



Research & Vehicle Technology
“Infotainment Systems Product Development”

Feature – Peripheral Module Provisioning
FNV2

Infotainment Subsystem Part Specific
Specification (SPSS)

Version 1.3
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Revision History

Date	Version	Notes	
February 20, 2018	1.0	Initial Release	
May 4, 2018	1.1		
	STR-458377/B-Architectural Design	rpaquet2 - Removed the Overview and updated the CLD's to match the ECG Provisioning requiriements and added a Physical module mapping requirement	
	ECGPR-CLD-REQ-302403/A-Provisioning Server	MBORREL4: New req.	
	ECGPR-CLD-REQ-302404/A-Provisioning OnBoard Client1	MBORREL4: New req.	
	ECGPR-CLD-REQ-302405/A-Provisioning OnBoard Client2	MBORREL4: New req.	
	PMPR-CLD-REQ-278626/B-Provisioning OnBoard Client3	rpaquet2- Updated to be the new CLD for the Peripherals	
	ECGPR-CLD-REQ-302406/A-Provisioning OffBoard Client1	MBORREL4: New req.	
	ECGPR-CLD-REQ-304073/A-Provisioning OffBoard Client2	MBORREL4: New req.	
	PMPR-DOC-531909/A-Physical Mapping of Classes	rpaquet2 - new	
	STR-458381/B-PMPR OnBoard Client 3 Interface	rpaquet2 - Change from Server to Client as they were swapped originally now aligned with ECG Provisioning	
	PMPR-IIR-REQ-278628/B-PMPRONBoardClient3_Tx	rpaquet2 - Added the APIM API signals also changed server to client to align with ECG Provisioning	
	MD-REQ-295854/B-PeripheralProvisioningData_St	rpaquet2 - Removed ECUID -Port	
	MD-REQ-303924/A-setSyncProvisioningState	MBORREL4: New req.	
	MD-REQ-303925/A-getSyncProvisioningData	MBORREL4: New req.	
	PMPR-IIR-REQ-278629/B-PMPRONBoardClient3_Rx	rpaquet2 - changed server to client to align with ECG Provisioning	
	STR-458382/B-Provisioning Server Interface	rpaquet2 - Change from Client to Server to align with ECG Provisioning	
	PMPR-IIR-REQ-278630/B-Provisioning Server_Tx	rpaquet2 - Added API MD's for the APIM/ECG interface also changed OnBoard Client to Server to align with ECG Provisioning	
	PMPR-IIR-REQ-278631/B-Provisioning Server_Rx	rpaquet2 - changed OnBoard Client to Server to align with ECG Provisioning	
	STR-458384/B-Requirements	rpaquet2 - added 304014	
	PMPR-REQ-278635/B-Peripheral Provisioning Server - Provisioning Status	rpaquet2 - Updated text per feature owner	
	PMPR-REQ-278636/B-Cellular Provisioning vs. Wifi Provisioning	rpaquet2 - Updated per feature owner	
	PMPR-REQ-278637/B-Storing of Peripheral ESN	rpaquet2 - Updated per feature owner	
	PMPR-REQ-278639/B-Peripheral Provisioning Failure	rpaquet2 - Updated per feature owner	
	PMPR-FUR-REQ-304014/A-PeripheralProvisioningServer Provisioning Data	Rpaquet2: New req.	
	PMPR-SD-REQ-278645/B-Peripheral Provisioning	rpaquet2 - Update diagram	
December 10, 2018	1.2		
	STR-458377/C-Architectural Design	rpaquet2 - Added Provisioning OnBoard Client4 to bring BLEM into this spec and interface for Client 4	
	STR-458380/B-Logical Signal Mapping	rpaquet2 - Added Paak to table for Feature owner and removed SYNCSerial_Rq	
	PMPR-CLD-REQ-278626/C-Provisioning OnBoard Client3	rpaquet2 - Updated per feature owner	
	PMPR-CLD-REQ-331340/A-Provisioning OnBoard Client4	rpaquet2 - New brought in for BLEM to commonize spec	
	PMPR-DOC-531909/B-Physical Mapping of Classes	rpaquet2 - Updated the peripheral names and add Client 4 for BLEM	
	PMPR-IIR-REQ-278628/C-PMPRONBoardClient3_Tx	rpaquet2 - no change	
	MD-REQ-295854/C-PeripheralProvisioningData_St	rpaquet2 - Updated the requirement to include all peripheral info	
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MD-REQ-303924/B-setSyncProvisioningState	rpaquet2 - Updated Prov State encodings
MD-REQ-303925/B-getSyncProvisioningData	rpaquet2 - Updated ProvDID encodings
PMPR-IIR-REQ-278629/C-PMPRONBoardClient3_Rx	rpaquet2 - removed 241971 and 295858
MD-REQ-295859/B-DSRCSerial_Rq	rpaquet2 - updated the description per feature owner
MD-REQ-295861/B-OBCCSerial_Rq	rpaquet2- updated the description per feature owner
MD-REQ-331824/A-ECGProvisioningStateBroadcast	rpaquet2 - New req.
STR-593498/A-PMPR OnBoard Client 4 Interface	rpaquet2 - Change from Server to Client as they were swapped originally now aligned with ECG Provisioning
PMPR-IIR-REQ-331398/A-PMPRONBoardClient4_Tx	rpaquet2 - Added the APIM API signals also changed server to client to align with ECG Provisioning
MD-REQ-241972/F-PaakESN_St	rpaquet2 - Updated the description to clarify operations
PMPR-IIR-REQ-331399/A-PMPRONBoardClient4_Rx	rpaquet2 - changed server to client to align with ECG Provisioning
MD-REQ-241971/D-PaakSerial_Rq	rpaquet2 - changed encoding value and updated description per feature owner
MD-REQ-242058/C-PaakWakeup_Rq	rpaquet2 - updated the decscription
PMPR-IIR-REQ-278630/C-Provisioning Server_Tx	rpaquet2 - removed 303925 and 295858
PMPR-IIR-REQ-278631/C-Provisioning Server_Rx	rpaquet2- Added PaaKESN_St for BLEM added 303925
STR-458384/C-Requirements	rpaquet2 - Added 331616, 331617, 331618, 331820, 331820, 331821, 331822, 331823, 332104,332105, 334891
PMPR-REQ-334891/A-Provisioning Process while the Vehicle is in Transport Mode	rpaquet2 - New requirement
PMPR-REQ-278635/C-Peripheral Provisioning Server - Provisioning Status	rpaquet2 - added additional peripheral provisioning states for BLEM, OBCC and DSRC per feature owner
PMPR-REQ-278636/C-Cellular Provisioning vs. Wifi Provisioning	rpaquet2 - Adde further explanation per feature owner
PMPR-REQ-278637/C-Storing of Peripheral ESN or FESN	rpaquet2 - Added further explanation per feature owner
PMPR-REQ-278639/C-Peripheral Provisioning Failure	rpaquet2 - Added further explanation per feature owner
PMPR-FUR-REQ-304014/B-PeripheralProvisioningServer Provisioning Data	rpaquet2 - Added further explanation per feature owner
PaaKv2-REQ-331616/A-BLEM NotAuthorized/Authorized/RemoveKeys	rpaquet2 - New requirement
PMPR-REQ-331617/A-Provisioning OnBoard Client4 Provisioning TP Message to Provisioning Server	rpaquet2 - New requirement
PMPR-REQ-331618/A-BLEM Provisioning Data Identifiers	rpaquet2 - New requirement
PMPR-REQ-334892/A-Provisioning Diagnostic Trouble Codes (DTCs)	rpaquet2 - New requirement
ECGPR-REQ-331821/A-ProvOffBoardClient1 or ProvOffBoardClient2 Validation of Provisioning Metadata	rpaquet2 - New requirement
ECGPR-REQ-331822/A-Criteria Description	rpaquet2 - New requirement
ECGPR-REQ-331823/A-Retry Strategy	rpaquet2 - New requirement
PMPR-REQ-331820/A-ECUPeripheralDataRequestCommand and ECUPeripheralDataRequestCommand Response	rpaquet2 - New requirement
PMPR-REQ-334893/A-Provisioning FTCP Messages	rpaquet2 - New requirement
ECGPR-REQ-331825/A-Provisioning CCS Criteria	rpaquet2 - New requirement
PMPR-REQ-334894/A-Provisioning Status Alert	rpaquet2 - New requirement
ECGPR-REQ-332104/A-Vehicle to ProvOffBoardClient1 or ProvOffBoardClient2 Encryption Requirements for Provisioning	rpaquet2 - New requirement
ECGPR-REQ-332105/A-ProvOffBoardClient1 or ProvOffBoardClient2 to Vehicle Encryption Requirements for Provisioning	rpaquet2 - New requirement
STR-458388/B-Sequence Diagrams	rpaquet2 - Added 331614
PMPR-SD-REQ-278645/C-Peripheral Provisioning	rpaquet2 - updated flow charts and updated provision sequence scenarios. Updated SWAP scenarios for further clarification per feature owner
PMPR-SD-REQ-331614/A-Peripheral Provisioning OnBoard Client4	rpaquet2 - new requirement

STR-458389/B-Appendix A: Definitions /
Acronyms

rpaquet2 - Updated

April 10, 2019

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MD-REQ-295854/D-PeripheralProvisioningData_St	rpaquet2 - Updated tables per feature owner
MD-REQ-303924/C-setSyncProvisioningState	rpaquet2 - Updated requirement content per feature owner
MD-REQ-303925/C-getSyncProvisioningData	rpaquet2 - Update table per feature owner
MD-REQ-241972/G-PaakESN_St	rpaquet2 - Update description per feature owner
STR-458384/D-Requirements	rpaquet2 - removed 334892 as it is in the ECG Provisioning SPSS added 348833
PMPR-FUR-REQ-304014/C-PeripheralProvisioningData	rpaquet2 - Change Peripheral Provisioning Server to PeripheralProvisioningData as correction
PaaKv2-REQ-331616/B-BLEM NotAuthorized/Authorized/RemoveKeys	rpaquet2 - Updated per feature owner
PMPR-REQ-348833/A-ProvOnBoardClient3 Required/Optional Data Fields Table	rpaquet2 - New requirement
ECGPR-REQ-331821/B-ProvOffBoardClient1 or ProvOffBoardClient2 Validation of Provisioning Metadata	MBORREL4: Updated table
PMPR-REQ-334894/B-Peripheral Provisioning Confirmation Status Alert	rpaquet2 - Updated the requirement name and content
ECGPR-REQ-332104/B-Vehicle to ProvOffBoardClient1 or ProvOffBoardClient2 Encryption Requirements for Provisioning	MBORREL4: Updated req.
PMPR-SD-REQ-278645/D-Peripheral Provisioning	rpaquet2 - Updated diagrams per feature owner
PMPR-SD-REQ-331614/B-Peripheral Provisioning OnBoard Client4	rpaquet2 - Updated diagrams per feature owner



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1 Architectural Design

1.1 Logical Signal Mapping

Each logical name used in this document is mapped to its corresponding CAN signal. Please refer to the following mapping:

Logical name	CAN signal name*
PeripheralProvisioningData_St	See TP SPSS
PaakESN_St	See TP SPSS
PaakWakeup_Rq	PaakWakeupActv_B_Rq
DSRCSerial_Rq	DSRCSerial_D_Rq
OBCCSerial_Rq	OBCCSerial_D_Rq
PaakSerial_Rq	PaakSerial_D_Rq

* Please refer to the Global CAN Signal Database for further details.

1.2 ECGPR-CLD-REQ-302403/A-Provisioning Server

The Provisioning Server (ProvServer) is responsible for the tasks listed below:

- Collecting provisioning data from vehicle modules that needed to be provisioned and send to the Provisioning OffBoard Client and communicate provisioning states back to module
- Storing the ESNs (or FESNs) in its non-volatile memory

Please review the implementation guide/ block diagram to locate the Provisioning Server class.

1.3 ECGPR-CLD-REQ-302404/A-Provisioning OnBoard Client1

The Provisioning OnBoard Client1 (ProvOnBoardClient1) is responsible for the tasks listed below:

- Providing its provisioning data to the Provisioning server
- Providing cellular or Wi-Fi channel to Provisioning Server to get the vehicle provision (if available)

Please review the implementation guide/ block diagram to locate the Provisioning OnBoard Client1 class.

1.4 ECGPR-CLD-REQ-302405/A-Provisioning OnBoard Client2

The Provisioning OnBoard Client2 (ProvOnBoardClient2) is responsible for the tasks listed below:

- Providing its provisioning data to the Provisioning server
- Providing Wi-Fi channel to Provisioning Server to get the vehicle provision (if available)

Please review the implementation guide/ block diagram to locate the Provisioning OnBoard Client2 class.

1.5 PMPR-CLD-REQ-278626/C-Provisioning OnBoard Client3

Responsibility: The Provisioning OnBoard Client 3 (ProvOnBoardClient3; aka Peripheral ECUs) is responsible for providing necessary information to the Provisioning Server over CAN or Ethernet depending on the Peripheral that is being provisioned.

1.6 PMPR-CLD-REQ-331340/A-Provisioning OnBoard Client4

Responsibility: The Provisioning OnBoard Client 4 (ProvOnBoardClient4) is responsible for providing the necessary information to the Provisioning Server in order to support PaaK functionality.



1.7 ECGPR-CLD-REQ-302406/A-Provisioning OffBoard Client1

The Provisioning OffBoard Client1 (ProvOffBoardClient1) is responsible for the tasks listed below:

- Accepting and validating provisioning data from Provisioning Server and providing the response back to the Provisioning Server

Please review the implementation guide/ block diagram to locate the Provisioning OffBoard Client1 class.

1.8 ECGPR-CLD-REQ-304073/A-Provisioning OffBoard Client2

The Provisioning OffBoard Client2 (ProvOffBoardClient2) is responsible for the tasks listed below:

- All communication from vehicle to cloud once ProvServer and ProvOnBoardClient1 is successfully provisioned.

