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软件需求规格说明书

(Software requirement specification)

**(SM)**

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变更履历(Change Log)

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# 引言(Introduction)

## 目的(Goal)

编写本文的目的，是为了SM模块提供详细的软件需求的定义，给开发人员和测试人员提供设计和测试执行的标准。

## 范围(Scope)

本文使用者： 开发人员、测试人员、PSM、TeamLeader、TestLeader和产品负责人。

本文使用方法：

* 对于开发人员、根据本文中定义的功能/非功能要求进行后续的设计。
* 对于测试人员、通过理解本文中的要求，进行测试用例的制作和后续测试执行。
* 对于PSM、TeamLeader、TestLeader和产品负责人、来判断需求理解的正确性。

## 参考文档(Reference)

|  |  |  |
| --- | --- | --- |
| **编号** | **SVN路径\文档名** | **文档版本** |
| 1 | 《AUTOSAR\_SWS\_StateManagement》 | R-2111 |
| 2 | 《AUTOSAR\_TPS\_ManifestSpecification》 | R-2111 |
|  |  |  |
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## 术语和缩略语(Terms And Abbreviations)

|  |  |  |
| --- | --- | --- |
| **编号** | **缩写** | **说明** |
| 1 | PHM | Platform Health Management |
| 2 | UCM | Update and Config Management |
| 3 | NM | Network Management |
| 4 | SM | State Management |
|  |  |  |

# 软件系统概述(Software System Overview)

## 软件系统背景(Software System Background)

状态管理模块是AUTOSAR Adaptive Platform的functional cluster，负责确定当前平台内部状态，并通过执行管理的请求进行功能组状态和Machine State转换。

SM是接收任何可能对SM内部状态产生影响的操作事件的中心。SM负责根据以下几点评估这些事件：

• 事件类型（根据项目特定要求在项目特定实施中定义）

• 事件优先级（根据项目特定要求在项目特定实施中定义）。

如果触发了SM的内部状态更改，则可能会要求EM将功能组或机器状态设置为新的功能组状态。

## 软件系统目标(Software System Goal)

状态管理模块开发的目标是根据AUTOSAR规范，实现状态管理守护进程，实现与其他模块的交互，完成状态管理相关功能。

## 外部关联 (External Association)

功能组的状态更改请求可以由几个PlatformApplications发出：

• PHM以触发错误恢复，例如激活fallback功能。

• 自适应诊断，将系统切换到不同的诊断状态并发出系统重置信息。

• UCM将系统切换到可以更新软件或配置并可以验证更新的状态。

• NM以协调所需的功能和网络状态。网络管理提供了几组NetworkHandle字段，其中状态管理向网络管理发布的这些字段的更改进行注册并做出反应。

# 功能需求(Functional Requirement)

## State Management Responsibilities

### [SWRD\_SM\_00001] Function Group Calibration Support

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00001 |
| **Type** | Invalid[不明确，不支持数据标定] |
| **Description** | 能够从已停用的功能组的标准数据中接受信息。  应该拒绝Adaptive Applications和AUTOSAR Adaptive Platform Applications更改功能组状态到一个功能组中未定义的状态。 |
| **Upstream ID** | [SWS\_SM\_00005][ SWS\_SM\_00006] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 验证方法：  通过SM日志记录查看。  主要测试点：   1. 弄清楚什么是已停用的功能组和标准数据。 2. 切换功能组状态到未定义的状态是否有记录。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00002] State Management Architecture

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00002 |
| **Type** | Valid |
| **Description** | 本图说明SM模块与平台中其他模块（进程）之间的关联关系。 |
| **Upstream ID** | [None] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | - |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

## State Management and Adaptive (Platform) Applications

某些自适应应用程序，包括AUTOSAR自适应平台应用程序，可能需要与状态管理进行交互。

状态管理提供一个带有“Notifier”字段的服务接口，每个自适应应用程序都可以在该字段中进行订阅，因此只要状态管理的内部状态发生更改，它就会被通知。自适应应用程序识别出更改后，便可以执行适当的操作。

### [SWRD\_SM\_00003]

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00003 |
| **Type** | Valid |
| **Description** | SM应具有“Notifier”字段的多个TriggerOut实例，这些实例反映SM的内部状态，因此应用程序可以获取SM的状态。  SM应具有“Trigger”字段的多个TriggerIn实例，这些实例会影响SM的内部状态，因此应用程序可以影响SM的状态。应用程序都可以通过写入SM提供的“Trigger” fields来影响SM的行为。 |
| **Upstream ID** | [SWS\_SM\_00020][ SWS\_SM\_00021] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 主要测试点：  应用程序可以通过“Notifier”字段的服务接口订阅状态变化。  应用程序可以通过“Trigger”字段的服务接口影响SM的行为。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | H |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 修改 |

