

RCA



Reference CCS Architecture

*An initiative facilitated by the ERTMS Users Group
and the EULYNX consortium*

A. Component Specification APS-FOT

This is a snapshot version. Please use it with caution.

There is ongoing work. The content of this document may be unfinished, will likely contain errors and can be changed without prior notice.

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REVISION HISTORY

Version	Date	Superseded documents/description/details	Change Request No
0.0.7	06-12-2019	Initial version of component specification	n/a

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1. CONCEPT (PHASE 1)

Cenelec Phase 1 is not covered in this document

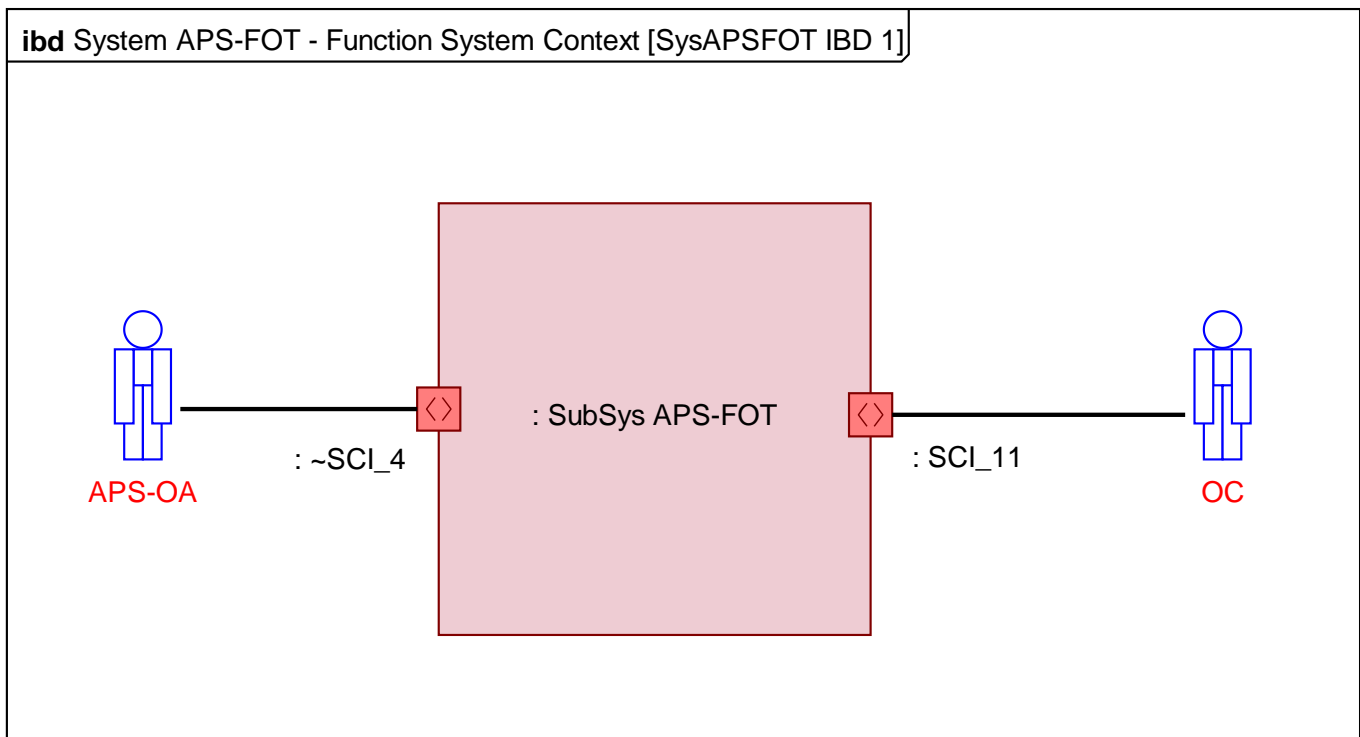
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2. SYSTEM DEFINITION (PHASE 2)

2.1. System Context

Description: [SubSys APS-FOT](#) communicates with all the relevant [SubSys OC](#). It translates the abstract commands of the [SubSys APS-OA](#) to asset specific commands when fitting to its own capabilities. In the other direction, it translates the asset specific status of the [SubSys OC](#) to an abstract status for the [Subsystem APS-OA](#) along the trackside asset's capabilities.

