



# Feature Document

<b>Feature Name:</b> SbLM - Sign-Based Light Modes										<b>Feature ID:</b> F001031										
LET																				
FR																				
LET																				
FR																				
Date	LET	FR	Revisions										FO	CK	<b>Reference:</b>					
15.01.16			Initial Version												<b>Prepared/Approved By:</b> mkoherr, dgulyas, aspycha1, wmuossa1					
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															<b>Other Approvals/Concurrences (as required):</b>					
															Wessam Moussa					

**STANDARD NOTES:**  
FOR CURRENT RELEASE STATUS, SEE THE WERS ENGINEERING NOTICE.

**CONTROL ITEM – THE ALSO IDENTIFIES CRITICAL CHARACTERISTICS DESIGNATED BY THE CROSS FUNCTIONAL TEAMS DEVELOPING THE PRODUCT. THESE, AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEWS, MUST APPEAR ON THE CONTROL PLANS ACCORDING TO ISO/TS 16949. THESE CONTROL PLANS REQUIRE PRODUCT ENGINEERING APPROVAL.**



# Feature Document

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# Feature Document

## 1 INTRODUCTION

### 1.1 Purpose

This Feature Document (FD) document specifies **what** the feature / feature group SBLM shall do and how it shall behave from customer perspective.

It should also provide reasoning and background **why** we have the feature in the vehicle.

To get more information about the concept this template is based on look [at the Requirements Engineering@EESA wiki pages](#).

### 1.2 Scope

The following set of features from the [Global Feature & Function List](#) is described in this FD.

Feature ID	Feature Name	Owner	Reference
F001031	SBLM – Sign based Light Mode	Wessam Moussa	<a href="https://www.vsemweb.ford.com:443/tc/launchapp?-attach=true&amp;-s=226TCSession&amp;-o=5aUZH_tYx3NrTDAAAAAAAAAAAAAA">https://www.vsemweb.ford.com:443/tc/launchapp?-attach=true&amp;-s=226TCSession&amp;-o=5aUZH_tYx3NrTDAAAAAAAAAAAAAA</a>

Table 1: Features described in this FD

### 1.3 Audience

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

For the latest list of stakeholder of the feature and their influence refer to [<TBD VSEM Link>](#).

Refer to the [Roles & Responsibilities page](#) in the in the [Ford RE Wiki](#) for a list of common Ford roles and their responsibilities.

### 1.4 Document Organization

#### 1.4.1 Document Context

Refer to the [Specification Structure page](#) in the [Ford RE Wiki](#) to understand how the FD relates to other Ford Requirements Documents and Specifications.

#### 1.4.2 Document Structure

The structure of this document is explained below:

**Section 1** – Introduction: Giving an explanation how to use this document including responsibilities and the scope of the document. Additionally it contains the revision history and a list of unsettled but known



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issues that have to be consolidated in future versions. It explains the terminology and gives a clarification of the definitions, concepts and abbreviations used in the document.

- Section 2** – Feature Description: States briefly the background and the purpose of the feature.
- Section 3** – Feature Context: Defines the context and boundaries of the feature.
- Section 4** – Feature Modeling: Provides room for different modeling techniques (e.g. Use case) to model certain aspects of the feature.
- Section 5** – Feature Requirements: Lists functional and non-functional requirements of the feature.
- Section 6** – Functional Decomposition: Giving an overview of which functions are necessary to implement this feature. The feature requirements shall be cascaded to the functions
- Section 7** – Requirements Traceability:
- Section 8** – Revision History: Change log of the document / template
- Section 9** – Appendix: Presenting additional data mainly in a tabular form, e.g., a data dictionary, a automatically generated list of requirements or a traceability matrix

## 1.5 References

### 1.5.1 Ford documents

List here all Ford internal documents, which are directly related to the feature.

