SR150 Release Notes

UWBIOT_SR150_v04.06.05

2025.03.13 **Release Notes**

Document information

Info	Content
Keywords	System Release note, SR150
Abstract	These are the FW/MW release notes of the SR150. The purpose is to describe the available features, an overview of how they have been validated, the weaknesses identified and their impact on end users.

Date	Description
2025.03.13	UWB_SR150_v04.06.05 - MW : UWBIOT_v04.06.05 - SR150 FW : Factory FW 46.44.03, Mainline FW 46.44.03
2024.01.25	UWB_SR150_v04.06.00 - MW : UWBIOT_v04.06.00 - SR150 FW : Factory FW 46.41.06, Mainline FW 46.41.06
2023.11.10	UWB_SR150_v04.05.07 - MW : UWBIOT_v04.05.07_SR150 - SR150 FW : Factory FW 46.41.04, Mainline FW 46.41.04
2023.04.19	UWB_SR150_v04.04.03 - MW : UWBIOT_v04.04.03_SR150 - SR150 FW : Factory FW 44.00.02, Mainline FW 44.00.02
2022.12.15	UWB_SR150_v04.03.02 - MW : UWBIOT_v04.03.02_SR150 - SR150 FW : Factory FW 42.00.02, Mainline FW 42.00.02
2022.10.19	UWB_SR150_v04.02.01 - MW : UWBIOT_v04.02.01_SR150 - SR150 FW : Factory FW 40.00.06, Mainline FW 40.00.06
2022.10.14	UWB_SR150_v04.02.00 - MW : UWBIOT_v04.02.00_SR150 - SR150 FW : Factory FW 40.00.05, Mainline FW 40.00.05

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1. Contents

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2. Introduction

2.1 Purpose of This Document

The purpose of this document is to provide information on SR150 system. The details of the release are as described in the following sections.

This Release Note includes:

- UWB feature released list validated on reference platform
- Possible limitation and Issues foreseen on SR150 and integration.

2.2 Definition and Abbreviations

Ultra-Wide-Band Communication, UWB, is a technology that allows objects to respond to each other. Detailed technical information can be found in SR150 datasheet and user manual.

Table 1. Abbreviations

Abbreviation	Reference
FW	Firmware
DH	Device Host
UWB	Ultra-Wide-Band

2.3 Reference platform

System level validation is done using RhodesV4 boards.

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3. Material information

Table 2. Material information detail

Description	Version
UWB FW	Mainline FW Version 46.44.03 Factory FW Version 46.44.03
MW	UWBIOT_v04.06.05
Applet SuS	SuS-2.0.0
Applet FiRa Lite	FiraLite-1.0.14
FiRa Consortium UWB Command Interface Generic Specification	2.0.0
NXP SR150 UCI specification	2.0.17
NXP CCC UCI spec	2.3
FiRa Consortium UWB MAC Conformance Test Specification	1.1.0
FiRa Consortium PHY Conformance Test Specification	1.1.0
QN9090 SDK	2.6.5

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4. UWB features list

Below table provides the list of implemented (functional) and validated UWB features as UWB system (FW and MW) with the newly introduced SW package.

	Features	Status		
		Functional	Validation	
1.	Encrypted FW Download	✔	✔	Ranging features
2.	IEEE 802.15.4 HRP UWB PHY Compliant	✔	✔	
3.	Time of Flight and Distance Measurement Single Sided Two Way Ranging	✔	✔	
4.	Time of Flight and Distance Measurement Double Sided Two Way Ranging	✔	✔	
5.	Ranging using Static STS	✔	✔	
6.	Ranging using Dynamic STS	✔	✔	
7.	Angle of Arrival measurement	✔	✔	
8.	Dual AoA Support (SR150)	✔	✔	
9.	UL TDOA feature	✔	✔	
10.	DL TDOA feature	✔	✔	
11.	Calibration routine for ToF and distance measurement	✔	✔	
12.	Calibration routine for AoA	✔	✔	
13.	Calibration data storage in OTP	✔	✔	
14.	Multi session support, Max 5 controller or 5 controlee or combination of both not exceeding 5 sessions	✔	✔	
15.	Hybrid Multisession – Controller/Initiator & Controlee/Responder	✔	✔	
16.	PER Test Support	✔	✔	
17.	Multicast DS-TWR ranging support (up to 8 anchors)	✔	✔	
18.	Home data transfer (common ranging and data transfer session) up to 50 bytes	✔	✔	
19.	CSA specific ranging	✔	✔	
20.	Contention based ranging	✔	✔	
21.	Power Management	✔	✔	Platform
22.	Tx/Rx Antenna switching support	✔	✔	

