MMWAVE DFP 02.02.02.01 Release Notes

1 Introduction

TI mmWave Device Firmware Package (DFP) enables the development of millimeter wave (mmWave) radar applications using AWR2243 Device/EVM. It includes necessary components which will facilitate end users to integrate AWR2243 SOC with their choice of processor. The user is expected to use mmWaveStudio to measure RF and key system performance on TI mmWave Radar devices.

In addition, DFP provides mmWaveLink framework and example application which will serve as a guide for integrating the AWR2243 with external processor.

2 Release Overview

2.1 Platform and Device Support

The device and platforms supported with this release include:

Supported Devices	Release Status	Supported EVMs
AWR2243 ES1.1	Release for Production	AWR2243BOOST : AWR2243 ES1.1 Booster pack + DCA1000EVM MMWCAS-RF-EVM : AWR2243 ES1.1 cascade imaging RF EVM + MMWCAS-DSP-EVM

Note: DFP supports the foundation components for the device mentioned in the table above. At system level, the mmWave SOC/EVM may interface with other SOCs/EVMs and software for other devices will not be a part of the DFP

2.2 Release contents and component versions

Component	Version	Type
RadarSS Firmware	ROM: 2.2.0.13 PATCH: **2.2.2.6**	Binary
MSS Firmware	ROM: 2.2.1.7 PATCH: **2.2.2.0**	Binary
mmWaveLink Framework	**2.2.2.1**	Source and Library
Docs	Release Notes DFP user guide Interface Control Document mmWaveLink Programmer's guide	PDF PDF PDF Doxygen HTML

2.3 Directory Structure

Directory Name	Content
Docs	mmWave-Radar-Interface-Control.pdf mmwave_dfp_release_notes.pdf mmwave_dfp_user_guide.pdf
Firmware	RadarSS and Master SS firmware binary files in RPRC format metaImage binary (xwr22xx_metaImage.bin) for AWR2243 ES1.1 for boot over Flash metaImage header file (xwr22xx_metaImage.h) for AWR2243 ES1.1 for boot over SPI mmwave_radarss_release_notes.pdf
ti	mmWaveLink framework and example source code mmWaveLink Programmer's guide
rf_eval	RF evaluation firmware

2.4 Component Descriptions

2.4.1 RadarSS Firmware

Refer to Radar SS firmware release notes (mmwave_radarss_release_notes.pdf) in firmware**radarss** folder.

2.4.2 MasterSS Firmware

The main software components of the MasterSS (MSS) firmware are

- System services – provides infrastructure services (error handling, mmWaveLink Host communication protocol manager) used by the functional firmware.

- Functional firmware – Is responsible for the external host API communication, RadarSS API handshake, data path control.

2.4.3 mmWaveLink framework

RadarSS is a closed subsystem whose internal blocks are configurable using messages coming over mailbox.
TI mmWaveLink framework acts as driver for RadarSS and MSS, and exposes services of mmWave Radar. It includes APIs to configure HW blocks of RadarSS/MSS and provides communication protocol for message transfer between external processor and AWR2243

- Link between application and RadarSS/MSS
- Platform and OS independent which means it can be ported into any processor which provides communication interface such as SPI and basic OS routines. The mmWaveLink framework can also run in single threaded environment
- The LDRA tool v9.7.6 with MISRA 2012 AMD1 rule is used to perform static analysis; the TI approved waiver policy is being used to take any waiver.

2.5 Licensing

Please refer to the mmwave_dfp_manifest.html, which outlines the licensing information for mmWave DFP package.

3 Release Contents

3.1 AWR2243 ES1.0 RAM contents (ES1.1 ROM)

3.1.1 Features and enhancements (DFP 2.0.3 - Compared to DFP 1.2/AWR1243)

- AWR2243 is TIs second generation 77GHz RF CMOS Radar, features supported in this firmware release are:
    - This release is derived from AWR1243 DFP1.2 release baseline and backward compatible to AWR1243 DFP 1.2 supported APIs.
    - Synthesizer RF frequency supported 76 – 81GHz
        - VCO1: 76 – 78GHz
        - VCO2: 76 – 81GHz
    - Supports 20MHz IF bandwidth
    - Supports 266MHz/us max slope
    - Supports New programmable filter (not characterized in this engineering release)
    - 20GHz LO cascade configuration improvements
- Refer mmWave-Radar-Interface-Control.pdf (ICD) for more information on AWR2243 ES1.0 API details.

3.1.2 Features and enhancements (DFP 2.0.8)

- Supported 13dBm max TX output power
- VCO calibration improvements
- Added support for new Programmable filter
- APLL boot calibration improvements
- New advance chirp configuration API (Only delta-F increment supported)
- The cascade link budget is improvement
- Supported calibration store and restore APIs for factory calibration
- Bug fixes and stability improvements in RadarSS and MSS
- Bug fixes related to SPI message protocol retry recovery on MSS
- Bug fixes related to SPI message protocol retry recovery on mmWaveLink
- Handled OS Interface Error when Mutex Lock callback returns Error in mmWaveLink
- Updated ICD and mmWaveLink Documents
- Avoiding CSI glitch issue by adjusting CSI transfer time