Reference	Doc. ID	Title	Revision
		<a href="#">CbAFS Attribute Requirements List</a>	1.71
		<a href="#">SDS EXTLTG</a>	
		<a href="#">SBLM Functional Specification</a>	
		<a href="#">IPMA Detection Specification</a>	5
		<a href="https://proj.sp.ford.com/sites/13767x/Home/Shared%20Documents/03%20GTDS/04%20AR/SbLM/AR-3%20Technical/AR-3.8%20Hardware%20and%20Controls%20Interface%20Requirements%20Updated%20and%20System%20Constraints%20Confirmed/IPMA_DetectionSpec_SignDetection_C519_20140914_v5.pdf">https://proj.sp.ford.com/sites/13767x/Home/Shared%20Documents/03%20GTDS/04%20AR/SbLM/AR-3%20Technical/AR-3.8%20Hardware%20and%20Controls%20Interface%20Requirements%20Updated%20and%20System%20Constraints%20Confirmed/IPMA_DetectionSpec_SignDetection_C519_20140914_v5.pdf</a>	
		<a href="#">LROS Interface Documentation</a>	10

### 1.5.2 External documents and publications

The list of external documents should include e.g. relevant standards.

Reference	Doc. ID	Title	Revision
UNECE <a href="http://www.unece.org/trans/main/wp29/wp29regs41-60.html">http://www.unece.org/trans/main/wp29/wp29regs41-60.html</a>	ECE R48	<a href="#">Installation of Lighting and Light-Signaling Devices</a>	6
	ECE R123	<a href="#">Approval of Adaptive Front Lighting Systems (AFS) for motor vehicles</a>	2
SAE	J2838	<a href="#">Full adaptive forward lighting systems.</a>	

## 1.6 Terminology

### 1.6.1 Definitions



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Definition	Description
Adaptive Front-Lighting System	A lighting device, providing beams with differing characteristics for automatic adaptation to varying conditions (ECE R123)
Neutral state	A state of the AFS when a defined mode of class C passing-beam or of the main-beam in the maximum condition of activation, if any, is produced, and no AFS control signal applies.
Class C	Mode of the passing-beam activated if no mode of another passing-beam class is activated. ECE R123
Class V	Mode of the passing-beam activated in conditions described in ECE R48, 6.22. and ECE R123 ("Urban mode").

**Table 2: Definitions used in this document**

## 1.6.2 Abbreviations

Abbr.	Stands for	Description
FD	Feature Document	The document describing, collecting and developing the functional behavior of a system in a vehicle.
ARL	Attribute Requirements List	List documenting vehicle-level characteristics.
ECE	Economic Commission for Europe	Set of vehicle regulations applicable to Europe and other countries outside Europe, where ECE rules are respected.
AFS	Adaptive Front-lighting System	As in Table 2.
AFS-I	Adaptive Front-lighting System, Part I	Dynamic bending modes as described in ECE R48, R123
AFS-II	Adaptive Front-lighting System, Part II	Light distribution modes as described in ECE R48, R123. Also known as Speed-dependent Light Distribution.
SDS	System Design Specification	
CbAFS	Camera-based Advanced Front-Lighting System	CbAFS is a former name of a set of features, which now have been named <ol style="list-style-type: none"> <li>SbLM – Sign based Light Modes</li> <li>CbDB – Camera based Dynamic Bending</li> </ol>
SbLM	Sign based Light Modes	A part of the CbAFS using traffic sign recognition offered by the camera to adapt the light distribution to driving situation. The signs triggering the light mode change include: Give Way (Yield) Sign, Stop Sign and Roundabout Sign
CbDB	Camera based Dynamic Bending	A part of the CbAFS using the lane marking detection to adapt the swiveling angle of the AFS headlamp to driving situation. The beam turn into the curve before the steering wheel is turned.:
LED	Light-Emitting Diode	
EXTLGT	Exterior Lighting	
SBL	Static Bending Lights	Supplementary lights increasing the visibility sideways, broadening the field of illuminated view.
DBL	Dynamic Bending Lights	Lights capable of swiveling and adjusting their yaw angle, consequently bending the light into the desired direction.
IPMA	Image Processing Module A	Electronic module comprising a camera, image processor and application processor mounted on vehicle's windshield.
HCM	Headlamp Control Module	Electronic module hosting numerous features being responsible for the control of headlamps.
LDM	LED Driver Module	Electronic driver controlling the operation of LED light sources.
GFHB	Glare-free High Beam	High-beam light feature, which prevents other road users from being glared when host vehicle is driving with activated high-beam.