Please review the implementation guide/ block diagram to locate the Provisioning OffBoard Client2 class.

1.9 Physical Mapping of Classes

The table below shows an example of how the logical classes that make up the Peripheral Provisioning feature can be mapped into physical modules. This mapping is an FNV2 example only and does not necessarily carryover to other carlines or vehicle architectures.

Logical Class	Physical Module (ECU)
ProvServer	ECG
ProvOnBoardClient1	TCU
ProvOnBoardClient2	SYNC
ProvOnBoardClient3	Peripheral(SYNC/OBCC/DSRC)
ProvOnBoardClient4	Peripheral(BLEM)
ProvOffBoardClient1	UPG Cloud
ProvOffBoardClient2	Regional/Home Cloud Instance

1.10 PMPR OnBoard Client 3 Interface

1.10.1 PMPR-IIR-REQ-278628/C-PMPROnBoardClient3_Tx

1.10.1.1 MD-REQ-295854/D-PeripheralProvisioningData_St

Message Type: Status

This is a TP CAN signal used to indicate the provisioning state of the Peripheral ECU (ECUProvDID) and ECU Metadata for each of the peripheral ECU's shown in the table below. PeripheralProvisioningData_St is sent by the ProvOnBoardClient3 to the ProvServer. It is a periodic TP message that provides the ProvServer with the information listed in the TP ProvisioningData Table shown below. Each peripheral module will have a unique ID that the ProvServer will use to determine which peripheral sent the message. Please refer to Transport Protocol (TP) SPSS for further details on the implementation.

Peripheral ProvisioningData_St Table

The table below denotes the peripheral ECUs that support **PeripheralProvisioningData_St** TP message:

Peripheral ECU	Transport Protocol Message	FTCP Logic
OBCC	PeripheralProvisioningData_St	OBCCProvisioningAlert
DSRC	PeripheralProvisioningData_St	DSRCProvisioningAlert

TP ProvisioningData Table



The table below denotes the data that is required in the “**PeripheralProvisioningData_St**” for each Peripheral ECUs. The payload of the message shall follow the TP protocol message defined in TP Protocol spec and Sync P spec defined in the SyncP S13a and S13b specs.

(*) Note that the BLEM will use the **PaakESN_St TP** message (MD-REQ-241972/F) and SYNC will use **getSyncProvisioningData** (SOA API) - (MD-REQ-303925/B).

Name	DID	Modules	
		DSRC	OBCC
ECUProvDID (Provisioning State)	0xD021	Refer to Table 1	Refer to Table 1
FESN (Ford ESN)	0xF17F 0xF18C	TBD	Required
SecurityKeyPackageID	0xD03D	TBD	Required
Hardware/CoreAssembly Part Number	0xF111	TBD	Required
Software Part Number	0xF188	TBD	Required
Calibration Config Part number	0xF10A	TBD	Required
Delivery Assembly Number	0xF113	TBD	Required
part2Partnumber	0xF110	TBD	Required
ECUID	ECU ID is an unique and fixed value for each ECU	TBD	Required
Provisioning Method	0xFD08	TBD	Required
Ethernet Mac Address	ECU internal data	TBD	Optional
Wi-Fi Mac Address	0xFD26	TBD	Optional
Bluetooth Mac Address	ECU internal data	TBD	Optional
ECU_Provisioning State	0xFD02	TBD	Optional
Firmware Version	0xFD12	TBD	Optional
Global Configuration Version	in the part II spec	TBD	Optional

TABLE 1: The table below denotes the provisioning states for the ProvOnBoardClient3 sent within the PeripheralProvisioningData_St TP message. Sent from ProvOnBoardClient3 to ProvServer.

Name (i.e. 0xD021 in ECU)	Literals	Value	Description
ECUProvDID	-	-	Describes the current state Provisioning
	FactoryMode	0x38	ECU is not Configured
	Unprovisioned	0x39	ECU Configured, Self-Test not complete
	ECUProvAlertACK	0x3A	ECU is waiting for Provisioning Alert Ack from ECG
	ECUProvisioned	0x3B	ECU Provisioned

ECUProvDID (“aka Authorization Status” or 0xD021 per GMRDB) is a DID that provides the ECU peripheral’s provisioning state whenever it is read. Whenever the peripheral ECU meets the specific criteria to transition from one state to the next, this DID will then be updated - (refer to expected flow diagram and the above table for a list of peripheral ECUs). The authorization status (ECUProvDID) will persist until peripheral ECU meets the criteria to transition to the next state. This also means that peripheral ECU needs to persist these states between ignition and or power cycles, and whenever the ignition or



power is returned peripheral ECU. In the event that power to peripheral is lost, peripheral ECU will complete the provision process from where it left off after power is resumed. (i.e. SYNC will not restart provisioning process whenever power is resumed.)

If Peripheral ECU does not transitioned to 0X3B after receiving "ECUSerial_D_rq=0x3B", ProvServer shall try 2 more time (total-3 times) to send "ECUSerial_D_rq"

1.10.1.2 MD-REQ-303924/C-setSyncProvisioningState

This message will be used to update the SYNC's provisioning status if Ethernet is used after the ProvServer receives an ACK from the ProvOffBoardClien2. This is a periodic message that will be transmitted through SOA from the ProvServer to the SYNC. If Sync does not transitioned to 0X3B after receiving "setSyncProvisioningState_St", ProvServer shall try 2 more time (total-3 times) to send "setSyncProvisioningState_Rq".

Method Type					
Method Type		One-Shot-(Message is sent continuously until the ProvServer receives Ack)			
QoS Level		Default			
Retained		No			
R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
R	ProvisioningStateRequest	Enum	-	-	To request the SYNC to enter one of the supported provisioning states.
			Factory Mode	0x38	
			Unprovisioned	0x39	ECG can only request the SYNC to enter Unprovisioned Mode (0x39) or Provisioned (0x3B)
			ECU Provisioning Ack	0x3A	
			Provisioned	0x3B	ECG can only request the SYNC to enter Unprovisioned Mode (0x39) or Provisioned (0x3B)
Response (_Rsp)					
R	ProvisioningStateResponse	Enum	-	-	SYNC response to a provisioning state change request.
			Success	0x00	
			Wait	0x01	
			Fail-Param Does Not Exist	0x02	
			Fail-Param Read Only	0x03	
			Fail-Param Out Of Range	0x04	
			Fail-Param Size Incorrect	0x05	
			Fail-Unknown Command Type	0x06	
			Fail- SYNC Internal Error	0x07	
			Fail-Command Already In Progress	0x08	
			Fail-Comman Not Permitted	0x09	



			Fail-Internal Memory Error	0x0A	
			Fail-Invalid Config Data	0x0B	
			Fail-Part2No Mismatch	0x0C	
			Fail-Invalid Apply Type Combo	0x0D	
			Fail-Access Denied	0x0E	
			Fail-Config Item Mismatch	0x0F	
			Fail-Already In Same State	0x10	
O	ErrorCode	Enum	-	-	To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456 for full list of errors)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	
			
				0xFFF	

1.10.1.3 MD-REQ-303925/C-getSyncProvisioningData

This message will be used to receive the SYNC's provisioning status and provisioning metadata if Ethernet is used. This is a periodic message that will be transmitted through SOA from the SYNC to the ProvServer.

Method Type					
Method Type		Periodic			
QoS Level		Default			
Retained		Yes			
R/O	Name	Type	Literals	Value	Description
Request					
-	-	-	-	-	N/A
Response					
R	ECU_ProvDID	Enum	-	-	To indicate the provisioning state of the SYNC
			Factory Mode	0x38	SYNC is not Configured
			Unprovisioned	0x39	SYNC Configured, Self-Test not complete
			ECU Provisioning Ack	0x3A	SYNC Configured, Waiting for ACK
			Provisioned	0x3B	Provisioned Mode
R	syncFESN	String	-	8 chars.	
R	SYNCProvisioningData Secure	Bytes	-	The max allowed by GPB	Specifies GPB encoded TCU Provisioning data signed with TCU SyncP key. SYNC FESN will be in the header of SyncP Signed message. The payload of the



					message shall follow the message structure defined in the SyncP S13a and S13b spec Refer to Rqmt PMPR-Req-348833 for details of the attributes that shall be included in the payload,
R	PayloadType	Enum	-	-	Specifies payload type as defined in FTCP proto file
			Encrypted	0x0	
			Signed	0x1	
R	ECUID_CAN	Int32	-	0-4095	Refer to Netcom ECUID table
O	ErrorCode	Enum	-	-	To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456 for full list of errors)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	
			
				0xFFFF	

1.10.2 PMPR-IIR-REQ-278629/C-PMPROnBoardClient3_Rx**1.10.2.1 MD-REQ-295859/B-DSRCSerial_Rq**

Message Type: Request

This signal is sent by the ProvServer to ProvOnBoardClient3 to update its provisioning state. Once the ProvServer receives the ACK from the ProvOffBoardClient2, it sends this request to the ProvOnBoardClient3 to change its provisioning state. This request is also sent by the ProvServer if there is a difference between the FESN stored in its non-volatile memory and the FESN it receives in the PeripheralProvisioningData_St TP message.

Name	Literals	Value	Description
Type	-	-	
	Not Present	0x00	
	Present & Unprovisioned	0x01	
	Present & DSRCProvAlertACK	0x02	
	Present & Provisioned	0x03	

1.10.2.2 MD-REQ-295861/B-OBCCSerial_Rq

Message Type: Request

This signal is sent by the ProvServer to ProvOnBoardClient3 to update its provisioning state. Once the ProvServer receives the ACK from the ProvOffBoardClient2, it sends this request to the ProvOnBoardClient3 to change its provisioning state. This request is also sent by the ProvServer if there is a difference between the FESN stored in its non-volatile memory and the FESN it receives in the PeripheralProvisioningData_St TP message.



Name	Literals	Value	Description
Type	-	-	
	Not Present	0x00	
	Present & Unprovisioned	0x01	
	Present & OBCCProvAlertACK	0x02	
	Present & Provisioned	0x03	

1.10.2.3 MD-REQ-331824/A-ECGProvisioningStateBroadcast

This is an Ethernet message (SOA API) which will be sent from the ProvServer to the SYNC to confirm the ProvServer has successfully provisioned. CCS shall subscribe to this message to receive the ProvServer provisioning state.

Method Type		One-Shot			
QoS Level		Default			
Retained		Yes			
R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
-	N/A	-	-	-	N/A
Response (_Rsp)					
R	ECGProvisioningState	Enum	-	-	
			Factory Mode	0x20	
			Unprovisioned	0x21	
			Waiting for ECG Provisioning Response	0x22	
			Waiting for TCU Provisioning Response	0x23	
			Waiting for HomeURL	0x24	
			Connecting to HomeURL	0x25	
			Provisioned	0x26	

1.10.2.4 MD-REQ-086348/A-CarMode_St

Message Type: Status

Name	Literals	Value	Description
Type	-	-	Defines what car mode state is active.
	Normal	0x0	
	Factory	0x1	
	NotUsed	0x2	
	Transportation	0x3	

1.10.2.5 MD-REQ-303924/C-setSyncProvisioningState

This message will be used to update the SYNC's provisioning status if Ethernet is used after the ProvServer receives an ACK from the ProvOffBoardClien2. This is a periodic message that will be transmitted through SOA from the ProvServer to the SYNC. If Sync does not transitioned to 0X3B after receiving "setSyncProvisioningState_St", ProvServer shall try 2 more time (total-3 times) to send "setSyncProvisioningState_Rq.



Method Type					
One-Shot--(Message is sent continuously until the ProvServer receives Ack)					
QoS Level					
Default					
Retained					
No					
R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
R	ProvisioningStateRequest	Enum	-	-	To request the SYNC to enter one of the supported provisioning states.
			Factory Mode	0x38	
			Unprovisioned	0x39	ECG can only request the SYNC to enter Unprovisioned Mode (0x39) or Provisioned (0x3B)
			ECU Provisioning Ack	0x3A	
			Provisioned	0x3B	ECG can only request the SYNC to enter Unprovisioned Mode (0x39) or Provisioned (0x3B)
Response (_Rsp)					
R	ProvisioningStateResponse	Enum	-	-	SYNC response to a provisioning state change request.
			Success	0x00	
			Wait	0x01	
			Fail-Param Does Not Exist	0x02	
			Fail-Param Read Only	0x03	
			Fail-Param Out Of Range	0x04	
			Fail-Param Size Incorrect	0x05	
			Fail-Unknown Command Type	0x06	
			Fail- SYNC Internal Error	0x07	
			Fail-Command Already In Progress	0x08	
			Fail-Comman Not Permitted	0x09	
			Fail-Internal Memory Error	0x0A	
			Fail-Invalid Config Data	0x0B	
			Fail-Part2No Mismatch	0x0C	
			Fail-Invalid Apply Type Combo	0x0D	
			Fail-Access Denied	0x0E	
			Fail-Config Item Mismatch	0x0F	
			Fail-Already In Same State	0x10	



O	ErrorCode	Enum	-	-	To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456 for full list of errors)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	
			
				0xFFFF	

1.11 PMPR OnBoard Client 4 Interface

1.11.1 PMPR-IIR-REQ-331398/A-PMPROnBoardClient4_Tx

1.11.1.1 MD-REQ-241972/G-PaakESN_St

Message Type: Status

This signal is used to indicate the provisioning state of the ProvOnBoardClient4 (BLEMProvDID) and ECU Metadata the peripheral ECU's shown in the table below. It is a periodic TP message that provides the ProvServer with the information listed in the PaakESN_St Parameters Table shown below

Peripheral ECU	Transport Protocol Message	FTCP Logic
BLEM	PaakESN_ST	BLEMProvisioningAlert

This signal is used to indicate the Provision State, ESN and BPEK (One way hashed).

BLEMProvDID (Actual name in GMRDB "Bluetooth Low Energy Module (BLEM) Provisioning Status")

The table below denotes the data that is required in the PaakESN_St TP message for the ProvOnBoardClient4. The payload of the message shall follow the message structure defined in TP Protocol spec and in the S13a and S13b spec.