3.1.3 Features and enhancements (DFP 2.1.0)

- Added TX Phase Shifter DAC Monitoring part of TX internal signal monitor
- Updated 20GHz cascade sync circuit buffer/bias settings for PVT
- Updated LODIST circuit buffer/bias settings for PVT based on DOE learning
- Added new API to enable VMON in analog monitor API
- Added option to enable/disable OSC clock in channel config API (enabled by default)
- Improvements to IF stage calibrations (HPF and LPF)
- Improvements to HPF Monitor
- Improvements to IQMM calibration
- Improvements to Synth calibration and control voltage monitor
- Improved 20GHz cascade sync power monitor
- Added new APLL and SYNTH BW control API
- Added new API to control runtime monitors to reduce effective FTTI interval in cascade systems
- Added an API to override temperature bin index for run time calibration to provide Host controlled run time calibration.
- Added a new DCC self-test monitor at boot-up and in latent fault API
- Added new power optimization logic to reduce inter burst/frame power consumption.
- Added an option to disable dither in test source configuration API

- Enabled and updated LPF monitor configuration and reports
- Added a new option in loopback burst API to disable RF front end
- Added a new API “AWR DIGITAL COMP EST CONTROL SB” to estimate and compensate digital corrections in cascade use case
- Enhanced TX OLPC calibration to improve power accuracy
- Error ASYNC event if the new chirp data arrives before the previous data is sent out on the HSI interface.
- OSC CLK enable at device power-up
- New API added for avoiding the CSI2 transition during ADC Sampling.
- New API for Debug Signals bring-out.
- Improvements to the Logging mechanism.
- New Error code added if Data path is not selected before the frame configuration.
- Updated ICD, mmWaveLink drivers and Document
- Enabled non-live synth frequency monitor

3.1.4 Features and enhancements (DFP 2.1.5)

- Enabled new advance waveform chirp configuration API
- Updated inter burst/frame power saving scheme to reduce power consumption
- Added new frame stop features in frame start stop API
- Enabled LODIST CLPC calibration
- Updated TX gain phase monitor to report interference/noise data
- Added new error codes in CPU fault Async-event
- Updates to calibration and monitors frequency limit to avoid out of band emission
- Improvements to LPF calibration
- Improvements to RX gain calibration and updated RF gain target
- Replaced TX BPM monitor with new TX phase shifter monitor (API update)
- Added a new API to disable inter burst power save
- Improvements to HPF calibration
- Updates to the API avoiding the CSI2 transition during ADC sampling.
- Updated ICD, mmWaveLink drivers and documents.

3.1.5 Features and enhancements (DFP 2.2.0)

- Updated DCC driver to overcome IP limitation
- Fix for intermittent ADC DC offset fluctuations
- Increased max supported PS dither value in AWR_ADVANCE_CHIRP_CONF_SB

- Improved Synth boot calibration
- Added new AWR_ADVANCE_CHIRP_DYN_LUT_ADDR_OFFSET_CFG_SB API
- Added a new feature ADVANCE_CHIRP_ERROR_CHK_DIS in AWR_RF_MISC_CTL_SB API
- Updated ICD, mmWaveLink drivers and documents.
- **Final support release for AWR2243 ES1.0 device**

3.2 AWR2243 ES1.1 Patch contents

AWR2243 **ES1.1** is having DFP 2.2.0 contents in **ROM** and below DFP releases applicable only for ES1.1 through patch updates.

3.2.1 Features and enhancements (DFP 2.2.1)

- **Patch Release for AWR2243 ES1.1 device (*not supported on ES1.0*)**
- Fix for RX IFA saturation issue
- Improved TX power boot calibration sequence
- Improvements to synthesizer over and under shoot
- Added a new option to disable PS DAC monitor in AWR_MONITOR_TX0_INTERNAL_ANALOG_SIGNALS_CONF_SB API
- Added a new feature CAL_MON_TIME_UNIT_ERROR_CHK_DIS in AWR_RF_MISC_CTL_SB API to optimize the monitoring duration in advance framing
- Updated calibration and monitor timing info as per measurement done on AWR2243 ES1.1 device
- Updates to the API avoiding the LVDS transitions as well as CSI2 during ADC sampling
- Added support for a new data path configuration for data out in the CQ, CP, ADC order

3.2.2 Features and enhancements (DFP 2.2.2)

- Improved Synthesizer duty cycle performance
- Few minor bug fixes based on system validation feedbacks
- MSS Logger disabled by default.
- Updated the AWR_DEV_CONFIGURATION_SET_SB to enable logger as needed.
- Support for MSS Watchdog self-test in Latent fault characterization mode.

3.3 Feature/Changes List by Components

3.3.1 RadarSS firmware

Refer to RadarSS firmware release notes (mmwave_radarss_release_notes.pdf) in firmware**radarss** folder

3.3.2 Master SS firmware (DFP 2.0.3 – compared to DFP1.2/AWR1243)

Type	Key	Summary
Bug	MMWAVE_DFP-61	Fixed Nerror is signaled during the RF power up sequence for 2243 device.
Bug	MMWAVE_DFP-62	Fixed device is being resetting repeatedly due to Watchdog expiration.

