Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – AdvanceTrac Control

APIM Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.0

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Version Date: April 9, 2021

FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
April 9, 2021	1.0	Initial Release	

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1 Architectural Design

1.1 Physical Mapping of Classes

The table below shows an example of how the logical classes that make up the Advance Traction Control feature may be mapped into physical modules. This mapping example is specific to the FNV3 architecture and does not necessarily carryover to other carlines or vehicle architectures.

Logical Class	Physical Module (ECU)
ATC Server	ABS
ATC Client	APIM CCPU

1.2 ATC-CLD-REQ-388542/A-ATC Server

The Advance Traction Control(ATC) Server is responsible for the tasks listed below

- Receive command from the ATC Client to Enable or Disable advance Traction control.
- Send status of the Advance Traction control status to ATC Client.

1.3 ATC-CLD-REQ-388543/A-ATC Client

The Advance Traction Control(ATC) Client is responsible for the tasks listed below:

- Receive input from the user display.
- Request ATC Server to Enable or Disable the Advance Traction control feature.
- Receive the status from ATC Server and update the user display.
- Support Diagnostics configuration to Enable or Disable the ATC feature configuration.

1.4 Logical Signal Mapping

The CAN signals mentioned throughout this document shall refer to the CAN signal's logical name. The logical names shall be mapped to their actual CAN signal names. Please use the table below to perform the mapping. The Info CAN database file is the master file for the actual CAN signal names.

Logical Name	CAN Signal Name
Vehicle_Ignition_St	Ignition_Status
Driver_Slip_Control_St	DrvSlipCtlMde_D_Ind
Driver_Slip_Control_Rq	DrvSlipCtlMde_D_Rq
Vehicle_Key_Type_St	IgnKeyType_D_Actl

Table: Logical name/CAN signal mapping

1.5 ATC-IIR-REQ-388544/A-Advance Traction Control Client_Rx

1.5.1 MD-REQ-386520/C-Vehicle_Ignition_St

Message Type: Status

This signal is used to indicate the processed value for current Ignition state.

Name	Literals	Value	Description
Vehicle_Ignition_St	-	-	Current Vehicle Ignition Status
	Unknown	0x0	
	Off	0x1	

	Accessory	0x2	
	Run	0x4	
	Start	0x8	
	Invalid	0xF	

1.5.2 MD-REQ-388546/A-Driver_Slip_Control_St

Message Type: Status

The signal is used to indicate the state of the slip control system by the Advance Traction Control (ATC) Server.

Name	Literals	Value	Description
Driver_Slip_Control_St	-	-	The state of Slip control
	Adv_Traction_ON	0x0	default mode
	Adv_Traction_OFF	0x1	appl-specific off mode 1
	Mode_2	0x2	appl-specific off mode 2
	Mode_3	0x3	appl-specific off mode 3

1.5.3 MD-REQ-393018/A-Vehicle_Key_Type_St

Message Type: Status

The signal is used to identify Admin or Restricted User by the My Key System.

Name	Literals	Value	Description
Vehicle_Key_Type_St	-	-	The state of Slip control
	Read_Progress	0x0	Key Read In Progress
	Std_Key	0x1	Key In Ignition Std Key
	My_Key	0x2	Key In Ignition My Key
	Read_Failure	0x3	Key Not Prgrm Read Failur
	Not used	0x4	
	Not used	0x5	
	Not used	0x6	
	Not used	0x7	
	Not used	0x8	
	Not used	0x9	
	Not used	0xA	
	Not used	0xB	
	Not used	0xC	
	Not used	0xD	
	Unknown	0xE	
	Invalid	0xF	

1.6 ATC-IIR-REQ-388547/A-Advance Traction Control Client_Tx

1.6.1 MD-REQ-388548/A-Driver_Slip_Control_Rq

Message Type: Request

The signal is used to request the Advance Traction Control (ATC) Server to change its Slip control state.

Name	Literals	Value	Description
Driver_Slip_Control_Rq	-	-	Request to change Slip control state.
	Adv_Traction_ON	0x0	default mode
	Adv_Traction_OFF	0x1	appl-specific off mode 1
	Mode_2	0x2	appl-specific off mode 2
	Mode_3	0x3	appl-specific off mode 3

2 General Requirements

2.1 ATC-REQ-388536/A-Feature Configuration

The ATC Client shall support for a Diagnostics DID configuration to enable or disable the Advance Traction Control(ATC) feature.

- When the ATC feature is Enabled, the user shall be presented with an option to enable or Disable the Advance Traction Control through ATC Client.
- When the ATC feature is Disabled, Advance Traction Control feature shall be disabled by ATC Client and the user **shall not** have an option to view the feature and change the settings.

Refer to the Infotainment Diagnostic Specification for the details of DID.