Source: RCA Alpha.1



Description:

2.2. Descriptions of Actors

2.2.1. APS-OA

Description: See [SubSys APS-OA](#)

2.2.2. OC

Description: See [SubSys OC](#)

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2.3. **Interface definition**

2.3.1. **SCI_11**

Description: [SCI_11](#) connects the [Advanced Protection System](#) to the different types of [TA](#) by using an [SubSys OC](#) according to [EULYNX](#) specifications.

Source: RCA Beta.1

2.3.2. **SCI_4**

Description: This interface is a single device-oriented interface, which can provide or consume only part of the control or monitor information. It includes the following information:

Downstream:

- Requests the required allocation state of the elements in a route (e.g. [TA](#))
- Grant [Movement Permissions](#) directly to the [Moveable Object](#) or indirectly via a trackside signal.
- Warn a [Moveable Object](#) (e.g. [TracksidePerson](#))

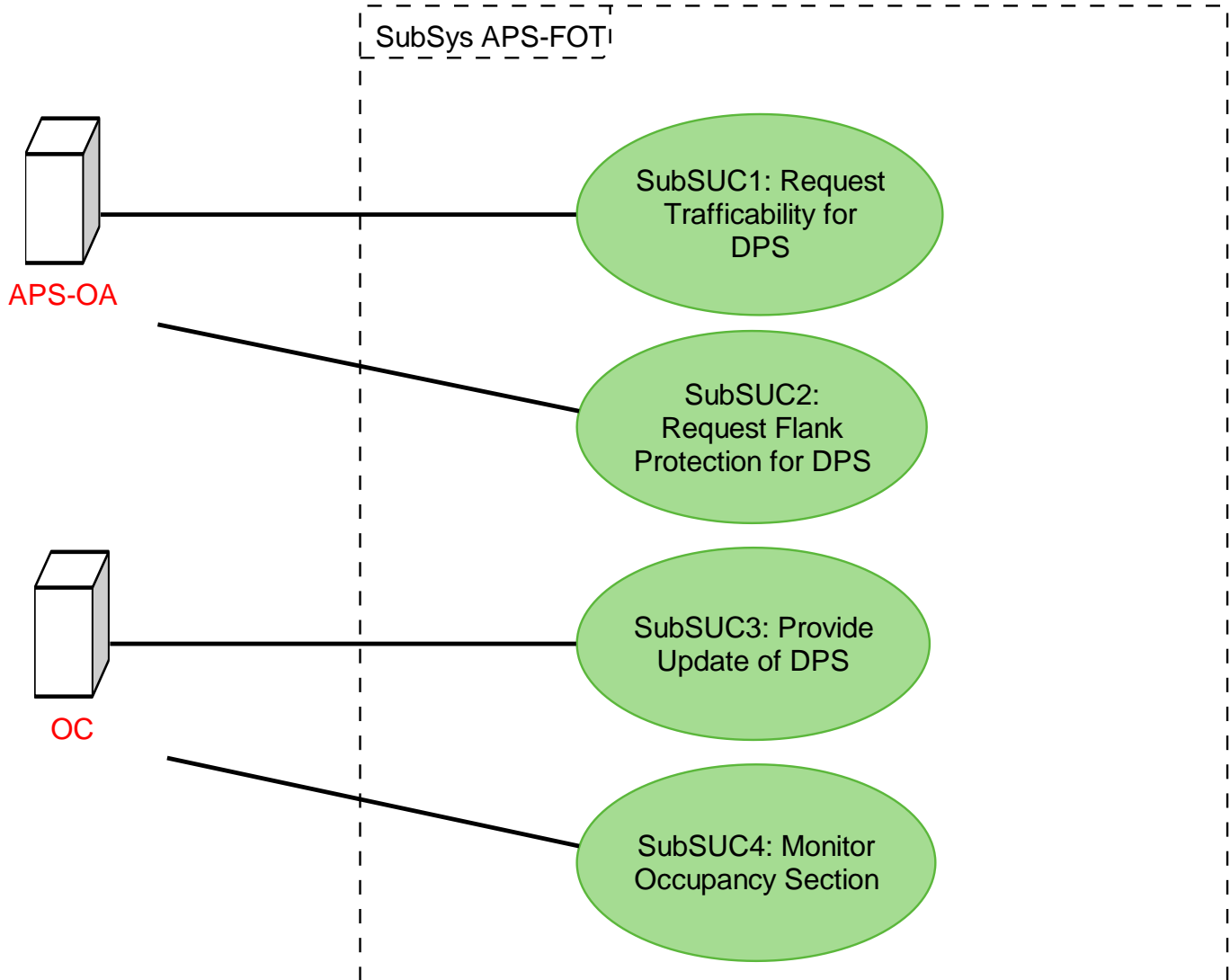
Upstream:

- Provides the current allocation state (updates) of the elements in a route (e.g. [TA](#)).
- Provides information about the position and extent (length) of a [Moveable Object](#). The information can already be assigned to a [Moveable Object](#) or be just location based without an assignment to a [Moveable Object](#) (e.g. [Occupancy](#)).

Source: RCA Beta.1

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2.4. UseCases



Description: Use Cases of [SubSys APS-FOTI](#)

2.4.1. SubSUC1: Request Trafficability for DPS

Description: Use cases showing the procedures of requesting a [Drive Protection Section](#)

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2.4.1.1. Alternative Scenario: Request Drive Protection for closing Level Crossing successfully executed [SubS APSFOT SD 1.1.2]

SubSUC1: Request Trafficability for DPS

Alternative Scenario: Request Drive Protection for closing Level Crossing successfully executed [SubS APSFOT SD 1.1.2]

Context

An **Operational Plan** is in execution. The specified track route in the **Operational Plan** needs a **Level Crossing** to be closed.

Precondition:

1. **APS-OA** demands **SubSys APS-FOT** with a **DriveProtectionSectionTrafficabilityDemand** to change the state of a **Drive Protection Section**
2. **SubSys APS-FOT** determines concerning **OC**.
3. **SubSys APS-FOT** demands **OC** with a **Cd_Activation** to command the **Level Crossing** to protect
4. **Level Crossing** protection is activated
5. **OC** updates **SubSys APS-FOT** with a **Msg_LX_Functional_Status** that the **Level Crossing** is protected
6. **SubSys APS-FOT** updates **APS-OA** with a **DriveProtectionSectionGroupUpdatedEvent** that the **Drive Protection Section** is trafficable.

Postcondition:

The **Level Crossing** is protected

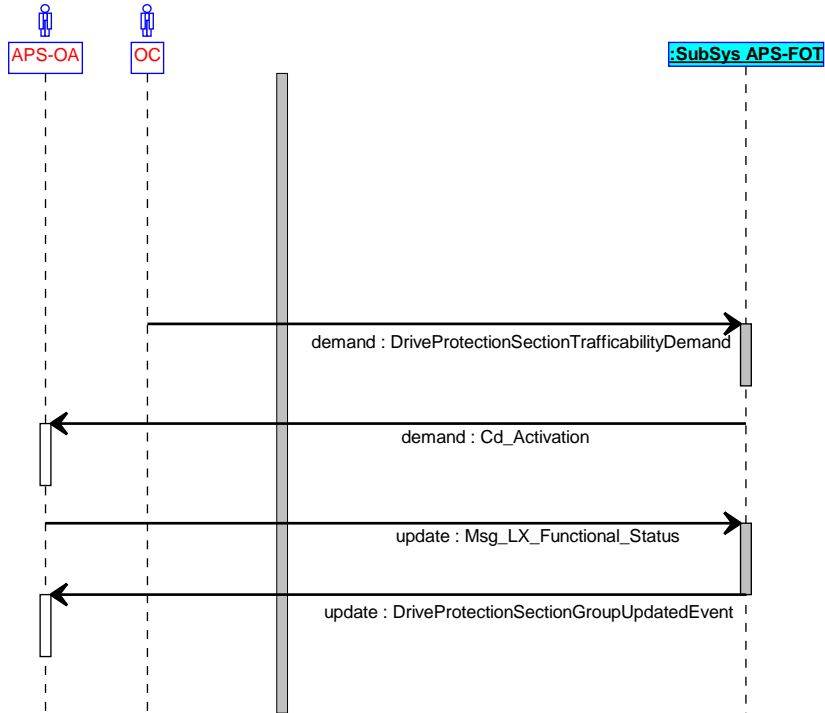


Figure 1 Alternative Scenario: Request Drive Protection for closing Level Crossing successfully executed [SubS APSFOT SD 1.1.2]