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23.	Antenna Pair selection	✓	✓	
24.	Host Interface Support SPI Mode 0, @16 MHz	✓	✓	
25.	Single wire WiFi Coex	✓	✓	
26.	FiRa PHY Compliancy	✓	✓	FiRa Features
27.	FiRa IE Support	✓	✓	
28.	FiRa Hopping	✓	✓	
29.	FiRa Dynamic STS	✓	✓	
30.	FiRa Static STS	✓	✓	
31.	FiRa Key Rotation	✓	✓	

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5. Platform configuration

The platform configuration should be set by the Host for the device to ready.

NOTES: Please note that Helios device will be waiting for the platform configuration information from the Host. It will not accept any other commands in this state.

The following platform values are validated.

Platform	Version	Platform Configuration Value
Rhodes	V4	0x7304

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6. MW/FW revision history

This section lists the major features available in UWB_UCIHAL and UWB Controller FW.

Compliant to IEEE spec reference – P802.15.4z-D05

6.1 UWB_SR150_IOT v04.06.05

6.1.1 Change list

Added Features/changes

- Only 1 calibration table per Channel is sent
- SNR is reported by poll and final message
- Antenna switching implementation to switch antennas between frames instead of during the a frame
- Aliro Session Type alignment as per latest Aliro specification
- CCC_NTF format to capture RSSI and SNR values
- Added MRM report in CCC ranging
- Moved to Aliro 0.7.3
- Change the limitation to display up to 255B
- Enabling pulse config to test CCC pulse shape
- Android jetpack API CONFIG_ID support

Improvements/Bug Fixes

- AoA display at Anchor side
- STATUS_INVALID_PARAM is Observed instead of STATUS_REJECTED when doing the GET_CALIB of AOA_ANTENNAE_PDOA_CALIB without setting the AOA_ANTENNAE_PDOA_CALIB Param
- For Slot Duration 1200 and Slots Per RR 6 - Scheduler is unable to schedule back to back sessions
- CFO returned by macro does not match with the expected value in some cases
- When DATA_MESSAGE_SND with Application Data larger than MAX_MESSAGE_SIZE = 2023, Helios will reset instead of handling this negative case
- On Controlees, in first few ranging notifications observing Status OK with SNR and RSSI fields are 0
- Wrong antenna delay being use in 2 Ranging round per ranging block configuration

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6.1.2 Code size

- MW Code Size:
  - RAM = 27kB
  - FLASH = 37kB
- FW Code Size (256kB available):
  - FLASH secure memory used = 58kB
  - FLASH non secure memory used = 194.5kB

6.2 UWB_SR150_IOT v04.06.00

6.2.1 Change list

Added Features/changes

- FoV was increased to +-90°
  - Number of steps was increased from 11 to 17 in the calibration table
- SNR was added into CCC ranging notification when antenna SWAP is enable
- UL TDOA tag feature disabled

Improvements/Bug Fixes

- Fix for wrong MW parsing in UL-TDoA

6.2.2 Code size

- MW Code Size:
  - RAM = 27kB
  - FLASH = 37kB
- FW Code Size (256kB available):
  - FLASH secure memory used = 58kB
  - FLASH non secure memory used = 196.5kB