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Table 3: Abbreviations used in this document.

## 1.7 Notation

### 1.7.1 Requirements Templates

Each requirement (including goals and use cases) in the document shall start with the following headline which gives a unique ID and a Title, followed by a description of the requirement (see below).

The headline shall be formatted by using the header styles "Goal", "Requirement" or "Use Case". The requirement ID should be prefixed and post fixed with 3 hash characters. This will ease the import to VSEM (refer to ["How to import specifications into VSEM as separate requirements"](#)) and enables indexing.

---

---

**###<Goal ID>### <Title>**

---

---

<Description>

---

---

**###<Requirements ID>### <Title>**

---

---

<Description>

The guideline ["How to write better requirements"](#) shows how to structure the textual description of a requirement.

---

---

**###<Use Case ID>### <Title>**

---

---

<Use Case Template>

For specifying Use Cases refer to the [Use Case guideline](#) in the [Ford RE Wiki](#). This should replace the free-formatted textual description.

### 1.7.2 Identification of requirements

The unique requirement ID given in the headline of any requirement follows the requirement throughout the development process. The requirement ID format follows a well-defined syntax.

All identifiers in a FRD shall be composed of 5 parts:

- A leading letter F (= Feature).
- Followed by an abbreviation of the feature
- Followed by a letter indicating the category of requirement (whether it is a Goal (=G), a Use Case (=U) or a Requirement (=R))
- Ending with the actual requirement number
- Ending with a requirement version number and a requirement revision letter.

Example:

*F\_ <FEATURE SHORT NAME>\_R0004\_V1A*



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Always keep in mind that the requirements numeration **doesn't have to be successive**, but it is crucial for every requirement to **keep its ID when a new revision of the document is created**.

## 1.7.3 Requirements Attributes

Additionally attributes can be added to each requirement. This helps to classify requirements. A [list of available attributes](#) is given in the RE Wiki.

The following template allows documentation of the attributes per requirement.

### <Legacy ID>\_Attr###

Requirement ID: <Legacy ID>			
Rationale			
Acceptance Criteria			Verification Method
Notes			
Type	Choose an item.	Source	
Priority	Choose an item.	Owner	
Stability	Choose an item.	ASILLevel	Choose an item.
Change Log			
Version	Date	Author	Change
1			Initial version





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## 2 FEATURE DESCRIPTION

SbLM activates a special light mode when the host vehicle traverses an intersection marked with a relevant traffic sign. The Sign-based Light Mode provides better visibility at intersections as it widens the illuminated area in direct proximity to the vehicle, thus illuminating previously dark obstacles that may be in, or enter, the vehicle's path.

The relevant signs are Stop, Yield, and Roundabout, placed at the intersection. They indicate places of feature activation when the car is present within a certain tolerance before such sign.

SbLM activates the light mode in a manner that it is active when the intersection situation occurs, from the passing of the sign until leaving the situation.

The Sign-based Light Mode is an additional AFS light distribution mode, complementing and overriding the conventional, speed-based modes. SbLM operates within the legal constraints of conventional AFS.

In the default SbLM light distribution on conventional AFS headlamps

- both SBLs shall be activated to 100% intensity
- and DBL *may* swivel outboard symmetrically, which can vary dependent on vehicle hardware.
- Beam Class V can be used to provide a wider beam shape. This is only applicable in Europe and China where class V is allowed.