3.3.3 Master SS firmware (DFP 2.1.0)

Type	Key	Description
Enhancement	MMWAVE_DFP-215	Unmasked FRC lockstep fatal error reported to MSS ESM G1 and sent over AE.
Bug	MMWAVE_DFP-216	Updates to the code to handle additional trigger2 safety tests.
Bug	MMWAVE_DFP-218	Fix for initializing the reserved bits in MSS ESM Error report
Bug	MMWAVE_DFP-209 MMWAVE_DFP-208	Fixed bugs in handling retry command received from host
Bug	MMWAVE_DFP-214 MMWAVE_DFP-213	Fix for EDMA and RTI latent fault digital monitoring API
Bug	MMWAVE_DFP-205	Fixed an issue in MSS message parsing related to message direction
Bug	MMWAVE_DFP-260	Fixed an issue with LVDS monitoring data transfer
Enhancement	MMWAVE_DFP-307	Avoiding CSI glitch issue by adjusting CSI transfer time
Bug	MMWAVE_DFP-285	Fix for occasional register read-back failure reported on SWIRQ registers
Bug	MMWAVE_DFP-319	Fix for SPI timeout issues due to faster HOST communication.
Enhancement	MMWAVE_DFP-286	Added new Asynchronous event for reporting the Chirp errors when new chirp data arrives while the previous chirp data is being transmitted out over HSI interface.
Bug	MMWAVE_DFP-340	Fix for DSI register (DSI_TIMING1) write-read back mismatched
Enhancement	MMWAVE_DFP-365	LVDS IO clock gating option enabled
Enhancement	MMWAVE_DFP-333	VMON error propagation through N-error
Enhancement	MMWAVE_DFP-384	Enabled OSC clock at device power-up in MSS boot-loader (applicable for ES1.1)
Bug	MMWAVE_DFP-399	Fix for occasional register read-back failure reported on MIBSPI registers
Bug	MMWAVE_DFP-277	Fix Parity tests on TCMA and TCMB memories.
Bug	MMWAVE_DFP-177	Fix for failure to download multiple files back to back over SPI.

Bug	MMWAVE_DFP-398	Indication of Patch download after the patch is applied.
Enhancement	MMWAVE_DFP-426	New APIs for CSI2 glitch avoidance by configuring Delay and Dummy data.
Enhancement	MMWAVE_DFP-412	New API for bringing out the Debug signals.
Bug	MMWAVE_DFP-389	Fix for EDMA MPU tests failing occasionally.
Enhancement	MMWAVE_DFP-380	Support for nesting of critical section
Enhancement	MMWAVE_DFP-358	HW Variant now reports 4 for 2243 devices.
Bug	MMWAVE_DFP-347	Fix for Watchdog failures when APLL locking fails.
Bug	MMWAVE_DFP-316	Fix for Logging mechanism for reliable logs.
Enhancement	MMWAVE_DFP-338	Redundancy through NERROR for an periodic test fail
Bug	MMWAVE_DFP-416	New Error code reported if HSI data path is not selected before chirp configuration.
Bug	MMWAVE_DFP-443	Fix for Chirp config API failure while configuring all 32 chirps together.
Bug	MMWAVE_DFP-499	Fix for Stale/invalid msgs reported at times for ASYNC responses.
Bug	MMWAVE_DFP-533	Fix for Register read-back failures on HOST_IRQ.
Bug	MMWAVE_DFP-532	Fix for missing ASYNC events occasionally due to an internal event miss.

3.3.4 Master SS firmware (DFP 2.1.5)

Type	Key	Description
Enhancement	MMWAVE_DFP-351	Updating the API for CSI2 glitch avoidance by configuring Delay and Dummy data to support dithered delay.
Bug	MMWAVE_DFP-422	Fix for fixing the logger buffer overflow issue.
Enhancement	MMWAVE_DFP-400	Improvements to the SPI synchronization to look for SYNC/CNYS path across 2 header chunks.
Enhancement	MMWAVE_DFP-484	Updated the a new error code for register read-back failures and added additional information of the read and written values.
Enhancement	MMWAVE_DFP-572 MMWAVE_DFP-573 MMWAVE_DFP-574	Mechanism to ACK the BSS MB if the msg on the MB is corrupted
Bug	MMWAVE_DFP-616	Fix for MSS Fault seen during the first chirp of Delay/Dummy configuration.
Enhancement	MMWAVE_DFP-591 MMWAVE_DFP-580 MMWAVE_DFP-578	Improvements to the SPI protocol handling
Enhancement	MMWAVE_DFP-615	Improvements to logger infrastructure and update of logger baud rate to 921600.
Bug	MMWAVE_DFP-612	Fix for DMA parity test failures during boot-up.
Bug	MMWAVE_DFP-594	Changes to setting up of tasks during bootup
Bug	MMWAVE_DFP-575	Fix for interrupt clearing of TPTC handler
Bug	MMWAVE_DFP-501	Fix for RTI latent fault test failure.
Bug	MMWAVE_DFP-576	Adding critical section for SW data variables across contexts.
Enhancement	MMWAVE_DFP-581	Removal of usage of SW data across contexts to avoid overwrites.

Enhancement	MMWAVE_DFP-595	Avoiding re-initialization of CRC module.
Enhancement	MMWAVE_DFP-596	Code cleanup to avoid redundant codes.
Enhancement	MMWAVE_DFP-597	Explicit initialization of global variables.
Bug	MMWAVE_DFP-577	Fix for Watchdog roll-over after 49.5 days.
Bug	MMWAVE_DFP-653	Fix for occasional failures of DMA MPU latent fault tests.
Bug	MMWAVE_DFP-682	Fix for register read-back failures during test pattern generation HSI.
Bug	MMWAVE_DFP-686	Static analysis fixes.
Bug	MMWAVE_DFP-701	Initialize monitoring global variables in the RAM image before setting up heartbeat timer to avoid re-initializing WDT
Bug	MMWAVE_DFP-702	Adding critical region in software interrupt triggers to avoid losing any software interrupt data
Bug	MMWAVE_DFP-703	Bug fix for handling BSS retry msgs when the msg is still pending to be sent to the HOST.
Bug	MMWAVE_DFP-706	Fix for register read-back failure on CLR_CBUFF_REG
Bug	MMWAVE_DFP-707	Fix for handling retry msgs.
Bug	MMWAVE_DFP-711	Fix for handling of retry msgs on slower HOST when the payload of the retry message is still pending to be received.