2.2 ATC-REQ-388537/A-Feature Availability

The ATC Client shall allow the user to change the Advance Traction Control settings through user display only when

- Vehicle Ignition status is RUN (or)
- Vehicle Ignition status is Start.

2.3 ATC-REQ-388538/A-Missing Signal

The ATC Client shall wait for the response from the ATC Server for any request placed by it. The wait time on the ATC Client shall follow applicable Ford design standards and best practices (ex. 5 sec). In case no response from the ATC Server module the ATC client shall remain in the last known state.

ATC Server signals that are periodic are to be considered missing if they aren't received by the ATC Client for more than 5 sec.

2.4 ATC-REQ-388539/A-ATC Client HMI content references

The references to HMI screen layouts and other related HMI content are for reference only and not intended to depict the actual text, graphical, or layout content. Refer to the released HMI specifications for further detail on this type of content.

2.5 ATC-REQ-388540/A-ATC Client system Accuracy

Within 100ms of receiving the data result or signal state change from the vehicle network, the ATC Client shall be able to update the display with appropriate status or graphics.

2.6 ATC-REQ-393019/A-Missing Message DTC

Based on the feature availability the ATC Client shall log DTC on the below scenario,

1. When Advance Traction Control feature is disabled, the ATC Client **shall not** log missing message DTC.
2. When Advance Traction Control feature is enabled, the ATC Client **shall log** missing message DTC.

Refer Infotainment Diagnostics Specification for more information.

3 Functional Definition

3.1 ATC-FUN-REQ-388549/A-Advance Traction Control Operation

3.1.1 Requirements

3.1.1.1 ATC-REQ-388532/A-Advance Traction Control default state at startup

The ATC Client shall set 'Driver_Slip_Control_Rq=0x0' (default mode) on system startup (ex. battery connect, Bus Wake-up and upon key-cycling).

3.1.1.2 ATC-REQ-388533/A-Support to change the Advance Traction Control setting

When ATC feature is enabled through DID configuration, the ATC Client shall allow the user to toggle Advance Traction Control feature through user display. The ATC Client shall make use of 'Driver_Slip_Control_Rq' to request the ATC Server to toggle the feature state.

3.1.1.3 ATC-REQ-388534/A-Status notification from ATC Server

The ATC Server is the control master for the Advance Traction Control feature, the ATC Client shall receive the status of the traction control from the ATC Server on 'Driver_Slip_Control_St'.
The ATC Client shall update its internal state and update the user display with appropriate graphics, ATC Client shall request the Server with appropriate traction control request on 'Driver_Slip_Control_Rq'.

3.1.1.4 ATC-REQ-388535/A-ATC feature disabled through Diagnostic DID

When the Advance Traction Control feature is disabled through diagnostics DID configuration, the ATC Client shall ignore the status of the traction control from the ATC Server on the 'Driver_Slip_Control_St'.

ATC Client shall set the traction control 'Driver_Slip_Control_Rq' to default state (i.e. Adv_Traction_ON).

3.1.1.5 ATC-REQ-393017/A-ATC feature selection affected by MyKey

1. When Advance Traction Control feature is disabled, regardless of key type used on 'Vehicle_Key_Type_St' the ATC Client shall set 'Driver_Slip_Control_Rq' to default (i.e. Adv_Traction_ON).
2. When Advance Traction Control feature is enabled, depending upon 'Vehicle_Key_Type_St' status the ATC Client shall allow the user to toggle the traction control setting using 'Driver_Slip_Control_Rq'.
    a. If 'Vehicle_Key_Type_St = My_Key', the ATC Client shall allow user to change/toggle advance traction control setting based on the user selection on the MyKey Traction Control Menu (i.e. MyKey_Traction_Control_Setup)
        i. When the user selection is 'OFF', then the user shall be allowed to toggle the traction control settings.
        ii. When the user selection is 'ON', then the user shall not be able to toggle the settings and 'Driver_Slip_Control_Rq' shall be set to default.
    b. If 'Vehicle_Key_Type_St != My_Key', the ATC Client shall allow user to toggle/change advance traction control settings. (i.e. regardless of 'MyKey_Traction_Control_Setup' state).

3.1.1.6 ATC-REQ-412397/A-MyKey_Traction_Control_Setup usage

When the ATC Client detect the key type as 'My_Key' on 'Vehicle_Key_Type_St', ATC Client is required to check current configuration state of traction control on 'MyKey_Traction_Control_Setup'.

Note: Refer 'MyKey Gen II Control Function' SPSS.

3.1.1.7 ATC-REQ-413708/A-Default traction Control state for Missing Message

When the 'Driver_Slip_Control_St' message is declared missing then the ATC Client shall set the 'Driver_Slip_Control_Rq' to default state.