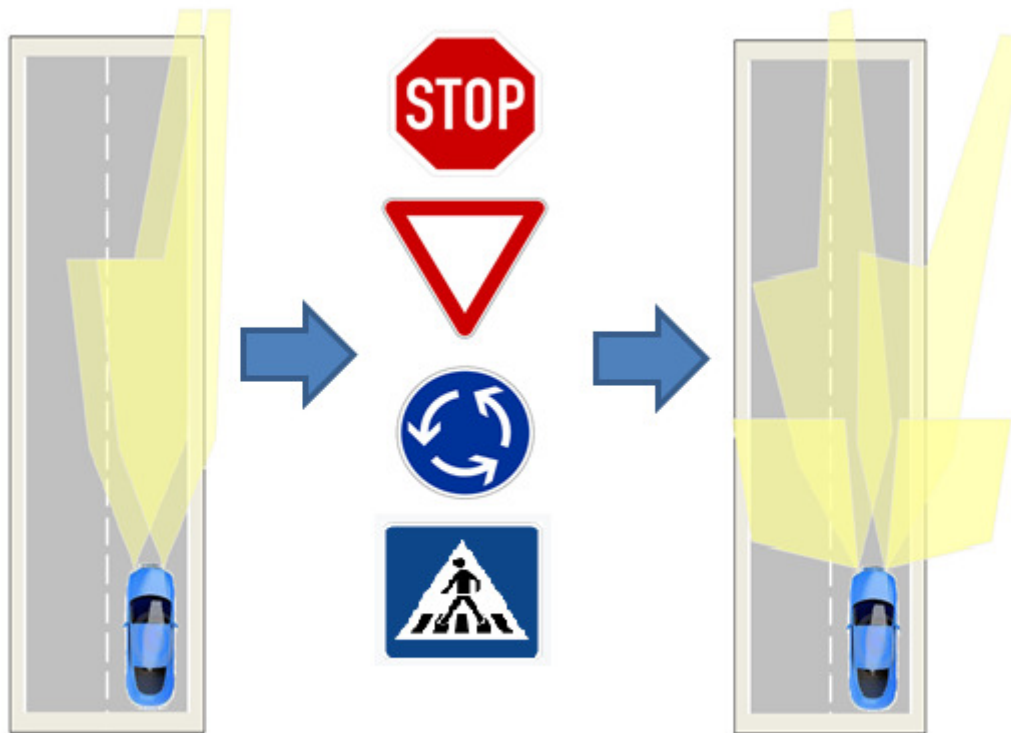


Figure 1: SbLM – light distribution birdseye view



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Figure 2: SbLM - Roundabout light distribution birdseye view

### 2.1 Feature Overview

Sign based Light Modes (SbLM) uses information about traffic signs detected in front of the car by the front viewing camera. If a Give Way (Yield), Stop, Roundabout, or Pedestrian Crossing Sign is detected, the feature activates the SbLM light distribution to provide a broad illumination, increasing user's visibility as a result.

The feature could be applied to all markets without changes, provided the requirements defined in Detection Specification are met. Currently the feature is only applied to North American market (with no roundabout support and with class C activation) and European Market (all signs supported with class V activation). Chinese market SbLM is planned to only support the Pedestrian crossing signs.

Generally SbLM is an enhancement of speed-dependent light modes. Compared to a conventional speed-dependent light modes, SbLM uses real-time camera based traffic sign data to activate the corresponding light distribution instead of the speed table.

To get the advantage of a traffic sign controlled light distribution, the headlamp system has to be certified with additional class "V" modes – according to ECE R123 – with a higher speed range.

Recommended: Vmax: 50 kph

For North American application, the light class to be used is class "C", as class V is not allowed.

As SbLM is a enhanced sensor input to speed-dependent light modes, the feature behavior is subject to the same constraints, with the difference of the speed table.