## Interaction with Platform Health Management

平台健康管理对受监督实体的故障进行去抖动。去抖动后，需要进行恢复操作。因此，平台健康管理通知状态管理。 状态管理作为平台的协调者可以决定如何处理检测到的故障，并可以触发相应的恢复动作。 在大多数情况下，这可能包括将故障功能组切换到另一个状态。

根据 ISO 26262，必须确保在发生安全相关故障后触发反应。 因此，平台健康管理必须确保状态管理收到有关检测到故障的通知。 平台健康管理使用可配置的超时监控 RecoveryHandler 的返回。 如果 State Management 不能及时从 RecoveryHandler 定期返回，PHM 将通过错误触发或停止触发所服务的看门狗来采取自己的对策。

### [SWRD\_SM\_00004] Notification to State Management due to Supervision failure

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00004 |
| **Type** | TBD |
| **Description** | 如果通过 RecoveryNotificationToPPortPrototypeMapping 映射的 GlobalSupervision 的状态切换到状态 GLOBAL\_STATUS\_STOPPED，则平台健康管理应通过方法 RecoveryHandler 通知状态管理。  参数 executionError 应包含相应的 Function Group 和当前的ProcessExecutionError。 参数监督应包含导致转换到状态GLOBAL\_STATUS\_STOPPED.c 的 TypeOfSupervision |
| **Upstream ID** | [SWS\_PHM\_00101] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 需与PHM模块同步 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00005] Notification to State Management due to Health Status

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00005 |
| **Type** | TBD |
| **Description** | 如果 Health Channel 的 Health Status 发生切换，需要 State Management 的响应，即 PhmHealthChannelStatus.triggersRecoveryNotification 对应的 PhmHealthChannelStatus.statusId 为 true，则 Platform Health Management 应通过 RecoveryHandler 方法通知 State Management。 参数 healthStatusId 应从方法 ReportHealthStatus 传递。  这意味着必须为平台健康管理配置有关是否需要响应的信息。 |
| **Upstream ID** | [SWS\_PHM\_00102] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 需与PHM模块同步 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

## Interaction with Adaptive Diagnostics

### [SWRD\_SM\_00006] Prevent Shutdown due to Diagnostic Session

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00006 |
| **Type** | TBD |
| **Description** | 在自适应诊断提供C++接口通知SM模块进入诊断会话后，SM模块禁止MachineState进入shutdown状态。 |
| **Upstream ID** | [SWS\_SM\_00100] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM状态仲裁测试 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00007] Diagnostic Reset

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00007 |
| **Type** | TBD |
| **Description** | 自适应诊断提供C++接口通知SM模块进行诊断重启，应实施自适应诊断程序接收诊断地址重置请求的方法。状态管理应针对特定的重置类型执行特定于项目的操作。  本项功能是项目自定义功能。目前接口只支持参数为softReset。 |
| **Upstream ID** | [SWS\_SM\_00101] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 触发诊断模块进行softreset，监控APP是否接收到重启通知。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 诊断地址如何使用如何关联暂时不明 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00008] Diagnostic Reset Last Cause

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00008 |
| **Type** | TBD |
| **Description** | 在系统重启之前，SM需存储重启原因。 |
| **Upstream ID** | [SWS\_SM\_00103] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 重启之前以文本形式查看SM是否正确存储的重启原因。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00009] Diagnostic Reset Last Cause Retrieval

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00009 |
| **Type** | TBD |
| **Description** | SM读取存储的重启原因，通过C++接口提供给DM。  （按照21-11标准需要SM提供的C++接口实现） |
| **Upstream ID** | [SWS\_SM\_00104] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 对比SM读取的重启原因，DM接受的重启原因是否一样 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00010] Diagnostic Reset Last Cause Reset

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00010 |
| **Type** | TBD |
| **Description** | 当SM读取当前值后，SM应立即重置存储的最后一个重启的原因。（按照20-11标准需要SM提供的C++接口实现） |
| **Upstream ID** | [SWS\_SM\_00105] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 需要查看诊断模块是否有读取重启原因的诊断项。第一次读取成功，第二次没有重启原因。测试时需要确认诊断模块是否有获取重启原因诊断项。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00011] Enabling of rapid shutdown