3.3.5 Master SS firmware (DFP 2.2.0)

Type	Key	Description
Bug	MMWAVE_DFP-721 MMWAVE_DFP-737	Fixed issue with MSS power-up when switching from ROM to RAM
Enhancement	MMWAVE_DFP-734	Added bootup TCM memory self-tests (Applicable only in SOP2)
Bug	MMWAVE_DFP-736	Parallel memory initialization fix for shared memory (Applicable only in SOP2)
Bug	MMWAVE_DFP-726 MMWAVE_DFP-741	Gate VMON during MSS boot to avoid spurious errors.
Enhancement	MMWAVE_DFP-729	Increase the periodicity for checking the occurrence of register read back failures.
Enhancement	MMWAVE_DFP-738	Preparing handoff for RAM image before ROM-RAM swap (Applicable only in SOP2)
Bug	MMWAVE_DFP-719	Updated DCC driver to overcome IP limitation (Applicable only in SOP2)
Enhancement	MMWAVE_DFP-739	Enabling of OSC_CLKOUT early in the boot-up sequence (Applicable only in SOP2)
Enhancement	MMWAVE_DFP-714	Adding support for GPIO based debug hook for MSS (Applicable only in SOP2)
Enhancement	MMWAVE_DFP-750	Latent Fault API to generate an error message if unsupported tests are triggered.
Bug	MMWAVE_DFP-765	Fixed an issue related to boot time PBIST
Bug	MMWAVE_DFP-794	OSC CLK to be enabled only after APLL IO BUFF LDO enable. (Applicable only in SOP2)
Bug	MMWAVE_DFP-788	Fix for BOOT ERROR STATUS (0x5005) being sent even when the SFLASH is enabled. (Applicable only in SOP2)
Bug	MMWAVE_DFP-786	Fix for support BSS only patch support. (Applicable only in SOP2)

3.3.6 Master SS firmware (DFP 2.2.1) – AWR2243 ES1.1 Only

Type	Key	Description
Enhancement	MMWAVE_DFP-903	Updating the API for CSI2 glitch avoidance by configuring Delay and Dummy data to support dithered delay, now extended to support LVDS as well.
Enhancement	MMWAVE_DFP-879	Added support for a new data path configuration mode of CQ_CP_ADC
Bug	MMWAVE_DFP-945	Fix for Incorrect implementation of the getDebugSignal API
Bug	MMWAVE_DFP-931	Fix for Mailbox related latent fault tests failing. (Applicable in SOP2 mode only)

3.3.7 Master SS firmware (DFP 2.2.2) – AWR2243 ES1.1 Only

Type	Key	Description
Bug	MMWAVE_DFP-993 MMWAVE_DFP-870	Disabled the logger by default and support to enable it back through AWR_DEV_CONFIGURATION_SET_SB as needed.
Enhancement	MMWAVE_DFP-928	Support for MSS Watchdog self-test in Latent fault characterization mode.

3.3.8 mmWaveLink framework (DFP 2.0.8 – compared to DFP 1.2/AWR1243)

Type	Key	Description
Bug	MMWL-150	Fixed an issue with No fault reported even after a CRC is corrupted in mmWaveLink
Bug	MMWL-166	Fixed bug in handling retry in case of NACK
Enhancement	MMWL-168	Added a new feature to report CRC failure in Async-event message to Application.
Bug	MMWL-173	Added a logic to recover from CNYS corruption scenario
Bug	MMWL-169	Fix for AE length info being reported to application upon CRC failure.
Bug	MMWL-178	Added an API to control number of retry for command
Bug	MMWL-177	Added max retry count limit in case of NACK retry
Bug	MMWL-180	Added a return in case of OS Interface Error when Mutex Lock callback returns Error.
Enhancement	MMWL-175	Added GET API for CPU and ESM fault errors
Bug	MMWL-193	Updated doxygen comments and incorporated code inspection review comments
Enhancement	MMWL-192	Notify Host through Async-event if mutex lock fails.
Enhancement	MMWL-189	Support for parallel SPI communication in mmWavelink

Enhancement	MMWL-182	Added a new advance chirp configuration API
Bug	MMWL-201	Updated default value of RL_CASCADE_NUM_DEVICES to 1
Enhancement	MMWL-203	Added new SPI register read and write APIs
Bug	MMWL-204	Added null termination to string passed to semaphore and mutex creation.

3.3.9 mmWaveLink framework (DFP 2.1.0)

Type	Key	Description
Bug	MMWL-217	mmWaveLink update for flushing 256 + CRC Size bytes instead of 256 + CRC Size + SYNC bytes in case of ACK SYNC corrupted
Bug	MMWL-215	Test Source configuration structure changed to match the ICD definition.
Bug	MMWL-199	Updated doxygen comments and incorporated code inspection review comments
Bug	MMWL-202	Fixes for LDRA violations.
Enhancement	MMWL-248	1. Added new parameter MISC FUNC CTRL to disable dither in test source configuration API. 2. Added new parameter to enable VMON in analog monitor configuration API. 3. Added new error code 160, if the number of dummy chirp configuration is incorrect. 4. Added new TX Phase shifter DAC monitor settings and reports in TX internal analog signal monitors. 5. Update Rx gain temp LUT description.
Enhancement	MMWL-252	Implementation of new APIs supported in MasterSS and RadarSS.
Enhancement	MMWL-253	Implementation of new features supported in RadarSS.
Bug	MMWL-250	Fix for mmWaveLink to match the sequence number for the ACK received.
Bug	MMWL-247	Doxygen comment updates.
Enhancement	MMWL-255	Updated RadarSS calibration store restore data structure definition and added new synth non-live monitor.
Enhancement	MMWL-239	Updated Advance chirp configuration API structure