Pre-requisites for the feature are:

- Sign-based Light Mode
  - SBL - mandatory
  - DBL – not mandatory
  - Light class V – not mandatory
- Light switch – Autolight
- Night/dawn environmental condition.
- Front viewing camera active with no faults.
- Host vehicle's ignition is in Run position.
- Vehicle gear is not in Reverse.
- SBLM feature is configured as active in the vehicle.

The inputs to the feature are traffic signs relevant to the host vehicle

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GIS1 Item Number: 25.06

GIS2 Classification: Proprietary

FAF03-150-3 (previously form: 3947-A2)



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- Stop sign
- Yield (give way) sign
- Roundabout sign
- Pedestrian Crossing Sign

The output from the feature is a Sign-based Light Mode.

## 2.2 Feature Variants

Variant Name	Variant Description	Variation of Feature Content	Applies to
Global Variant	<p><b>SbLM is an enhancement of an speed-dependent light modes.</b> (Improved sensor input:-standard: speed table) As on the AFS system the behavior is equivalent to the Standard speed-dependent light modes – therefore no market specific setting.</p> <p>Sign based light mode is class V with 100% intensity of both sides of Static Bending Lights</p> <p>SbLM activates with Yield, Stop and roundabout signs</p> <p>It must be stressed that the detection performance of the image processor varies among different countries as well. The exact selection of countries, where the feature is implemented shall depend on the recognition abilities (selected traffic signs) of the front viewing camera in the concerned country.</p>	<p>UK shows different traffic signs for roundabouts. Here the sign is not directly located in front of the roundabout – therefore the system can not be triggered in the right time. Also in UK all roundabouts have to be illuminated by street lights – therefore no need for the roundabout scenario in UK.</p> <p>⇒ <b>RHD vehicles in LHTraffic:</b> roundabout scenario deactivate</p> <p>⇒ <b>RHD vehicles in RHTraffic:</b> roundabout scenario activate</p> <p>⇒ <b>LHD vehicles in RHTraffic:</b> roundabout scenario activate</p> <p>⇒ <b>LHD vehicles in LHTraffic:</b> roundabout scenario deactivate</p>	All markets – depending on traffic sign detection in the required markets.
North American Variant	<p>SbLM activates with Yield and Stop signs only – No roundabouts</p> <p>Sign based light mode is class C with 100% intensity of both sides of static bending lights</p>	<p>Lack of Roundabout signs leads to removal of roundabout situations from the feature.</p> <p>Sign quality and sign position in Mexico leads to disabling the feature there.</p>	North American market.
Chinese Variant	<p>SbLM activates with only Pedestrian crossing signs.</p> <p>Sign based light mode is class V with 100% intensity on both sides of static bending lights</p>	Inconsistent placement of other traffic signs leads to disabling Stop, Yield and Roundabout activation in the market.	Chinese market

## 2.3 Safety Goals

There are twofold safety goals in the SbLM feature. The safety in this context refers to both, the vehicle users and other road users. As the four concerned signs – Give way (Yield), Stop, Roundabout and Pedestrian crossings are located in parts of the road being particularly vulnerable to accidents, the operation of the SbLM is critical to the reduction collision risk and potential severity in case of it taking place.

The aim of the SbLM is to improve the visibility for the driver in intersections and/or roundabouts. This makes it easier for the driver to spot approaching cyclists, pedestrians, animals, or other hazardous objects, and avoid a

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**GIS2 Classification: Proprietary**

**FAF03-150-3 (previously form: 3947-A2)**



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potential collision. As a result, the safety of the driver and car's passengers, as well as the other vulnerable road users is significantly increased.

## 2.4 Constraints

### 2.4.1 Functional constraints

As the SbLM is a camera-based feature, its performance greatly relies on the traffic sign detection abilities of the camera in the given situation. The feature can only be used in regions where the sign detection is able to offer sufficient performance as described in the according detection specifications.

The weather conditions and the quality of the traffic signs also affect the overall feature performance.