3.1.2 Use Cases

3.1.2.1 ATC-UC-REQ-388550/A-Advance Traction Control Toggled by User

Actors	ATC User
Pre-conditions	1. Advance Traction Control feature is enabled through Diagnostic DID configuration in ATC Client. 2. Vehicle Ignition status is RUN or Start.
Scenario Description	1. User toggles the traction control state through User Display.
Post-conditions	1. The traction control state toggles in the user display.
List of Exception Use Cases	1. No Response from the ATC Server for the request from the ATC Client.
Interfaces	ATC Server, ATC Client

3.1.2.2 ATC-UC-REQ-388551/A-Advance Traction Control is not Operational by User

Actors	ATC User
Pre-conditions	1. Advance Traction Control feature is Disabled through Diagnostic DID configuration in ATC Client. 2. Vehicle Ignition status is RUN or Start.
Scenario Description	1. User tries to toggle the ATC feature through User Display.
Post-conditions	1. The Advance traction control feature shall not be operational through user display. 2. The status of the ATC shall be Turned Off/Disabled.
List of Exception Use Cases	
Interfaces	ATC Server, ATC Client

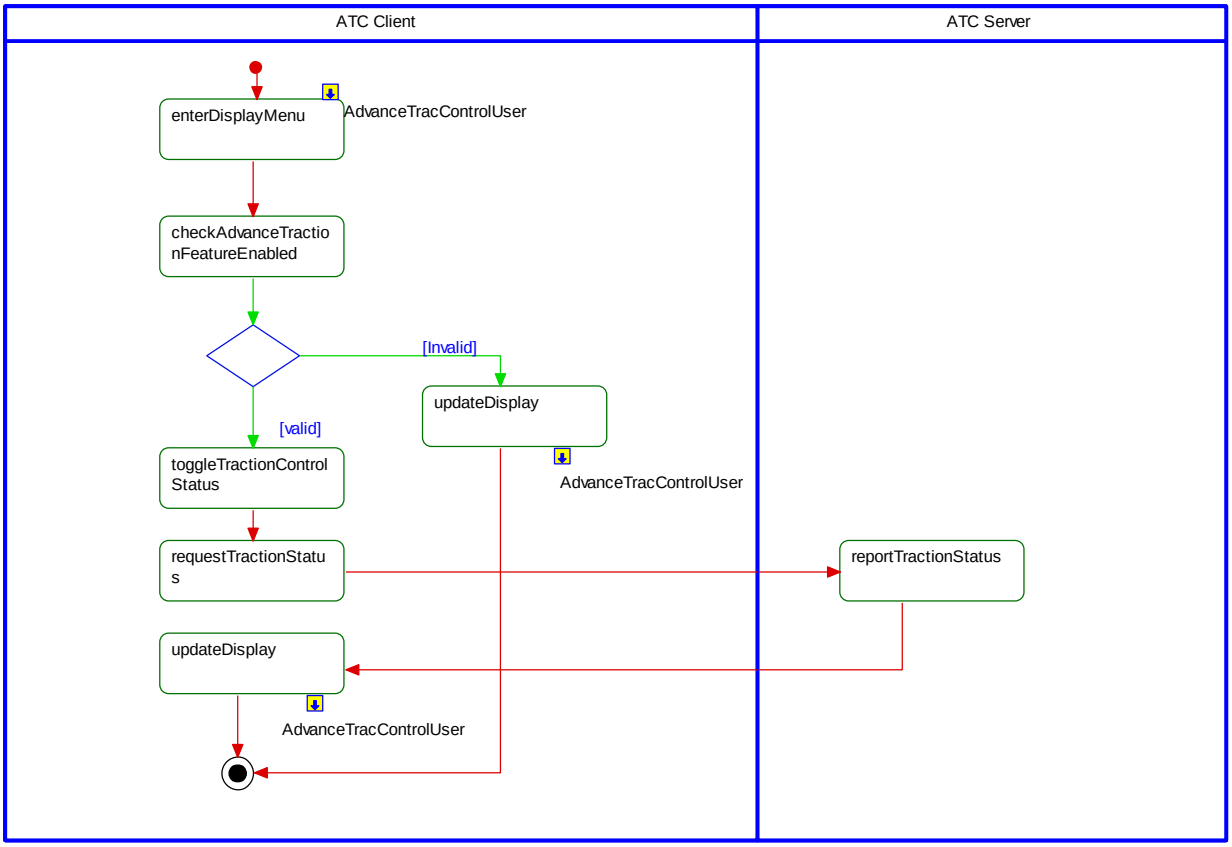
3.1.2.3 ATC-UC-REQ-412398/A-Advance Traction Control status based on MyKey