3.3.10 mmWaveLink framework (DFP 2.1.5)

Type	Key	Description
Enhancement	MMWL-237	Support Advance Chirp Configuration to allow flexible waveform programming: ▪ Program more than 512 unique chirps ▪ Delta dither programming capability for all chirp configuration parameters ▪ Phase shifter dither support

Enhancement	MMWL-258	Updated frame start/stop, TX gain phase AE report API structure and new option for CSI2 delay dither.
Bug	MMWL-260	Fix mmWaveLink macros to align with the firmware values
Enhancement	MMWL-261	Updated RF gain target settings and MSS CPU fault API in mmWaveLink
Enhancement	MMWL-262	Separate MSS API from frameconfig and AdvFrameConfig
Enhancement	MMWL-263	Phase shifter monitor API updates
Enhancement	MMWL-264	Added function to fill up chirp LUT buffer
Enhancement	MMWL-265	Added function to internally chunk the chirp LUT buffer
Enhancement	MMWL-275	Doxygen comment updates.
Bug	MMWL-249	Fixed rlGpAdcCfg_t structure to match with the latest ICD

3.3.11 mmWaveLink framework (DFP 2.2.0)

Type	Key	Description
Enhancement	MMWL-287	Added new API to dynamically update LUT Address offset for Advance chirp API

3.3.12 mmWaveLink framework (DFP 2.2.1) – AWR2243 ES1.1 Only

Type	Key	Description
Enhancement	MMWL-309 MMWL-315	Added support for logging SPI data
Enhancement	MMWL-301	Added big endian support for Filling Advanced chirp LUT RAM buffer
Bug	MMWL-305	Fixed update for LUT RAM for non-zero location
Enhancement	MMWL-286	Doxygen comment updates.
Enhancement/Bug	MMWL-293	Changed 64 bit fields into 2 32-bit fields in MSS power up status and MSS boot error status
Enhancement	MMWL-321 MMWL-322	Doxygen comment updates.

3.3.13 mmWaveLink framework (DFP 2.2.2) – AWR2243 ES1.1 Only

Type	Key	Description
Bug	MMWL-327	Fixed compiler warning of dead assignment
Enhancement	MMWL-326	Doxygen comment updates
Enhancement	MMWL-317	Added ICD API mapping in mmwavelink source code
Enhancement	MMWL-282	Updates to rlRfPhShiftCalibDataStore/Restore API

Enhancement	MMWL-334 MMWL-335	Doxygen comment updates

4 Unsupported features and APIs (applicable to all DFP releases)

Refer to RadarSS firmware release notes in firmware**radarss** folder for radarSS APIs.

The following device MSS APIs and features are not validated fully at system level, it is recommended not to use these APIs in this and all previous DFP releases. This list of unsupported features is in addition to the list mentioned in known issues.

4.1 Functional APIs

API	Feature	Description
The SPI transfer (option 2) in DATA_INTF_SEL in AWR_DEV_RX_DATA_PATH_CONF_SET_SB	ADC data transfer over SPI	This API is not validated at system level. It is recommended not to use the same.

4.2 Debug APIs

API	Feature	Description
AWR_DEV_RX_CONTSTREAMING_MODE_CONF_SET_SB	Continuous streaming mode	Continuous streaming mode is not supported in functional mode, recommended to use only for debug.
AWR_DEV_TESTPATTERN_GEN_SET_SB	Data path test pattern generation	Pattern generation is not supported in functional mode, recommended to use only for debug.
AWR_DEV_RF_DEBUG_SIG_SET_SB	Debug signal bring out	Pin-mux to bring out debug signals for the chirp cycle.

5 Known Issues (applicable to all DFP releases)

5.1 RadarSS firmware known Issues:

Refer to RadarSS firmware release notes (mmwave_radarss_release_notes.pdf) in firmware**radarss** folder.

5.2 MasterSS firmware known Issues:

Key	Severity	Description
MMWAVE_DFP-207	S2-Major	In case of checksum failure for the command received by MSS, the SPI buffer DMA synchronization will be lost with HOST/mmWaveLink. Workaround: Use 4 bytes CRC for commands and AE messages.
MMWAVE_DFP-233	S3-Minor	Occasionally MSS ATCM and BTCM self -tests generating a data abort in a long tracking stress test, which is looping Latent fault API infinite times with all digital monitoring tests enabled. Workaround: Disable MSS ATCM and BTCM parity, Single bit (SB) and Double Bit (DB) ECC self-tests in AWR_MSS_LATENTFAULT_TEST_CONF_SB API. The MSS latent self-tests are destructive tests, which would cause corruption in ongoing SPI/mailbox transactions and may generate N-Error signals while performing ESM G2 error checks. It is recommended not to run these self-tests in functional mode of operation.