6.3 UWB_SR150_IOT v04.05.07

6.3.1 Change list

Added Features/changes

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- AoA Field of View Flag to identify the object within the configured Azimuth range.
- PSDU Data rate of 850kbps for FIRA one way ranging.
- CSA 0.7 support.
- CCC Controlee support.
- CCC - Added PDoA and Antenna selection in ranging NTF
- RSSI based front/back door detection in CCC Session.
- Add new demo nearby client
- Add read otp XTAL and TX power at startup for MCTT demo
- Add by default TX timestamp in the demo TDoA
- PDOA Calib table update to support 4 antenna pair instead of 8 antenna pair
- Calibration parameters TLV format updated from 2 Byte length to 1 byte.

Features updated

- GET_ALL_UWB_SESSIONS_CMD Function
- DO_VCO_PLL_CALIBRATION_CMD Function
- Set Device Calibration
- Get Device Calibration
- Periodic Rx/Tx Test Ntf & RX Test & Loopback
- PSDU Log Ntf
- CIR Log Ntf
- Support for VDD_IO & VDD_HOST 1.2V
- SetVendorAppConfiguration
- URSK_DELETE Function
- GetVendorAppConfiguration
- UWB-eSE Connectivity
- UWB-eSE Binding
- UWB-eSE Binding Check
    - Vendor DeviceInfo
    - Vendor Specific Extensions for Range Data Notification

Addition of FiRa 2.0 Features

- UCI flow control in OWR for AoA measurement

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- Session handle logic replacing session ID
- GID OID table cleaning
- Connection-less PDU definition for data transfer during ranging
- UCI generic specification Remove Endpoint from UCI data messages
- MIN_FRAMES_PER_RR allowed range
- Merge commands to configure active ranging rounds and responder MAC address list for DT-Anchors
- Capability for DL-TDoA Maximum Number of Active Ranging Rounds
- UCI generic spec- corrections to APP configuration parameter Table : Partial required in the scope of FIRA test Event.
- UCI bug fixes and clarifications for DL-TDOA
- Merge commands to configure active ranging rounds and responder MAC address list for DT-Anchors
- Error handling for DL-TDoA measurements
- CFO reporting format from Q5.11 to Q6.10
- UCI Spec Sequence Number field size correction in SESSION_DATA_TRANSFER_STATUS_NTF
- MAC Requirement OWR AOA measurement IFI guard time
- Corrections and clarifications on status codes
- UCI specification ballot review comment resolution for PSDU length support capability
- UCI generic spec device capability parameter for DT-Tag block skipping capability
- Message Control Updates for DTMs
- UCI Generic spec UWB Session ID usage for Config Digest
- UCI Generic spec application config clarification in contention based ranging
- Controller device type and responder device role underspecified
- UCI Generic spec mandatory APP config parameter update
- OWR for AoA – MAC address value when MAC address is determined

6.3.2 Code size

- MW Code Size:
  - RAM = 27kB
  - FLASH = 37kB
- FW Code Size (256kB available):
  - FLASH secure memory used = 55kB

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- FLASH non secure memory used = 240.4kB

6.4 UWB_SR150_IOT v04.04.03

6.4.1 Change list

- Support of Hybrid Scheduling is added
- Support of Suspend Ranging is added
- Support of PSDU Data Rate 850Kbps in TWR FIRA session is added
- Reason Code extension for SESSION_STATUS_NTF_r2
- Interval based Scheduling Removal as per FIRA CR 423
- UWB device capability parameters information is updated
- Added new Session Type for In-band Data Transfer
- Handling of Negative Distance values in range notification is added
- OTP calibration for PDOA_MANUFACT_ZERO_OFFSET_CALIB & AOA_ANTENNAS_MULTIPOINT_CALIB is added
- Default host interface baud rate is changed from 115.2 kbps to 3Mbps
- Advertisement mode Observer support is removed
- Added support for Data Transfer SESSION_QUERY_DATA_SIZE_IN_RANGING_CMD

6.4.2 Code size

- MW Coode Size:
  - RAM = 23KB
  - FLASH = 34KB
- FW Code Size:
  - FLASH = 213KB