Actors	ATC User
Pre-conditions	1. Advance Traction Control feature is enabled through Diagnostic DID configuration in ATC Client. 2. Vehicle Ignition status is RUN or Start.
Scenario Description	1. MyKey is detected.
Post-conditions	1. Traction Control shall be turned ON and the vehicle user may not be able to change the traction control settings.
List of Exception Use Cases	
Interfaces	ATC Server, ATC Client

3.1.3 White Box Views

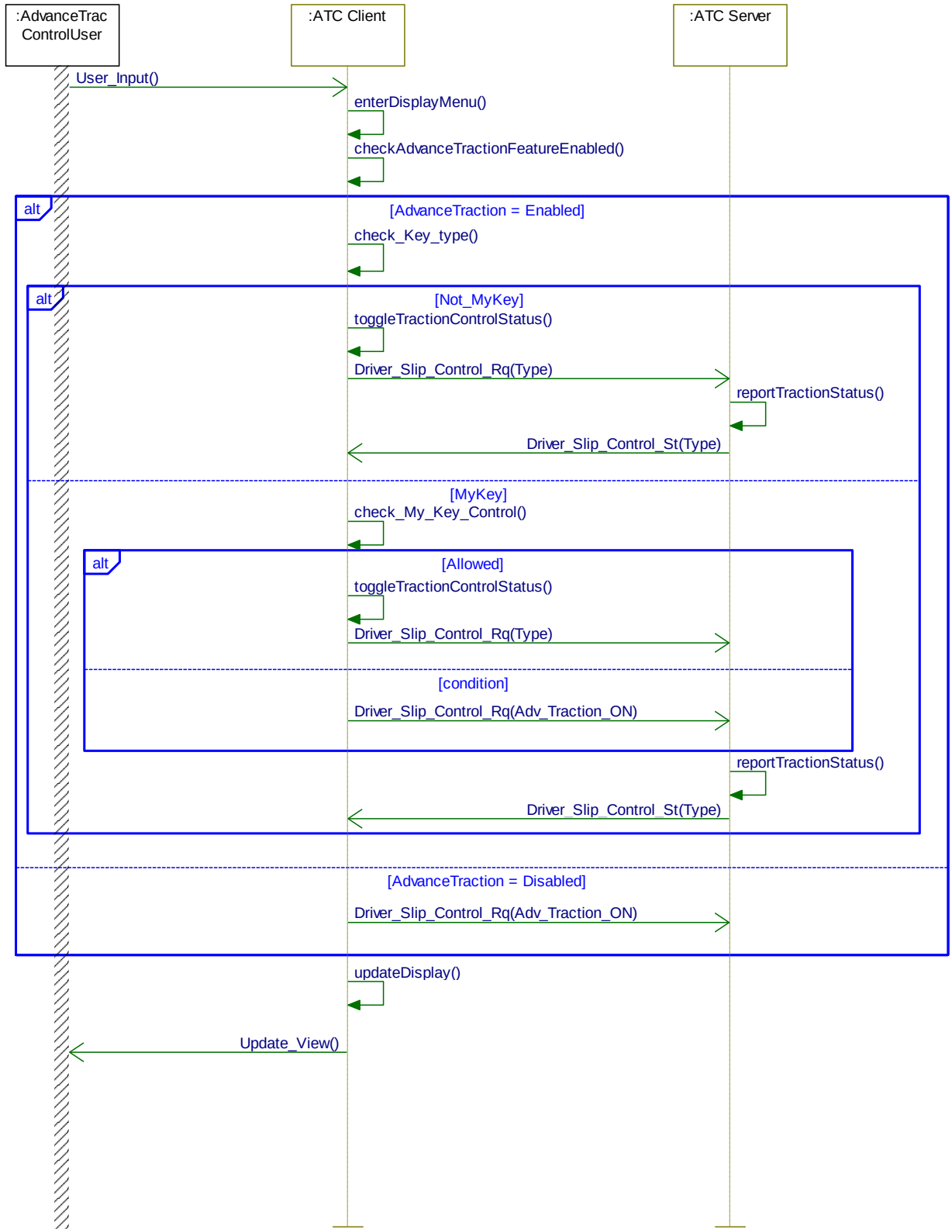
3.1.3.1 Activity Diagrams

3.1.3.1.1 ATC-ACT-REQ-388531/A-Advance Traction Control operation_AD



3.1.3.2 Sequence Diagrams

3.1.3.2.1 ATC-SD-REQ-388552/A-Advance Traction Control operation_SD



4 Appendix: Reference Documents

Reference #	Document Title
1	AdvanceTrac Control Function - CGEA1.3
2	Infotainment Diagnostics Specification
3	MyKey GEN II Control Function – CGEA 1.3
4	
5	
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