEES  
# DST_MAC_ADDRESS
```

Responder : Must have different DEVICE MAC address to distinguish the devices.

See below parameters in python script*

```
*# DEVICE_MAC_ADDRESS
```

After session start, initiator send multicast packet and responder will reply according to the direction from initiator, so packet confliction will not happen. Even some of connection lost, initiator will keep sending multicast packet and keep multicast session.

Multicast : DEMO

1. Check COM port numbers for each EVKs
2. Start responder 1 ~ 8 by running command below
 - python DS-TWR_SR150_multicast_responder0_v04.04.03.py COM11
 - python DS-TWR_SR150_multicast_responder1_v04.04.03.py COM12
 - python DS-TWR_SR150_multicast_responder2_v04.04.03.py COM13
 - python DS-TWR_SR150_multicast_responder3_v04.04.03.py COM14
 - python DS-TWR_SR150_multicast_responder4_v04.04.03.py COM15
 - python DS-TWR_SR150_multicast_responder5_v04.04.03.py COM16
 - python DS-TWR_SR150_multicast_responder6_v04.04.03.py COM17
 - python DS-TWR_SR150_multicast_responder7_v04.04.03.py COM18
3. Start initiator by running command below
 - python DS-TWR_SR150_multicast_initiator_v04.04.03.py COM10

Note :

*No need to run all of 8 responders at the same time.

*COM port number may different based on environment, please assign proper COM port for devices.

[In this demo script, COM10 assigned for initiator, COM11~18 assigned for responders]

*Please confirm next page.

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Multicast : Explanation for Script files

Default setting for Multicast

DS-TWR_SR150_multicast_initiator_v04.04.03.py

-NUMBER_OF_CONTROLEES is set in
UWB_SESSION_SET_UP_CONFIG
Default is 8.

```
127 UWB_SESSION_SET_APP_CONFIG = [0x21, 0x03, 0x00, 0x75] + SESSION_ID + [  
128     0x22,                                     # Number of parameters  
129     # 0x00, 0x01, 0x00,                       # DEVICE_TYPE  
130     0x01, 0x01, 0x02,                         # RANGING_ROUND_USAGE  
131     0x02, 0x01, 0x00,                         # STS_CONFIG  
132     0x03, 0x01, 0x01,                         # MULTI_NODE_MODE --> multi mode  
133     0x04, 0x01] + channel_ID + [  
134     0x05, 0x01, 0x08,                         # NUMBER_OF_CONTROLEES --> 8  
135     # 0x06, 0x02, 0x00, 0x00,                 # DEVICE_MAC_ADDRESS
```

-DST_MAC_ADDRESS is set in
UWB_SESSION_SET_INITIATOR_CONFIG
Set 8 Destination MAC address.
0x1000/0x1001/0x1002/0x1003/0x1004/0x1005/0x1006/0x1007

```
203 UWB_SESSION_SET_INITIATOR_CONFIG = [0x21, 0x03, 0x00, 0x21] + SESSION_ID + [  
204     0x04,                                     # Number of parameters  
205     0x00, 0x01, 0x01,                         # DEVICE_TYPE: Controller  
206     0x06, 0x02, 0x11, 0x11,                   # DEVICE_MAC_ADDRESS: 0x1111  
207     0x07, 0x10, 0x00, 0x10, 0x01, 0x10,     #  
208     0x02, 0x10, 0x03, 0x10,                   #  
209     0x04, 0x10, 0x05, 0x10,                   #  
210     0x06, 0x10, 0x07, 0x10,                   # DST_MAC_ADDRESS: 0x1000-0x1007  
211     0x11, 0x01, 0x01,                         # DEVICE_ROLE: Initiator  
212 ]
```

DS-TWR_SR150_multicast_responderX_v04.04.03.py

-DEVICE_MAC_ADDRESS is set in
UWB_SESSION_SET_RESPONDER_CONFIG

Responder0:

```
213 UWB_SESSION_SET_RESPONDER_CONFIG = [0x21, 0x03, 0x00, 0x13] + SESSION_ID + [  
214     0x04,                                     # Number of parameters  
215     0x00, 0x01, 0x00,                         # DEVICE_TYPE: Controlee  
216     0x06, 0x02, 0x00, 0x10,                   # DEVICE_MAC_ADDRESS: 0x1000  
217     0x07, 0x02, 0x11, 0x11,                   # DST_MAC_ADDRESS: 0x1111  
218     0x11, 0x01, 0x00,                         # DEVICE_ROLE: Responder  
219 ]
```

Responder7:


```
213 UWB_SESSION_SET_RESPONDER_CONFIG = [0x21, 0x03, 0x00, 0x13] + SESSION_ID + [  
214     0x04,                                     # Number of parameters  
215     0x00, 0x01, 0x00,                         # DEVICE_TYPE: Controlee  
216     0x06, 0x02, 0x07, 0x10,                   # DEVICE_MAC_ADDRESS: 0x1007  
217     0x07, 0x02, 0x11, 0x11,                   # DST_MAC_ADDRESS: 0x1111  
218     0x11, 0x01, 0x00,                         # DEVICE_ROLE: Responder  
219 ]
```

Multicast, Initiator