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2.4.1.2. Alternative Scenario: Request Drive Protection for moving Point successfully executed [SubS APSFOT SD 1.1.1]

SubSUC1: Request Trafficability for DPS

Alternative Scenario: Request Drive Protection for moving Point successfully executed [SubS APSFOT SD 1.1.1]

Context

An **Operational Plan** is in execution. The specified track route in the **Operational Plan** needs a to move a **Point**

Precondition:

SubSys APS-SL ensures that the given **Point** not occupied.

1. **APS-OA** demands **SubSys APS-FOT** with a **DriveProtectionSectionTrafficabilityDemand** to change the state of a **Drive Protection Section**
2. **SubSys APS-FOT** determines concerning **OC**.
3. **SubSys APS-FOT** demands **OC** with a **Cd_Move_Point** to command the point machine to move the **Point** to an end position
4. **Point** is moving
5. **Point** reached its end position
6. **OC** updates **SubSys APS-FOT** with a **Msg_Point_Position** that the **Point** has reached its end position.
7. **SubSys APS-FOT** updates **APS-OA** with a **DriveProtectionSectionGroupUpdatedEvent** that the **Drive Protection Section** is trafficable.

Postcondition:

The point is in the specified end position

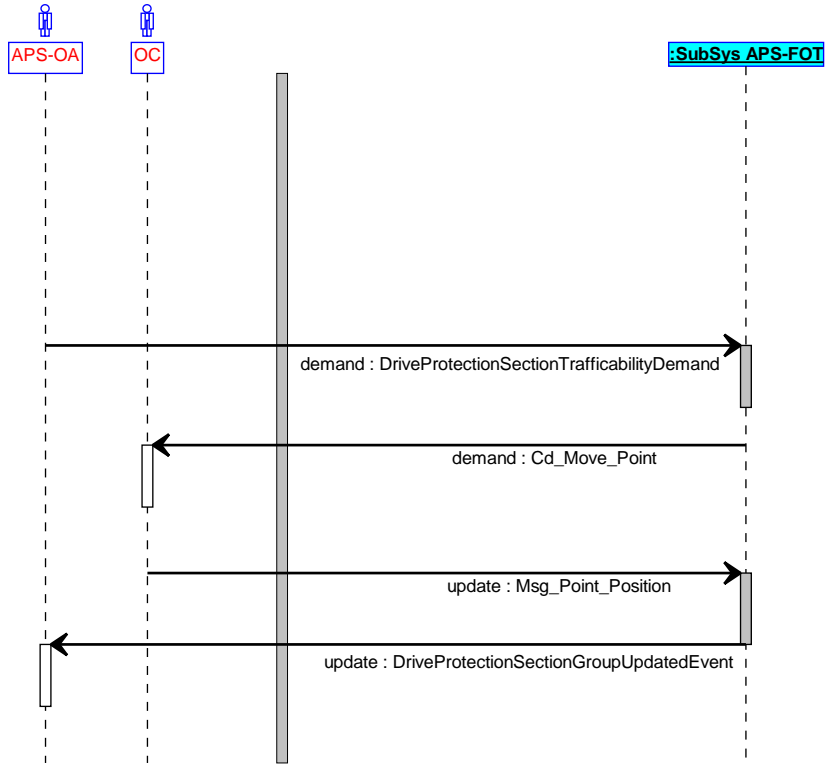


Figure 2 Alternative Scenario: Request Drive Protection for moving Point successfully executed [SubS APSFOT SD 1.1.1]

2.4.2. SubSUC2: Request Flank Protection for DPS

Description: Use cases showing the procedures of requesting [Flank Protection](#)

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2.4.2.1. Alternative Scenario: Request Flank Protection successfully executed [SubS APSFOT SD 2.1.1]