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00011 |
| **Type** | TBD |
| **Description** | SM在诊断重启的系统关闭时，应该尽可能减少等待时间。 |
| **Upstream ID** | [SWS\_SM\_00106] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | - |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00012] Disabling of rapid shutdown

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00012 |
| **Type** | TBD |
| **Description** | SM在诊断重启的系统关闭时，应该设置一个等待时间值。 |
| **Upstream ID** | [SWS\_SM\_00107] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | - |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

## Interaction with Update and Config Management

### [SWRD\_SM\_00013] Supervision of Shutdown Prevention

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00013 |
| **Type** | Valid |
| **Description** | SM应以项目特定的超时来监督升级的持续时间，因此系统不会永远运行。 |
| **Upstream ID** | [SWS\_SM\_00201] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 主要测试点：SM应监督升级的持续时间 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00014] Start update session​

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00014 |
| **Type** | Valid |
| **Description** | SM为UCM提供应用更新请求接口，SM检查跟新是否执行。接口名称为：RequestUpdateSession。 |
| **Upstream ID** | [SWS\_SM\_00203] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM更新接口单元测试。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00015] Preventing multiple update sessions​

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00015 |
| **Type** | Valid |
| **Description** | 如果存在正在进行更新的会话，再次调用RequestUpdateSession请求更时，SM应该回复kNotAllowedMultipleUpdateSessions。 |
| **Upstream ID** | [SWS\_SM\_00209] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM更新接口单元测试。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00016] Persist session status​

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00016 |
| **Type** | Valid |
| **Description** | SM保存更新会话的信息，能够在机器重启后读取这个信息。 |
| **Upstream ID** | [SWS\_SM\_00204] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM更新接口单元测试。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00017] Stop update session​

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00017 |
| **Type** | Valid |
| **Description** | SM为UCM提供更新结束的接口，UCM通过这个接口通知SM更新结束。接口名称：StopUpdateSession |
| **Upstream ID** | [SWS\_SM\_00205] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM更新接口单元测试。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00018] Prepare Update

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00018 |
| **Type** | Valid |
| **Description** | SM为UCM提供更新准备的接口，UCM通过这个接口请求SM为更新应用执行功能组准备。接口名称：PrepareUpdate |
| **Upstream ID** | [SWS\_SM\_00206] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM更新接口单元测试。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00019] Prepare Verify

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00019 |
| **Type** | Valid |
| **Description** | SM为UCM提供更新检查的接口，UCM通过这个接口请求SM为应用更新验证执行功能组准备，接口名称：VerifyUpdate |
| **Upstream ID** | [SWS\_SM\_00207] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM更新接口单元测试。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00020] Prepare Rollback

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00020 |
| **Type** | Valid |
| **Description** | SM为UCM提供更新回滚的接口，UCM通过这个接口请求SM为应用更新回滚执行功能组准备，接口名称：PrepareRollback |
| **Upstream ID** | [SWS\_SM\_00208] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM更新接口单元测试。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | M |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

## Interaction with Network Management

网络管理模块提供了很多NetworkHandle fields，代表了一系列（部分）网络节点，SM将评估NetworkCurrentState字段，以将功能组设置为相应的功能组状态，并根据功能组及其功能组状态的相关性来设置NetworkRequestedState字段。此外，SM应防止网络在活动更新或诊断会话期间关闭。

为了在不同的ECU之间具有可移植，自适应应用程序不必知道需要哪些网络来实现其功能，因为在不同的ECU上，网络的配置可能不同。为了控制多个自适应应用程序的网络可用性，状态管理通过服务接口与网络管理进行交互。

### [SWRD\_SM\_00021] NetworkHandle

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00021 |
| **Type** | TBD |
| **Description** | SM应该从机器清单中获取NetworkHandles相关的信息以及它们相关的功能组状态。  SM应注册可从机器清单中获得的NM提供的所有NetworkHandle。  当SM识别出NetworkHandle值的变化时，应将功能组设置为在机器清单中为NetworkHandle配置的相应功能组状态。 |
| **Upstream ID** | [SWS\_SM\_00300][ SWS\_SM\_00301] [SWS\_SM\_00302] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | - |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00022] FunctionGroupState to NetworkHandle