If OnBoardClient4 (BLEM) does not transitioned to 0X53 after receiving "PaakSerial_D_rq=0x53", ProvServer shall try 2 more time (total-3 times) to send "PaakSerial_D_rq"

Name	Literals	Value	Description
BLEMProvDID	-	-	Describes the current state Provisioning
	FactoryMode	0x50	BLEM is not Configured
	Unprovisioned	0x51	BLEM Configured, TargetID not Transfer/ BLEM Self-Test not complete
	BLEMProvAlertACK	0x52	BLEM is waiting for Provisioning Alert Ack from PaakOnBoardClient
	ReadyForKeyDelivery	0x53	BLEM is Provisioned and ready for Key Delivery
	KeyDelivered	0x54	Key(s) are delivered to BLEM
BLEMSyncPPacket	-	-	BLEM SyncP Signed (BLEM ESN). BLEM ESN will be in the header of SyncP Signed message. SyncP Payload information found in Paak-REQ-281398-Provisioning SyncP Payload. Max. 1000 bytes.

**1.11.2 PMPR-IIR-REQ-331399/A-PMPROnBoardClient4_Rx****1.11.2.1 MD-REQ-241971/D-PaakSerial_Rq**

Message Type: Request

This signal is sent by the ProvServer to ProvOnBoardClient 4 to update the its provisioning state. Once the ProvServer receives the ACK from the ProvOffBoardClient2, it sends this request to the BLEM peripheral to change its provisioning state. This request is also sent by the ProvServer if there is a difference between the ESN stored in its non-volatile memory and the ESN it receives in the PaakESN_St TP message.

Name	Literals	Value	Description
Type	-	-	
	Not Present	0x0	
	Present & Unprovisioned	0x1	
	Present & BLEMPProvAlertACK	0x2	
	Present & ReadyForKeyDelivery	0x3	
	Present & KeyDelivered	0x4	

1.11.2.2 MD-REQ-242058/C-PaakWakeup_Rq

Message Type: Request

Wakeup signal from (PaakOnBoardClient/ProvServer) to (PaakServer/ProvOnBoardClient4).

Name	Literals	Value	Description
Type	-	-	
	Off	0x0	
	On	0x1	

1.12 Provisioning Server Interface**1.12.1 PMPR-IIR-REQ-278630/C-Provisioning Server_Tx****1.12.1.1 MD-REQ-241971/D-PaakSerial_Rq**

Message Type: Request

This signal is sent by the ProvServer to ProvOnBoardClient 4 to update the its provisioning state. Once the ProvServer receives the ACK from the ProvOffBoardClient2, it sends this request to the BLEM peripheral to change its provisioning state. This request is also sent by the ProvServer if there is a difference between the ESN stored in its non-volatile memory and the ESN it receives in the PaakESN_St TP message.

Name	Literals	Value	Description
Type	-	-	
	Not Present	0x0	
	Present & Unprovisioned	0x1	
	Present & BLEMPProvAlertACK	0x2	



	Present & ReadyForKeyDelivery	0x3	
	Present & KeyDelivered	0x4	

1.12.1.2 MD-REQ-242058/C-PaakWakeup_Rq

Message Type: Request

Wakeup signal from (PaakOnBoardClient/ProvServer) to (PaakServer/ProvOnBoardClient4).

Name	Literals	Value	Description
Type	-	-	
	Off	0x0	
	On	0x1	

1.12.1.3 MD-REQ-295859/B-DSRCSerial_Rq

Message Type: Request

This signal is sent by the ProvServer to ProvOnBoardClient3 to update its provisioning state. Once the ProvServer receives the ACK from the ProvOffBoardClient2, it sends this request to the ProvOnBoardClient3 to change its provisioning state. This request is also sent by the ProvServer if there is a difference between the FESN stored in its non-volatile memory and the FESN it receives in the PeripheralProvisioningData_St TP message.

Name	Literals	Value	Description
Type	-	-	
	Not Present	0x00	
	Present & Unprovisioned	0x01	
	Present & DSRCProvAlertACK	0x02	
	Present & Provisioned	0x03	

1.12.1.4 MD-REQ-295861/B-OBCCSerial_Rq

Message Type: Request

This signal is sent by the ProvServer to ProvOnBoardClient3 to update its provisioning state. Once the ProvServer receives the ACK from the ProvOffBoardClient2, it sends this request to the ProvOnBoardClient3 to change its provisioning state. This request is also sent by the ProvServer if there is a difference between the FESN stored in its non-volatile memory and the FESN it receives in the PeripheralProvisioningData_St TP message.

Name	Literals	Value	Description
Type	-	-	
	Not Present	0x00	
	Present & Unprovisioned	0x01	
	Present & OBCCProvAlertACK	0x02	
	Present & Provisioned	0x03	

1.12.1.5 MD-REQ-303924/C-setSyncProvisioningState

This message will be used to update the SYNC's provisioning status if Ethernet is used after the ProvServer receives an ACK from the ProvOffBoardClient2. This is a periodic message that will be transmitted through SOA from the



ProvServer to the SYNC. If Sync does not transitioned to 0X3B after receiving "setSyncProvisioningState_St", ProvServer shall try 2 more time (total-3 times) to send "setSyncProvisioningState_Rq.

Method Type					
Method Type		One-Shot--(Message is sent continuously until the ProvServer receives Ack)			
QoS Level		Default			
Retained		No			
R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
R	ProvisioningStateRequest	Enum	-	-	To request the SYNC to enter one of the supported provisioning states.
			Factory Mode	0x38	
			Unprovisioned	0x39	ECG can only request the SYNC to enter Unprovisioned Mode (0x39) or Provisioned (0x3B)
			ECU Provisioning Ack	0x3A	
			Provisioned	0x3B	ECG can only request the SYNC to enter Unprovisioned Mode (0x39) or Provisioned (0x3B)
Response (_Rsp)					
R	ProvisioningStateResponse	Enum	-	-	SYNC response to a provisioning state change request.
			Success	0x00	
			Wait	0x01	
			Fail-Param Does Not Exist	0x02	
			Fail-Param Read Only	0x03	
			Fail-Param Out Of Range	0x04	
			Fail-Param Size Incorrect	0x05	
			Fail-Unknown Command Type	0x06	
			Fail- SYNC Internal Error	0x07	
			Fail-Command Already In Progress	0x08	
			Fail-Comman Not Permitted	0x09	
			Fail-Internal Memory Error	0x0A	
			Fail-Invalid Config Data	0x0B	
			Fail-Part2No Mismatch	0x0C	
			Fail-Invalid Apply Type Combo	0x0D	
			Fail-Access Denied	0x0E	
			Fail-Config Item Mismatch	0x0F	



			Fail-Already In Same State	0x10	
O	ErrorCode	Enum	-	-	To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456 for full list of errors)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	
			
				0xFFFF	

1.12.1.6 MD-REQ-331824/A-ECGProvisioningStateBroadcast

This is an Ethernet message (SOA API) which will be sent from the ProvServer to the SYNC to confirm the ProvServer has successfully provisioned. CCS shall subscribe to this message to receive the ProvServer provisioning state.

Method Type		One-Shot			
QoS Level		Default			
Retained		Yes			
R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
-	N/A	-	-	-	N/A
Response (_Rsp)					
R	ECGProvisioningState	Enum	-	-	
			Factory Mode	0x20	
			Unprovisioned	0x21	
			Waiting for ECG Provisioning Response	0x22	
			Waiting for TCU Provisioning Response	0x23	
			Waiting for HomeURL	0x24	
			Connecting to HomeURL	0x25	
			Provisioned	0x26	

1.12.2 PMPR-IIR-REQ-278631/C-Provisioning Server_Rx**1.12.2.1 MD-REQ-295854/D-PeripheralProvisioningData_St**

Message Type: Status

This is a TP CAN signal used to indicate the provisioning state of the Peripheral ECU (ECUProvDID) and ECU Metadata for each of the peripheral ECU's shown in the table below. PeripheralProvisioningData_St is sent by the ProvOnBoardClient3 to the ProvServer. It is a periodic TP message that provides the ProvServer with the information listed in the TP ProvisioningData Table shown below. Each peripheral module will have a unique ID that the ProvServer will use to determine which peripheral sent the message. Please refer to Transport Protocol (TP) SPSS for further details on the implementation.

Peripheral ProvisioningData_St Table

The table below denotes the peripheral ECUs that support **PeripheralProvisioningData_St** TP message:



Peripheral ECU	Transport Protocol Message	FTCP Logic
OBCC	PeripheralProvisioningData_St	OBCCProvisioningAlert
DSRC	PeripheralProvisioningData_St	DSRCProvisioningAlert

TP ProvisioningData Table

The table below denotes the data that is required in the “**PeripheralProvisioningData_St**” for each Peripheral ECUs. The payload of the message shall follow the TP protocol message defined in TP Protocol spec and Sync P spec defined in the SyncP S13a and S13b specs.

(*) Note that the BLEM will use the **PaakESN_St TP** message (MD-REQ-241972/F) and SYNC will use **getSyncProvisioningData** (SOA API) - (MD-REQ-303925/B).

Name	DID	Modules	
		DSRC	OBCC
ECUProvDID (Provisioning State)	0xD021	Refer to Table 1	Refer to Table 1
FESN (Ford ESN)	0xF17F 0xF18C	TBD	Required
SecurityKeyPackageID	0xD03D	TBD	Required
Hardware/CoreAssembly Part Number	0xF111	TBD	Required
Software Part Number	0xF188	TBD	Required
Calibration Config Part number	0xF10A	TBD	Required
Delivery Assembly Number	0xF113	TBD	Required
part2Partnumber	0xF110	TBD	Required
ECUID	ECU ID is an unique and fixed value for each ECU	TBD	Required
Provisioning Method	0xFD08	TBD	Required
Ethernet Mac Address	ECU internal data	TBD	Optional
Wi-Fi Mac Address	0xFD26	TBD	Optional
Bluetooth Mac Address	ECU internal data	TBD	Optional
ECU_Provisioning State	0xFD02	TBD	Optional
Firmware Version	0xFD12	TBD	Optional
Global Configuration Version	in the part II spec	TBD	Optional

TABLE 1: The table below denotes the provisioning states for the ProvOnBoardClient3 sent within the PeripheralProvisioningData_St TP message. Sent from ProvOnBoardClient3 to ProvServer.



Name (i.e. 0xD021 in ECU)	Literals	Value	Description
ECUProvDID	-	-	Describes the current state Provisioning
	FactoryMode	0x38	ECU is not Configured
	Unprovisioned	0x39	ECU Configured, Self-Test not complete
	ECUProvAlertACK	0x3A	ECU is waiting for Provisioning Alert Ack from ECG
	ECUProvisioned	0x3B	ECU Provisioned

ECUProvDID (“aka Authorization Status” or 0xD021 per GMRDB) is a DID that provides the ECU peripheral’s provisioning state whenever it is read. Whenever the peripheral ECU meets the specific criteria to transition from one state to the next, this DID will then be updated - (refer to expected flow diagram and the above table for a list of peripheral ECUs). The authorization status (ECUProvDID) will persist until peripheral ECU meets the criteria to transition to the next state. This also means that peripheral ECU needs to persist these states between ignition and or power cycles, and whenever the ignition or power is returned peripheral ECU. In the event that power to peripheral is lost, peripheral ECU will complete the provision process from where it left off after power is resumed. (i.e. SYNC will not restart provisioning process whenever power is resumed.)

If Peripheral ECU does not transitioned to 0X3B after receiving “ECUSerial_D_rq=0x3B”, ProvServer shall try 2 more time (total-3 times) to send “ECUSerial_D_rq”

1.12.2.2 MD-REQ-241972/G-PaakESN_St

Message Type: Status

This signal is used to indicate the provisioning state of the ProvOnBoardClient4 (BLEMProvDID) and ECU Metadata the peripheral ECU’s shown in the table below. It is a periodic TP message that provides the ProvServer with the information listed in the PaakESN_St Parameters Table shown below

Peripheral ECU	Transport Protocol Message	FTCP Logic
BLEM	PaakESN_ST	BLEMProvisioningAlert

This signal is used to indicate the Provision State, ESN and BPEK (One way hashed).

BLEMProvDID (Actual name in GMRDB “Bluetooth Low Energy Module (BLEM) Provisioning Status”)

The table below denotes the data that is required in the PaakESN_St TP message for the ProvOnBoardClient4. The payload of the message shall the follow the message structure defined in TP Protocol spec and in the S13b and S13c spec.

If OnBoardClient4 (BLEM) does not transitioned to 0X53 after receiving “PaakSerial_D_rq=0x53”, ProvServer shall try 2 more time (total-3 times) to send “PaakSerial_D_rq”

Name	Literals	Value	Description
BLEMProvDID	-	-	Describes the current state Provisioning
	FactoryMode	0x50	BLEM is not Configured
	Unprovisioned	0x51	BLEM Configured, TargetID not Transfer/ BLEM Self-Test not complete
	BLEMProvAlertACK	0x52	BLEM is waiting for Provisioning Alert Ack from PaakOnBoardClient
	ReadyForKeyDelivery	0x53	BLEM is Provisioned and ready for Key Delivery
	KeyDelivered	0x54	Key(s) are delivered to BLEM
BLEMSyncPPacket	-	-	BLEM SyncP Signed (BLEM ESN). BLEM ESN will be in the header of SyncP Signed message. SyncP Payload information found in PaaK-REQ-281398-Provisioning SyncP Payload. Max. 1000 bytes.

**1.12.2.3 MD-REQ-303925/C-getSyncProvisioningData**

This message will be used to receive the SYNC's provisioning status and provisioning metadata if Ethernet is used. This is a periodic message that will be transmitted through SOA from the SYNC to the ProvServer.