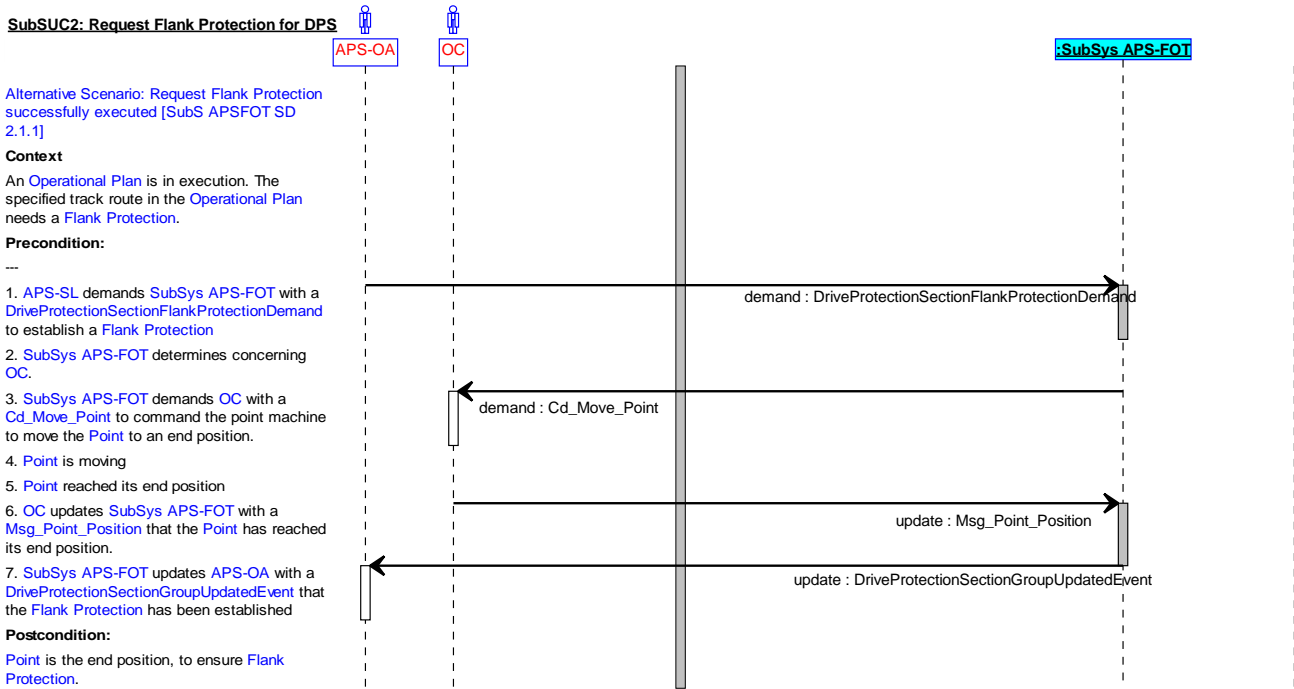


Figure 3 Alternative Scenario: Request Flank Protection successfully executed [SubS APSFOT SD 2.1.1]

2.4.3. SubSUC3: Provide Update of DPS

Description: Use cases showing the procedures of providing an update of a [Drive Protection Section](#)

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2.4.3.1. Alternative Scenario: Provide Update of DPS [SubS APSFOT SD 3.1.1]

SubSUC3: Provide Update of DPS

Alternative Scenario: Provide Update of DPS [SubS APSFOT SD 3.1.1]

Context

A DriveProtectionSectionFlankProtectionDemand or DriveProtectionSectionTrafficabilityDemand has been demanded.

Precondition:

- 1. SubSys APS-FOT updates APS-OA with a DriveProtectionSectionGroupUpdatedEvent

Postcondition:



Figure 4 Alternative Scenario: Provide Update of DPS [SubS APSFOT SD 3.1.1]

2.4.4. SubSUC4: Monitor Occupancy Section

Description: Use cases showing the procedures of monitoring an [Occupancy](#) Section.

2.4.4.1. Alternative Scenario: Vehicle enters Occupancy Section [SubS APSFOT SD 4.1.1]

SubSUC4: Monitor Occupancy Section

Alternative Scenario: Vehicle enters Occupancy Section [SubS APSFOT SD 4.1.1]

Context

An extent on the Topology (called Occupancy section) is monitored by a Train Detection System. The Train Detection System is connected to an OC. The Occupancy Section is currently unoccupied.

