AWD/4WD

<<Feature>>

(F001131 )

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# Introduction

## Document Purpose

The Feature Implementation Specification (FIS) specifies the deployment of the logical functions of a feature to an electrical architecture. The FIS specifies all interactions between the ECUs of the electrical architecture required for the feature including the technical signals and the interfaces. It also gives interface and integration requirements, which are specific to the feature for the electrical architecture.

To get more information about the concept of feature, function and component level abstraction refer to the [Ford RE Wiki](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Engineering+for+SW+Enabled+Features).

## Document Scope

This FIS describes the deployment of the feature AWD/4WD <Feature> to the following electrical architecture(s):

*No Electrical Architecture found.*

## Document Audience

The FIS is authored by - . All Stakeholders, i.e., all people who have a valid interest in the feature implementation should read and, if possible, review the FIS. It needs to be guaranteed, that all stakeholders have access to the currently valid version of the FIS.

### Stakeholder List

For the latest list of the function stakeholders and their roles & responsibilities refer to <Put VSEM Link here>.

## References

### Ford Documents

The list of all Ford internal documents, which are directly related.

| **Reference** | **Title** | **Doc. ID** | **Revision** | **Document Location** |
| --- | --- | --- | --- | --- |
| Ford GIS Standard | Ford GIS Standard |  |  |  |

Table 1‑2: Ford internal Documents

### External Documents and Publications

The list of external documents could include books, reports and online sources.

| **Reference** | **Document / Publication** |
| --- | --- |
| IEEE Std 1012-2004 IEEE Standard for Software Verification and Validation |  |
| ISO/IEC 19500-2:2003 |  |
| UML Testing Profile (UTP), v1.2 |  |
| Wikipedia | https://en.wikipedia.org/wiki/Concept |

Table 1‑3: External documents and publications

## Glossary

### Definitions

| **Definition** | **Description** |
| --- | --- |
| Feature Mode | Torque Modes provided by the AWD/4WD feature: 2Hi, 4Hi, 4L, 4Auto |
| High speed | Approximately more than 52 mph (83 kph) |
| Low speed | Approximately 12 to 36 mph (19 to 58 kph ) |
| Medium speed | Approximately 36 mph to 52 mph (58 to 83 kph) |
| Technician | Service employee responsible for maintenance |
| term glossary | A term glossary is a table of agreed upon definitions for terms used in project development that may provide clarity or avoid confusion to stakeholders. |
| Very Low Speed | Approximately 0 to 12 mph (0 to 19 kph) |

Table 1‑4: Definitions used in this document

### Abbreviations

| **Abbr.** | **Stands for** | **Description** |
| --- | --- | --- |
| 2H | Two High (2Hi) Feature Mode. |  |
| 4A | Automatic Four (4Auto) Feature Mode |  |
| 4H | Four High (4Hi) Feature Mode |  |
| 4L | Four Low Feature Mode. |  |
| 4WD | Four-Wheel Drive |  |
| ATLA | Another Three Letter Acronym |  |
| AWD | All-Wheel Drive |  |
| CAN | Controller Area Network |  |
| FWD | Front-Wheel Drive |  |
| HMI | Human-Machine Interface |  |
| KOL | Key Off Load |  |
| OBD | On-Board Diagnostic |  |
| RWD | Rear-Wheel Drive |  |
| SDM | Selectable Drive Mode |  |
| TLA | Three Letter Acronym |  |

Table 1‑5: Abbreviations used in this document.

# Feature Implementation Overview

## Description

AWD/4WD

AWD/4WD provides 4 drive traction by diverting torque from the primary axle to the secondary axle based on high-speed inputs. The feature uses various inputs like accelerator pedal position, steering wheel angle, Powertrain torque, and wheel speeds along with other vehicle dynamic inputs which are utilized by the AWD/4WD system to provide improved handling under all conditions.

## Input Requirements/Documents

|  |  |  |  |
| --- | --- | --- | --- |
| **Reference**  (Reference as listed in ch. “References”) | **Section/Requirement** | **Description** | **Derived Requirement**  (optional – reference to requirement in ch. “Feature Implementation Requirements”) |
| **Feature/Function Requirements** | | | |
|  | <Example:  id + title of relevant Function Spec> | <Example: “Function requirements of Logical Function …”> | <Note: If you reference a requirement in this column, then that requirement should have a trace link in its [“Source”/”Source Req.” attribute](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) field pointing back to the input requirement (or to a requirement inside the input document) given in this table row> |
|  |  |  |  |
| **Ford Engineering Standards** | | | |
|  | <Example: some SDS (requirement)> |  |  |
|  |  |  |  |
| **Legal Regulations** | | | |
|  | Compliance with FMVSS101 | The Feature shall comply with FMVSS101. |  |
|  |  |  |  |
| **Industry Standards** | | | |
|  | ISO 26262 | The system should be developed according to Ford's implementation of Functional Safety. |  |
|  |  |  |  |
| **Other Sources** | | | |
|  |  |  |  |
|  | Example AR |  |  |
|  |  |  |  |

Table 2‑1: Input Requirements/Documents

## Lessons Learned

No lessons learned specified.

## Assumptions

No Assumptions specified.

# Feature Implementation Architecture

## Physical Architecture

### E/E Architecture

#### E/E Architecture Variants

*No E/E Architecture Variant found.*

##### E/E Architecture “Architecture Variant”: Physical

##### Architecture

This E/E Architecture variant … <add some explanatory text here>

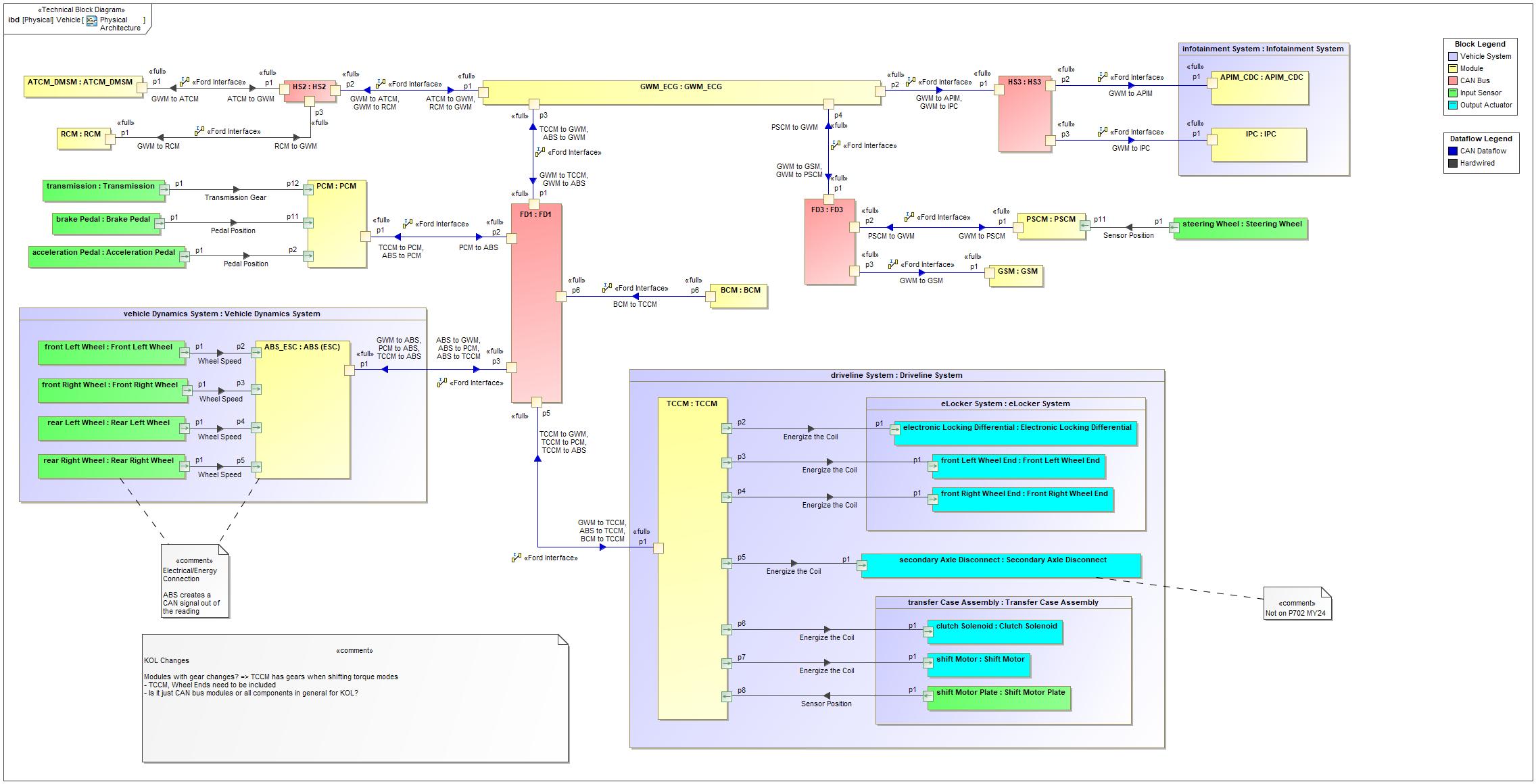


Figure 3‑2-1: Physical

Architecture

#### E/E Components

|  |  |
| --- | --- |
| Component Name | **Description** |
| ABS\_ESC (ABS (ESC)) | Anti-lock Braking System |
| acceleration Pedal (Acceleration Pedal) | Acceleration Pedal Component |
| APIM\_CDC | Accessory Protocol Interface Module (SYNC) |
| ATCM\_DMSM | All Terrain Control Module |
| BCM | Body Control Module |
| brake Pedal (Brake Pedal) | Brake Pedal Component |
| clutch Solenoid (Clutch Solenoid) | Clutch Solenoid Component |
| driveline System (Driveline System) | Driveline System |
| electronic Locking Differential (Electronic Locking Differential) | eLocker Component |
| eLocker System | eLocker System |
| FD1 | Flexible Data-Rate CAN Bus #1 |
| FD3 | Flexible Data-Rate CAN Bus #3 |
| front Left Wheel (Front Left Wheel) | Front Left Wheel Component |
| front Left Wheel End (Front Left Wheel End) | Front Left Wheel End Component |
| front Right Wheel (Front Right Wheel) | Front Right Wheel Component |
| front Right Wheel End (Front Right Wheel End) | Front Right Wheel End Component |
| GSM | Gear Shift Module |
| GWM\_ECG | Enhanced Communication Gateway (Gateway Module) |
| HS2 | High Speed CAN Bus #2 |
| HS3 | High Speed CAN Bus #3 |
| infotainment System (Infotainment System) | Infotainment System |
| IPC | Instrument Panel Cluster |
| PCM | Powertrain Control Module |
| PSCM | Power Steering Control Module |
| RCM | Restraint Control Module |
| rear Left Wheel (Rear Left Wheel) | Rear Left Wheel Component |
| rear Right Wheel (Rear Right Wheel) | Rear Right Wheel Component |
| secondary Axle Disconnect (Secondary Axle Disconnect) | Secondary Axle Disconnect Component |
| shift Motor (Shift Motor) | Shift Motor Component |
| shift Motor Plate (Shift Motor Plate) | Shift Motor Plate Component |
| steering Wheel (Steering Wheel) | Steering Wheel Component |
| TCCM | Transfer Case Control Module |
| transfer Case Assembly (Transfer Case Assembly) | Transfer Case Assembly |
| transmission (Transmission) | Transmission Component |
| vehicle Dynamics System (Vehicle Dynamics System) | Vehicle Dynamics System |

Table 3‑6: Electrical Components

#### E/E Connections

*No E/E Connections found.*

#### Signal List

|  |  |  |
| --- | --- | --- |
| **Signal Name** | **Description** | **Details** |

Table 3‑8: List of Technical Signals

### Software Component Architecture

*Not supported by MagicDraw report generation.*

#### Description

*Not supported by MagicDraw report generation.*

## Function Deployment

### Deployment Variants

*Not supported by MagicDraw report generation.*

#### Deployment “Variant 1”

This deployment variant … <add some explanatory text here>

No description specified.