Method Type					
Method Type		Periodic			
QoS Level		Default			
Retained		Yes			
R/O	Name	Type	Literals	Value	Description
Request					
-	-	-	-	-	N/A
Response					
R	ECU_ProvDID	Enum	-	-	To indicate the provisioning state of the SYNC
			Factory Mode	0x38	SYNC is not Configured
			Unprovisioned	0x39	SYNC Configured, Self-Test not complete
			ECU Provisioning Ack	0x3A	SYNC Configured, Waiting for ACK
			Provisioned	0x3B	Provisioned Mode
R	syncFESN	String	-	8 chars.	
R	SYNCProvisioningData Secure	Bytes	-	The max allowed by GPB	Specifies GPB encoded TCU Provisioning data signed with TCU SyncP key. SYNC FESN will be in the header of SyncP Signed message. The payload of the message shall follow the message structure defined in the SyncP S13a and S13b spec Refer to Rqmt PMPR-Req-348833 for details of the attributes that shall be included in the payload,
R	PayloadType	Enum	-	-	Specifies payload type as defined in FTCP proto file
			Encrypted	0x0	
			Signed	0x1	
R	ECUID_CAN	Int32	-	0-4095	Refer to Netcom ECUID table
O	ErrorCode	Enum	-	-	To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456 for full list of errors)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	



Ford Motor Company

Subsystem Part Specific Specification
Engineering Specification

			
				0xFFFF	



2 Functional Definition

2.1 PMPR-FUN-REQ-278632/A-Provisioning

2.1.1 Requirements

2.1.1.1 PMPR-REQ-334891/A-Provisioning Process while the Vehicle is in Transport Mode

If the vehicle enters Transport Mode and the ignition is on, the ProvOnBoardClient3 and ProvOnBoardClient4 shall wake up from Deep Sleep Mode and allow the ProvServer to continue the provisioning process.

2.1.1.2 PMPR-REQ-278635/C-Peripheral Provisioning Server - Provisioning Status

Peripheral ECUs (OnBoardClient3) provisioning status:

ECG_ECUProvState - represents the Provisioning State of an ECU within the ProvServer. Currently ProvServer shall protect for following ECUs

1. SYNC – State in ProvServer shall be-ECG_SYNCProvState– refer to Table 1
2. DSRC – State in ProvServer shall be-ECG_DSRCProvState– refer to Table 1
3. OBCC – State in ProvServer shall be ECG_OBCCProvState– refer to Table 1
4. BLEM – State in ProvServer shall be-ECG_BLEMProvState – refer to Table 2

Whereas, ECUProvDID represents the Provisioning State of an ECU within itself. Please refer to requirement “MDREQ295854/BPeripheralProvisioningData_St” for more information.

DID (i.e. 0xFD02 in ECG)	Literals	Value	Description
ECG_ECUProvState (generic): (ECG_SYNCProvState, ECG_DSRCProvState, ECG_OBCCProvState)	Not Present or Not Configured	0x38	ECG looks DE00 to determine if ECU peripheral is present.
	Present & Unprovisioned	0x39	
	Present &Waiting for ECUProvAlertACK (e.g. SYNCProvAlertACK, DSRCProvAlertACK, OBCCProvAlertACK)	0x3A	
	Present & Provisioned	0x3B	

PERIPHERAL ECU Not Present:

The value of the DID (i.e. FD02) shall be set to “*Not Present*” in case of the peripheral ECU is not present in the vehicle. The structure of DID values are defined in the part II spec.

PERIPHERAL ECU Present & Unprovisioned:

The value of the DID shall be set to “*Present & Unprovisioned*” in case of the peripheral ECU is present in the vehicle. This shall be the initial state after the ProvServer gets configured to peripheral ECU enabled vehicles via Configuration DID DE00 of the peripheral ECU.

PERIPHERAL ECU Present & Waiting for Provisioning Alert Acknowledgement:

Once peripheral ECU Self-Test successfully complete (if needed), the peripheral ECU shall start transmitting TP Message which includes: FESN of Peripheral ECU in the header of SyncP message, etc...

“PeripheralProvisioningData_St” shall be transmitted every 5 sec. The ProvServer shall receive the TP message and send the ProvisioningAlert to SDN. The ProvServer shall wait for the Provisioning Alert ACK from SDN. Once ACK is received,



ProvServer shall send the ACK to a peripheral ECU via ECUSerial_D_Rq Message. If ECUProvDID is still in 0x3A after receiving ECGSerial_D_Rq (0x2) then ProvServer shall retry it two more times upon receiving the ECUProvDID state in the TP message "PeripheralProvisioningData_St". This condition shall be checked at every ignition cycle at peripheral ECU. A Total three retries shall happen if the ECUProvDID is not updated in TP message "PeripheralProvisioningData_St".

PERIPHERAL ECU Present & Provisioned:

Once ECUProvDID is updated to "ECUProvisioned" (0x3B) and is reflected in the "PeripheralProvisioningData_St". The ProvServer shall update that particular peripheral's ECG_ECUProvState to "Present and Provisioned" (0x3B) that will complete the provisioning for given peripheral ECU. The ProvServer shall then send the PeripheralProvisioningStatusAlert to the ProvOffBoardClient2 to communicate the completion of this process for that particular ECU.

BLEM (OnBoardClient4) Provisioning Status

DID	Literals	Value	Description
ECG_BLEMProvState	Bluetooth Low Energy Module (BLEM) Not Present	0x50	
	Bluetooth Low Energy Module (BLEM) Present & Unprovisioned	0x51	
	Bluetooth Low Energy Module (BLEM) Present & Waiting For Provisioning Alert Acknowledgement	0x52	
	Bluetooth Low Energy Module (BLEM) Present & Ready For Key Delivery (aka Present & Provisioned)	0x53	
	Bluetooth Low Energy Module (BLEM) Present & Key Delivered	0x54	

Bluetooth Low Energy Module (BLEM) Not Present:

The value of the DID shall be set to "*Bluetooth Low Energy Module (BLEM) Not Present*" in case of the ProvOnBoardClient4 is not present in the vehicle.

Bluetooth Low Energy Module (BLEM) Present & Unprovisioned:

The value of the DID shall be set to "*Bluetooth Low Energy Module (BLEM) Present & Unprovisioned*" if the ProvOnBoardClient4 is present in the vehicle. This shall be the initial state after the ProvServer gets configured to ProvOnBoardClient4 enabled vehicles via Configuration DID DE00 of the ProvServer.

Bluetooth Low Energy Module (BLEM) Present & Waiting for Provisioning Alert Acknowledgement:

Once the TargetID is transferred and BLEM Self-Test is successfully completed, ProvOnBoardClient4 shall start transmitting the TP Message "PaakESN_St" which includes: ESN of BLEMServer in the header of SyncP* message and BLEMProvDID, BPEK (one-way hash), HW Part Number (F111), SW Part Number (F188) and ECU Cal-Config Part Number (DID F10A) in the payload of SyncP Message. ProvServer will receive the TP message and send the ProvisioningAlert to ProvOffBoardClient2.

ProvServer shall wait for the BLEM Provisioning Alert ACK from ProvOffBoardClient2. Once ACK is received, ProvServer shall send the ACK to ProvOnBoardClient4 via PaakSerial_D_Rq CAN Message. If BLEMProvDID is still in 0x52 after receiving PaakSerial_D_Rq (0x2) then ProvServer shall retry it two more times upon receiving the BLEMProvDID state in the TP message PaakESN_St. This condition shall be checked at every ignition cycle at ProvServer. Total three retries shall be tried if the BLEMProvDID is not updated in TP message PaakESN_St.

Bluetooth Low Energy Module (BLEM) Present & Ready for Key Delivery:

After receiving the ACK, ProvOnBoardClient4 shall change its BLEMProvDID to 0x53 (i.e. *ReadyForKeyDelivery*). "PaakESN_St" TP message from ProvOnBoardClient4 shall transmit the BLEMProvDID updated state (i.e. 0x53). ProvServer shall update "ECG_BLEMProvState" to 0x3 (i.e. "*Bluetooth Low Energy Module (BLEM) Present & Ready For Key Delivery*") upon receiving the updated BLEMProvDID (i.e. 0x53) in the "PaakESN_St". This state shall constitute that ProvOnBoardClient4 is provisioned and ready for BLEM Keys to be delivered.

Bluetooth Low Energy Module (BLEM) Present & Key Delivered:

Once the Key(s) are delivered to ProvOnBoardClient4, it shall update BLEMProvDID to 0x54 (i.e. *KeyDelivered*).



ProvServer shall update its DID "ECG_BLEMProvState" to 0x4 (i.e. "Bluetooth Low Energy Module (BLEM) Present & Key Delivered") via TP Message "PaakESN_St". This state indicates that BLEM Key(s) are present in the ProvOnBoardClient4.

2.1.1.3 PMPR-REQ-278636/C-Cellular Provisioning vs. Wifi Provisioning

Peripheral ECU shall provision via same method as ProvServer is configured to provisioned i.e. TCU Cellular/TCU Wi-Fi/SYNC Wi-Fi. In the event that ProvOnBoardClient1 is not present in the vehicle, then peripheral ECU (ProvOnBoardClient3/ ProvOnBoardClient4) and/or ProvServer provisioning will take place through SYNC WIFI after WIR establishes WIFI connection with SYNC – refer to WIR spec for further details.

If the ProvServer provisions using Wi-Fi and the vehicle is not in Transport Mode, the vehicle shall continue the provisioning process using the Wi-Fi connection. If vehicle enters Transport Mode while the ignition is on, and the vehicle is provisioning using the ProvOnBoardClient1, then ProvServer shall change Provisioning Method to "Cellular" and finish provisioning the rest of the provisioning process using cellular connection.

If the vehicle is in transport mode and all ECUs have been provisioned, then ProvServer shall follow the Power Management SPSS requirements.

2.1.1.4 PMPR-REQ-278637/C-Storing of Peripheral ESN or FESN

The ProvServer shall store the ESN or FSEN of the peripheral ECU. The ProvServer shall compare the ECU's ESN or FSEN stored in the non-volatile memory of the ProvServer with the ECU's FESN or ESN sent in the periodic TP Message "PeripheralProvisioningData_St" for ProvOnBoardServer3 and "PaakESN_St" for ProvOnBoardClient4 at every ignition cycle. If ECU ESN or FESN is different and ECUProvDID = 0x3A (ECUProvAlertACK) and ECG_ECUProvState >= 0x3A then ProvServer shall update ECG_ECUProvState to 0x3A and start the ECU Provisioning Process again. This will cover the ECU swap scenario.

2.1.1.5 PMPR-REQ-278639/C-Peripheral Provisioning Failure

If ProvServer unable to send the ECUProvisioningAlert to cloud (ProvOffBoardClient2) or unable to receive the ACK from cloud (ProvOffBoardClient2) then ECU will be stuck in the ECUProvAletACK (i.e. 0x3A) state.

2.1.1.6 PMPR-FUR-REQ-304014/C-PeripheralProvisioningData

ProvOnBoardClient3 shall periodically publish its provisioning state and provisioning data (as defined in the sequence flow as PeripheraProvisioningData_ST) at a rate of 5 seconds when:

- Every module boot up
- Every ignition cycle (the ignition Status transitions from Off to On)
- Every provisioning state changes

ProvOnBoardClient4 shall periodically publish its provisioning state and provisioning data (as defined in the sequence flow as PaakESN_ST) at a rate of 5 seconds when:

- Every module boot up
- Every ignition cycle (the ignition Status transitions from Off to On)
- Every provisioning state changes

The ProvOnBoardClient3 or ProvOnBoardClient4 (aka Peripheral ECU) shall stop publishing its provisioning data when the corresponding Acknowledgment is received from the ProvServer (aka ECG).

2.1.1.7 PaakV2-REQ-331616/B-BLEM NotAuthorized/Authorized/RemoveKeys

ECGAuth_St is periodic CAN message from ProvServer to ProvOnBoardClient4. For further details, please refer to Paak SPSS (REQ269554/B)



This authorization status will be communicated by ProvServer through CCS – please refer to CCS SPSS for more details.

2.1.1.8 PMPR-REQ-331617/A-Provisioning OnBoard Client4 Provisioning TP Message to Provisioning Server

The ProvOnBoardClient4 will provide its ESN to the ProvServer using a TP message (PaakESN_St). PaakESN_St shall include the

- BLEMServer SyncP* Signed BLEM ESN in the Header
- BLEMServer SyncP Signed BLEMProvDID in the payload
- BLEMServer SyncP Signed BPEK in the payload
- BLEMServer Hardware Number (DID F111) in the payload
- BLEMServer Software Part Number (DID F188) in the payload
- BLEMServer ECU Cal-Config Part Number (DID F10A) in the payload

*SYNCP is to provide a routine and security layer to the message. Please refer to SyncP functional spec for further details in the security layer.

The payloads are application defined as the purpose of Payload type indicates the payload is either signed or encrypted. The message structure is defined in the FTCP spec.

The ProvOnBoardClient4 shall change its BLEMProvDID to 0x52 after it detects the TargetID DID has transitioned from Unlocked to Locked state and BLEM Self-Test Executed.

The ProvOnBoardClient4 shall begin to send PaakESN_St TP periodic message (5 sec interval) after BLEMProvDID reaches state 0x52 (i.e. BLEMProvAlertACK). The ProvOnBoardClient4 shall send PaakESN_St to the ProvServer and APIM(ProvOnBoardClient2?)

2.1.1.9 PMPR-REQ-331618/A-BLEM Provisioning Data Identifiers

Once ProvServer receives the PaakESN_St with BLEMProvDID value 0x52, ProvServer shall update ECG_BLEMProvState to 0x2 and publish the BLEMProvisioningAlert to the ProvOffBoardClient2. Subsequent PaakESN_St with the BLEMProvDID value 0x52 shall not trigger ProvServer to send BLEMProvisionAlert to ProvOffBoardClient2 again.

ProvOffBoardClient2 can solicit BLEMProvisioningAlert data anytime (e.g. SDN failure, data corruption) via BLEMProvisioningRequestCommand to ProvServer.