6 Migration Guide

This section explains the steps to migrate from AWR1243 (DFP1.2.5) release to this package

Impact	Change list
MEDIUM	The ESM_MONITORING_EN flag in rlDigMonPeriodicConf_t structure have been made reserved. Application should ignore the reserved flag.
HIGH	The bit 22nd of esmGrp1Err field in rlMssEsmFault_t structure is updated with FRC lockstep error indication. Application should handle this error as a fatal error from the mmWave Device.
HIGH	The bit 14 and 25 of esmGrp1Err field in rlBssEsmFault_t structure is updated with programmable filter parity and ECC DB fatal error indications respectively. Application should handle this error as a fatal error from the mmWave Device.
MEDIUM	The ESM_MONITORING flag in rlDigPeriodicReportData_t structure have been made reserved. Application should ignore the reserved status flags.
MEDIUM	New asynchronous event message ID has been added for notification of CRC/Checksum failure in the received message (Async-event) from the device. Application needs to handle this msgID RL_MMWL_ASYNC_EVENT_MSG and SBID-RL_MMWL_AE_MISMATCH_REPORT in the 'rlAsyncEvent' callback implementation.
MEDIUM	New API rlDeviceSetRetryCount has been added, where application can set retry count to zero to skip the command retry step at mmWaveLink level. This API provides an option to change the retry count from default value to customizable value which should be <=RL_API_CMD_RETRY_COUNT.
MEDIUM	Value option '0x2' for rltestPattern_t-> testPatGenCtrl is not validated and removed. So application should not use this option to generate the test pattern.
MEDIUM	In case MutexLock callback returns non-zero value in the interrupt context (reading async-event) then mmWaveLink generates internal Async-event with error code to notify the Host about this failure. Application should able to handle this error Async-event message and take appropriate action.
HIGH	Added new bit 34 in bootTestStatus in rlInitComplete_t structure to report boot time PCR self-test of MSS in AWR1243 devices
HIGH	The bits [11:8] STATUS_PWRDET_RXn in statusFlags in rlMonRxIntAnaSigRep_t structure have been made reserved as RX power detector monitoring has been disabled.
HIGH	The bit 26 PCR test enable in enMask in rlMonAnaEnables_t is made reserved as this test has been de-featured.
MEDIUM	Added a missing 4 bytes reserved field reserved1 in rlMssEsmFault_t.
HIGH	The bit 2 PCR test status in testStatusFlg2 in rlMssLatentFaultReport_t as this test has been de-featured.
HIGH	A new status 0x7 has been added errStatusFlg in rlMssRfErrStatus_t.
HIGH	The bit 26 PCR test status in digMonLatentFault in rlDigLatentFaultReportData_t is made reserved as this test has been de-featured.
HIGH	The bit 2 PCR test enable in testEn2 in rlperiodicTest_t as this test has been de-

	featured.
HIGH	Added new fields loopbackPowerRF1, loopbackPowerRF2, loopbackPowerRF3, rxNoisePower1 and rxNoisePower2 in rlMonRxGainPhRep_t structure.
MEDIUM	Added reportMode field in rlRxGainPhaseMonConf_t structure.
MEDIUM	Added reportMode field in rlTxGainPhaseMismatchMonConf_t structure.
MEDIUM	Moved rlRfTempData_t structure from mmwavelink.h to rl_sensor.h
MEDIUM	Added new parameter 'miscFunCtrl' to disable dither in rlTestSource_t structure.
MEDIUM	Added new parameter to enable VMON circuit monitoring in ldoVmonScEn in rlMonAnaEnables_t structure.
MEDIUM	Added new error code 160 to indicate dummy chirps at end of frame is not supported in rlFrameCfg_t structure.
MEDIUM	Added new field txPhShiftDacMonThresh in rlTxIntAnaSignalsMonConf_t structure.
MEDIUM	Updated rxGainTempLut description in rlRxGainTempLutData_t structure.
MEDIUM	anaTxPos filed in rlTestSource_t is reserved. Application should ignore the reserved field.
HIGH	Report mode 0 is not supported for the following monitoring APIs: rlRfTxIntAnaSignalsMonConfig rlRfRxIntAnaSignalsMonConfig, rlRfPmClkLoIntAnaSignalsMonConfig, rlRfGpadcIntAnaSignalsMonConfig, rlRfPllContrlVoltMonConfig, rlRfDualClkCompMonConfig.
MEDIUM	Bit3 in statusFlags in rlMonPmclkloIntAnaSigRep_t is now STATUS_LVDS_PMCLKLO to match with ICD.
MEDIUM	Bit 2 in statusFlags in rlMonGpadcIntAnaSigRep_t is now STATUS_GPADC_REF2 to match with ICD
MEDIUM	Added new API rlRfApllSynthBwCtlConfig to control the bandwidth of the APLL and the Synthesizer.
MEDIUM	Added new API rlMonTypeTrigConfig that maintains monitoring timing synchronization in cascaded devices to avoid mutual interference of monitors running in different devices in the cascade sensor.
MEDIUM	Added new API rlDeviceSetCsi2DelayDummyConfig that is used to increase the time between the availability of chirp data and the transfer of chirp data over CSI2 interface.
MEDIUM	Added new API rlDeviceSetDebugSigEnableConfig to enable the pin-mux and bring out debug signals for the chirp cycle.
HIGH	Bit 6 in cascadingPinoutCfg in rlChanCfg_t is now "INTFRC_MASTER_EN" to match with ICD.
HIGH	Added new field "monitoringMode" in rlRfCalMonTimeUntConf_t.
HIGH	Added new fields in rlRunTimeCalibConf_t.
HIGH	Added new field "monitorMode" in rlSynthFreqMonConf_t