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00022 |
| **Type** | TBD |
| **Description** | 当功能组更改其功能组状态并且NetworkHandle与机器清单中的该功能组状态相关联时，SM应更改NetworkHandle的值。 |
| **Upstream ID** | [SWS\_SM\_00303] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 功能组状态变化时，相应的NetworkHandle变化。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

### [SWRD\_SM\_00023] Network Afterrun

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00023 |
| **Type** | TBD |
| **Description** | 状态管理应支持afterrun，用来关闭相关功能组或（部分）网络的方法。参数必须从例如机器清单中获取参数。 |
| **Upstream ID** | [SWS\_SM\_00304] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | SM从机器清单中获取afterrun timeoutvalue。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

## State Management in a virtualized/hierarchical environment

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00024 |
| **Type** | TBD |
| **Description** | 在ECU上，多台机器可能会在虚拟环境中运行。每个虚拟机可能包含一个AUTOSAR自适应平台。因此，每个虚拟机都包含状态管理。为了对多个虚拟机进行协调控制，必须有一个虚拟机可以监控整个ECU状态。这不仅对虚拟化环境有效，而且对hierarchical也有效。  SM应能够注册到监督SM实例的Trigger字段，以接收有关整个ECU状态的信息。  SM应根据监督SM实例提供的信息，采取措施来计算其内部状态。 |
| **Upstream ID** | [SWS\_SM\_00500][ SWS\_SM\_00501] [2111A] |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 前提条件：无 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

# 非功能需求(Non-Functional Requirements)

## 制约(Constraint)

### [ SWRD\_SM\_00025] Existence of State Manager

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00025 |
| **Type** | Valid |
| **Description** | SM必须配置在MachineFG的所有状态（Off除外） |
| **Upstream ID** | SWS\_SM\_CONSTR\_00001 |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 主要测试点：验校SM必须配置在MachineFG的所有状态。 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

## 性能质量要求(Performance Quality Requirements)

### [ SWRD\_SM\_00026] 功能组切换时间

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_SM\_00026 |
| **Type** | Valid |
| **Description** | 对单个功能组的切换时间，单个功能组应在10秒内切换完毕。 |
| **Upstream ID** | NA |
| **Dependencies** | - |
| **Verification method** | 集成测试 |
| **Verification Criteria** | 主要测试点：关注SM对切换功能组接口的响应时间 |
| **ASIL** | QM |
| **Status** | Draft |
| **Priority** | L |
| **CR** | - |
| **Risk** | 无 |
| **Change Type** | 新增 |

## 质量（Quality）

暂无

# 接口说明(API)

## 接口头文件(API Header files)

在每个数据类型定义或者API中定义。

## 接口共同数据类型(API Common Data Types)

### PowerMode types

#### [ SWRD\_API\_SM\_00001]

|  |  |  |
| --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00001 | |
| **Type** | Valid | |
| **Priority** | M | |
| **Upstream ID** | SWS\_SM\_91011 | |
| **CR** | - | |
| **Consistency** | Yes | |
| **Change Type** | 新增 | |
| **Name** | PowerModeMsg | |
| ***Kind*** | STRING | |
| **Description** | Message to all running Processes in the system to indicate a request for a PowerMode switch | |
| **Range / Symbol** | **Limit** | **Description** |
| On | ‘On’ | normal operation. |
| Off | ‘Off’ | persist data preparation for shutdown. |
| Suspend | ‘Suspend’ | prepare for suspend2ram. |

#### [ SWRD\_API\_SM\_00002]

|  |  |  |
| --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00002 | |
| **Type** | Valid | |
| **Priority** | M | |
| **Upstream ID** | SWS\_SM\_91012 | |
| **CR** | - | |
| **Consistency** | Yes | |
| **Change Type** | 新增 | |
| **Name** | PowerModeRespMsg | |
| ***Kind*** | STRING | |
| **Description** | Reply message from Process, which received PowerModeMessage from State Management | |
| **Range / Symbol** | **Limit** | **Description** |
| kDone | 0 | requested mode sucessfully reached. |
| kFailed | 1 | requested mode not reached. |
| kBusy | 2 | cant process requested mode e.g. important things are ongoing. |
| kNotSupported | 3 | requested mode not supported. |

### DiagnosticReset types

#### [ SWRD\_API\_SM\_00003]

|  |  |  |
| --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00003 | |
| **Type** | Valid | |
| **Priority** | M | |
| **Upstream ID** | SWS\_SM\_91013 | |
| **CR** | - | |
| **Consistency** | Yes | |
| **Change Type** | 新增 | |
| **Name** | DiagnosticResetMsg | |
| ***Kind*** | STRING | |
| **Description** | Message to all Processes(in a SoftwareCluster) to indicate a request to perform Diagnostic SoftReset | |
| **Range / Symbol** | **Limit** | **Description** |
| SoftReset | ‘SoftReset’ | normal operation. |