### Function Allocation

| Component | Technology Function Name | Logical Function Name |
| --- | --- | --- |
|
| PSCM | Provide Steering Wheel Angle | * Determine Torque Allocation |  |
| Shift Motor Plate | Plate Sensing | * Operate Feature Mode Change |  |
| APIM\_CDC | Display Status of AWD System in Sync | * Display Torque Allocation Errors/Warnings |
| Display Allocated Torque | * Display Torque Allocation Distribution * Display Torque Allocation Errors/Warnings * Read Torque Allocation Feedback |  |
| BCM | Provide Ignition Status | * Determine Torque Allocation |  |
| IPC | Display 4x4 Shifting Message | * Send Shifting Progress Message * Recieve Controller Commands |
| Illuminate Indicator Lamps | * Receive Feature Mode Change Feedback |
| Display Status of AWD System in Cluster | * Display Torque Allocation Errors/Warnings |  |
| GWM\_ECG | Feature Mode Change CAN Arbitration | * Send Feature Mode Change Request |
| Torque Allocation CAN Arbitration | * Determine Torque Allocation * Read Torque Allocation Feedback * Request Torque Allocation |  |
| ATCM\_DMSM | Feature Mode Selection | * Switch/Knob Selection Change * Send Feature Mode Change Request |
| Light LEDs in Switch | * Update Switch/Knob LED * Update Switch/Knob LED to Blinking |  |
| TCCM | Arbitrate & Apply Feature Mode Change | * Operate Feature Mode Change |
| Feature Mode Change Indication | * Send Change Feedback to HMI |
| Determine Torque Calculation | * Determine Torque Allocation * Engage/Disengage Secondary Axle |
| AWD System Monitoring | * Operation Check |
| Request Calculated Torque | * Request Torque Allocation * Operate Feature Mode Change |
| MyMode Feature | *No logical function allocated* |
| Sleep Inhibit | * KOL Monitoring |  |
| ABS (ESC) | Provide Wheel Speeds | * Determine Torque Allocation |
| Provide Vehicle Sensors Data | * Determine Torque Allocation |  |
| PCM | Provide Pedal Positions | * Determine Torque Allocation |
| Provide Transmission Gear | * Determine Torque Allocation |
| Limit Powertrain Torque | * Determine Torque Allocation |  |
| Clutch Solenoid | Modify Clutch based on Feature Mode | * Operate Feature Mode Change |
| Apply Torque | * Apply Torque to Wheels |  |
| Shift Motor | Shift New Mode | * Operate Feature Mode Change |  |

Table 3‑9: Function Allocation Table (Basic)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Component | | Technology Function Name | TSR | |
| Name | ASIL |  | ID | ASIL |
| PSCM |  | Provide Steering Wheel Angle | * Steering Wheel Angle Provider |  |  |
| Shift Motor Plate |  | Plate Sensing | * Sensing Plate |  |  |
| APIM\_CDC |  | Display Status of AWD System in Sync | * Sync Displays State of Transfer Box and Off-Road Mode |  |
|  | Display Allocated Torque | * Sync Displays Allocated Torque |  |  |
| BCM |  | Provide Ignition Status | * Ignition Status Provider |  |  |
| IPC |  | Display 4x4 Shifting Message | * 4x4 Shifting Message in Cluster |  |
|  | Illuminate Indicator Lamps | * Cluster Telltale Indication of Feature Mode |  |
|  | Display Status of AWD System in Cluster | * Cluster Displays Status of AWD System |  |  |
| GWM\_ECG |  | Feature Mode Change CAN Arbitration | * CAN Arbitration for Feature Mode Change |  |
|  | Torque Allocation CAN Arbitration | * CAN Arbitration for Torque Allocation |  |  |
| ATCM\_DMSM |  | Feature Mode Selection | * ATCM Selection of Feature Mode |  |
|  | Light LEDs in Switch | * ATCM LEDs State |  |  |
| TCCM |  | Arbitrate & Apply Feature Mode Change | * Feature Mode Change Arbitration |  |
|  | Feature Mode Change Indication | * Indicate Feature Mode Change |  |
|  | Determine Torque Calculation | * Torque Calculation |  |
|  | AWD System Monitoring | * Monitor AWD System |  |
|  | Request Calculated Torque | * Calculated Torque Request |  |
|  | MyMode Feature | * MyMode |  |
|  | Sleep Inhibit | * Sleep Inhibit |  |  |
| ABS (ESC) |  | Provide Wheel Speeds | * Wheel Speeds Provider |  |
|  | Provide Vehicle Sensors Data | * Vehicle Sensor Data Provider |  |  |
| PCM |  | Provide Pedal Positions | * Pedal Positions Provider |  |
|  | Provide Transmission Gear | * Transmission Gear Provider |  |
|  | Limit Powertrain Torque | * Powertrain Torque Limited |  |  |
| Clutch Solenoid |  | Modify Clutch based on Feature Mode | * Clutch Modified based on Feature Mode |  |
|  | Apply Torque | * Clutch Applies Torque |  |  |
| Shift Motor |  | Shift New Mode | * New Feature Mode Shift |  |  |

Table 3‑10: Function Allocation Table (Functional Safety Extension)

# Feature Implementation Modeling

## Component Interaction Diagrams

### Scenario: “System Startup / Shutdown”

### Scenario: “Normal Operation”

## Component Interface Behavior Diagrams

*Not supported by MagicDraw report generation.*

*See Appendix Section 8.1.9 for Technology State Machines*

# Feature Implementation Requirements

## Functional Safety

### ASIL Decomposition of Technical Safety Requirements

<Place the input TSR here above the decomposition table>

| **Input TSR** | <Provide the ID of the TSR which shall be decomposed. That TSR is given above> | |
| --- | --- | --- |
| **Decomposition Rationale** | <Give a reason why the decomposition was performed> | |
| **Method for Decomposition** | Choose a Method | |
| **TSR 1 after Decomposition** | **TSR ID** | <Provide the ID of the decomposed TSR> |
| **TSR Title** | <Provide the title of the decomposed TSR> |
| **ASIL** |  |
| **Rationale** | <Provide a reason and thought behind that particular requirement. Should include how the requirement is able to independently fulfill the needs of the parent requirement> |
| **Satisfied by** | <Provide an Technology Function, physical signal, or physical component satisfying the requirement. This element shall be independent of the element satisfied by the other half of the ASIL decomposition.> |
| **TSR 2 after Decomposition** | **TSR ID** | <Provide the ID of the decomposed TSR> |
| **TSR Title** | <Provide the title of the decomposed TSR> |
| **ASIL** |  |
| **Rationale** | <Provide a reason and thought behind that particular requirement. Should include how the requirement is able to independently fulfill the needs of the parent requirement> |
| **Satisfied by** | <Provide an Technology Function, physical signal, or physical component satisfying the requirement. This element shall be independent of the element satisfied by the other half of the ASIL decomposition.> |
| **TSR for Independence**  *Note: should consider commonly used input, output and processing*  *Note: additional row should be added if additional* *requirements for Independence are necessary* | **TSR ID** |  |
| **TSR Title** |  |
| **ASIL** |  |
| **Rationale** |  |

Table 5‑1: ASIL Decomposition Table

## Requirements on Components

### APIM\_CDC

APIM\_CDC

#### Technology Function 990853839.jpg Display Status of AWD System in Sync

Component Function where the APIM Sync Screen displays the state of the Transfer Box and Off-Road Mode.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Display Status of AWD System in Sync | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Off-Road Mode | Off-Road Mode :  AwdOffRoadMode\_D\_Stats | | |  |  |  |
| Review in model  Transfer Box State | Transfer Box State :  AwdRnge\_D\_Actl | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Display Status of AWD System in Sync

###### Outputs

(No outputs have been defined)

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Sync Displays State of Transfer Box and Off-Road Mode

When "Display State of AWD Status in Sync" receives the inputs "Transfer Box State" and "Off-Road Mode", the APIM shall display the state of the Transfer Box and Off-Road Mode on it's Sync screen based on the input values.

Satisfied by:

* Functions:
  + Display Status of AWD System in Sync

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -1280581568.jpg Torque Allocation Errors/Warnings Display * -1280581568.jpg Torque Allocation Feedback Read | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 990853839.jpg Display Allocated Torque

Component Function where the APIM Sync Screen displays the percentage of allocated torque.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Display Allocated Torque | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Front Left Wheel | Front Left Wheel :  AwdLckWhlFl\_Pc\_RqDsply | | |  |  |  |
| Review in model  Front Right Wheel | Front Right Wheel :  AwdLckWhlFr\_Pc\_RqDsply | | |  |  |  |
| Review in model  Rear Left Wheel | Rear Left Wheel :  AwdLckWhlRl\_Pc\_RqDsply | | |  |  |  |
| Review in model  Rear Right Wheel | Rear Right Wheel :  AwdLckWhlRr\_Pc\_RqDsply | | |  |  |  |
| Review in model  Torque Commanded | Torque Commanded :  AwdLck\_Tq\_Rq | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Display Allocated Torque

###### Outputs

(No outputs have been defined)

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Sync Displays Allocated Torque

When "Display Allocated Torque" receives the inputs "Torque Commanded", "Front Left Wheel", "Front Right Wheel", "Rear Left Wheel" and "Rear Right Wheel", the APIM shall display their values on it's Sync Screen.

Satisfied by:

* Functions:
  + Display Allocated Torque

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -833123907.jpg Torque Allocation Distribution Display * -1280581568.jpg Torque Allocation Feedback Read | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### Shift Motor Plate

Shift Motor Plate

#### Technology Function -1950991330.jpg Plate Sensing

Component Function where the Shift Motor Plate sends it's detected position to the TCCM.

##### Function Interfaces

###### Inputs

(No inputs have been defined)

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Plate Sensing | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Plate Position | Plate Position : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Plate Sensing

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Sensing Plate

The "Plate Sensing" function shall send the Shift Motor Plate position in the Transfer Case Assembly as the electrical output "Plate Position".