6.5 UWB_SR150_IOT v04.03.02

6.5.1 Change list

- Contention based ranging
- UL TDOA 2.0
- Data transfer 2.0

6.6 UWB_SR150_IOT v04.02.01

6.6.1 Change list

- SR140 support added

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6.7 UWB_SR150_IOT v04.02.00

6.7.1 Change list

- Provisioned STS without secure element
- FIRA CR 346/396 Geo Fencing/Proximity notification
- Advertisement Tag and anchor
- Nordic MCU support (UWBIOT_SR150_NRF52840_v04.02.00_SEGGER.zip)
- VCOM interface for Linux MCTT/PCTT
- Single wire WiFi Coex
- Writer thread is removed
- DL-TDOA 2.0 supported
- FiRa UCI generic spec version v1.1.0.9 supported
- Nearby Interaction Accessory Protocol Specification Release R2 supported
- Memory stack size for UWB stack:
  o Flash: 32 kBytes
  o RAM: 27 kBytes

6.8 UWB_SR150_IOT v03.15.11

6.8.1 Change list

- FIRA Data transfer
- +-90° AoA support
- 360° Field of View
- BLE SDK 2.6.5 integration
- BLE Demos updated to support Multi Phone
- CHIP_ENABLE is made default pullup in DPD/Active mode
- Memory stack size for UWB stack:
  o Flash: 34 kBytes
  o RAM: 26 kBytes

6.9 UWB_SR150_IOT v03.14.04

6.9.1 Change list

- Feature based compilation of MW is enabled

6.10 UWB_SR150_IOT v03.13.03

6.10.1 Change list

- DL-TDOA Feature supported

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- UCI 1.1 supported
- PCTT, MCTT conformance
  - Baud rate for Rhodes V4 must be at min 3Mbps.
- NXP Proprietary spec for antenna selection
- AoA multipoint calibration using up to 4 points is supported

6.11 UWB_SR150_IOT v03.10.06

6.11.1 Change list

- Fix of the CIR logging

6.12 UWB_SR150_IOT v03.10.02

6.12.1 Change list

- New features
  - 2 new API added - for DL TDOA feature support·
  - Demos for DL TDOA added
  - BLE demo for RV4 added
- Updated features
  - UCI Refactorization·
  - phUwbappContext_tis updated with new callbacks functions. Operating mode will be set asper the Callback functions.
- Removed features
  - Wiring pi support for Kernel driver
  - Data transfer feature support

6.13 UWB_SR150_IOT v03.09.06

6.13.1 Change list

- UCI Refactorization
- DL TDOA feature

6.14 UWB_SR150_IOT v03.09.04

6.14.1 Change list

- 2D/3D AoA calibration not correctly applied → fixed.
- Wrong distance reported at close distance → fixed
- Additional Fira Lite and SuS applets available (see page 4 for applets)

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6.15 UWB_SR150_IOT v03.09.00

6.15.1 Change list

- RV4 support available
- MCTT mode enabled for RV4, validation in progress

6.16 UWB_SR150_IOT v03.08.01

6.16.1 Change list

- Writing up to 2 bytes of Module maker information into OTP area is enabled
- Rx window for RCM on controlee/responder is configurable to cope up with potential interop issues in field where Controller/Initiator has too huge clock drift
- Secure Ranging with Responder Specific ranging key is added as a part of PACS use case
- Folder restructuring:
    - Limited the number of folders needed to include in IDE for compilation. Only few header files have been moved. Location of ``.c`` files remains as is.

6.17 UWB_SR150_IOT v03.06.01

6.17.1 Change list

- phNxpUwbConfig.c file is moved to “boards” module
- SE051W specific MCU project is removed, all SE demos are now part of “QN9090_MK_SHIELD_V4_SE“ project
- Improvements in typical Power consumption in case of DS_TWR Ranging

6.18 UWB_SR150_IOT v03.05.00

6.18.1 New Features

- New application configuration for smart home data transfer was added
- New proprietary device parameters for the smart home data transfer were added
- All files are converted from cpp to c
- Improvements of MAC and PHY conformance testing for FiRa Compliance
- New 3DAoA Algorithm for robustness and UCI specification updated to support configuring of two PDOA offsets.