#### [ SWRD\_API\_SM\_00004]

|  |  |  |
| --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00004 | |
| **Type** | Valid | |
| **Priority** | M | |
| **Upstream ID** | SWS\_SM\_91014 | |
| **CR** | - | |
| **Consistency** | Yes | |
| **Change Type** | 新增 | |
| **Name** | DiagnosticResetRespMsg | |
| ***Kind*** | VALUE | |
| **Description** | Reply message from Process, which received DiagnosticResetMessage from State  Management | |
| **Range / Symbol** | **Limit** | **Description** |
| kDone | 0 | reset performed sucessfully. |
| kFailed | 1 | reset not sucessfully performed |
| kBusy | 2 | can’t perform reset(e.g. important things are ongoing). |
| kNotSupported | 3 | reset not supported. |

### Data types for Update And Configuration Managemet interaction

#### [ SWRD\_API\_SM\_00005]

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00005 |
| **Type** | Valid |
| **Priority** | H |
| **Upstream ID** | SWS\_SM\_91018 |
| **CR** | - |
| **Consistency** | YES |
| **Change Type** | 新增 |
| **Name** | FunctionGroupListType |
| ***Kind*** | VECTOR |
| **Description** | A list of FunctionGroups. |

#### [ SWRD\_API\_SM\_00006]

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00006 |
| **Type** | Valid |
| **Priority** | H |
| **Upstream ID** | SWS\_SM\_91019 |
| **CR** | - |
| **Consistency** | YES |
| **Change Type** | 新增 |
| **Name** | FunctionGroupNameType |
| ***Kind*** | STRING |
| **Description** | full qualified FunctionGroup shortName. |

## 接口定义(API Reference)

以下为Provided Service Interfaces

### State Management TriggerIn

#### [ SWRD\_API\_SM\_00007]

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00007 |
| **Type** | Valid |
| **Priority** | H |
| **Upstream ID** | SWS\_SM\_91001 |
| **CR** | - |
| **Consistency** | Yes |
| **Change Type** | 修改 |
| **Name** | TriggerIn\_{State} |
| ***Kind*** | ProvidedPort |
| **Interface** | TriggerIn |
| **Description** | To be used by Adaptive (Platform) Applications to tigger State Management to change its internal state. |

#### [ SWRD\_API\_SM\_00008]

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00008 |
| **Type** | Valid |
| **Priority** | H |
| **Upstream ID** | SWS\_SM\_91007 |
| **CR** | - |
| **Consistency** | Yes |
| **Change Type** | 修改 |
| **Name** | TriggerIn\_{StateGroup} |
| ***NameSpace*** | ara::sm |
| **Field** | Trigger |
| **Description** | Value to be evaluated by State Management in a projectspecific way. |
| **Type** | project\_specific |
| **HasGetter** | false |
| **HasNotifier** | false |
| **HasSetter** | true |

### State Management TriggerOut

#### [SWRD\_API\_SM\_00009]

|  |  |  |  |
| --- | --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00009 | | |
| **Type** | Valid | | |
| **Priority** | H | | |
| **Upstream ID** | SWS\_SM\_91002 | | |
| **CR** | - | | |
| **Consistency** | Yes | | |
| **Change Type** | 修改 | | |
| **Name** | TriggerOut\_{State} | | |
| ***Kind*** | ProvidedPort | ***Interface*** | TriggerOut |
| **Description** | To be used by Adaptive (Platform) Applications to be informed when State Management has changed its internal state. | | |

#### [ SWRD\_API\_SM\_00010]

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00010 |
| **Type** | Valid |
| **Priority** | H |
| **Upstream ID** | SWS\_SM\_91008 |
| **CR** | - |
| **Consistency** | Yes |
| **Change Type** | 修改 |
| **Name** | TriggerOut\_{StateGroup} |
| ***NameSpace*** | ara::sm |
| **Field** | Notifier |
| **Description** | To be set by State Management in a projectspecific way to inform Adaptive (Platform) Applications about changes within State Management |
| **Type** | project\_specific |
| **HasGetter** | true |
| **HasNotifier** | true |
| **HasSetter** | false |