Satisfied by:

* Functions:
  + Plate Sensing

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -1931841240.jpg Feature Mode Change Operation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### ABS (ESC)

ABS (ESC)

#### Technology Function 913990298.jpg Provide Wheel Speeds

Component Function where the ABS sends the current Wheel Speed reads to the TCCM.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Provide Wheel Speeds | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  FL Wheel Speed | FL Wheel Speed : | | |  |  |  |
| Review in model  FR Wheel Speed | FR Wheel Speed : | | |  |  |  |
| Review in model  RL Wheel Speed | RL Wheel Speed : | | |  |  |  |
| Review in model  RR Wheel Speed | RR Wheel Speed : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Provide Wheel Speeds

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Provide Wheel Speeds | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  FL Wheel Speed | FL Wheel Speed : | | |  |  |  |
| Review in model  FR Wheel Speed | FR Wheel Speed : | | |  |  |  |
| Review in model  RL Wheel Speed | RL Wheel Speed : | | |  |  |  |
| Review in model  RR Wheel Speed | RR Wheel Speed : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Provide Wheel Speeds

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Wheel Speeds Provider

When "Provide Wheel Speeds" receives the inputs "FL Wheel Speed", "FR Wheel Speed", "RL Wheel Speed" and "RR Wheel Speed", the ABS shall output "FL Wheel Speed", "FR Wheel Speed", "RL Wheel Speed" and "RR Wheel Speed" with the same values respectively.

Satisfied by:

* Functions:
  + Provide Wheel Speeds

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 913990298.jpg Provide Vehicle Sensors Data

Component Function where the ABS sends it's current Sensors Data to the TCCM.

##### Function Interfaces

###### Inputs

(No inputs have been defined)

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Provide Vehicle Sensors Data | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  output | output : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Provide Vehicle Sensors Data

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Vehicle Sensor Data Provider

When "Vehicle Sensor Data Provider" receives the input "Sensor Data", the ABS shall output "Sensor Data" with the same value.

Satisfied by:

* Functions:
  + Provide Vehicle Sensors Data

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### IPC

IPC

#### Technology Function 1933151176.jpg Display 4x4 Shifting Message

Component Function where the IPC Cluster Screen displays or hides the Feature Mode "Shifting In Progress" text message.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Display 4x4 Shifting Message | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  4x4 Message | 4x4 Message :  AwdStat\_D\_RqDsply | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Display 4x4 Shifting Message

###### Outputs

(No outputs have been defined)

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

4x4 Shifting Message in Cluster

When "Display 4x4 Shifting Message" receives the input "4x4 Message", the IPC shall show/hide the "Shifting In Progress" Cluster message based on the input value.

Satisfied by:

* Functions:
  + Display 4x4 Shifting Message

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * 1078520166.jpg Shifting Commands Received * 1078520166.jpg Shifting Progress Message Display * 1078520166.jpg Change Feedback to HMI Request | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function -1750089546.jpg Illuminate Indicator Lamps

Component Function where the IPC Cluster Screen displays the notification telltale lights of a Feature Mode Change.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Illuminate Indicator Lamps | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  4x2 Lamp | 4x2 Lamp :  Awd2wdLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4x4 Auto Lamp | 4x4 Auto Lamp :  AwdAutoLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4x4 High Lamp | 4x4 High Lamp :  AwdHiLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4x4 Low Lamp | 4x4 Low Lamp :  AwdLoLamp\_D\_RqDsply | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Illuminate Indicator Lamps

###### Outputs

(No outputs have been defined)

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Cluster Telltale Indication of Feature Mode

When "Illuminate Indicator Lamps" receives the inputs "4x4 Auto Lamp", "4x4 High Lamp", "4x2 Lamp" and "4x4 Low Lamp", the IPC shall display or hide their telltale indicator lamps based on it's value states on the Cluster Screen.

Satisfied by:

* Functions:
  + Illuminate Indicator Lamps

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -1931841240.jpg Feature Mode Change Operation * -1639975307.jpg Feature Mode Change Operation Errors/Warnings | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 990853839.jpg Display Status of AWD System in Cluster

Component Function where the IPC Cluster Screen displays the state of the Transfer Box.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Display Status of AWD System in Cluster | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Transfer Box State | Transfer Box State :  AwdRnge\_D\_Actl | | |  |  |  |
| Review in model  AWD Status | AWD Status :  AwdLck\_D\_Stat | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Display Status of AWD System in Cluster

###### Outputs

(No outputs have been defined)

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Cluster Displays Status of AWD System

When "Display State of AWD Status in Cluster" receives the inputs "AWD Status" and "Transfer Box State", the IPC shall display the state of the AWD System and Transfer Box on it's Cluster screen based on the input value.

Satisfied by:

* Functions:
  + Display Status of AWD System in Cluster

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -1280581568.jpg Torque Allocation Errors/Warnings Display | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### TCCM

TCCM

#### Technology Function -1950991330.jpg Arbitrate & Apply Feature Mode Change

Component Function where the TCCM is responsible for managing the request to change the current Torque Mode of the AWD System.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Arbitrate & Apply Feature Mode Change | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Selected Mode | Selected Mode : | | |  |  |  |
| Review in model  KOL Feedback | KOL Feedback : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Arbitrate & Apply Feature Mode Change

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Arbitrate & Apply Feature Mode Change | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Solenoid Power | Solenoid Power : | | |  |  |  |
| Review in model  Shift Motor Power | Shift Motor Power : | | |  |  |  |
| Review in model  4x4 Message | 4x4 Message : | | |  |  |  |
| Review in model  Shift In Progress | Shift In Progress : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Arbitrate & Apply Feature Mode Change

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Feature Mode Change Arbitration

When "Arbitrate & Apply Feature Mode Change" receives the input "Selected Mode", the TCCM shall send the "Solenoid Power" and "Shift Motor Power" based on it's input value and the output "4x4 Message"==IN PROGRESS.

Satisfied by:

* Functions:
  + Arbitrate & Apply Feature Mode Change

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * 572156603.jpg Feature Mode Change Request | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 913990298.jpg Feature Mode Change Indication

Component Function where the TCCM receives the confirmation feedback of a Feature Mode change and sends state indicators be displayed at the HMI.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Feature Mode Change Indication | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Clutch Feedback | Clutch Feedback : | | |  |  |  |
| Review in model  Shift Motor Feedback | Shift Motor Feedback : | | |  |  |  |
| Review in model  Plate Position | Plate Position : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Feature Mode Change Indication

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Feature Mode Change Indication | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  4x4 Message | 4x4 Message : | | |  |  |  |
| Review in model  4A Indicator | 4A Indicator : | | |  |  |  |
| Review in model  4H Indicator | 4H Indicator : | | |  |  |  |
| Review in model  2H Indicator | 2H Indicator : | | |  |  |  |
| Review in model  4L Indicator | 4L Indicator : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Feature Mode Change Indication

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Indicate Feature Mode Change

When "Feature Mode Change Indication" receives the inputs "Clutch Feedback", "Shift Motor Feedback" and the "Plate Position", the TCCM shall send the output "4x4 Message"==COMPLETED and use the following logic to set the remaining outputs:

- If the new Feature mode is 2 High, "2H Indicator"==0x1 ON

- If the new Feature mode is 4 Auto, "4A Indicator"==0x1 ON

- If the new Feature mode is 4 High, "4H Indicator"==0x1 ON

- If the new Feature mode is 4 Low, "4L Indicator"==0x1 ON

Satisfied by:

* Functions:
  + Feature Mode Change Indication

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -608526439.jpg Feature Mode Change Feedback Received * -1639975307.jpg Feature Mode Change Operation Errors/Warnings | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 913990298.jpg Determine Torque Calculation

Component Function responsible for calculating the required torque to be allocated into the vehicle wheels at the TCCM.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Determine Torque Calculation | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  FL Wheel Speed | FL Wheel Speed : | | |  |  |  |
| Review in model  Brake Pedal | Brake Pedal : | | |  |  |  |
| Review in model  AWD Status | AWD Status : | | |  |  |  |
| Review in model  input3 | input3 : | | |  |  |  |
| Review in model  Ignition Status | Ignition Status : | | |  |  |  |
| Review in model  Steering Angle | Steering Angle : | | |  |  |  |
| Review in model  Current SDM | Current SDM :  SelDrvMdeSwtch\_D\_Stat4 | | |  |  |  |
| Review in model  Selected Feature Mode | Selected Feature Mode : | | |  |  |  |
| Review in model  FR Wheel Speed | FR Wheel Speed : | | |  |  |  |
| Review in model  RL Wheel Speed | RL Wheel Speed : | | |  |  |  |
| Review in model  RR Wheel Speed | RR Wheel Speed : | | |  |  |  |
| Review in model  Acceleration Pedal | Acceleration Pedal : | | |  |  |  |
| Review in model  Transmission Gear | Transmission Gear : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Determine Torque Calculation

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Determine Torque Calculation | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Calculated Torque | Calculated Torque : | | |  |  |  |
| Review in model  SDM Request | SDM Request :  SelDrvMdeAwd\_D\_Rq | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Determine Torque Calculation

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Torque Calculation

When "Determine Torque Calculation" receives the inputs "Ignition Status", "Steering Angle", "Current SDM", "Selected Feature Mode", "Transmission Gear", "Acceleration Pedal", "Brake Pedal", "FL Wheel Speed", "FR Wheel Speed", "RL Wheel Speed", "RR Wheel Speed" and "AWD Status", the TCCM shall calculate the required torque to be allocated into the Vehicle Wheels and send it as the output "Calculated Torque".

Satisfied by:

* Functions:
  + Determine Torque Calculation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function -1792817294.jpg AWD System Monitoring

Component Function responsible for monitoring the state of the AWD System at the TCCM.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: AWD System Monitoring | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Request Feedback | Request Feedback : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function AWD System Monitoring

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: AWD System Monitoring | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Torque Limit | Torque Limit : | | |  |  |  |
| Review in model  AWD Status | AWD Status : | | |  |  |  |
| Review in model  Transfer Box State | Transfer Box State : | | |  |  |  |
| Review in model  Off-Road Mode | Off-Road Mode : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function AWD System Monitoring

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Monitor AWD System

When "AWD System Monitoring" receives the input "Request Feedback", the TCCM shall send it's outputs "AWD State", "Transfer Box State", "Off-Road Mode" and "Torque Limit" based on the current state of the AWD System.

Satisfied by:

* Functions:
  + AWD System Monitoring

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * 595632611.jpg Check Torque Operation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function -1950991330.jpg Request Calculated Torque

Component Function where the TCCM request the new torque to be allocated into the driveline system.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Request Calculated Torque | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Calculated Torque | Calculated Torque : | | |  |  |  |
| Review in model  Clutch Feedback | Clutch Feedback : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Request Calculated Torque

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Request Calculated Torque | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Torque Commanded Display | Torque Commanded Display : | | |  |  |  |
| Review in model  FL Wheel Display | FL Wheel Display : | | |  |  |  |
| Review in model  FR Wheel Display | FR Wheel Display : | | |  |  |  |
| Review in model  RL Wheel Display | RL Wheel Display : | | |  |  |  |
| Review in model  Request Feedback | Request Feedback : | | |  |  |  |
| Review in model  RR Wheel Display | RR Wheel Display : | | |  |  |  |
| Review in model  Torque Request | Torque Request : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Request Calculated Torque

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Calculated Torque Request

When "Request Calculated Torque" receives the input "Calculated Torque", the TCCM shall send the "Torque Request" electrical output to the Clutch Solenoid and wait for the input "Clutch Feedback" to assign the outputs "Request Feedback", "Torque Commanded Display", "FL Wheel Display", "FR Wheel Display", "RL Wheel Display" and "RR Wheel Display".

