

# Predict Run#2



You are a Requirements Engineer for the project named "Standard Firmware." You are creating links between the System and Software Requirements for the development to start. I will give you system requirements SYSRS and software requirements SWRS along with their ID. They are in a random order. Your task is to analyze which system requirement is being detailed by which software requirement strictly based on the meaningfulness and completeness aspects and not mere words overlap or surface similarities. If multiple software requirements are necessary to fully satisfy a system requirement, link them accordingly. If a particular SYSRS cannot be linked to any SWRS, then do not link it forcefully. Same applies to SWRS. Give me the matched requirements IDs in the template "SYSRS (one or many) - SWRS (one or many)." Wait for me to provide you the list of requirements. Lastly, give me a list in this template "SYSRS - SWRS" along with reason, unlinked SYSRS and SWRS along with reason.



Got it! I'll wait for your list of system requirements (SYSRS) and software requirements (SWRS). Once you provide them, I'll carefully analyze the links and follow your instructions to match or leave unlinked requirements accordingly.



System Requirement SYSRS 001: The Sensor IC shall digitize the Transducer Input Signal at the IC Pins with sampling frequency of ( CALIB\_samplingFreq plus YPX\_samplingFreqOffset). "SYSRS 003: BEFORE Sending CRM\_RCC After Reception of the CRM\_FCC, THEN the Sensor IC shall set CRM\_RSP Parameter CrmStatus = Status Value. " SYSRS 021: Diagnostic - Retry configuration: The firmware shall allow configurability to select the retry for open and short faults independently "SYSRS 012: BEFORE Leaving the Discovery Mode AND IF the effective value of the parameter DSI3\_physicalAddress is NOT equal to the default value of the Parameter DSI3\_physicalAddress THEN the Sensor IC shall set Error: err\_discPhysAddrMismatch = 0x1 ("error detected"). " "SYSRS 014: IF the Event\_MAX is generated, THEN the Sensor IC shall measure the time of the occurrence of the event condition relative to the start of the measurement and provide PDCM\_RSP P12, P13 Parameter EventTimeStamp<i> for the <i>th Event transmitted in a DSI3 packet." "SYSRS 009: If Performing Memory Access in Broadcast AND IF the state if the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea for the operation as determined by CRM\_CMD 0x8 Operation Flag is in the state Locked, THEN the Sensor IC shall respond with PDCM\_RSP P0: Report CRM\_RSP Information containing CRM\_RSP 0x8: Report Lock Status and CRM\_RSP 0x8 Flag KeyRequest = 0b1 ("key requested"). " "SYSRS 018: - Unlocked, If No Key Is Set If Performing Memory Access AND If the Key is NOT set THEN the Sensor IC shall set the state of the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea to the state Memory Area State: Unlocked." "SYSRS 006: If Performing Memory Access in Unicast AND IF the state of the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea for the operation as determined by CRM\_CMD 0x8 Operation Flag is in the state Locked, THEN the Sensor IC shall respond with CRM\_RSP 0x8: Report Lock Status and CRM\_RSP 0x8 Flag KeyRequest = 0b1 ("key requested"). " "SYSRS 019: If Performing Memory Access in Unicast AND AFTER reception of the CRM\_FCC\_CMD, AND If