```
C:\Windows\System32\cmd.exe - python DS-TWR_PBF_Multicast_A25_Murata_initiator_1E01_file.py.txt COM6
00 74 14 64 ee f1 64 00 00 00 00 00 00 00 00 00 00 00 00 f5 ae c7 e5 12 57 07 00 00 00 30 00 f7 ff 64 f5 1a 64 00 00 ^
00 00 00 00 12 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 6b 00 56 e9 64 00 e2 64 00
2021-10-12 15:08:09.393NXPUCIR <= 62 00 00 12 00 00 00 00 00 00 13 00 00 00 00 00 00 00 46 bb 2d 7d a5 14
***[20]
***(0) NLos:0 Dist:44 Azimuth:11.300000 (FOM:100) Elevation:44.000000 (FOM:100)
***(1) NLos:0 Dist:54 Azimuth:24.600000 (FOM:100) Elevation:60.000000 (FOM:100)
***(2) NLos:0 Dist:122 Azimuth:-24.100000 (FOM:100) Elevation:44.000000 (FOM:100)
***(3) NLos:1 Dist:22 Azimuth:-2.700000 (FOM:100) Elevation:-60.000000 (FOM:100)
***(4) NLos:0 Dist:47 Azimuth:-58.700000 (FOM:100) Elevation:-60.000000 (FOM:100)
***(5) NLos:1 Dist:87 Azimuth:40.900000 (FOM:100) Elevation:-28.100000 (FOM:100)
***(6) NLos:0 Dist:48 Azimuth:-0.100000 (FOM:100) Elevation:53.900000 (FOM:100)
***(7) NLos:0 Dist:107 Azimuth:-45.300000 (FOM:100) Elevation:-60.000000 (FOM:100)
2021-10-12 15:08:09.787NXPUCIR <= 72 00 00 ff 15 00 00 00 01 00 00 00 00 00 1c 02 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 08
01 00 00 00 2a 00 91 00 64 a0 13 64 00 00 00 00 00 00 00 00 0c 00 00 00 00 00 00 00 00 c3 34 f6 6b eb 7b 02 00 00 00 38 00 f1 0d 64
00 1e 64 00 00 00 00 00 00 00 0d 00 00 00 00 00 00 04 02 22 f6 f7 f9 03 00 00 00 88 00 00 ee 64 00 e2 64 00 00 00 00 00 00
0e 00 00 00 00 00 00 00 11 5e 86 90 97 e7 04 00 00 01 0e 00 bd 02 64 00 e2 64 00 00 00 00 00 00 0f 00 00 00 00 00 00 8d 64
03 80 00 e1 05 00 00 00 34 00 00 e8 64 00 e2 64 00 00 00 00 00 10 00 00 00 00 00 00 00 7d 7f 22 00 12 10 06 00 00 01 50
00 e9 0d 64 00 1e 64 00 00 00 00 00 00 11 00 00 00 00 00 f5 ae c7 e5 12 57 07 00 00 00 2f 00 ca fd 64 11 1a 64 00 00
00 00 00 12 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 68 00 1a e5 64 00 e2 64 00
2021-10-12 15:08:09.865NXPUCIR <= 62 00 00 12 00 00 00 00 00 00 13 00 00 00 00 00 00 00 46 bb 2d 7d a5 14
***[21]
***(0) NLos:0 Dist:42 Azimuth:1.100000 (FOM:100) Elevation:39.200000 (FOM:100)
***(1) NLos:0 Dist:56 Azimuth:27.900000 (FOM:100) Elevation:60.000000 (FOM:100)
***(2) NLos:0 Dist:136 Azimuth:-36.000000 (FOM:100) Elevation:-60.000000 (FOM:100)
***(3) NLos:1 Dist:14 Azimuth:5.500000 (FOM:100) Elevation:-60.000000 (FOM:100)
***(4) NLos:0 Dist:52 Azimuth:-48.000000 (FOM:100) Elevation:-60.000000 (FOM:100)
***(5) NLos:1 Dist:80 Azimuth:27.800000 (FOM:100) Elevation:60.000000 (FOM:100)
***(6) NLos:0 Dist:47 Azimuth:-4.400000 (FOM:100) Elevation:52.100000 (FOM:100)
***(7) NLos:0 Dist:104 Azimuth:-53.800000 (FOM:100) Elevation:-60.000000 (FOM:100)
```

- Initiator script creates csv file to store measurement result.

 log_20230622-142531.csv

- This output happens frequently (per ranging interval).
 - PC may miss some measurement results because of the load to output.
 - Set data_log False if some measurements are missing, and parse the log on the command prompt instead.

```
data_log = False
```

Revision History

Revision	Release Date	Comments
A	Jun. 22 th , 2023	Initial revision for SDK 04.04.03
B	Jun. 28 th , 2023	Add Explanation for script files