Satisfied by:

* Functions:
  + Request Calculated Torque

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * 696181427.jpg Secondary Axle Disengagement * 696181427.jpg Torque Allocation Request * -107380983.jpg Calculate Torque Allocation * 696181427.jpg Secondary Axle Engagement | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function -1158144272.jpg MyMode Feature

Component Function where the TCCM receives the MyMode Feature selection.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: MyMode Feature | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  MyMode | MyMode :  AwdMdeCstm\_D\_RqDrv | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function MyMode Feature

###### Outputs

(No outputs have been defined)

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

MyMode

When "MyMode Feature" receives the input "MyMode", the TCCM shall apply it's value to the AWD System.

Satisfied by:

* Functions:
  + MyMode Feature

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 532654893.jpg Sleep Inhibit

Component Function where the TCCM receives the requests to continue it's functionality when the vehicle ignition goes Off.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Sleep Inhibit | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Shift In Progress | Shift In Progress : | | |  |  |  |
| Review in model  Ignition Status | Ignition Status : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Sleep Inhibit

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Sleep Inhibit | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  KOL Feedback | KOL Feedback : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Sleep Inhibit

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Sleep Inhibit

When "Sleep Inhibit" receives the inputs "Ignition Status", "Shift In Progress" and "KOL Request", it shall output "KOL Feedback".

Satisfied by:

* Functions:
  + Sleep Inhibit

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * 1997486090.jpg Monitoring KOL | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### PCM

PCM

#### Technology Function 913990298.jpg Provide Pedal Positions

Component Function where the PCM sends the current Acceleration and Brake pedal positions to the TCCM.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Provide Pedal Positions | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Acceleration Pedal | Acceleration Pedal : | | |  |  |  |
| Review in model  Brake Pedal | Brake Pedal : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Provide Pedal Positions

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Provide Pedal Positions | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Brake Pedal | Brake Pedal : | | |  |  |  |
| Review in model  Acceleration Pedal | Acceleration Pedal : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Provide Pedal Positions

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Pedal Positions Provider

When "Provide Pedal Positions" receives the inputs "Acceleration Pedal" and "Brake Pedal", the PCM shall output "Acceleration Pedal" and "Brake Pedal" with the same value respectively.

Satisfied by:

* Functions:
  + Provide Pedal Positions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 913990298.jpg Provide Transmission Gear

Component Function where the PCM sends the current Transmission Gear to the TCCM.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Provide Transmission Gear | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Transmission Gear | Transmission Gear : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Provide Transmission Gear

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Provide Transmission Gear | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Transmission Gear | Transmission Gear : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Provide Transmission Gear

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Transmission Gear Provider

When "Provide Transmission Gear" receives the input "Transmission Gear", the PCM shall output "Transmission Gear" with the same value.

Satisfied by:

* Functions:
  + Provide Transmission Gear

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 913990298.jpg Limit Powertrain Torque

Component Function where the PCM receives a request of a torque limit to be applied.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Limit Powertrain Torque | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Torque Limit | Torque Limit : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Limit Powertrain Torque

###### Outputs

(No outputs have been defined)

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Powertrain Torque Limited

When "Limit Powertrain Torque" receives the input "Torque Limit", the PCM shall use it's value as the limit of torque to be allocated into the wheels.

Satisfied by:

* Functions:
  + Limit Powertrain Torque

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### GWM\_ECG

GWM\_ECG

#### Technology Function -1950991330.jpg Feature Mode Change CAN Arbitration

Component Function responsible for managing the CAN communication at the GWM during the Feature Mode Change operation.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Feature Mode Change CAN Arbitration | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Selected Mode | Selected Mode :  AwdMde\_D\_RqDrv | | |  |  |  |
| Review in model  4x4 Message | 4x4 Message : | | |  |  |  |
| Review in model  4A Indicator | 4A Indicator : | | |  |  |  |
| Review in model  4H Indicator | 4H Indicator : | | |  |  |  |
| Review in model  2H Indicator | 2H Indicator : | | |  |  |  |
| Review in model  4L Indicator | 4L Indicator : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Feature Mode Change CAN Arbitration

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Feature Mode Change CAN Arbitration | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  4A LED | 4A LED :  AwdAutoLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4H LED | 4H LED :  AwdHiLamp\_D\_RqDsply | | |  |  |  |
| Review in model  2H LED | 2H LED :  Awd2wdLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4L LED | 4L LED :  AwdLoLamp\_D\_RqDsply | | |  |  |  |
| Review in model  Selected Mode | Selected Mode : | | |  |  |  |
| Review in model  4x4 Message | 4x4 Message :  AwdStat\_D\_RqDsply | | |  |  |  |
| Review in model  4x4 Auto Lamp | 4x4 Auto Lamp :  AwdAutoLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4x4 High Lamp | 4x4 High Lamp :  AwdHiLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4x2 Lamp | 4x2 Lamp :  Awd2wdLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4x4 Low Lamp | 4x4 Low Lamp :  AwdLoLamp\_D\_RqDsply | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Feature Mode Change CAN Arbitration

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

CAN Arbitration for Feature Mode Change

The "Feature Mode Change CAN Arbitration" shall use the following logic to set the GWM outputs:

- If the input "Selected Mode" is received, the output "Selected Mode" shall be sent with the same value.

- If the input "4x4 Message" is received, the output "4x4 Message" shall be sent with the same value.

- If the input "4A Indicator" is received, the outputs "4A LED" and "4x4 Auto Lamp" shall be sent with the same value.

- If the input "4H Indicator" is received, the outputs "4H LED" and "4x4 High Lamp" shall be sent with the same value.

- If the input "2H Indicator" is received, the outputs "2H LED" and "4x2 Lamp" shall be sent with the same value.

- If the input "4L Indicator" is received, the outputs "4L LED" and "4x4 Low Lamp" shall be sent with the same value.

Satisfied by:

* Functions:
  + Feature Mode Change CAN Arbitration

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -1931841240.jpg Feature Mode Change Operation * 572156603.jpg Feature Mode Change Request | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function 913990298.jpg Torque Allocation CAN Arbitration

Component Function responsible for managing the CAN communication at the GWM during the Torque Allocation operation.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Torque Allocation CAN Arbitration | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  SDM Request | SDM Request :  SelDrvMdeAwd\_D\_Rq | | |  |  |  |
| Review in model  Torque Command Display | Torque Command Display : | | |  |  |  |
| Review in model  FL Wheel Display | FL Wheel Display : | | |  |  |  |
| Review in model  FR Wheel Display | FR Wheel Display : | | |  |  |  |
| Review in model  RL Wheel Display | RL Wheel Display : | | |  |  |  |
| Review in model  RR Wheel Display | RR Wheel Display : | | |  |  |  |
| Review in model  AWD Status | AWD Status : | | |  |  |  |
| Review in model  Transfer Box State | Transfer Box State : | | |  |  |  |
| Review in model  Off-Road Mode | Off-Road Mode : | | |  |  |  |
| Review in model  Steering Angle | Steering Angle : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Torque Allocation CAN Arbitration

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Torque Allocation CAN Arbitration | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Front Left Wheel | Front Left Wheel :  AwdLckWhlFl\_Pc\_RqDsply | | |  |  |  |
| Review in model  Front Right Wheel | Front Right Wheel :  AwdLckWhlFr\_Pc\_RqDsply | | |  |  |  |
| Review in model  Rear Left Wheel | Rear Left Wheel :  AwdLckWhlRl\_Pc\_RqDsply | | |  |  |  |
| Review in model  Rear Right Wheel | Rear Right Wheel :  AwdLckWhlRr\_Pc\_RqDsply | | |  |  |  |
| Review in model  Off-Road Mode | Off-Road Mode :  AwdOffRoadMode\_D\_Stats | | |  |  |  |
| Review in model  MyMode | MyMode :  AwdMdeCstm\_D\_RqDrv | | |  |  |  |
| Review in model  AWD Status | AWD Status :  AwdLck\_D\_Stat | | |  |  |  |
| Review in model  Torque Commanded | Torque Commanded :  AwdLck\_Tq\_Rq | | |  |  |  |
| Review in model  Transfer Box State | Transfer Box State :  AwdRnge\_D\_Actl | | |  |  |  |
| Review in model  Current SDM | Current SDM :  SelDrvMdeSwtch\_D\_Stat4 | | |  |  |  |
| Review in model  Selected Feature Mode | Selected Feature Mode : | | |  |  |  |
| Review in model  Steering Angle | Steering Angle : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Torque Allocation CAN Arbitration

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

CAN Arbitration for Torque Allocation

The "Torque Allocation CAN Arbitration" shall use the following logic to set the GWM outputs:

- If the input "Steering Angle" is received, the output "Steering Angle" shall be sent with the same value.

- If the input "SDM Request" is received, the output "Current SDM" shall be sent with the current value of the SDM parameter.

- If the input "Off-Road Mode" is received, the output "Off-Road Mode" shall be sent with the same value.

- If the input "Transfer Box Mode" is received, the output "Transfer Box Mode" shall be sent with the same value.

Satisfied by:

* Functions:
  + Torque Allocation CAN Arbitration

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * 595632611.jpg Check Torque Operation * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### PSCM

PSCM

#### Technology Function 913990298.jpg Provide Steering Wheel Angle

Component Function where the PSCM sends the current Steering Wheel Angle to the TCCM.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Provide Steering Wheel Angle | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Steering Angle | Steering Angle : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Provide Steering Wheel Angle

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Provide Steering Wheel Angle | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Steering Angle | Steering Angle : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Provide Steering Wheel Angle

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Steering Wheel Angle Provider

When "Provide Steering Wheel Angle" receives the input "Steering Angle", the PSCM shall output "Steering Angle" with the same value.

Satisfied by:

* Functions:
  + Provide Steering Wheel Angle

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### ATCM\_DMSM

ATCM\_DMSM

#### Technology Function -449566432.jpg Feature Mode Selection

Component Function responsible for sending a request when a new Feature Mode has been selected at the ATCM.

##### Function Interfaces

###### Inputs

(No inputs have been defined)

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Feature Mode Selection | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Selected Mode | Selected Mode :  AwdMde\_D\_RqDrv | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Feature Mode Selection

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

ATCM Selection of Feature Mode

The "Feature Mode Selection" function shall read the new selected Feature Mode at the ATCM to send it as it's "Selected Mode" output.