SbLM underlies the same constraints as the conventional speed-dependent light modes with the exception of the speed limitation.

### 2.4.2 Legal constraints

The feature must obey legal regulations applicable in the country of application.

The European variant of the feature must be compliant with ECE rules, which can be accessed at [this link](#) to obtain the latest versions of the documents.

The regulations relevant to the SbLM are:

- ECE R48 – Installation of Lighting and Light-Signaling Devices
- ECE R123 – Approval of adaptive front-lighting systems (AFS) for motor vehicles
- SAE J2838 – Full adaptive forward lighting systems.

to operates also at higher speed than the “normal” playstreet light – the headlamp has to be certified with an additional class-“V” mode with a higher operating speed.

The North American variant of the feature must be compliant with SAE rules, which can be accessed at [this link](#) which specify that Class “V” mode is not allowed, hence the activation of SbLM in NA is a class “C” distribution as well as Static bending lights.



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### 3 FEATURE CONTEXT

#### 3.1 Feature Context Diagram

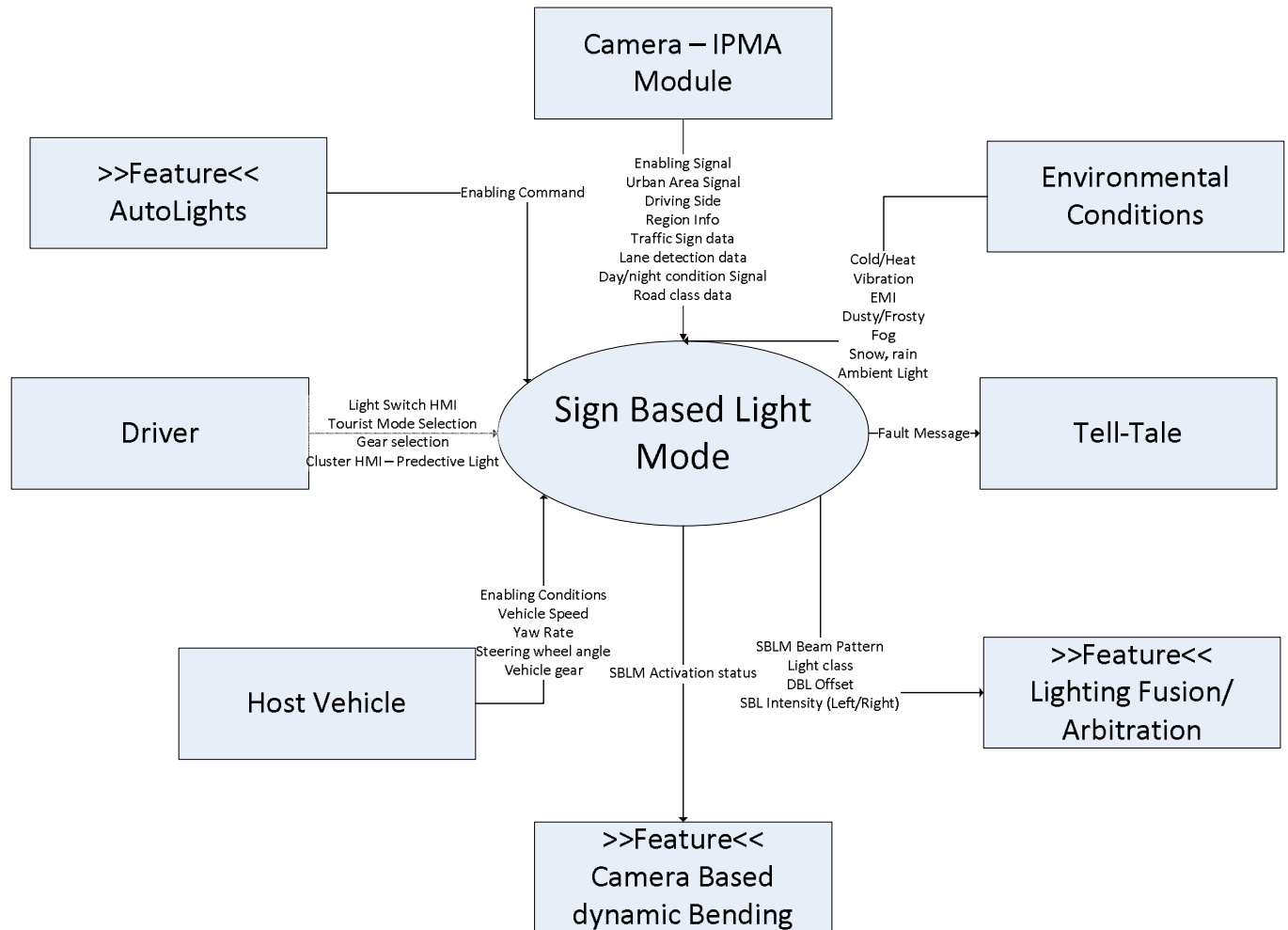


Figure 4. SbLM feature interfaces in the feature context.

#### 3.2 Interfaces

Detailed information in the according Interface spec of SbLM

Interface	Direction	Data	Range	Description
Driver	Input	Light Switch HMI	OFF, POS, LB, FTP, HB, AUTO	Enable: AUTO Disable: OFF, POS, LB, FTP, HB  The Light Switch HMI must be placed in AUTO position to enable the operation of the Sign-based Light Modes Feature. It shall be configurable if SBLM is active with auto HB or not.
		Tourist Mode selection	Left-hand Traffic,	The tourist mode selection of the current traffic style shall determine the expected pattern of behaviour in a roundabout situation. It can also



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			Right-hand Traffic	be used to suppress the activation of SbLM in roundabouts in left-hand traffic countries.