2.1.1.10 PMPR-REQ-348833/A-ProvOnBoardClient3 Required/Optional Data Fields Table

The following table represents the data attribute/parameter sent from ProvOnBoardClient3 to ProvServer in the provisioning message. The payload of the message shall follow the SyncP message structure defined in the SyncP S13a and S13b specs.

(*) R=Required; O=Optional in FTCP

R/O (*)	Data Attribute/Parameter	DID	Type	Length
R	FESN	0xF17F 0xF18C	String	8 chars.
R	SecurityKeyPackageID	0xD03D	String	40 chars. (64 bit)
R	Hardware/Core Assembly Part Number	0xF111	String	24 chars.
R	Software Part Number	0xF188	String	24 chars.
R	CalConfig Partnumber	0xF10A	String	24 chars.
R	DeliveryAssembly Number	0xF113	String	24 chars.



R	Provisioning State - ECUProvDID	0xD021	Enum	24 chars.
R	ECUID	ECU ID is an unique and fixed value for each ECU	String	8 chars.
R	Provisioning Method	0xFD08	String	11 chars.
R	part2Partnumber	0xF110	String	20 chars.
O	Wi-Fi Mac Address	0xFD26	String	17 chars.
O	Ethernet Mac Address	ECU internal data	String	17 chars.
O	Primary Bootloader Part Number	CCPU: 0x8068 VMCU: 0xD027	String	24chars.
O	Recovery load part number	CCPU: 0xEEFF VMCU: 0xEEFE	String	24 chars.
O	ECUID IPAddress	ECU internal data	String	4 chars.
O	Firmware Version	0xFD12 0xFD15	String	50 chars.
O	globalConfigVersion	In the part II spec	String	50 chars.

2.1.1.11 ECGPR-REQ-331821/B-ProvOffBoardClient1 or ProvOffBoardClient2 Validation of Provisioning Metadata

The table below provides the parameters that are required to be sent within the ECUProvisioningAlert and the provisioning data that requires validation by the ProvOffBoardClient1 or ProvOffBoardClient2 and their respectively validation criteria

Data Field	Applicable To	Cloud Required Validation Yes/No	Validation Scenarios (Based on data transmitted in Provisioning Alert)	Criteria
ESN	ProvOnBoardClient4 Only	Yes	Missing (not found in supplier feed)	1
			Different (ESN is different than what came as a part of Supplier Feed in the Cloud (Via GIVIS))	2
FESN	Multiple ECUs	Yes	Missing (not found in supplier feed)	1
SecurityKeyPackageID	Multiple ECUs	Yes	Missing SPID (Not found in Supplier Feed)	1
			Different (Different than what came as a part of Supplier Feed in the Cloud (Via GIVIS))	1
VIN	Multiple ECUs	Yes	Missing	1
Destination Region Code	ProvOnBoardClient1 & ProvServer Only	Yes	Different (Region is different than what came as a part of Supplier Feed in the Cloud (Via GIVIS))	2
Destination Country code	ProvOnBoardClient1 Only	Yes	Missing	1
BLEMSyncP Cert	ProvOnBoardClient4 Only	Yes	Missing	1
			Different	1
ICCID	ProvOnBoardClient1 Only	Yes	Missing	1
			Different (ICCID is different than what came as a part of Supplier Feed in the Cloud (Via GIVIS))	2



SIM_IMSI	ProvOnBoardClient1 Only	Yes	Missing	1
IMEI	ProvOnBoardClient1 Only	Yes	Missing	1
SIM_MSISDN	ProvOnBoardClient1 Only	Yes	Missing	1
Hardware/CoreAssembly Part Number	Multiple ECUs	No		N/A
Software Part Number	Multiple ECUs	No		N/A
CalConfig Partnumber	Multiple ECUs	No		N/A
Delivery/Assembly Number	Multiple ECUs	No		N/A
Provisioning State - ProvDID	Multiple ECUs	No		N/A
CANDatabaseVersion	Multiple ECUs	No		N/A
homeURL	ProvServer Only	No		N/A
ECUID	Multiple ECUs	No		N/A
Ethernet Mac Address	Multiple ECUs	No		N/A
Primary Bootloader Part Number	Multiple ECUs	No		N/A
Recovery load part number	Multiple ECUs	No		N/A
Provisioning Method	Multiple ECUs	No		N/A
Part2Partnumber	Multiple ECUs	No		N/A
FirmwareVersion	Multiple ECUs	No		N/A
GlobalConfigVersion	Multiple ECUs	No		N/A
ECU Identifiers	Multiple ECUs	No		N/A
ECG_ECUProvState	ProvServer Only	No		N/A

2.1.1.12 ECGPR-REQ-331822/A-Criteria Description

The following describes the data validation criteria:

- 1) **Criteria 1** - ProvOffBoardClient1 or ProvOffBoardClient2 shall NOT overwrite the data and it shall fail the provisioning process as GIVIS is the master.
 - a) ProvOffBoardClient1 or ProvOffBoardClient2 shall fail the provisioning process
 - i) i.e. not to go to next step in the provisioning sequence
 - ii) shall not send the ChangeHomeURL to ProvServer
 - iii) ProvOffBoardClient1 or ProvOffBoardClient2 will not send the failure cause in the Provisioning Alert Response but it shall log error
 - b) ProvServer will validate for missing data and shall not sent provisioning alert to ProvOffBoardClient1 or ProvOffBoardClient2 if data is missing

Criteria 2 - ProvOffBoardClient1 or ProvOffBoardClient2 shall overwrite the data and it shall continue with the provisioning process. Vehicle data is the master for these parameters: VIN/Region Code/Country Code/SIM_IMSI/ICCID/ ESN (BLEM only): If data received from the vehicle does not match supplier feed or the data stored in TMC/GIVIS, then ProvOffBoardClient1 or ProvOffBoardClient2 shall overwrite the existing data with the data received in the ProvisioningAlert. It shall then continue the provisioning process as described in SPSS

2.1.1.13 ECGPR-REQ-331823/A-Retry Strategy

- ProvOffBoardClient1 or ProvOffBoardClient2 shall start a timer after it receives a MQTT ACK for the ChangeHomeURLCommand. If it does not receive the ChangeHomeURLCommandResponse after 5 seconds from receiving that MQTT ACK, it shall resend ChangeHomeURLCommand. This shall at least be sent once.
- If ProvServer and Central Broker establish a successful MQTT Connection and the ECGProvisioningAlert is NOT received by ProvOffBoardClient1 within 15 seconds (timer shall be configurable), the ProvOffBoardClient1 shall send the ECGProvisioningDataRequestCommand.

**2.1.1.14 PMPR-REQ-331820/A-ECUPeripheralDataRequestCommand and ECUPeripheralDataRequestCommand Response**

The table below denotes the corresponding command request and command response for each peripheral ECU: These are only logical names. For the names used in FTCP, please refer to the FTCP SPSS.

Peripheral ECU	Corresponding ECUPeripheralDataRequestCommand and ECUPeripheralDataRequestCommandResponse
SYNC	SyncProvisioningDataRequestCommand
SYNC	SyncProvisioningDataRequestCommandResponse
OBCC	OBCCProvisioningDataRequestCommand
OBCC	OBCCProvisioningDataRequestCommandResponse
DSRC	DSRCProvisioningDataRequestCommand
DSRC	DSRCProvisioningDataRequestCommandResponse

2.1.1.15 PMPR-REQ-334893/A-Provisioning FTCP Messages

CV Enabler Name: FNV2 Provisioning - ECUs peripheral						
Description		Provisioning process enable vehicle's ECU to be verified and provisioned in the Cloud				
FTCP Message	SMS Required ?	ECU's Peripheral Provisioning/Author				
ECU PERIPHERALS (Provisioning Status in ECG)		38	39	3A	3B	-
SyncProvisioningAlert				X		
SyncProvisioningDataRequestCommand	No			X		
SyncProvisioningAlertCommandResponse				X		
OBCCProvisioningAlert				X		
OBCCProvisioningDataRequestCommand	No			X		
OBCCProvisioningDataRequestCommandResponse				X		
DSRCProvisioningAlert				X		
DSRCProvisioningDataRequestCommand	No			X		
DSRCProvisioningDataRequestCommandResponse				X		
BLEM PERIPHERAL ONLY (Provisioning Status in ECG)		50	51	52	53	
BLEMProvisioningAlert				X		
BLEMProvisioningDataRequestCommand	No			X		
BLEMProvisioningDataRequestCommandResponse				X		

**2.1.1.16 ECGPR-REQ-331825/A-Provisioning CCS Criteria**

CCS shall not interfere in any communication exchange between ProvServer and ProvOffBoardClient1 or ProvOffBoardClient2 if the vehicle is in Transport Mode or ProvServer is Unprovisioned. ProvServerProvisioning Status is provided by the following requirement 331824-ECGProvisioningStateBroadcast.

Vehicle Power Mode	ProvServer Provisioning Status	CCS Policy Enforcement
Factory Mode	Any – Provisioned or Unprovisioned	Not Applicable – CCS Should not interfere with the communication exchange between ProvServer & ProvOffBoardClient1 or ProvOffBoardClient2
Transport Mode	Any – Provisioned or Unprovisioned	Not Applicable – CCS Should not interfere with the communication exchange between ProvServer & ProvOffBoardClient1 or ProvOffBoardClient2
Normal Mode	Unprovisioned	Not Applicable – CCS Should not interfere with the communication exchange between ProvServer & ProvOffBoardClient1 or ProvOffBoardClient2
	Provisioned	Applicable – CCS Policy Enforcer shall be enabled

2.1.1.17 PMPR-REQ-334894/B-Peripheral Provisioning Confirmation Status Alert

This is ECU Peripheral Provisioning Status Alert Message. An alert shall be sent by the ProvServer to ProvOffBoardClient2 whenever ProvOnBoardClient2, ProvOnBoardClient3 or ProvOnBoardClient4 transitions to the “Provisioned” state (ECG_ECUProvState=0x3B). This alert shall include the FESN and the provisioning status (ECUProvDID) of the ProvOnBoardClient2, ProvOnBoardClient3 or ProvOnBoardClient4, ProvServer and ProvOnBoardClient1.



If the ProvisioningStatusAlert is received multiple times, ProvOffBoardClient2 shall overwrite the existing data with the newly received data.

In case all present ECU Peripherals are provisioned at the same time, one ProvisioningStatusAlert shall be sent including the provisioning status of all ECU peripherals along with the provisioning status of ProvServer and ProvOnBoardClient1.

If ProvOffBoardClient2 receives an ECUPeripheralProvisioningAlert after it has already received a ProvisioningStatusAlert for the same ECU, the ECUPeripheralProvisioningAlert data shall supersede the previously received ProvisioningStatusAlert. ProvOffBoardClient1 or ProvOffBoardClient2 shall overwrite the existing data with the newly received data.

2.1.1.18 ECGPR-REQ-332104/B-Vehicle to ProvOffBoardClient1 or ProvOffBoardClient2 Encryption Requirements for Provisioning

SYNCP is to provide a routine and security layer to the message. Please refer to SyncP functional spec (S13a and S13b) for further details in the security layer.

ProvServer - Single Signature Wrap

- ECGProvisioningAlert - use ProvServer signed SyncP key and encrypted to wrap
- ECGProvisioningDataCommandResponse - use ProvServer SyncP key to wrap

ProvOnBoardClient1 – Double Signature Wrap

- TCUProvisioningAlert - use ProvOnBoardClient1 SyncP key for inter wrap and ProvServer signed SyncP key and encrypted to wrap for outer wrap
- TCUProvisioningDataCommandResponse - use ProvOnBoardClient1 SyncP key for inter wrap and ProvServer SyncP key for outer wrap

ProvOnBoardClient2 - Double Signature Wrap

- SYNCPProvisioningAlert - use ProvOnBoardClient2 SyncP key for inter wrap and ProvServer signed SyncP key and encrypted to wrap for outer wrap
- SYNCPProvisioningDataCommandResponse - use ProvOnBoardClient2 SyncP key for inter wrap and ProvServer SyncP key for outer wrap

ProvOnBoardClient4 - Double Signature Wrap

- BLEMProvisioningAlert - use ProvOnBoardClient4 signed key for inter wrap and ProvServer signed SyncP key and encrypted to wrap for outer wrap
- BLEMProvisioningDataCommandResponse - use ProvOnBoardClient4 signed key and encrypted for inter wrap and ProvServer SyncP key for outer wrap

ProvOnBoardClient3 (non-SYNC) – Double Signature Wrap

- All peripherals should follow the same strategy as ProvOnBoardClient1 and ProvOnBoardClient2 where the inter wrapping is with the ECU that needs to provision and the outer wrapping with signed SyncP key and encrypted to wrap for outer wrap unless otherwise specified.

2.1.1.19 ECGPR-REQ-332105/A-ProvOffBoardClient1 or ProvOffBoardClient2 to Vehicle Encryption Requirements for Provisioning

All FTCP communication exchanged between ProvOffBoardClient1 or ProvOffBoardClient2 and vehicle shall be wrapped with ProvServer SyncP-Key unless otherwise specified.