Satisfied by:

* Functions:
  + Feature Mode Selection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * 1511580738.jpg Selection Change in Switch/Knob | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function -1727136102.jpg Light LEDs in Switch

Component Function responsible for the light state of the LEDs to be displayed at the ATCM.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Light LEDs in Switch | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  4L LED | 4L LED :  AwdLoLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4H LED | 4H LED :  AwdHiLamp\_D\_RqDsply | | |  |  |  |
| Review in model  4A LED | 4A LED :  AwdAutoLamp\_D\_RqDsply | | |  |  |  |
| Review in model  2H LED | 2H LED :  Awd2wdLamp\_D\_RqDsply | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Light LEDs in Switch

###### Outputs

(No outputs have been defined)

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

ATCM LEDs State

When "Light LEDs in Switch" receives the inputs "4A LED", "4H LED", "2H LED" and "4L LED", the ATCM shall light it's LED's using the following logic:

- If "4A LED"==0x0 OFF, the 4A LED in the Switch will be off. If "4A LED"==0x1 ON, the 4A LED in the Switch will be on. If "4A LED"==0x2 FLASH, the 4A LED in the Switch will be blinking.

- If "4H LED"==0x0 OFF, the 4H LED in the Switch will be off. If "4H LED"==0x1 ON, the 4H LED in the Switch will be on. If "4H LED"==0x2 FLASH, the 4H LED in the Switch will be blinking.

- If "2H LED"==0x0 OFF, the 2H LED in the Switch will be off. If "2H LED"==0x1 ON, the 2H LED in the Switch will be on. If "2H LED"==0x2 FLASH, the 2H LED in the Switch will be blinking.

- If "4L LED"==0x0 OFF, the 4L LED in the Switch will be off. If "4L LED"==0x1 ON, the 4L LED in the Switch will be on. If "4L LED"==0x2 FLASH, the 4L LED in the Switch will be blinking.

Satisfied by:

* Functions:
  + Light LEDs in Switch

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -1335735228.jpg Switch/Knob Selection LED Blink * -1335735228.jpg Switch/Knob Selection LED ON | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### Clutch Solenoid

Clutch Solenoid

#### Technology Function -1950991330.jpg Modify Clutch based on Feature Mode

Component Function where the clutch solenoid is modified based on the new Feature Mode shift.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Modify Clutch based on Feature Mode | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Solenoid Power | Solenoid Power : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Modify Clutch based on Feature Mode

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Modify Clutch based on Feature Mode | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Clutch Feedback | Clutch Feedback : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Modify Clutch based on Feature Mode

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Clutch Modified based on Feature Mode

When "Modify Clutch based on Feature Mode" receives the input "Solenoid Power", the Clutch Solenoid in the Transfer Case Assembly shall apply the shift based on the input power and send it's electrical feedback as the output "Clutch Feedback".

Satisfied by:

* Functions:
  + Modify Clutch based on Feature Mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -1931841240.jpg Feature Mode Change Operation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

#### Technology Function -1750089546.jpg Apply Torque

Component Function where the Clutch applies the requested torque to the vehicle wheels.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Apply Torque | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Torque Request | Torque Request : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Apply Torque

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Apply Torque | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Clutch Feedback | Clutch Feedback : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Apply Torque

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Clutch Applies Torque

When "Apply Torque" receive the input "Torque Request", the Clutch Solenoid shall apply it's value as torque to the wheels and send it's electrical feedback as the output "Clutch Feedback".

Satisfied by:

* Functions:
  + Apply Torque

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * 526723618.jpg Torque Applied to Wheels | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### Shift Motor

Shift Motor

#### Technology Function -1950991330.jpg Shift New Mode

Component Function where the Shift Motor in the Transfer Case changes it's current Torque Mode based on the request from the TCCM.

##### Function Interfaces

###### Inputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inputs: Shift New Mode | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Review in model  Shift Motor Power | Shift Motor Power : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Inputs | | | |

Table 5‑2: Input Signal mappings of Function Shift New Mode

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Shift New Mode | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Shift Motor Feedback | Shift Motor Feedback : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Shift New Mode

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

New Feature Mode Shift

When "Shift New Mode" receives the input "Shift Motor Power", the Shift Motor in the Transfer Case Assembly shall apply the shift based on the input power and send it's electrical feedback as the output "Shift Motor Feedback".

Satisfied by:

* Functions:
  + Shift New Mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -1931841240.jpg Feature Mode Change Operation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

### BCM

BCM

#### Technology Function 913990298.jpg Provide Ignition Status

Component Function where the BCM sends the Ignition Status to the TCCM.

##### Function Interfaces

###### Inputs

(No inputs have been defined)

###### Outputs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outputs: Provide Ignition Status | | | | | | |
| **Logical Signal Name** | **Technical Signal Name** | | | **Mapping Details** *(Conditional)* | **Publisher Interface** | **Connection**  (*Optional)* |
| Review in model  Ignition Status | Ignition Status : | | |  |  |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1 | End of Outputs | | | |

Table 5‑3: Output Signal mappings of Function Provide Ignition Status

###### Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |

Table 5‑2: Parameter mappings of Function “MyLogicalFunctionA\_Component1”

###### Interface Requirements

##### Function Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) | **Comment** |
| REQ\_abc |  | Removed | -- |  |
| REQ\_def |  | Replaced | REQ\_xyz |  |
| -- |  | Added | REQ\_123 |  |

Table 5‑3: Component Specific Requirements

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑4: Inherited Requirements

###### Component Specific Requirements

Ignition Status Provider

When "Provide Ignition Status" receives the input "Ignition Status", the BCM shall output "Ignition Status" with the same value.

Satisfied by:

* Functions:
  + Provide Ignition Status

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** |  | | | | | | |
| **Source** |  | | | | | **Owner** | Dave Thompson  Anthony Ward |
| **Source Req.** | * -107380983.jpg Calculate Torque Allocation | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** | 1 - High | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

## Requirements on Connections

### Networks

#### “CAN Bus xxx”

##### Protocol Requirements

##### Electrical Requirements

#### “LIN Bus xxx”

##### Protocol Requirements

###### Schedule Table

##### Electrical Requirements

#### “Ethernet xxx”

### HW I/Os

#### “HW I/O xxx”

## Requirements on Development Process

# Open Concerns

| ID | Concern Description | e-Tracker Reference | Status | Solution |
| --- | --- | --- | --- | --- |
| 1 | How to fully capture Wake/Sleep requirements. Currently we have a mismatch between what is captured in old EuCD SRD requirements and what is captured in AIS Publisher Interfaces (Publishing Network Sleep Inhibitor, Network Wake Up) |  | Open | Extend AIS attributes? |
| 2 | Clarify how to export Message list entries from CMDB in VSEM |  | Open |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |

Table 6‑1: Open Concerns

# Revision History

No Revision History found.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Revision | Date | Description | Approved by | Responsible |
| A |  | Initial version |  | Jbaden1 |
|  |  |  |  |  |