### State Management TriggerInOut

#### [ SWRD\_API\_SM\_00011]

|  |  |  |  |
| --- | --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00011 | | |
| **Type** | Valid | | |
| **Priority** | H | | |
| **Upstream ID** | SWS\_SM\_91003 | | |
| **CR** | - | | |
| **Consistency** | Yes | | |
| **Change Type** | 修改 | | |
| **Name** | TriggerInOut\_{State} | | |
| ***Kind*** | ProvidedPort | ***Interface*** | TriggerInOut |
| **Description** | To be used by Adaptive (Platform) Applications to tigger State Management to change its internal state and to get information when it is carried out. | | |

#### [ SWRD\_API\_SM\_00012]

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00012 |
| **Type** | Valid |
| **Priority** | H |
| **Upstream ID** | SWS\_SM\_91009 |
| **CR** | - |
| **Consistency** | Yes |
| **Change Type** | 修改 |
| **Name** | TriggerInOut\_{StateGroup} |
| ***NameSpace*** | ara::sm |
| **Field** | Trigger |
| **Description** | Value to be evaluated by State Management in a projectspecific way. |
| **Type** | project\_specific |
| **HasGetter** | false |
| **HasNotifier** | false |
| **HasSetter** | true |

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_API\_EM\_00012 |
| **Type** | Valid |
| **Priority** | H |
| **Upstream ID** | SWS\_SM\_91009 |
| **CR** | - |
| **Consistency** | Yes |
| **Change Type** | 修改 |
| **Name** | TriggerInOut\_{StateGroup} |
| ***NameSpace*** | ara::sm |
| **Field** | Notifier |
| **Description** | To be set by State Management in a projectspecific way to inform Adaptive (Platform) Applications about changes within State Management |
| **Type** | project\_specific |
| **HasGetter** | true |
| **HasNotifier** | true |
| **HasSetter** | false |

### UpdateRequest

UpdateRequest 接口旨在供更新和配置管理用于与状态管理交互以执行软件集群的更新（包括安装和删除）。

#### [ SWRD\_API\_SM\_00013]

|  |  |  |  |
| --- | --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00013 | | |
| **Type** | Valid | | |
| **Priority** | H | | |
| **Upstream ID** | SWS\_SM\_91016 | | |
| **CR** | - | | |
| **Consistency** | Yes | | |
| **Change Type** | 修改 | | |
| **Name** | UpdateRequest | | |
| **Kind** | ProvidedPort | **Interface** | UpdateRequest |
| **Description** | To be used by Update And Configuration Management to request State Management to perform steps for updating SoftwareClusters. | | |

#### [ SWRD\_API\_SM\_00014]

|  |  |
| --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00014 |
| **Type** | Valid |
| **Priority** | H |
| **Upstream ID** | SWS\_SM\_91017 |
| **CR** | - |
| **Consistency** | Yes |
| **Change Type** | 修改 |

|  |  |  |
| --- | --- | --- |
| **Name** | UpdateRequest | |
| **NameSpace** | ara::sm | |
| **Method** | ResetMachine | |
| **Description** | Requests a reset of the machine. Before the reset is performed all information within the machine shall be persisted. Request will be rejected when StartUpdateSession was not called successfully before. | |
| **FireAndForget** | false | |
| **Application Errors** | kRejected | Requested operation was rejected due to State Managements/machines internal state. |
| **Method** | StopUpdateSession | |
| **Description** | Has to be called by Update And Configuration Management once the update is finished to let State Managemen know that update is done and Machine is in a stable state. Request will be rejected when StartUpdateSession was not called successfully before. | |
| **FireAndForget** | false | |
| **Application Errors** | kRejected | Requested operation was rejected due to State Managements/machines internal state. |
| **Method** | RequestUpdateSession | |
| **Description** | Has to be called by Update And Configuration Management once it has to start interaction with State Management. State Management might decline this request when machine is not in a state to be updated. | |
| **FireAndForget** | false | |
| **Application Errors** | kRejected | Requested operation was rejected due to State Managements/machines internal state. |
| **Application Errors** | kNotAllowed-  MultipleUp-  dateSessions | Request for new session was rejected as only single active (update) session is allowed. |
| **Method** | PrepareUpdate | |
| **Description** | Has to be called by Update And Configuration Management after State Management allowed to update.  State Management will decline this request when StartUpdateSession was not called before successfully. | |
| **FireAndForget** | false | |
| **Parameter** | FunctionGroupList | |
| **Description** | The list of FunctionGroups within the SoftwareCluster to be prepared to be updated. |
| **Type** | FunctionGroupListType |
| **Variation** |  |
| **Direction** | IN |
| **Application Errors** | kRejected | Requested operation was rejected due to State Managements/machines internal state. |
| **Application Errors** | kPrepareFailed | Preparation step of update failed. |
| **Method** | VerifyUpdate | |
| **Description** | Has to be called by Update And Configuration Management after State Management allowed to update and the update preparation has been done. State Management will decline this request when Prepare Update was not called before successfully. | |
| **FireAndForget** | false | |
| **Parameter** | FunctionGroupList | |
| **Description** | The list of FunctionGroups within the SoftwareCluster to be verified. |
| **Type** | FunctionGroupListType |
| **Variation** |  |
| **Direction** | IN |
| **Application Errors** | kRejected | Requested operation was rejected due to State Managements/machines internal state. |
| **Application Errors** | kVerifyFailed | Verification step of update failed. |
| **Method** | PrepareRollback | |
| **Description** | Has to be called by Update And Configuration Management after State Management allowed to update. | |
| **FireAndForget** | false | |
| **Parameter** | FunctionGroupList | |
| **Description** | The list of FunctionGroups within the SoftwareCluster to be prepared to roll back. |
| **Type** | FunctionGroupListType |
| **Variation** |  |
| **Direction** | IN |
| **Application Errors** | kRejected | Requested operation was rejected due to State Managements/machines internal state. |
| **Application Errors** | kRollbackFailed | Rollback step of update failed. |