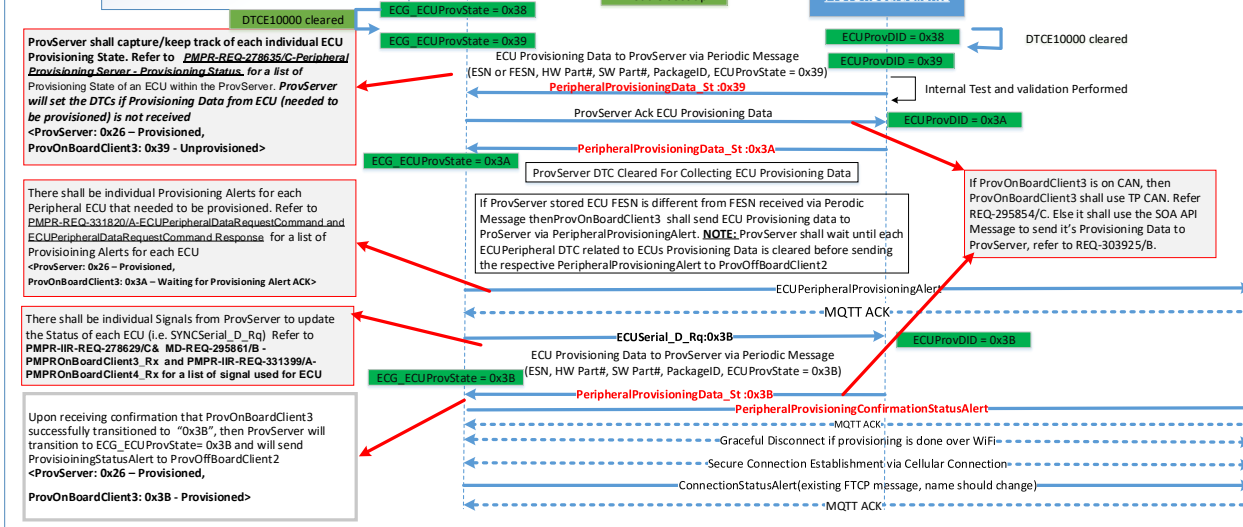
2.1.2 White Box Views

2.1.2.1 Sequence Diagrams

2.1.2.1.1 PMPR-SD-REQ-278645/D-Peripheral Provisioning

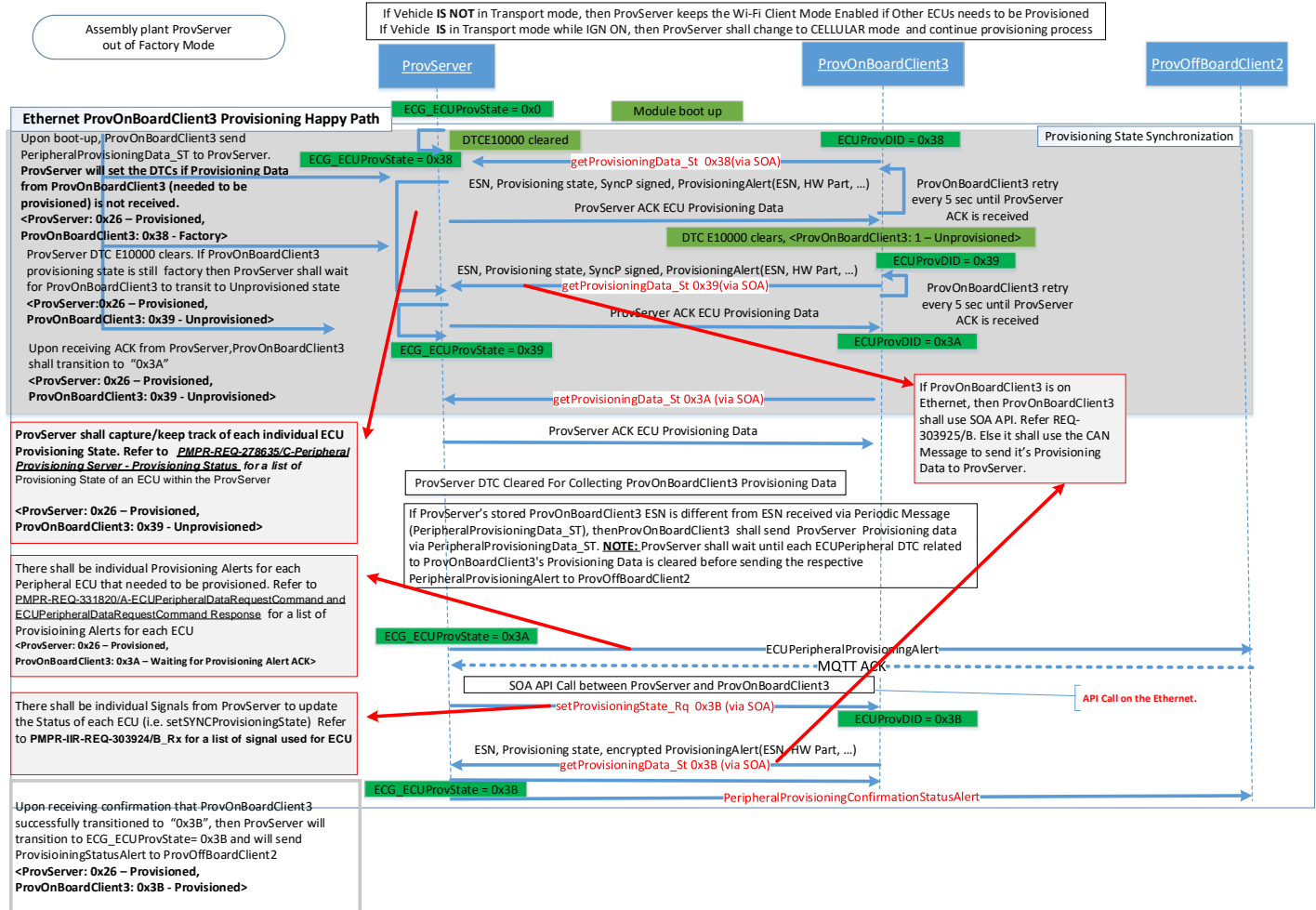
Provisioning OnBoard Client3 Sequence Scenario: Expected Path

In this scenario, the ECU follows the provisioning flow without any unexpected failure modes. The ECU transitions through all the states and provisions successfully. Refer to the diagram below for the detailed ECU provisioning sequence.



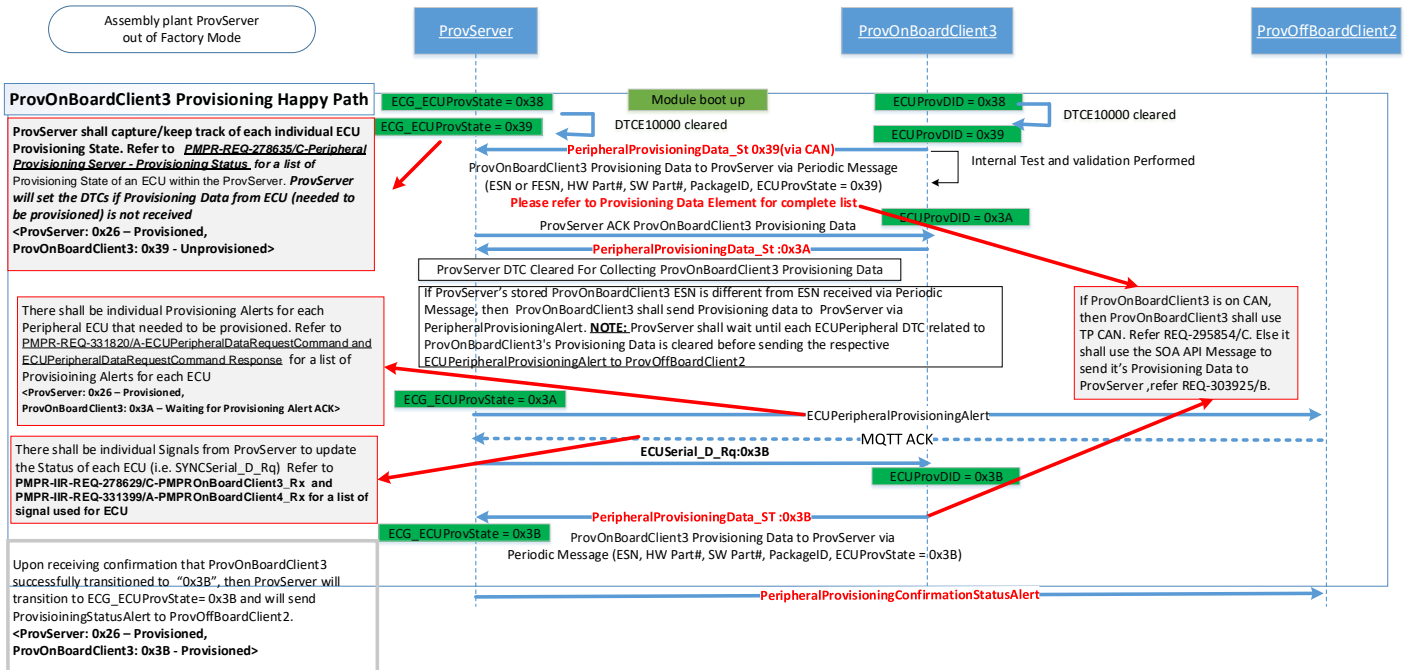


Peripheral On Ethernet



Peripheral On CAN

If Vehicle **IS NOT** in Transport mode, then ProvServer keeps the Wi-Fi Client Mode Enabled if Other ECUs needs to be Provisioned
If Vehicle **IS** in Transport mode while IGN ON, then ProvServer shall change to CELLULAR mode and continue provisioning process



Provisioning Sequence Scenario: ProvOnBoardClient3 Swap

In this scenario, the ProvServer shall send the peripheral ECU Provisioning Alert for new ECU (swapped). Once peripheral ECU's Self-Test is executed (if needed) then ProvonBoardClient3 shall start transmitting PeripheralProvisioningData_St periodic TP message with ECUProvDID = 0x3A. If FESN stored in ProvServer is different than the FESN that is being broadcasting in PeripheralProvisioningData_St TP message, then ProvServer will set ECG_ECUProvState back 0x39 (Unprovisioned) and ECUProvDID back to ECUProvDID = 0x39. ProvOnBoardClient2 shall send Provisioning data via PeripheralProvisioningData_St. Once ProvServer and Peripheral ECU synchronization successfully occurs, ProvServer will send an ACK to ProvOnBoardClient3 and then ProvServer will transition to state 0x3A. Once the FESN that is being broadcast matches the FESN stored in ProvServer, then ProvServer shall send ECUProvisioningAlert back to central broker (ProvoOffBoardClient2). ProvServer shall wait until each Peripheral ECU DTC related to ProvOnBoardClient3's provisioning data is cleared before sending the respective ECUPeripheralProvisioningAlert to ProvoOffBoardClient2. The rest sequences follow the Expected Path of provisioning process.

If the ProvServer stored ECU FESN is different from PeripheralProvisioningData_St TP signal and ECUProvDID = 0x3A and ECG_ECUProvState>=0x3A then the ProvServer shall change ECUProvDID back to 0x39 (Unprovisioned). ProvServer will set the DTCs if provisioning data from ProvOnBoardClient3 is not received. ProvServer shall wait until each Peripheral ECU DTC related to ProvOnBoardClient3's provisioning data is cleared before sending the respective ECUPeripheralProvisioningAlert to ProvOffBoardClient2

If the ProvServer stored ECU FESN matches the one that is being transmitted in PeripheralProvisioningData_St TP signal and ECUProvDID = 0x3A and ECG_ECUProvState>=0x3A and there are no Peripheral ECU DTCs related to ProvOnBoardClient3's provisioning data, then the ProvServer shall send ECUPeripheralProvisioningAlert to ProvOffBoardClient2.

**ECUPeipheralProvisioningAlerts**

The table below denotes the corresponding ECUProvisioningAlert for each peripheral ECU:

Peripheral ECU	Corresponding ECUProvisioningAlert
SYNC	SyncProvisioningAlert
OBCC	OBCCProvisioningAlert
DSRC	DSRCProvisioningAlert

For more details on the FTCP alerts and message structure please refer to the latest FTCP SPSS.

If ECU is connected on Ethernet, the PeripheralProvisioningData_St TP may need to be converted to SOA format. Please refer to Transport Protocol (TP) SPSS for further details on the implementation.

Provisioning Sequence Scenario: ProvOnBoardClient3 ABA Scenario

In this scenario, "ECU-A" shall follow the expected path scenario. When "ECU-A" is replaced with "ECU-B", it shall follow the ECU swap scenario. When "ECU-B" is replaced with "ECU-A" (ECU-A was initially provisioned in the same vehicle). ECU-A has to go through the Self-Test (if needed) and start transmitting PeripheralProvisioningData_St periodic TP message and ProvServer see the persisted FESN previous FESN from ECU-A). The ProvServer shall see updated FESN for ECU and shall follow the ECU swap scenario.