## Template Revisions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Version | Rev. | Date | Description | Responsible |
| 0 | 2 | 2015-08-05 | * TOC corrected * Document Properties adapted to match needs of VBA macros | Awegman1 |
| 1 | 0 | 2015-11-16 | * Revision History moved to chapter 7 * Table-Styles removed | Awegman1 |
| 1 | 1 | 2016-03-02 | * Rework according to PCL example | Jbaden1 |
| 1 | 2 | 2016-03-22 | * V1.3: Footer formating corrected (Issue 19) * “Constraints” chapter renamed to “Input Requirements” (Issue 20) | Jbaden1 |
| 1 | 3 | 2016-04-20 | * Broken Wiki links repaired | Jbaden1 |
| 2 | 0 | 2016-05-23 | * Prepared for Specification\_Macros.dotm v2.0 * Additional explanations added to ch. 2.2 “Input Requirements” (ARL and SDS requirements often go here) | Jbaden1 |
| 2 | 1 | 2016-07-08 | * Template version added to footer | Jbaden1 |
| 2 | 2 | 2016-07-15 | * Sample SysML diagrams added * Data Dictionary reworked * Alignment with relevant sections in SRD templated | Jbaden1 |
| 3 | 0 | 2016-09-05 | * Lessons learned from IPRB incorporated | Jbaden1 |
| 4 | 0 | 2016-09-27 | * Alignment with QPIP Feature Function Ownership workstream. Platform Spec renamed to Feature Implementation Spec | Jbaden1 |
| 4 | 1 | 2016-11-04 | * Chapters “Purpose” and “Scope” reworked. | Jbaden1 |
| 4 | 1 | 2016-11-10 | * Subsection for “Logical Service Interfaces” added. | Jbaden1 |
| 5 | 0 | 2017-01-13 | * Meta data updated for specification macros, version 3.1 * SW Unit chapter removed for the time being * Green boxes added for user hints | Jbaden1 |
| 5 | 1 | 2017-01-18 | * Minor editorial changes (e.g. hyperlinks highlighted in comments) | Jbaden1 |
| 5 | 1b | 2017-01-20 | * Some editorial corrections * Substructure of old Network Communication (now Connections) moved to Requirements on Connections | Jbaden1 |
| 6 | 0 | 2018-07-24 | * CR53: * Add new cover sheet * Add disclaimer section * Add the following meta-data to the doc properties for the the new cover sheet   + DocGis1ItemNumber   + DocGis2Classification   + DocType   + DocStatus   + DocIssueDate   + DocReleaseDate * CR63: Update FuSa sharepoint references in templates | Jbaden1 |
| 6 | 0 | 2018-08-06 | * CR81: Incorporate lessons learned from System Service Spec pilot (Vehicle Speed) into AFS and FIS | Jbaden1 |
| 6 | 0 | 2018-09-28 | * Broken links to RE Wiki repaired | Jbaden1 |
| 6 | 0 | 2018-10-31 | * Minor corrections on cover sheet and in footer to be more GIS compliant and VSEM aligned * “Overview” and “Description” exchanged in headings (following common sense) | Jbaden1 |
| 6 | 0 | 2018-11-30 | * Update of Functional Safety sections after review by Functional Safety Team * Initial support for variant handling | Jbaden1 |
| 6 | 0 | 2018-12-01 | * Variant condition fields added consistently * Links updated | Jbaden1 |
| 6 | 0 | 2018-12-11 | * Variant condition fields removed from mapping/allocation tables * Mapping tables simplified * Explanatory text for “Variants” sections revised | Jbaden1 |
| 6 | 0a | 2019-01-04 | * Chapter heading “Inherited Function Requirements” removed. Corresponding table renamed to “Requirements not cascaded”. * E/E Connection table got another column for allocated messages * Naming conventions for Implemented Functions corrected (FncName\_CmpName instead of FncName\_on\_CmpName) * Editorial corrections on the cover sheet * Explanatory text added to “Ethernet” section in chapter “Requirements on Connections” * AIS templates updated. Linked to Wiki page | Jbaden1 |
| 6 | 0a | 2019-01-04 | * Minor restructuring in FuSa chapter – after aligning with ECU Functional Spec * Bugfix: table 13 renamed from FTTI table to FHT table, includes a bug fix: each FSR is allocated to only one ECU/component | Jbaden1 |
| 6 | 0b | 2019-02-04 | * Change: Chapter “Interface Requirements” added to “Implemented Function xxx” section (to have a single chapter for to collect subscriber/publisher interface and mapping requirements which to not conform to the corresponding Data Dictionary objects) * Change: “CAN Interface” subsection renamed to “AIS Interfaces” again. Although several Subscriber/Publisher interface attributes are probably CAN bus specific, other attributes seem to be well suited for other networks than CAN. * Change: Chapter “ECU Specific Requirements” renamed to “Component Specific Requirements” in chapter “Implemented Function xxx”. Table “Requirements not cascaded” renamed to “Component Specific Requirements” and refined to describe changes from Logical Function requirements set more formally. This is also to help during VSEM import to identify those requirements of the Logical Function which cannot be simply carried over to the ECU. * Change: Explanatory text in section “Implemented Function xxx” improved. | Jbaden1 |
| 6 | 0c | 2019-02-05 | * Change: Layout of AIS Interfaces in Data Dictionary reworked to enable Excel Import | Jbaden1 |
| 6 | 0c | 2019-02-20 | * Bugfix: In AIS Interfaces none-picklist fields formatted as invisible | Jbaden1 |
| 6 | 1a | 2019-02-05 | Functional Safety related changes:   * Table “Architectural Redundancy Summary” updated * Section “Functional Flows for FTTI ‘xyz’” added to chapter “Component Interaction Diagrams” * Fault Tolerant Time Summary section added to Functional Safety chapter * Chapter “HW Metrics” added | Jbaden1 |
| 6 | 1a | 2019-04-02 | Headings of “Architectural Redundancy Summary” table clarified | Jbaden1 |
| 6 | 1a | 2019-04-10 | * ASIL Decomposition table moved from Function Spec into the Feature Implementation Spec (ASIL Decomposition of Technical Safety Requirements) * 2 alternative versions of the Function Allocation Table (Standard variant vs. Functional Safety variant) placed next to each other. | Jbaden1 |
| 6 | 1a | 2019-05-31 | * Function Allocation Table split into a base (non FuSa) part and a FuSa part to allow a more flexible mapping of MBSE functions (Logical and Technology) to RE functions (Atomic Logical and Implemented). | Jbaden1 |
| 6 | 1a | 2019-05-31 | * “Input Requirement” section reworked (symmetrically to all other templates). * Sections “Functional Flows for FTTI xyz” and “Fault Tolerant Time Summary” removed, because guidance is not available yet. * “Reference” and “Glossary” section moved back to introduction, i.e., to the very beginning of the document (such that also section 2 can already rely on it). * Some mostly editorial changes per request from FuSa team. | Jbaden1 |
| 6 | 1a | 2019-07-02 | * "Important" box added on cover sheet which points to the macros * “Input Requirements” section renamed to Input Information (after discussion with FuSa team) | Jbaden1 |
| 6 | 1a | 2019-07-17 | * Chapter “Message List” removed from CAN and LIN specific chapters of section “Requirements on Connections” | Jbaden1 |
| 6 | 1a | 2019-10-08 | * Chapter “ASIL Decomposition of Technical Safety Requirements”: Input TSRs are specified in the chapter right above the decomposition table. | Jbaden1 |
| 6 | 1a | 2019-10-09 | * Chapter “Service Oriented Communication” moved to section “Messages” in the Data Dictionary. Details from Central SW Wiki about FNV2 SOA added | Jbaden1 |
| 6 | 1a | 2019-10-25 | * Minor updates for HW IOs/Signals * Subsection “Functional Safety” removed from chapter “Feature Implementation Modeling”. Per requrest from FuSa team since no guidance is available how to model e.g. FHT timing diagram. | Jbaden1 |
| 6 | 1a | 2019-05-11 | * Copyright notice shortened and moved to cover sheet and added to footer (to be compliant [with Ford copyright guidelines](http://www.fgti.ford.com/client/NewFGTI/CopyrightNotice.html)) * Term “Disclaimer” no longer used for what is actually only a copyright notice | Jbaden1 |
| 6 | 1a | 2019-22-11 | * Some minor modifications for the SOA APIs/MQTT Messages in the section “Messages” of the Data Dictionary (section references Service Contracts via the API name) * Some minor updates of the Input/Output mapping tables in section “Requirements on Components” for mappings to SOA APIs and EDAS signals. | Jbaden1 |
| 6 | 1a | 2019-12-05 | * Upstream Documents section added to “Input Requirements/Documents” table * Custom style table formatting removed | Jbaden1 |
| 6 | 1a | 2020-01-07 | * Some fine tuning for naming conventions of E/E components and connections. * List of HW I/O signal types reduced to RF-A, RF-D, D, A, Networked and PWM. * Protocol column added to the E/E connection table | Jbaden1 |
| 6 | 1a | 2020-01-07 | * “HW Metric” and “Architecture Redundancy Summary” sections removed per request from the Functional Architecture Team (based on Governance Board decision [FSTGB-97](mailto:TrackLite%20%23%20FSTGB-97:%20https://www.tracklite.ford.com/prweb/PRAuth/TrackLiteSSO?pyActivity=@baseclass.RedirectAndRunWraper&ThreadName=WorkLinkThread&bPurgeTargetThread=true&AccessGroupName=FSTGB:ProjectAdministrators&Location=pyActivity%3DWork-.Open%26Action%3DReview%26HarnessPurpose%3DReview%26InsHandle%3DFORD-FSTGB-WORK+FSTGB-97)) * “Functional Safety” chapter moved to “Feature Implementation Requirements” section. “Function Allocation” chapter seemed no longer appropriate. | Jbaden1 |
| 6 | 1a | 2020-01-07 | * Ordering of fields in AIS interfaces tables modified to conform with the Macro Template and the Importer Sheet * Page Header: no longer in bold letters | Jbaden1 |
| 6 | 1a | 2020-03-09 | * Missing doc property “LatestSigMappingID” and “LatestAisInterfaceID” added * doc property “CopyrightDate” re-formatted to text and copyright date field in footer corrected * Version numbering re-initialized as 0.1 * Init value of version/revision date set to “yyyy/mm/dd” instead of “yyyy-mm-dd” to be in line with the “Edit Document Property” dialog * Type of “Latest….ID” doc properties changed from Text to Number | Jbaden1 |
| 6 | 1a | 2020-03-11 | * “Mapping” table removed from template. Has been migrated to macro. | Jbaden1 |
| 6 | 1a | 2020-03-13 | * Separate chapter “Technical Safety Requirements” removed. Content already covered by Allocation Table in chapter Function Allocation. * “Implemented Function” replaced by term “Technology Function” | Jbaden1 |

# Appendix

## Data Dictionary

### Logical Signals

Actuation Status

|  |  |  |
| --- | --- | --- |
| **ASIL** | | Choose an item. |
| **Encoding Type Name** | |  |
| Note: An encoding is either discrete or continuous. Delete fields below which are not needed | | |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) | Value 1 |  |
| Value 2 | … |
| … | … |
|  |  |
|  |  |
| **Unit** | |  |

Table: Signal Details of Actuation Status

User Command

|  |  |  |
| --- | --- | --- |
| **ASIL** | | Choose an item. |
| **Encoding Type Name** | |  |
| Note: An encoding is either discrete or continuous. Delete fields below which are not needed | | |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) | Value 1 |  |
| Value 2 | … |
| … | … |
|  |  |
|  |  |
| **Unit** | |  |

Table: Signal Details of User Command

User Feedback

|  |  |  |
| --- | --- | --- |
| **ASIL** | | Choose an item. |
| **Encoding Type Name** | |  |
| Note: An encoding is either discrete or continuous. Delete fields below which are not needed | | |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) | Value 1 |  |
| Value 2 | … |
| … | … |
|  |  |
|  |  |
| **Unit** | |  |