### Application interaction

#### [SWRD\_API\_SM\_00015] PowerMode

|  |  |  |
| --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00015 | |
| **Type** | Valid | |
| **Priority** | H | |
| **Upstream ID** | SWS\_SM\_91020 | |
| **CR** | - | |
| **Consistency** | Yes | |
| **Change Type** | 新增 | |
| **Name** | PowerMode | |
| ***NameSpace*** | ara::sm | |
| **Method** | message | |
| **Description** | sends PowerModeMsg defined in 9.1 Type definition to all Processes to request a PowerMode. | |
| **Parameter** | msg | |
| Description | Message to all running Processes in the system to indicate a request to enter this state. |
| Type | PowerModeMsg |
| Variation |  |
| Direction | OUT |
| **Method** | event | |
| **Description** | All Processes which got a PowerMode request sends this as answer to State Management | |
| **Parameter** | respMsg | |
| Description | ResponseMessage from a Processes which received PowerMode request from State Management. |
| Type | PowerModeRespMsg |
| Variation |  |
| Direction | OUT |

#### [SWRD\_API\_SM\_00016] DiagnosticReset

|  |  |  |
| --- | --- | --- |
| **SWRD-ID** | SWRD\_API\_SM\_00016 | |
| **Type** | Valid | |
| **Priority** | H | |
| **Upstream ID** | SWS\_SM\_91015 | |
| **CR** | - | |
| **Consistency** | Yes | |
| **Change Type** | 修改 | |
| **Name** | DiagnosticReset | |
| ***NameSpace*** | ara::sm | |
| **Method** | message | |
| **Description** | sends DiagnosticResetMsg defined in 9.1 Type definition to all Processes in a SoftwareCluster. | |
| **Parameter** | msg | |
| Description | Message to all running Processes in the SoftwareCluster to indicate a request to perform softReset. |
| Type | DiagnosticResetMsg |
| Variation |  |
| Direction | OUT |
| **Method** | event | |
| **Description** | All Processes which got a DiagnosticReset request sends this as answer to State Management | |
| **Parameter** | respMsg | |
| Description | ResponseMessage from a Processes which received DiagnosticReset request from State Management. |
| Type | DiagnosticResetRespMsg |
| Variation |  |
| Direction | OUT |