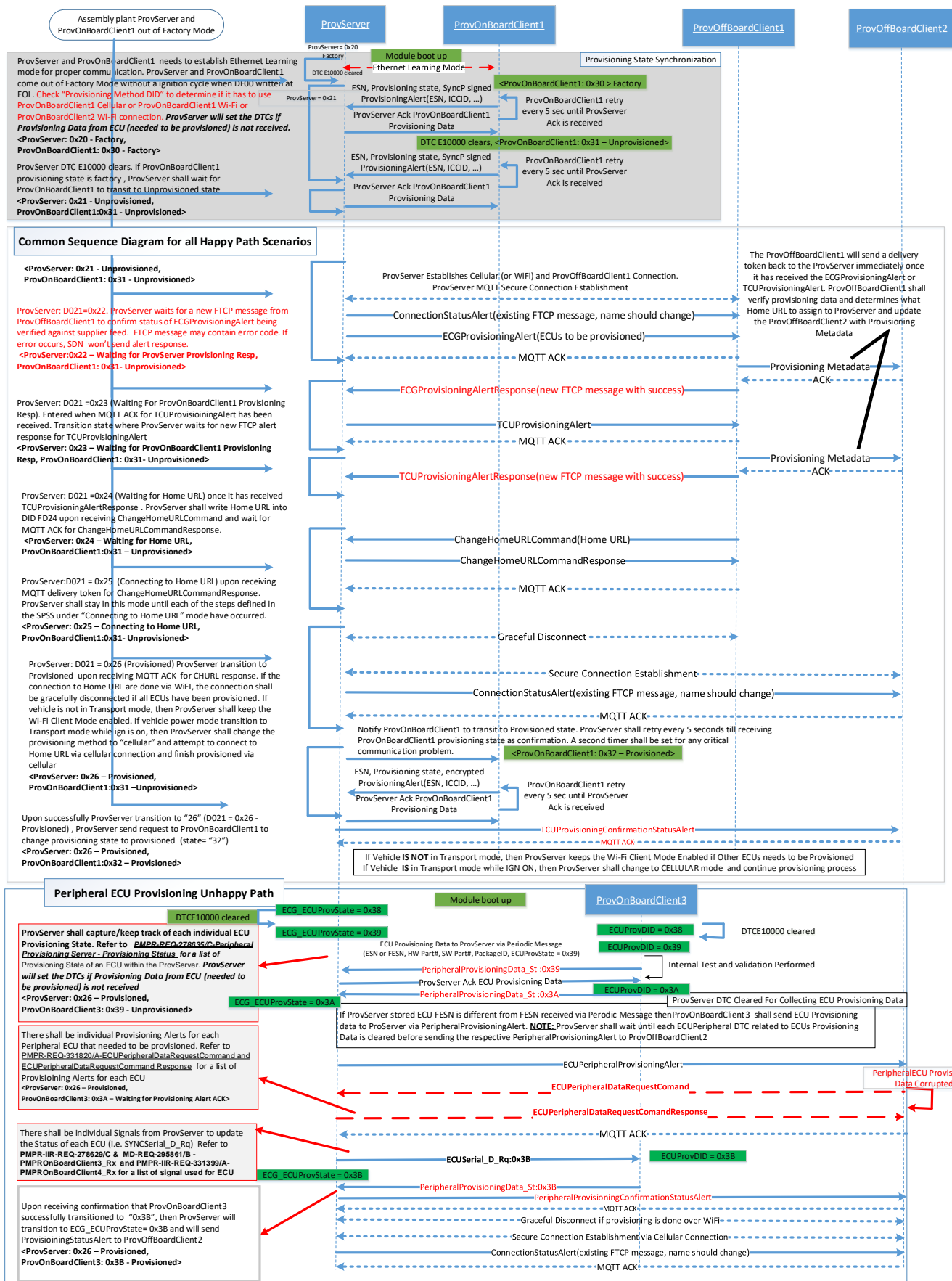
During the Swap scenario and proper Peripheral ECU configuration, ProvServer, ProvOffBoardClient1 and ProvOffBoard2 shall follow the inhale/exhale process defined in GCF spec

Provisioning Sequence Scenario: ProvServer SWAP

In this scenario, if the ProvServer is swapped then all ProvOnBoardClient3 peripherals will go through the re-provisioning process. Please refer "Expected Path" Sequence diagram for details.

Provisioning Sequence Scenario: Peripheral ECU -Unhappy Path

In this scenario, the ProvOffBoardClient2 loses the provisioning data before it can send the ACK to the ProvServer. ProvOffBoardClient2 can solicit ECUProvisioningAlert data anytime (e.g. SDN failure, data corruption) via ECUProvisioningDataRequestCommand (*) to ProvServer.





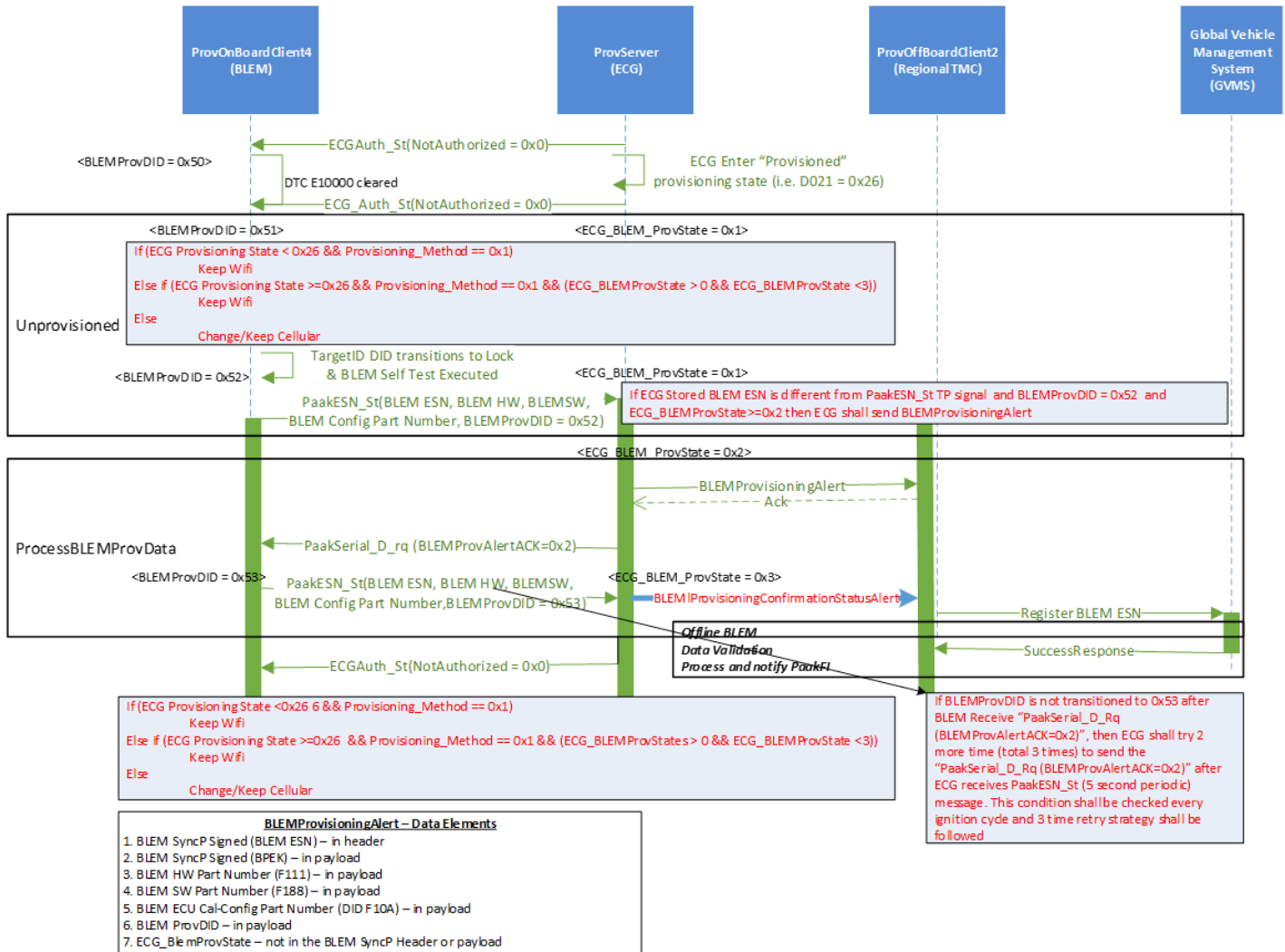
2.1.2.1.2 PMPR-SD-REQ-331614/B-Peripheral Provisioning OnBoard Client4

Provisioning OnBoard Client4 Sequence Scenario: Expected Path

In this scenario, the ProvOnBoardClient4 follows the provisioning flow without any unexpected failure modes. The ProvOnBoardClient4 transitions through all the authorization states and provisions successfully. Refer to the diagram below for the detailed ProvOnBoardClient4 provisioning sequence.

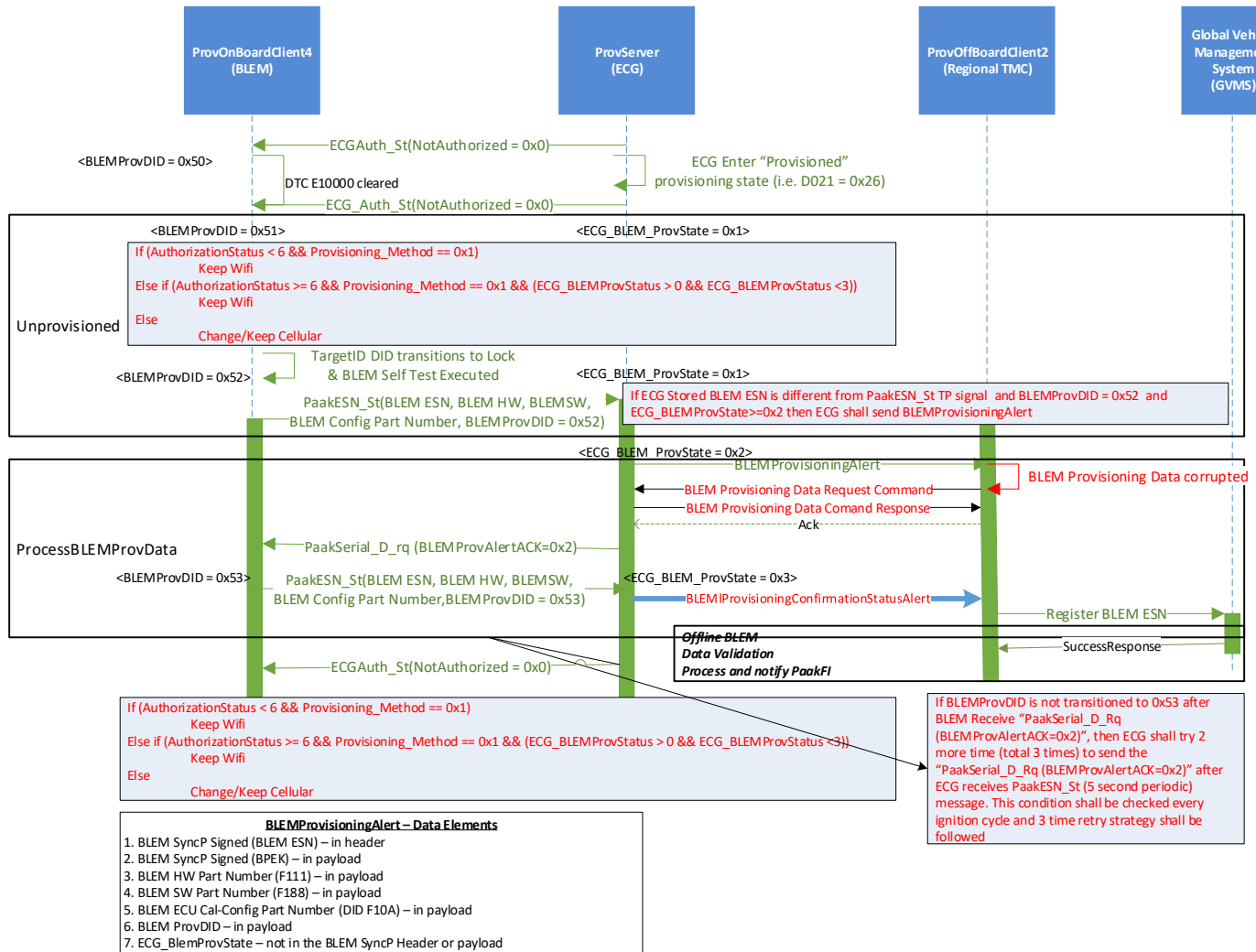
```
If (AuthorizationStatus < 6 && Provisioning_Method == 0x1)
    Keep Wifi
Else if (AuthorizationStatus >= 6 && Provisioning_Method == 0x1 && (ECG_BLEMProvStatus > 0 && ECG_BLEMProvStatus < 3))
    Keep Wifi
Else
    Change/Keep Cellular
```

BLEM Provisioning Sequence Scenario – Cellular/Wi-Fi Happy Path



**Provisioning OnBoard Client4 Sequence Scenario: Unhappy Path**

In this scenario, the ProvOffBoardClient2 loses the provisioning data before it can send the ACK to the ProvServer. ProvOffBoardClient2 can solicit BLEMProvisioningAlert data anytime (e.g. SDN failure, data corruption) via BLEMProvisioningRequestCommand to ProvServer.

BLEM Provisioning Sequence Scenario – Unhappy Path**Provisioning Sequence Scenario: ProvServer Swap**

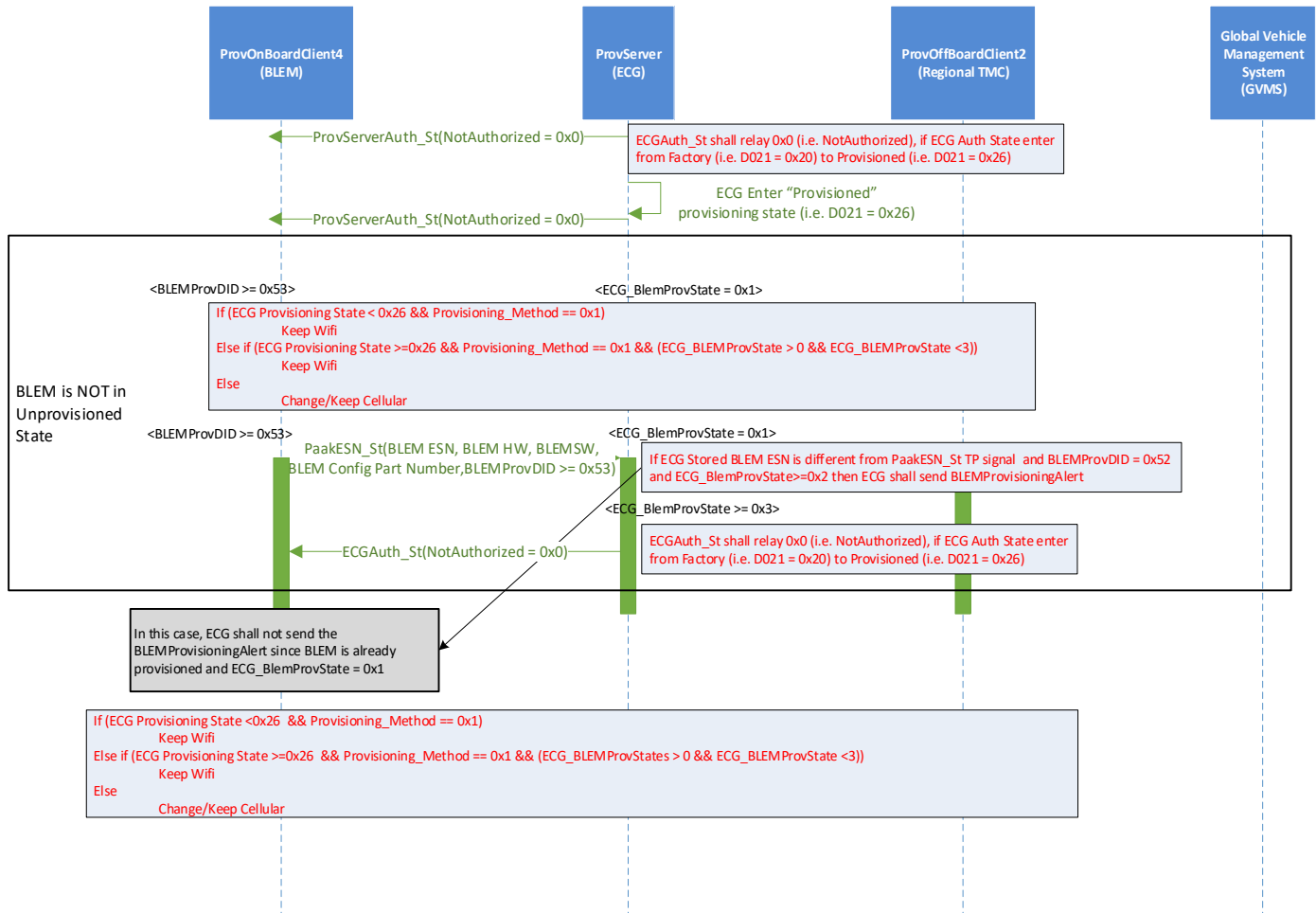
In this scenario, the ProvOnBoardClient4 does not have to reprovision if only ProvServer (ECG) is swapped. After ProvServer is provisioned and ECG_ECUProvState is 0x1 and ProvOnBoardClient4's BLEMProvDID >= 0x53.