Table: Signal Details of User Feedback

### Logical Parameters

### Technical Signals

|  |  |  |
| --- | --- | --- |
| **Signal Name** | **Description** | **Details** |
| **TorqueAllocationDisplay** | Full feedback message from the torque allocation feature process, containing the torque percentages and error and warning messages | Satisfies:  *No reqs. satisfied* |
| **AwdLckWhlRl\_Pc\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **AwdSrvcRqd\_B\_Rq** |  | Satisfies:  *No reqs. satisfied* |
| **Actuation Status** |  | Satisfies:  *No reqs. satisfied* |
| **Example Signal** | The description of the signal in the Documentation field. | Satisfies:  *No reqs. satisfied* |
| **WheelSpeed\_FrontRight** | Wheel Speed measurement in the front right wheel | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocation\_FrontLeft** | Command created by the feature to allocate torque into the front left wheel | Satisfies:  *No reqs. satisfied* |
| **I/O\_Shaft** | Current state of the Input/Output shaft | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocationDisplay\_Wheels\_RearLeft** | Percentage of torque allocated in the rear left wheel displayed at the HMI | Satisfies:  *No reqs. satisfied* |
| **AwdLck\_Tq\_Actl** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLckTqNeg\_B\_Actl** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLatDelta\_B\_Rq** |  | Satisfies:  *No reqs. satisfied* |
| **4A/4H/2H/4L Mode** |  | Satisfies:  *No reqs. satisfied* |
| **SelDrvMdeSwtch\_D\_Stat4** |  | Satisfies:  *No reqs. satisfied* |
| **AwdOffRoadMode\_D\_Stats** |  | Satisfies:  *No reqs. satisfied* |
| **KOLRequest** |  | Satisfies:  *No reqs. satisfied* |
| **AccelerationPedal** | Percentage representing the press force applied to the Acceleration Pedal | Satisfies:  *No reqs. satisfied* |
| **DriveMode\_Selection** | SDM choice made by the Driver | Satisfies:  *No reqs. satisfied* |
| **ModeChange\_Selection** | New Feature Mode selected through the change process | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocationDisplay\_Wheels\_FrontRight** | Percentage of torque allocated in the front right wheel displayed at the HMI | Satisfies:  *No reqs. satisfied* |
| **ModeChange\_Errors/Warnings** | Error and Warning messages received through the Feature Mode change process to be displayed in the HMI | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocationDisplay\_Errors/Warnings** | Error and Warning messages received through the torque allocation feature process to be displayed in the HMI | Satisfies:  *No reqs. satisfied* |
| **PrplWhlTot\_Tq\_RqMxAwd** |  | Satisfies:  *No reqs. satisfied* |
| **SOCThreshold\_Lowest** |  | Satisfies:  *No reqs. satisfied* |
| **AwdStat\_D\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **AwdSys\_D\_Stat** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLckWhlRr\_Pc\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLck\_Tq\_RqMn** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLck\_Tq\_Rq** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLck\_Tq\_RqMx** |  | Satisfies:  *No reqs. satisfied* |
| **SteeringAngle** | Measurement of the current angle used in the steering wheel | Satisfies:  *No reqs. satisfied* |
| **AwdMde\_D\_RqBrk** |  | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocationDisplay\_Wheels\_RearRight** | Percentage of torque allocated in the rear right wheel displayed at the HMI | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocation\_RearRight** | Command created by the feature to allocate torque into the rear right wheel | Satisfies:  *No reqs. satisfied* |
| **SelDrvMdeAwd2\_D\_Cstm** |  | Satisfies:  *No reqs. satisfied* |
| **WheelSpeed\_RearRight** | Wheel Speed measurement in the rear right wheel | Satisfies:  *No reqs. satisfied* |
| **WheelSlip\_RearLeft** | Wheel Slip measurement in the rear left wheel | Satisfies:  *No reqs. satisfied* |
| **EngineStatus** | State of the Engine Ignition | Satisfies:  *No reqs. satisfied* |
| **SleepInhibit\_TimeLimit** |  | Satisfies:  *No reqs. satisfied* |
| **ShiftingMessage\_Status** | State of the Shifting Message from the Feature Mode process at the HMI of the Vehicle | Satisfies:  *No reqs. satisfied* |
| **EngineLoad** | Load applied to the Engine | Satisfies:  *No reqs. satisfied* |
| **SecondaryAxle\_Command** | Command created by the feature to engage and disengage the secondary axle of the vehicle | Satisfies:  *No reqs. satisfied* |
| **AwdHiLamp\_D\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **AwdMde\_D\_RqDrv** |  | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocation\_RearLeft** | Command created by the feature to allocate torque into the rear left wheel | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocationDisplay\_Wheels** | Percentage of torque allocated in the Vehicle displayed at the HMI | Satisfies:  *No reqs. satisfied* |
| **SwitchKnobLEDs\_2H** | ValueType representing the state of the 2H LED in the Switch/Knob of the Vehicle | Satisfies:  *No reqs. satisfied* |
| **SwitchKnobLEDs\_4L** | ValueType representing the state of the 4L LED in the Switch/Knob of the Vehicle | Satisfies:  *No reqs. satisfied* |
| **WheelSpeed\_RearLeft** | Wheel Speed measurement in the rear left wheel | Satisfies:  *No reqs. satisfied* |
| **WheelSpeed** | Wheel Speed measurements in the vehicle wheels | Satisfies:  *No reqs. satisfied* |
| **SwitchKnobLEDs\_4H** | ValueType representing the state of the 4H LED in the Switch/Knob of the Vehicle | Satisfies:  *No reqs. satisfied* |
| **WheelSlip** | Wheel Slip measurements in the vehicle wheels | Satisfies:  *No reqs. satisfied* |
| **AwdMdeCstm\_D\_RqDrv** |  | Satisfies:  *No reqs. satisfied* |
| **SwitchKnobLEDs\_4A** | ValueType representing the state of the 4A LED in the Switch/Knob of the Vehicle | Satisfies:  *No reqs. satisfied* |
| **BrakePedal** | Percentage representing the press force applied to the Brake Pedal | Satisfies:  *No reqs. satisfied* |
| **WheelSlip\_FrontLeft** | Wheel Slip measurement in the front left wheel | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocation** | Command created by the feature to allocate torque into the vehicle wheels | Satisfies:  *No reqs. satisfied* |
| **SelDrvMdeAwd\_D\_Rq** |  | Satisfies:  *No reqs. satisfied* |
| **PrplWhlTotTqRqMxAwd\_No\_Cnt** |  | Satisfies:  *No reqs. satisfied* |
| **WheelSlip\_FrontRight** | Wheel Slip measurement in the front right wheel | Satisfies:  *No reqs. satisfied* |
| **ModeChange** | Full command created by the feature when a new Feature Mode change has been requested by the Driver | Satisfies:  *No reqs. satisfied* |
| **FeatureMode\_Selection** | Current Feature Mode selected | Satisfies:  *No reqs. satisfied* |
| **WheelSlip\_RearRight** | Wheel Slip measurement in the rear right wheel | Satisfies:  *No reqs. satisfied* |
| **VehicleSpeed** | Vehicle Speed measured | Satisfies:  *No reqs. satisfied* |
| **AwdLckWhlFr\_Pc\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLatDelta\_Tq\_Rq** |  | Satisfies:  *No reqs. satisfied* |
| **WheelSpeed\_FrontLeft** | Wheel Speed measurement in the front left wheel | Satisfies:  *No reqs. satisfied* |
| **SelDrvMdeAwd2\_D\_Stat** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLckWhlFl\_Pc\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocationDisplay\_Wheels\_FrontLeft** | Percentage of torque allocated in the front left wheel displayed at the HMI | Satisfies:  *No reqs. satisfied* |
| **AwdAutoLamp\_D\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **User Feedback** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLckRgen\_Tq\_RqMn** |  | Satisfies:  *No reqs. satisfied* |
| **ModeChange\_Telltale** | HMi indicator to be displayed depending on the new Feature Mode selected | Satisfies:  *No reqs. satisfied* |
| **User Command** |  | Satisfies:  *No reqs. satisfied* |
| **TransmissionGear** | Current Transmission Gear selected by the Driver | Satisfies:  *No reqs. satisfied* |
| **TorqueAllocation\_FrontRight** | Command created by the feature to allocate torque into the front right wheel | Satisfies:  *No reqs. satisfied* |
| **SwitchKnobLEDs** | ValueType representing the state of the LEDs in the Switch/Knob of the Vehicle | Satisfies:  *No reqs. satisfied* |
| **BatterySOC** |  | Satisfies:  *No reqs. satisfied* |
| **Awd2wdLamp\_D\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLoLamp\_D\_RqDsply** |  | Satisfies:  *No reqs. satisfied* |
| **AwdLck\_D\_Stat** |  | Satisfies:  *No reqs. satisfied* |
| **AwdRnge\_D\_Actl** |  | Satisfies:  *No reqs. satisfied* |
| **PrplWhlTotTqRqMxAwd\_No\_Cs** |  | Satisfies:  *No reqs. satisfied* |

#### GSDB Signals

#### HW I/Os

#### Diagnostic Interfaces

##### DTCs

<Some Description of the DTC.

Refer to VSEM document “[Diagnostic Fault Coverage and DTC Numbers](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=yAUtrNhnx3NrTDAAAAAAAAAAAAA&servername=Production_Server)

[Design Consideration](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=yAUtrNhnx3NrTDAAAAAAAAAAAAA&servername=Production_Server)”, what to fill into the attributes below>

|  |  |
| --- | --- |
| **Test Period Time** |  |
| **Test Run Criteria,** |  |
| **Enable Criteria (EC)** |  |
| **Applicable** |  |
| **FailureTypeBytes** |  |
| **Test Period Time** |  |
| **Test Run Criteria,** |  |

##### DIDs

### Technical Parameters

### Mappings

### Technical Interfaces

#### AIS Interfaces

##### Publisher Interfaces

##### Subscriber Interfaces

#### AUTOSAR Ports

### Messages/APIs

#### CAN Bus “<Bus Name>”

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CAN ID** | **Transmission Mode** | **Period** | **Signal Names** | **Transmitter(s)** | **Receiver(s)** |
|  |  |  |  |  |  |
|  |
|  |
|  |

#### LIN Bus “<Bus Name>”

#### AUTOSAR Interfaces

#### SOA Service Contracts

<Service contract purpose/behavior>

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Messaging Pattern | Frequency  (For Data Broadcast Only) | Message Data Element(s)  (Must Match GPB) or applicable CAN signal | Description of Data Element(s) | Topic Name |
| Choose an item. |  | GBP Data element / CAN Signal name 1 | Detailed encoding of data element 1 |  |
| … |  |  |
| GBP Data element / CAN Signal name 1 | Detailed encoding of data element 3 |  |

### Encoding Types

TorqueAllocationDisplay

Full feedback message from the torque allocation feature process, containing the torque percentages and error and warning messages

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
|  |  |
|  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocationDisplay

AwdLckWhlRl\_Pc\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLckWhlRl\_Pc\_RqDsply

AwdSrvcRqd\_B\_Rq

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdSrvcRqd\_B\_Rq

WheelSpeed\_FrontRight

Wheel Speed measurement in the front right wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSpeed\_FrontRight

TorqueAllocation\_FrontLeft

Command created by the feature to allocate torque into the front left wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocation\_FrontLeft

I/O\_Shaft

Current state of the Input/Output shaft

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of I/O\_Shaft

TorqueAllocationDisplay\_Wheels\_RearLeft

Percentage of torque allocated in the rear left wheel displayed at the HMI

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocationDisplay\_Wheels\_RearLeft

AwdLck\_Tq\_Actl

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLck\_Tq\_Actl

AwdLckTqNeg\_B\_Actl

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLckTqNeg\_B\_Actl

AwdLatDelta\_B\_Rq

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLatDelta\_B\_Rq

SelDrvMdeSwtch\_D\_Stat4

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of SelDrvMdeSwtch\_D\_Stat4

AwdOffRoadMode\_D\_Stats

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdOffRoadMode\_D\_Stats

KOLRequest

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **REQUESTED** |  |
| **NONE** |  |
| **Unit** | |  |

Table: Encoding Details of KOLRequest

AccelerationPedal

Percentage representing the press force applied to the Acceleration Pedal

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AccelerationPedal

DriveMode\_Selection

SDM choice made by the Driver

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **ECO** |  |
| **SPORT** |  |
| **NORMAL** |  |
| **MUD/RUTS** |  |
| **GRASS/GRAVEL/SNOW** |  |
| **SAND** |  |
| **TOW HAUL** |  |
| **Unit** | |  |

Table: Encoding Details of DriveMode\_Selection

ModeChange\_Selection

New Feature Mode selected through the change process

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **4A** |  |
| **4H** |  |
| **2H** |  |
| **4L** |  |
| **Unit** | |  |

Table: Encoding Details of ModeChange\_Selection

TorqueAllocationDisplay\_Wheels\_FrontRight

Percentage of torque allocated in the front right wheel displayed at the HMI

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocationDisplay\_Wheels\_FrontRight

ModeChange\_Errors/Warnings

Error and Warning messages received through the Feature Mode change process to be displayed in the HMI

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of ModeChange\_Errors/Warnings

TorqueAllocationDisplay\_Errors/Warnings

Error and Warning messages received through the torque allocation feature process to be displayed in the HMI

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocationDisplay\_Errors/Warnings

PrplWhlTot\_Tq\_RqMxAwd

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of PrplWhlTot\_Tq\_RqMxAwd

SOCThreshold\_Lowest

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of SOCThreshold\_Lowest

AwdStat\_D\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdStat\_D\_RqDsply

AwdSys\_D\_Stat

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdSys\_D\_Stat

AwdLckWhlRr\_Pc\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLckWhlRr\_Pc\_RqDsply

AwdLck\_Tq\_RqMn

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLck\_Tq\_RqMn

AwdLck\_Tq\_Rq

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLck\_Tq\_Rq

AwdLck\_Tq\_RqMx

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLck\_Tq\_RqMx

SteeringAngle

Measurement of the current angle used in the steering wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of SteeringAngle

AwdMde\_D\_RqBrk

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdMde\_D\_RqBrk

TorqueAllocationDisplay\_Wheels\_RearRight

Percentage of torque allocated in the rear right wheel displayed at the HMI

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocationDisplay\_Wheels\_RearRight

TorqueAllocation\_RearRight

Command created by the feature to allocate torque into the rear right wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocation\_RearRight