Addressed with the Broadcast Command THEN the Sensor IC shall set the parameter Status Value = 0x2 ("invalid")." "SYSRS 020: If Performing Memory Access in Broadcast AND AFTER reception of the CRM\_FCC\_CMD, AND If Addressed with the Unicast Command THEN the Sensor IC shall set the parameter Status Value = 0x2 ("invalid")." "SYSRS 007: If Performing Memory Access AND If the Key is Set AND If Read Operation is Requested AND If Memory Area Is Set Read Accessible THEN the Sensor IC shall set the state of the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea to the state Locked." "SYSRS 015: Increment KAC AFTER Sending PDCM Packet After Reception of the BRC THEN the Sensor IC shall increment the PDCM\_RSP Parameter KAC by 1; the counter is reset to 0 at overflow" "SYSRS 010: If Performing Memory Area Modification AND AFTER reception of CRM\_CMD 0x9: Take Data or Send Data THEN the Sensor IC shall cache the CRM\_CMD 0x9 Parameter Data to the Data Cache." "SYSRS 013: The Sensor IC shall amplify the Transducer Input Signal at the IC Pins with the three amplification factors ( Parameter CALIB\_analogGain plus Parameter SPX\_dynGainStartValue plus CRM\_CMD 0x4 Parameter CalibrationGain plus Parameter YPX\_calibrationGainOffset )." "SYSRS 016: After Reception of the Valid CRM\_FCC\_CMD, THEN the Sensor IC shall set the PDCM\_RSP Parameter KAC = 0x0." "SYSRS 017: If Performing the Standard Path Measurement AND IF performing Stop Ongoing Measurement (Blocked) AND IF the functionality in US-Transducer Control (Non-Modulated Sine Burst) has NOT been fully performed, THEN the Sensor IC shall set Error: err\_burstGenerationStopped = 0x1 ("error")." "SYSRS 004: If performing Erase Backup AND If Addressed with the Unicast Command THEN the Sensor IC shall respond with CRM\_RSP 0x0: Report Acknowledgement." "SYSRS 002: The Sensor IC FW shall have a watchdog to detect FW or HW malfunction by resetting the WDG time in appropriate time within the FTTI." "SYSRS 005: IF the Sensor IC generates more information than possible to store in Event Buffer or Time Series Data Buffer THEN the Sensor IC shall forget the according information." "SYSRS 008: If Performing Memory Access With Set Key AND If Write Operation is Requested AND If Memory Area Is Set Write Accessible THEN the Sensor IC shall set the state of the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea to the state Locked." "SYSRS 011: If Performing Memory Area Modification AND AFTER reception of CRM\_CMD 0x9: Take Data or Send Data THEN the Sensor IC shall increment the CRM\_CMD 0x8 Parameter StartAddress by 1 word address."



Please provide the corresponding software requirements (SWRS) so I can begin linking the system and software requirements for the "Standard Firmware" project.



SWRS 017: Increment KAC  
AFTER Sending PDCM Packet After Reception of the BRC  
THEN  
the Software shall  
increment the PDCM\_RSP Parameter KAC by 1;  
SWRS 010: If Performing Memory Access in Broadcast  
AND IF the state if the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea for the operation as determined by CRM\_CMD 0x8 Operation Flag is in the state Locked,  
THEN  
the Software shall prepare to  
respond with PDCM\_RSP P0: Report CRM\_RSP Information containing CRM\_RSP 0x8: Report Lock Status and CRM\_RSP 0x8 Flag KeyRequest = 0b1 ("key requested").  
SWRS 016: The software shall send the MAX events with the measured time of the occurrence of the

event, condition relative to the start of the measurement, and provide the PDCM\_RSP P12,P13 Parameter EventTimeStamp<i> for the <i>th Event transmitted in a PDCM frame.

SWRS 018: After Reception of the Valid CRM\_FCC\_CMD,  
THEN  
the Software shall  
set the PDCM\_RSP Parameter KAC = 0x0.

SWRS 002: The software shall enable a watchdog to detect software or hardware malfunction AND IF a malfunction is present, perform a reset in an appropriate time within the Fault Tolerant Time Interval of 20ms

SWRS 012 : BEFORE Leaving the Discovery Mode  
AND IF the effective value of the Parameter DSI3\_physicalAddress (RAM) is NOT equal to the default value of the Parameter DSI3\_physicalAddress (NVM)  
THEN  
the Software shall  
set Error: err\_discPhysAddrMismatch = 0x1 ("error detected").  
OTHERWISE  
the Software shall  
set Error: err\_discPhysAddrMismatch = 0x0 ("no error").

SWRS 005: - The software shall store information for up to 5 Echo Events.

SWRS 006: - The software shall hold at least the information for up to 100 time series data samples (time stamp and value)  
IF NOT possible regarding memory constraints could be reduced up to 50 time series data samples.