ProvServer shall check the following condition. Following condition shall be checked by ProvServer (this condition shall be checked at every ignition cycle as well).

If ECG Stored BLEM ESN is different from PaakESN_St TP signal and BLEMProvDID = 0x52 and ECG_ECUProvState >= 0x2 then ECG shall send BLEMProvisioningAlert



BLEM Provisioning Sequence Scenario – ECG Swap



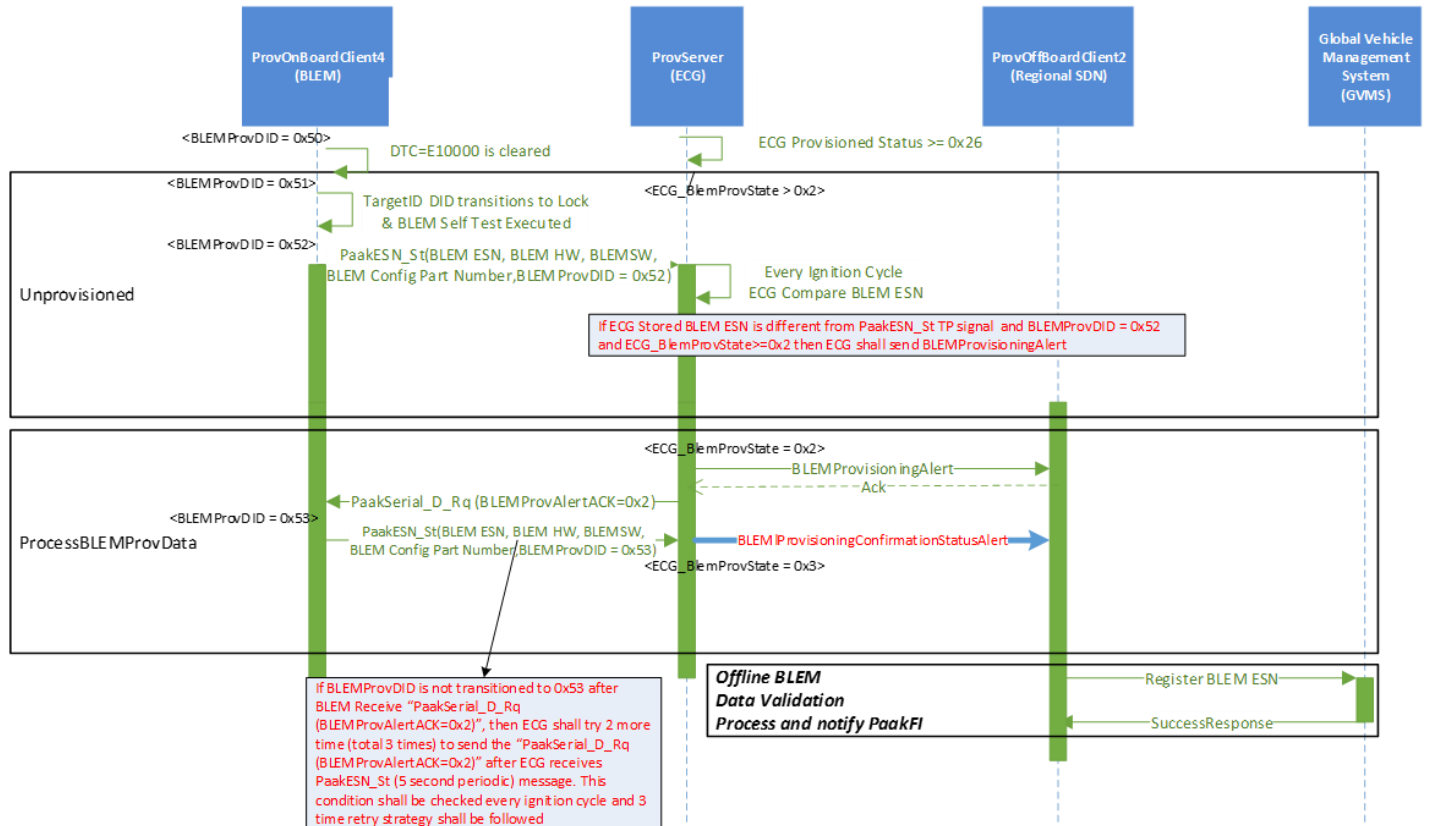
Provisioning Sequence Scenario: ProvOnBoardClient4 SWAP

In this scenario, ProvServer shall send the BLEMProvisioningAlert for new ProvOnBoardClient4 (swapped). Once TargetID are locked and BLEM Self-Test is executed ProvOnBoardClient4 shall start transmitting PaakESN_St periodic TP message with BLEMProvDID = 0x52 and ProvServer's ECG_ECUProvState > 0x2. Following condition shall be checked by ProvServer (this condition shall be checked at every ignition cycle as well). ProvServer shall update ECG_ECUProvStatus to 0x2 and sent the BLEM Provisioning Alert. After this ProvServer and ProvOnBoardClient4 shall follow the Expected Path process

If ECG Stored BLEM ESN is different from PaakESN_St TP signal and BLEMProvDID = 0x52 and ECG_ECUProvState >= 0x2 then ECG shall send BLEMProvisioningAlert



BLEM Provisioning Sequence Scenario – BLEM Swap



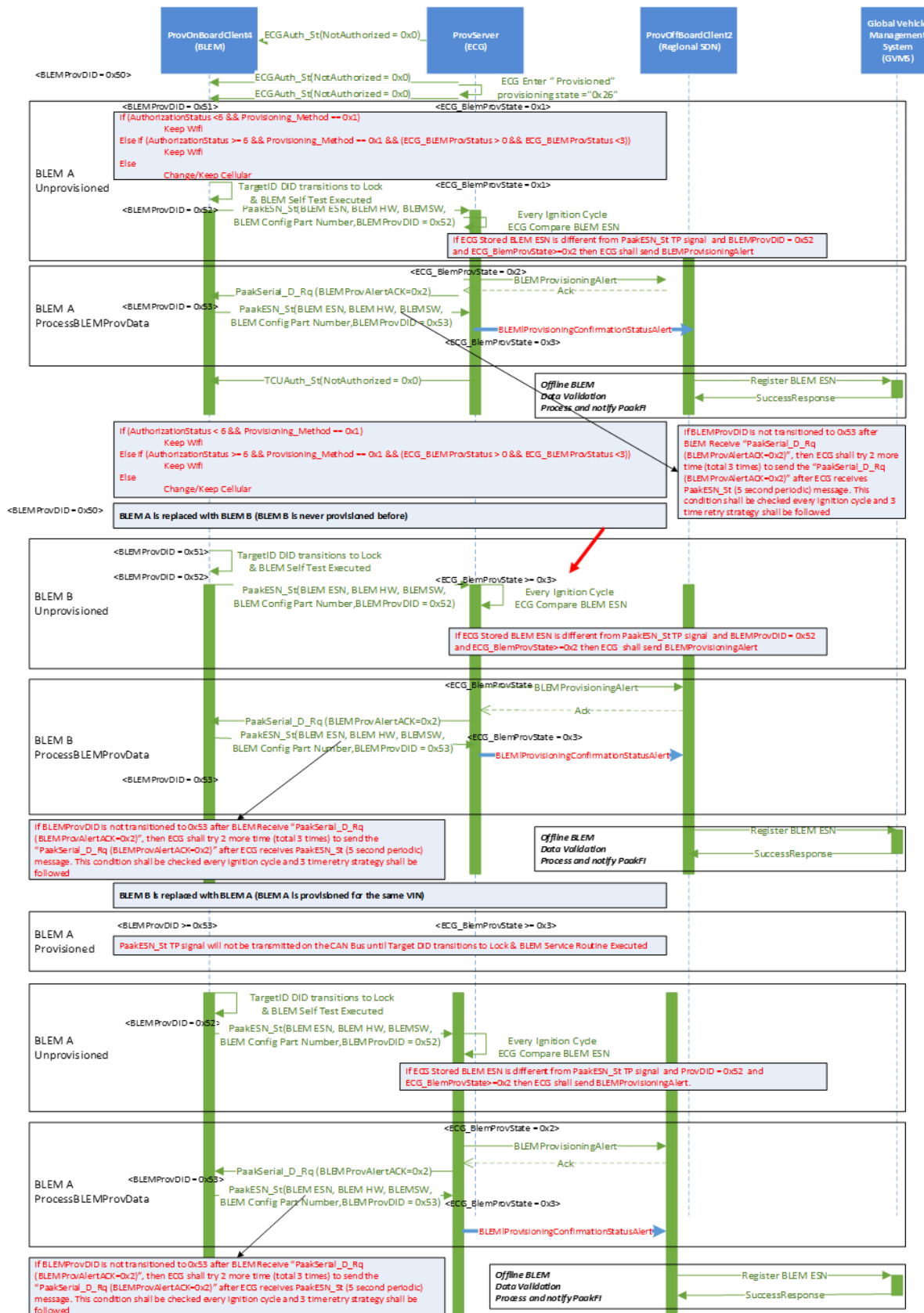
Provisioning Sequence Scenario: ProvOnBoardClient4 ABA SWAP Scenario

In this scenario, "ProvOnBoardClient4-A" shall follow the expected path scenario. When "ProvOnBoardClient4-A" is replaced with "ProvOnBoardClient4-B", it shall follow the ProvOnBoardClient4 swap scenario. When "ProvOnBoardClient4-B" is replaced with "ProvOnBoardClient4-A" (ProvOnBoardClient4-A was initially provisioned in the same vehicle). ProvOnBoardClient4-A has to go through the TargetID exchange and BLEM Self-Test. This shall change the BLEMProvDID in ProvOnBoardClient4-A to 0x52. After this ProvOnBoardClient4-A and ProvServer shall follow the BLEM swap scenario.

During the Swap scenario and proper Peripheral ECU configuration, ProvServer and ProvOffBoard2 shall follow the inhale/exhale process defined in GCF spec.



BLEM ABA Scenario – Happy Path





3 Appendix A: Definitions / Acronyms

Abbr.	Stands for	Description
FS	ECU Functional Specification	The document describing, collecting and developing the functional behavior of an ECU.
PaaK	Phone as a Key	
PaSK	Phone as Smart Key	
PEPS	Passive Entry Passive Start	Vehicle feature that uses LF/UHF communication between a key FOB and the vehicle to provide vehicle entry and starting capability.
BLE	Bluetooth low energy	
BLEM	Bluetooth low energy module	
BLEAM	Bluetooth low energy antenna module	
BCM	Body Control Module	
BPEK	BLEM Payload Exchange key	
NGSDN	Next Generation Service Delivery Network	
CAN	Controlled Area Network	
LIN	Local interconnect network	
DTC	Diagnostic trouble codes	
RED	Requirement and Expectation for development	
NVM	Nonvolatile memory	
HS-CAN	High Speed Controlled Area Network	
ms	Millisecond	
RAM	Random access memory	
ROM	Read only memory	
FMC	FPGA mezzanine card	
PCB	Printed circuit board	
UART	Universal asynchronous receiver/transmitter	
TCU	Telematic control unit	
SoC	System on Chip	
HSM	Hardware secured memory/module	
PWR	Power	
GND	Ground	
USCAR	United states council for automotive research	
RSSI	Received Signal Strength Indication	
CAN-FD	Controlled area network Flexible data-rate	
SIG	Special interest group (for Bluetooth)	
ESN	Electronic Serial Number	
FESN	Ford Electronic Serial Number	
FTCP	Ford Telematics Communication Protocol	
SOA	Service Oriented Architecture	



Abbr.	Stands for	Description
TP	Transport Protocol	
SPSS	Subsystem Part Specific Specification	
CCS	Customer Connectivity Settings	
OBCC	On Board Charging Controller	
DSRC	Dedicated Short Range Communication	



4 Appendix B: Reference Documents

Reference #	Document Title
1	

The requirements of the documents listed in the reference table above, of the latest revision level, form a part of this Engineering Specification