Precondition:

- 1. A vehicle enters the Occupancy Section.
- 2. OC updates SubSys APS-FOT with a Msg_TVPS_Occupancy_Status: Occupancy Status = occupied that an Occupancy Section has been occupied
- 3. SubSys APS-FOT updates APS-OA with a OccupancySectionUpdatedEvent

Postcondition:

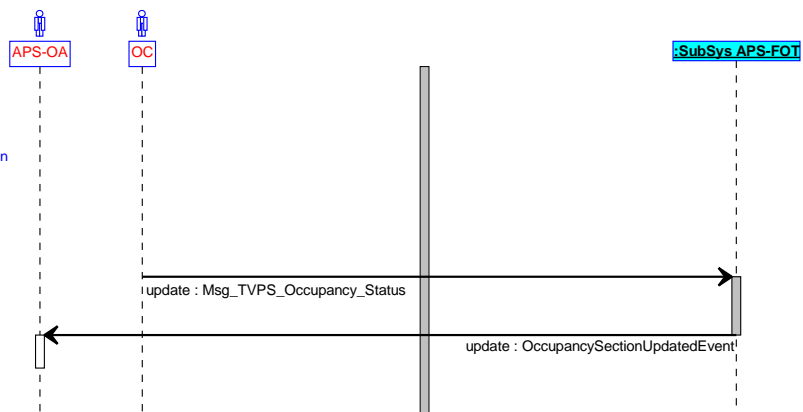


Figure 5 Alternative Scenario: Vehicle enters Occupancy Section [SubS APSFOT SD 4.1.1]

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2.4.4.2. *Alternative Scenario: Vehicle leaves Occupancy Section [SubS APFOT SD 4.1.2]*

SubSUC4: Monitor Occupancy Section

Alternative Scenario: Vehicle leaves Occupancy Section [SubS APFOT SD 4.1.2]

Context

An extent on the [Topology](#) (called [Occupancy section](#)) is monitored by a [Train Detection System](#). The [Train Detection System](#) is connected to an [OC](#). The [Occupancy Section](#) is currently occupied with one single vehicle.

Precondition:

1. A vehicle leaves the [Occupancy](#) Section. No other vehicles remain in the [Occupancy](#) Section.
2. [OC](#) updates [SubSys APS-FOT](#) with a [Msg_TVPS_Occupancy_Status](#):
Occupancy Status = vacant
that an [Occupancy](#) Section has been occupied
3. [SubSys APS-FOT](#) updates [APS-OA](#) with a [OccupancySectionUpdatedEvent](#)

Postcondition:

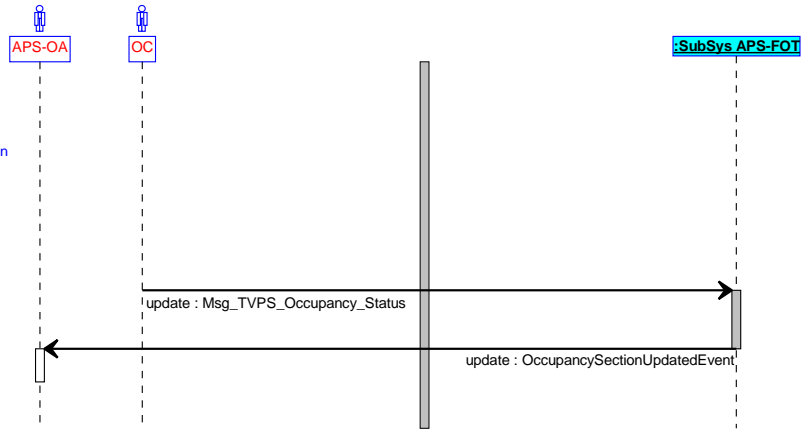


Figure 6 Alternative Scenario: Vehicle leaves Occupancy Section [SubS APFOT SD 4.1.2]

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3. RISK ANALYSIS AND EVALUATION (PHASE 3)

Cenelec Phase 3 is not covered in this document

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4. SYSTEM REQUIREMENTS (PHASE 4)

No items found for : Model