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6.19 UWB_SR150_IOT v03.04.00

6.19.1 New Features

- Support of eSE + Non-eSE legacy features based on D24
- Added support of installing FiraLite applet
- Added dedicated demo for ADF provisioning for FiRaLite applet
- Added E2E demo for Firalite OOB channel initialization over UART
- UCI 1.0 support

6.20 UWB_SR150_IOT v03.02.00

6.20.1 New Features

- Home data transfer up to 50 Bytes – data transfer in one common session with ranging

6.21 UWB_SR150_IOT v03.01.00

6.21.1 New Features

- OTP Storage is available to store configuration data
- Support for SR140 Variant (Single Rx Mode)

6.21.2 MW Refactoring and updates

- [RhodesV3] Now the middleware logs are re-directed to the USB Interface.
- In order to have logging over FTDI (Same as earlier releases of Rhodes V3) following change is needed:

```
//BOARD_InitUsbDebugConsole(); /* Log over USB Interface */
BOARD_InitDebugConsole(); /* Log over UART + FTDI */
```

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7. Interoperability

UWBIOT_SR150_v04.06.05 is Interoperable with all FiRa 2.0 compliant device and all Aliro 0.7 devices.

8. Known Issues, Limitations and Information

- The NTF from the command SESSION_UPDATE_CONTROLLER_MULTICAST_LIST_CMD is not matching with the Fira 2.0 specification
- Offset between two active ranging round is not matching for adaptive modulo hopping in csa_mac_mode: 0x7f
- STATUS_INVALID_PARAM is Observed instead of STATUS_REJECTED when doing the GET_CALIB of AOA_ANTENNAE_PDOA_CALIB without setting the AOA_ANTENNAE_PDOA_CALIB Param.
- When running PCTT Tests, Baud rate of pctt demo application has to be set to 3Mbps
- Max Data transfer in advertisement scenario is 2023 bytes
- Max Data transfer in TWR is 252 bytes for slot duration longer than 1ms, it can be queried by the host using SESSION_QUERY_DATA_SIZE_IN_RANGING_CMD
    - Limitation: For slot duration of 1ms the Max Data transfer in TWR is lower than 252 bytes
- Provision STS - Start Ranging NTF not seen when all controlees are removed
- When controller session is stopped, then controlee session will also be terminated even when inband termination is disabled.
- When for Ranging NTFs status is not OK, not all bytes of additional information ae set to 0x00. Host has to ignore the NTF Data in case of Status is not OK
- In rare cases device bootup after FW Download might fail. MW/application recovery is needed, Application side need to handle recovery if MW timeout is notified
- Ranging NTFs will still be observed after Session Stop CMD in case of Inband Termination ongoing. Host has to ignore the NTFs
- Observed upshift randomly from 5% up to 78% with Dual AOA and SSTWR test cases in HPRF Sets
- Receiving DATA_TX_STATUS_ERROR_DATA_TRANSFER when max data is sent in HPRF_1/BPRF mode with 1ms slot length in AOA Mode/Dual RX TOF mode
- AoA Values are Zero in Vendor Specific Notification
- Observing timeouts when RANGING_INTERVAL: 24480 (maximum) is configured.
- PDOA elevation field is reported zero on responder for dual AoA mode and channel 5 <-
    - only seen on Channel 5 in 0.01% of NTFs

Negative scenarios

- Observing NO RSP from FW if second packet is not sent and PBF bit is enabled.
- Expected SYNTAX_ERROR when Invalid header is sent from the host, but observe no response.

- Observing ERR_DYNAMIC_STS_IS_NOT_SUPPORTED instead of ERR_STATUS_SESSION_KEY_NOT_FOUND

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