SWRS 008: If Performing Memory Access AND If the Key is Set AND If Read Operation is Requested AND If Memory Area Is Set Read Accessible THEN the Software shall set the state of the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea to the state Locked.

SWRS 013: Analog Amplification: AFTER reception of the command CRM\_CMD 0x4: Start Calibration Measurement the software shall set the register the register ASP\_CFG.g\_ana to Parameter CALIB\_analogGain .

SWRS 009: If Performing Memory Access  
AND If the Key is Set  
AND If Write Operation is Requested  
AND If Memory Area Is Set Write Accessible  
THEN  
the Software shall  
set the state of the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea to the state Locked.

SWRS 004: If performing Erase Backup  
AND If Addressed with the Unicast Command  
THEN  
the Software shall prepare to  
respond with CRM\_RSP 0x0: Report Acknowledgement.

SWRS 020: - Unlocked, If No Key Is Set  
ELA0938-15904 - If Performing Memory Access  
AND ELA0938-17453 - If the Key is NOT set  
THEN  
the Software shall  
set the state of the Memory Area identified by ELA0938-9158 - CRM\_CMD 0x8 Parameter MemoryArea to the state ELA0938-16683 - Memory Area State: Unlocked.

SWRS 021: If Performing Memory Access in Unicast  
AND AFTER reception of the CRM\_FCC\_CMD,  
AND If Addressed with the Broadcast Command

THEN  
the Software shall  
set the parameter Status Value = 0x2 ("invalid").

SWRS 022: If Performing Memory Access in Broadcast

AND AFTER reception of the CRM\_FCC\_CMD,  
AND If Addressed with the Broadcast Command  
THEN

the Software shall  
set the parameter Status Value = 0x2 ("invalid").

SWRS 011: If Performing Memory Area Modification

AND AFTER reception of CRM\_CMD 0x9: Take Data or Send Data

THEN

the Software shall store the CRM\_CMD 0x9 Parameter Data to RAM until the command CRM\_CMD 0xA: Perform Memory Operation with CRM\_CMD 0xA Parameter MemoryOperation == 0x2 "Write to NVM" is received.

SWRS 007: If Performing Memory Access in Unicast

AND IF the state of the Memory Area identified by CRM\_CMD 0x8 Parameter MemoryArea for the operation as determined by CRM\_CMD 0x8 Operation Flag is in the state Locked,

THEN

the Software shall prepare to  
respond with CRM\_RSP 0x8: Report Lock Status and CRM\_RSP 0x8 Flag KeyRequest = 0b1 ("key requested").

SWRS 003: BEFORE responding with the CRM\_RSP,

the Software shall include the CRM\_RSP Parameter CrmStatus into the CRM\_RSP.

SWRS 019: IF in Main-Measurement

AND IF Break Burst Generation occurs

THEN

the software shall set

Error: err\_burstGenerationStopped = 0x1 ("error").

SWRS 001: AFTER reception of the command CRM\_CMD 0x1: Start Standard Measurement

AND

BEFORE the start of the Measurement the software shall set the register BRG.FS.f\_s to (CALIB\_samplingFreq plus YPX\_samplingFreqOffset).

SWRS 014: Digital Amplification: AFTER reception of the command CRM\_CMD 0x4: Start Calibration

Measurement the software shall set the register ENVP\_AMPD\_CFG.g\_dig to Parameter SPX\_dynGainStartValue .

SWRS 015: Calibration Gain: AFTER reception of the command CRM\_CMD 0x4: Start Calibration Measurement

the software shall set the register ENVP\_GCAL.g\_cal to ( CRM\_CMD 0x4 Parameter CalibrationGain + Parameter YPX\_calibrationGainOffset).



## Matched System Requirements (SYSRS) and Software Requirements (SWRS):

### 1. SYSRS 001 - SWRS 001

- **Reason:** Both describe setting the sampling frequency based on parameters ``CALIB_samplingFreq`` and ``YPX_samplingFreqOffset`` for starting a measurement.

## 2. SYSRS 003 - SWRS 003

- **Reason:** Both mention handling the ``CRM_RSP`` parameter and ensuring ``CrmStatus`` is set before sending the response.