HIGH	Added new field "programMode" in rlDynPerChirpPhShftCfg_t.
HIGH	Added new error code 284, Monitoring trigger API rlMonTypeTrigConfig is not supported in autonomous mode of operation. Added new error code 285, Monitoring trigger bit masks monTrigTypeEn are all zeros in rlMonTypeTrigCfg_t structure. Added new error code 286, forced temperature bin index is invalid in rlRunTimeCalibConf_t structure.
HIGH	Bit 21 in enMask in rlMonDigEnables_t is now “DCC test” to match with ICD.
MEDIUM	Added new asynchronous event 0x100A - RL_RF_AE_MONITOR_TYPE_TRIGGER_DONE_SB (rlMonTypeTrigDoneStatus_t). The triggered monitor types are done with execution and Host can use this signal to trigger next type of monitor.
MEDIUM	Added new asynchronous event 0x1033 - RL_RF_AE_MON_SYNTH_FREQ_NONLIVE_REPORT (rlMonSynthFreqNonLiveRep_t). This is a Non live Monitoring report which device sends to the host, containing information related to measured frequency error during the monitoring chirp for two profiles configurations.
HIGH	Added new field “lineStartEndDis” in rlDevCsi2Cfg_t.
HIGH	Bit 28 in enMask in rlMonAnaEnables_t is now “SYNTH_FREQ_MONITOR_NON_LIVE_EN” to match with the ICD.
HIGH	Added new fields in rlInterRxGainPhConf_t.
HIGH	Added new fields in rlRxIfStageMonConf_t.
HIGH	Added new fields in rlSynthFreqMonConf_t.
MEDIUM	Added new error code 1052, Data path configuration not done.
HIGH	Value of 4 in loopbackSel in rlLoopbackBurst_t is now “Rx FE disabled” to match with ICD.
HIGH	Updated RadarSS calibration store restore data structure definition (rlCalibrationData_t)
HIGH	Updated rlAdvChirpCfg_t and added rlAdvChirpLUTCfg_t to match with the ICD.
LOW	Updated rlFrameTrigger_t to add new modes in frame stop.
MEDIUM	Updated RL_RF_AE_MON_TX_GAIN_MISMATCH_REPORT (rlMonTxGainPhaMisRep_t) to add new fields.
MEDIUM	Support for “rxLoAmpFault” and “txLoAmpFault” fields in rlAnaFaultInj_t is de-featured.
MEDUIM	Bits 0, 2 and 4 in bpmConfig in rlLoopbackBurst_t are made reserved.
LOW	Value of 2 in enDisCfg in rlCsi2DelayDummyCfg_t is now “delay in each chirp” to match with ICD.
MEDIUM	Added new error codes for Advanced chirp configuration errors.
LOW	Updated reserved to “errorCode” field in rlCpuFault_t for RL_RF_AE_CPUFAULT_SB.
MEDIUM	Updated RF gain target in rlProfileCfg_t, rlContModeCfg_t and rlLoopbackBurst_t.
LOW	Updated “faultType “, “faultLR “, “faultPrevLR “ and “faultSpsr“ fields in rlCpuFault_t

	for RL_DEV_AE_MSS_CPUFAULT_SB.
LOW	Separated MSS API's from rlSetFrameConfigand rlSetAdvFrameConfig. (Added rlDeviceFrameConfigApply and rlDeviceAdvFrameConfigApply)
LOW	Added new API - rlRfTxPhShiftMonConfig (TX0, TX1and TX2) and removed rlRfTxBpmMonConfig API.
LOW	Added TX Phase shifter monitor reports rlAllTxPhShiftMonConf_t and Removed TX BPM monitoring reports rlAllTxBpmMonConf_t.
LOW	Changed a reserved field to " bssAnaControl" in rlRfDevCfg_t.
LOW	Changed a reserved field to " monChirpSlope" in rlTxGainPhaseMismatchMonConf_t.
LOW	Changed “numDummyChirpsAtEnd” field to reserved in rlFrameCfg_t.
LOW	Added new error code 316 to indicate invalid phase mask or atleast one of the phase should be enabled in rlTxPhShiftMonConf_t structure. Added new error code 317 to indicate invalid RX mask in rlTxPhShiftMonConf structure or the RX mask is not enabled in rlChanCfg_t structure.
LOW	Bits 10 and 11 in testEn1 in rllatentFault_t structure have been made reserved. Bits 16 to 21 in testEn1 in rllatentFault_t structure are not supported. Bits 0 and 1 in testEn2 in rllatentFault_t structure have been made reserved.
LOW	Value of 2 in intfSel field of rlDevDataPathCfg_t structure is not supported.
LOW	Value of 0 in dataRate field of rlDevDataPathClkCfg_t structure is not supported.
LOW	Sub block ID 0x500A rlRcvAdcData_t have been made reserved
LOW	Bit 5 in dccPairEnables in rlDualClkCompMonConf_t have been made reserved.
LOW	Bit 5 in statusFlags and Bits 10 and 11 in freqMeasVal in rlMonDccClkFreqRep_t structure have been made reserved.
LOW	Bits 0, 4, 10 and 11 in testStatusFlg1 in rlMssLatentFaultReport_t have been made reserved. Bits 16 to 21 in testStatusFlg1 in rlMssLatentFaultReport _t are not supported Bits 0 and 1 in testStatusFlg2 in rlMssLatentFaultReport _t have been made reserved.
LOW	Added new fields (bits 31-63) in powerUpStatus in rlMssBootErrStatus_t. Bits 2, 10, 11, 12, 16 – 21, 31, 32 and 33 in bootTestStatus in rlMssBootErrStatus_t structure have been made reserved. Bits 34, 35 and 36 in bootTestStatus in rlMssBootErrStatus_t have been changed from reserved to PCR test, VIM RAM parity test and SCI boot time test respectively.
LOW	Changed description of bits 6-9, 18, 26, 28-29 in esmGrp1Err in rlMssEsmFault_t. Changed description of bit 3 in esmGrp2Err in rlMssEsmFault_t. Bit 12 in esmGrp2Err in rlMssEsmFault_t have been made reserved. Bit 4 and 25 in esmGrp2Err in rlMssEsmFault_t have been changed from reserved to DSS TPTC1 write MPU error and radarSS to MSS ESM G2 Trigger respectively.
LOW	Added new fields (bits 31-63) in powerUpStatus in rlInitComplete_t. Bits 2, 10, 11, 12, 16 – 21, 31, 32 and 33 in bootTestStatus in rlInitComplete_t