SelDrvMdeAwd2\_D\_Cstm

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of SelDrvMdeAwd2\_D\_Cstm

WheelSpeed\_RearRight

Wheel Speed measurement in the rear right wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSpeed\_RearRight

WheelSlip\_RearLeft

Wheel Slip measurement in the rear left wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSlip\_RearLeft

EngineStatus

State of the Engine Ignition

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **ENGINE\_ON** |  |
| **ENGINE\_OFF** |  |
| **Unit** | |  |

Table: Encoding Details of EngineStatus

SleepInhibit\_TimeLimit

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of SleepInhibit\_TimeLimit

ShiftingMessage\_Status

State of the Shifting Message from the Feature Mode process at the HMI of the Vehicle

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **SHOW** |  |
| **HIDE** |  |
| **Unit** | |  |

Table: Encoding Details of ShiftingMessage\_Status

EngineLoad

Load applied to the Engine

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of EngineLoad

SecondaryAxle\_Command

Command created by the feature to engage and disengage the secondary axle of the vehicle

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **ENGAGE** |  |
| **DISENGAGE** |  |
| **Unit** | |  |

Table: Encoding Details of SecondaryAxle\_Command

AwdHiLamp\_D\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdHiLamp\_D\_RqDsply

AwdMde\_D\_RqDrv

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdMde\_D\_RqDrv

TorqueAllocation\_RearLeft

Command created by the feature to allocate torque into the rear left wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocation\_RearLeft

TorqueAllocationDisplay\_Wheels

Percentage of torque allocated in the Vehicle displayed at the HMI

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocationDisplay\_Wheels

SwitchKnobLEDs\_2H

ValueType representing the state of the 2H LED in the Switch/Knob of the Vehicle

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **ON** |  |
| **OFF** |  |
| **BLINKING** |  |
| **Unit** | |  |

Table: Encoding Details of SwitchKnobLEDs\_2H

SwitchKnobLEDs\_4L

ValueType representing the state of the 4L LED in the Switch/Knob of the Vehicle

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **ON** |  |
| **OFF** |  |
| **BLINKING** |  |
| **Unit** | |  |

Table: Encoding Details of SwitchKnobLEDs\_4L

WheelSpeed\_RearLeft

Wheel Speed measurement in the rear left wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSpeed\_RearLeft

WheelSpeed

Wheel Speed measurements in the vehicle wheels

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSpeed

SwitchKnobLEDs\_4H

ValueType representing the state of the 4H LED in the Switch/Knob of the Vehicle

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **ON** |  |
| **OFF** |  |
| **BLINKING** |  |
| **Unit** | |  |

Table: Encoding Details of SwitchKnobLEDs\_4H

WheelSlip

Wheel Slip measurements in the vehicle wheels

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSlip

AwdMdeCstm\_D\_RqDrv

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdMdeCstm\_D\_RqDrv

SwitchKnobLEDs\_4A

ValueType representing the state of the 4A LED in the Switch/Knob of the Vehicle

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **ON** |  |
| **OFF** |  |
| **BLINKING** |  |
| **Unit** | |  |

Table: Encoding Details of SwitchKnobLEDs\_4A

BrakePedal

Percentage representing the press force applied to the Brake Pedal

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of BrakePedal

WheelSlip\_FrontLeft

Wheel Slip measurement in the front left wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSlip\_FrontLeft

TorqueAllocation

Command created by the feature to allocate torque into the vehicle wheels

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocation

SelDrvMdeAwd\_D\_Rq

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of SelDrvMdeAwd\_D\_Rq

PrplWhlTotTqRqMxAwd\_No\_Cnt

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of PrplWhlTotTqRqMxAwd\_No\_Cnt

WheelSlip\_FrontRight

Wheel Slip measurement in the front right wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSlip\_FrontRight

ModeChange

Full command created by the feature when a new Feature Mode change has been requested by the Driver

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
|  |  |
|  |  |
|  |  |
| **Unit** | |  |

Table: Encoding Details of ModeChange

FeatureMode\_Selection

Current Feature Mode selected

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **4A** |  |
| **4H** |  |
| **2H** |  |
| **4L** |  |
| **Unit** | |  |

Table: Encoding Details of FeatureMode\_Selection

WheelSlip\_RearRight

Wheel Slip measurement in the rear right wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSlip\_RearRight

VehicleSpeed

Vehicle Speed measured

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of VehicleSpeed

AwdLckWhlFr\_Pc\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLckWhlFr\_Pc\_RqDsply

AwdLatDelta\_Tq\_Rq

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLatDelta\_Tq\_Rq

WheelSpeed\_FrontLeft

Wheel Speed measurement in the front left wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of WheelSpeed\_FrontLeft

SelDrvMdeAwd2\_D\_Stat

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of SelDrvMdeAwd2\_D\_Stat

AwdLckWhlFl\_Pc\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLckWhlFl\_Pc\_RqDsply

TorqueAllocationDisplay\_Wheels\_FrontLeft

Percentage of torque allocated in the front left wheel displayed at the HMI

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocationDisplay\_Wheels\_FrontLeft

AwdAutoLamp\_D\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdAutoLamp\_D\_RqDsply

AwdLckRgen\_Tq\_RqMn

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLckRgen\_Tq\_RqMn

ModeChange\_Telltale

HMi indicator to be displayed depending on the new Feature Mode selected

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **4x4 AUTO** |  |
| **4x4 HIGH** |  |
| **4x4 LOW** |  |
| **4x2** |  |
| **Unit** | |  |

Table: Encoding Details of ModeChange\_Telltale

TransmissionGear

Current Transmission Gear selected by the Driver

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **PARK** |  |
| **REVERSE** |  |
| **NEUTRAL** |  |
| **DRIVE** |  |
| **Unit** | |  |

Table: Encoding Details of TransmissionGear

TorqueAllocation\_FrontRight

Command created by the feature to allocate torque into the front right wheel

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of TorqueAllocation\_FrontRight

SwitchKnobLEDs

ValueType representing the state of the LEDs in the Switch/Knob of the Vehicle

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| **Unit** | |  |

Table: Encoding Details of SwitchKnobLEDs

BatterySOC

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of BatterySOC

Awd2wdLamp\_D\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of Awd2wdLamp\_D\_RqDsply

AwdLoLamp\_D\_RqDsply

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLoLamp\_D\_RqDsply

AwdLck\_D\_Stat

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdLck\_D\_Stat

AwdRnge\_D\_Actl

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of AwdRnge\_D\_Actl

PrplWhlTotTqRqMxAwd\_No\_Cs

**Note:** An encoding is either discrete or continuous. Delete those fields, which are not needed.

|  |  |  |
| --- | --- | --- |
| **Value**  (Continuous Encoding) | Min Value |  |
| Max Value |  |
| Resolution |  |
| Offset |  |
| **Value**  (Discrete  Encoding) |  |  |
| **Unit** | |  |

Table: Encoding Details of PrplWhlTotTqRqMxAwd\_No\_Cs

### Technology State Machines

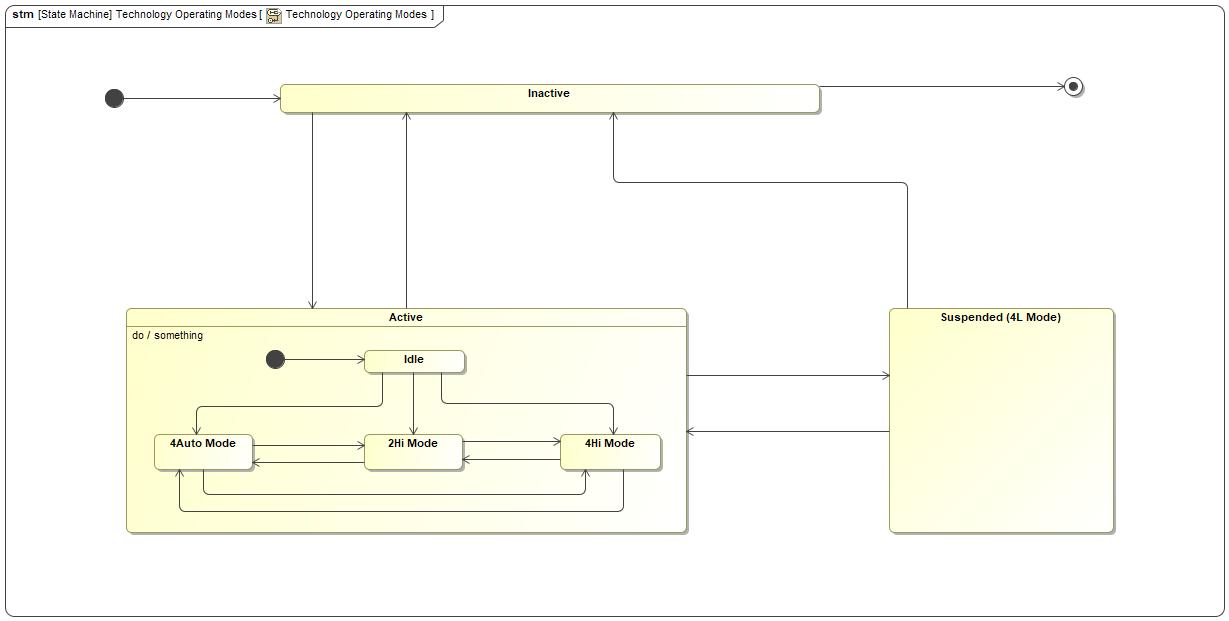


Figure 8‑1: Technology Operating Modes

|  |  |  |
| --- | --- | --- |
| **State** | **Description** | **Requirements Reference** (optional) |
| 2Hi Mode |  |  |
| 4Auto Mode |  |  |
| 4Hi Mode |  |  |
| Active | Do behavior: something |  |
| Idle |  |  |
| Inactive |  |  |
| Suspended (4L Mode) |  |  |

Table 8‑1: Operation Modes and States on Technology Operating Modes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Transition ID** | **Source** | **Destination** | **Description** | **Requirements Reference**  (optional) |
| T1 | Idle | 4Hi Mode |  |  |
| T2 | Idle | 2Hi Mode |  |  |
| T3 | Idle | 4Auto Mode |  |  |
| T4 |  |  |  |  |
| T5 | 4Hi Mode | 4Auto Mode |  |  |
| T6 | 2Hi Mode | 4Auto Mode |  |  |
| T7 |  |  |  |  |
| T8 | Inactive | Active |  |  |
| T9 | 4Hi Mode | 2Hi Mode |  |  |
| T10 | Inactive | a |  |  |
| T11 | 4Auto Mode | 2Hi Mode |  |  |
| T12 | 2Hi Mode | 4Hi Mode |  |  |
| T13 | Active | Suspended (4L Mode) |  |  |
| T14 | Active | Inactive |  |  |
| T15 | 4Auto Mode | 4Hi Mode |  |  |
| T16 | Suspended (4L Mode) | Inactive |  |  |
| T17 | Suspended (4L Mode) | Active |  |  |

Table 8‑2: Transitions between Operation Modes and States on Technology Operating Modes

Document ends here.