## 3. SYSRS 021 - No SWRS Linked

- **Reason:** SYSRS 021 relates to retry configurations for diagnostics, but no SWRS directly discusses retry behavior or fault diagnostics configurability.

## 4. SYSRS 012 - SWRS 012

- **Reason:** Both describe behavior before leaving Discovery Mode and setting the ``Error: err_discPhysAddrMismatch`` if the physical address doesn't match the default value.

## 5. SYSRS 014 - SWRS 016

- **Reason:** Both involve measuring the occurrence time of an event (``EventTimeStamp``) and transmitting it in a DSI3/ PDCM frame.

## 6. SYSRS 009 - SWRS 010

- **Reason:** Both specify responding to a locked memory area during a broadcast memory access and setting the ``KeyRequest`` flag.

## 7. SYSRS 018 - SWRS 020

- **Reason:** Both describe setting the memory area state to unlocked if no key is set during memory access.

## 8. SYSRS 006 - SWRS 007

- **Reason:** Both describe responding with lock status (``KeyRequest = 0b1``) if the memory area is locked during unicast memory access.

## 9. SYSRS 019 - SWRS 021

- **Reason:** Both discuss invalidating the operation if a broadcast command is addressed incorrectly after the reception of ``CRM_FCC_CMD``.

## 10. SYSRS 020 - SWRS 022

- **Reason:** Similar to SYSRS 019, but this time for handling memory access in broadcast mode with incorrect addressing.

## 11. SYSRS 007 - SWRS 008

- **Reason:** Both describe setting a memory area to "locked" when a read operation is requested and the key is set.

## 12. SYSRS 015 - SWRS 017

- **Reason:** Both discuss incrementing the ``PDCM_RSP Parameter KAC`` after receiving a broadcast command.

## 13. SYSRS 010 - SWRS 011

- **Reason:** Both involve performing memory area modifications after receiving a specific command (``CRM_CMD 0x9``) and handling the data in a cache or RAM.

## 14. SYSRS 013 - SWRS 013, SWRS 014, SWRS 015

- **Reason:** Both requirements handle amplifying the transducer input signal, either through analog or digital gain and setting corresponding calibration gains.

## 15. SYSRS 016 - SWRS 018

- **Reason:** Both describe setting the ``PDCM_RSP Parameter KAC`` to 0 after receiving a valid ``CRM_FCC_CMD``.

#### 16. **SYSRS 017 - SWRS 019**

- **Reason:** Both handle setting an error (`err_burstGenerationStopped = 0x1``) if burst generation is stopped unexpectedly during measurement.

#### 17. **SYSRS 004 - SWRS 004**

- **Reason:** Both describe handling unicast commands during memory operations and responding with an acknowledgment (`CRM_RSP 0x0``).

#### 18. **SYSRS 002 - SWRS 002**

- **Reason:** Both describe enabling a watchdog to detect hardware or firmware malfunction and resetting the watchdog timer within a specified fault-tolerant time interval.

#### 19. **SYSRS 005 - SWRS 005, SWRS 006**

- **Reason:** Both describe handling buffer overflows for event or time series data, with constraints on storage limits.

#### 20. **SYSRS 008 - SWRS 009**

- **Reason:** Both describe setting a memory area to "locked" during a write operation if the key is set and the memory area is write-accessible.

#### 21. **SYSRS 011 - No SWRS Linked**

- **Reason:** SYSRS 011 talks about incrementing the start address of memory after receiving a command, but no SWRS directly correlates with this.

### Unlinked System Requirements (SYSRS):

1. **SYSRS 021** - No SWRS discussing retry configurations for open and short faults.
2. **SYSRS 011** - No SWRS discussing incrementing a memory address after a command.


### Unlinked Software Requirements (SWRS):

1. **SWRS 005** - No SYSRS specifically mentions storing echo events.
2. **SWRS 006** - Already linked to SYSRS 005 but no additional SYSRS explicitly matches.
3. **SWRS 015** - Already partially linked to SYSRS 013 but not needed elsewhere.

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Let me know if you need further clarification or adjustments!

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