附录A- 信息定义

|  |  |  |
| --- | --- | --- |
| 类别 | 结构 | 备注 |
| SWRD-ID | SWRD-{需求类型}-{功能简称}-流水号  功能简称：参见下面功能简称列表  需求类型：功能需求为空，非功能需求为NF,接口为API  流水号：从00001开始的5位自然数 | *例：*  *SWRD-Nvm-00001*  *SWRD-NF\_Nvm-00001*  *SWRD-API-Nvm-00001* |

|  |  |
| --- | --- |
| 功能简称列表(aCore) | 说明 |
| DM\_DEM | Diagnostics management模块的诊断事件管理 |
| DM\_DCM | Diagnostics management模块的诊断通信管理 |
| DM\_DCM\_DOIP | Diagnostics management模块的DO/IP相关功能 |
| CoreTypes | 核心数据类型 |
| CM\_CommunicationAPI | Communication management模块的Communication API相关功能 |
| CM\_SOMEIP | Communication management模块的SOME/IP相关功能 |
| CM\_DDS | Communication management模块的DDS相关功能 |
| CM\_CommunicationGroup | Communication management模块的通信组相关功能 |
| CM\_SHM | Communication management模块的共享内存相关功能 |
| CM\_IPC | Communication management模块的IPC相关功能 |
| CM\_Raw | Communication management模块的raw data streaming相关功能 |
| CM\_TLS | Communication management模块的TLS相关功能 |
| CM\_S2S | Communication management模块的S2S相关功能 |
| CM\_E2E | Communication management模块的E2E相关功能 |
| UCM\_Master | Update and config management模块的主站相关功能 |
| UCM\_Server | Update and config management模块的从站相关功能 |
| LT | Log and trace模块相关功能 |
| PHM | Platform health management模块相关功能 |
| Per | Persistency模块相关功能 |
| SM | State management模块相关功能 |
| Crypto | Cryptography模块相关功能 |
| EM | Execution mangement模块相关功能 |
| NM | Network management模块相关功能 |
| TS | Time synchronization模块相关功能 |

说明：根据项目情况可自己定义，增加功能简称

|  |  |  |
| --- | --- | --- |
| 安全等级(ASIL) | 解释说明 | 备注 |
| ASIL A | 根据S – Severity(严重度)  E – Exposure(暴露度) C – Controllability(可控性) 排定功能安全等级。详细理解可以参考26262标准文件。 | *如果有关于ASIL等级的特殊解释说明，请记录在此* |
| ASIL B |  |
| ASIL C |  |
| ASIL D |  |
| QM(A) | 从ASIL A到ASIL D 中分解出来，分解的标准，参考功能安全体系文件《功能安全需求分解指南\_FS.pdf》  其中:括号内的等级为原始等级。 |  |
| QM(B) |  |
| QM(C) |  |
| QM(D) |  |
| ASIL A(A) |  |
| ASIL A(B) |  |
| ASIL A(C) |  |
| ASIL A(D) |  |
| ASIL B(B) |  |
| ASIL B(C) |  |
| ASIL B(D) |  |
| ASIL C(C) |  |
| ASIL C(D) |  |
| ASIL D(D) |  |

|  |  |  |
| --- | --- | --- |
| 优先级(Priority) | 解释说明 | 备注 |
| H | 高优先级 | *例：被依赖的需求优先级设置为H级别* |
| M | 中优先级 | *例：* |
| L | 低优先级 | *例：其余功能均设置为L级别* |
| N/A | 不适用 |  |

|  |  |  |
| --- | --- | --- |
| 类型  (Type) | 状态说明 | 备注 |
| Valid | 有效 | *例：表示需要对应* |
| InValid | 不适用 | *例：表示不做对应* |
| TBD | 检讨中 | *例：表示正在检讨中* |

说明：根据项目情况可自己定义，但需要明确

|  |  |  |
| --- | --- | --- |
| 状态  (Status) | 状态说明 | 备注 |
| Draft | 草稿 | *例：表示新建* |
| In Review | 评审中 | *例：表示处于评审中* |
| Approved | 批准 | *例：表示通过评审* |
| Released | 发布 | *例：表示通过客户确认* |
| Modified | 修改 | *例：表示正在检讨修改中* |

|  |  |  |
| --- | --- | --- |
| 变更类型  (Change Type) | 解释说明 | 备注 |
| 新增 | 与AutoSAR标准*XXX*相比，新增的需求。 | 如果有关于每个变更类型的特殊解释说明，请记录在此 |
| 修改 | 与AutoSAR标准*XXX*相比，发生了修改的需求 |  |
| 不变 | 与AutoSAR标准*XXX*相比，没有变更的需求。 |  |
| 删除 | 与AutoSAR标准*XXX*相比，没有变更的需求。 |  |

说明：根据项目情况可自己定义，但需要明确

附录B- 配置信息

|  |  |  |  |
| --- | --- | --- | --- |
| 配置信息 | 说明 | 范围 | 备注 |
| *API configuration class* |  | *1、2、3* |  |
|  |  |  |  |
|  |  |  |  |