	structure have been made reserved. Bits 35 and 36 in bootTestStatus in rlInitComplete_t have been changed from reserved to VIM RAM parity test and SCI boot time test respectively.
LOW	Bit 8 in enMask in rlMonDigEnables_t structure have been made reserved. Bit 8 in bssSysStatus in rlRfBootStatusCfg_t structure have been made reserved. Bit 8 in status in rlStartComplete_t structure have been made reserved. Bit 8 in digMonLatentFault in rlDigLatentFaultReportData_t structure have been made reserved.
MEDIUM	Changed macro RL_MAX_GPADC_SENSORS to 6. Added new reserved fields of 12 bytes in rlGpAdcCfg_t structure. Added new reserved fields of 36 bytes in rlRecvdGpAdcData_t structure.
LOW	Added new error code 318 to indicate invalid TX index in rlRfPhShiftCalibDataRestore API.
LOW	Bits 16 and 17 in bootTestStatus in rlInitComplete_t structure have been changed from reserved to TCMA single bit error test and TCMB single bit error test respectively. Bits 16 and 17 in bootTestStatus in rlMssBootErrStatus_t structure have been changed from reserved to TCMA single bit error test and TCMB single bit error test respectively.
LOW	Bit 4 in esmGrp1Err in rlBssEsmFault_t structure have been made reserved. Bit 9 in esmGrp2Err in rlBssEsmFault_t structure have been made reserved.
LOW	Bit 2 in miscCtl in rlRfMiscConf_t has been changed from reserved to ADVANCE_CHIRP_ERROR_CHK_DIS.
LOW	Added new API rlSetAdvChirpDynLUTAddrOffConfig that helps to update only the LUT offset address for chirp parameters when LUT data is modified at frame boundary dynamically while frames are running.
LOW	Added new debug level (RL_DBG_LEVEL_DATABYTE) and shifted the index of existing debug levels by 1.
HIGH	Changed 64 bit powerUpStatus in rlInitComplete_t/ rlMssBootErrStatus_t structure into two 32 bit fields (powerUpStatus1 and powerUpStatus2). The same is applicable for 64 bit bootTestStatus as well. (bootTestStatus1 and bootTestStatus2).
LOW	Added new field CQ_CP_ADC_DATA in transferFmtPkt0 in rlDevDataPathCfg_t structure.
MEDIUM	Changed the structure name from rlCsi2DelayDummyCfg_t to rlHsiDelayDummyCfg_t. Similarly, changed the corresponding API name from rlDeviceSetCsi2DelayDummyConfig to rlDeviceSetHsiDelayDummyConfig.
LOW	Changed the description of the field ‘txPhShiftDacMonThresh’ in rlTxIntAnaSignalsMonConf_t structure.
MEDIUM	Added a new bit (b3) ‘CAL_MON_TIME_UNIT_ERROR_CHK_DIS’ in miscCtl in rlRfMiscConf_t structure.
LOW	Changed the description of the field ‘observedPhShiftData’ in

	rlPhShiftCalibrationStore_t structure.
LOW	Updated the monitoring and calibration timings.
MEDIUM	Updated the API sequence for single chip and cascade.
HIGH	Added new field miscDevCfg (instead of reserved0) in rlDevMiscCfg_t structure. This field can be used to enable the logger back. Logger disabled by default.
MEDIUM	Added notes for usage of rlRfPhShiftCalibDataRestore and rlRfPhShiftCalibDataStore API.
LOW	Added notes on API error handling
MEDIUM	Updated description of timingFailCode field in rlCalMonTimingErrorReportData_t structure.

Note:

When migrating for AWR2243 ES1.0 to AWR2243 ES1.1, please refer to the DFP example provided for the sequence update. Changes needed:

- No more ESM/CPU fault at the boot up & during file-download.
- Swap Reset step is no more required in ES1.1

7 Notes

7.1 File Formats

The file format of the image downloaded/loaded, to the SFLASH/over the SPI, has been updated and unified with the entire range of mmWave sensors. Hence, a multicore image (metaImage) needs to be downloaded to the SFLASH or loaded over the SPI interface.

Device	File Format	
AWR2243 ES 1.1 device	Multicore image to be downloaded over SFLASH/SPI	
	SFLASH	mmwave_dfp_02_02_02_00\firmware\xwr22xx_metaImage.bin
	SPI	mmwave_dfp_02_02_02_00\firmware\xwr22xx_metaImage.h (This is hex format conversion of MetaImage binary file to embed within the Host application source code.)

7.2 Serial Data FLASH Supported

For further information on supported SFLASH variants, please refer SPRACH9.