		Reverse Gear	OFF, ON	The selection of the reverse gear shall disable the operation of the SbLM feature.
		Cluster HMI – Predictive Lighting	Off, On	The selection of the Predictive Lighting features means that SbLM along with other features is active.
Host vehicle	Input	Vehicle Speed	0 to 655.35 km/h	Enable: $\leq V_{\max}$ Disable: $> V_{\max}$  Additionally, the vehicle speed is used to track the situation to determine whether the vehicle has left the road situation and SbLM beam pattern can be deactivated.
		Yaw rate	-6.5 to 6.61 rad/s	Yaw rate allows to estimate the radius of a roundabout in a roundabout situation as well as determine whether the roundabout has been passed by the vehicle.
		Ignition state	OFF, ACC, RUN, START	Enable: RUN Disable: OFF, ACC, START
		Enabling Conditions	OK, NOK	OK status means that all relevant CAN messages have no faults, no faults on the camera system and no fault in the headlamps. In this case the SbLM is activated.
		Steering Wheel angle	-1600° to 1676.7°	The steering wheel input is required to monitor the behaviour of the car in a roundabout situation. This is used to decide when the SbLM can be deactivated.
		Reverse Gear	OFF, ON	The selection of the reverse gear shall disable the operation of the SbLM feature.
Camera	Input	Sign Type	Number-encoded descriptors	Activate: STOP, YIELD (GIVE WAY), ROUNDABOUT  Not activate: All other signs.
		Sign Lateral Position	0m to 128m either side of the road	Signs with a large lateral offset are rejected. Lateral position signal also helps as a robustness measure to determine whether a tracked sign is still within camera's field of view.
		Sign Longitudinal Position	0m to 255m	Longitudinal position data is required to activate the SBLM beam pattern when vehicle enters a defined threshold.  Activate: Longitudinal Distance < Activation threshold  Not activate: Longitudinal Distance $\geq$ Activation threshold
		Sign relevancy decision	0 – 7	The relevancy decision signal decides if the detected sign is relevant to the lane or not. 0 = relevant sign Other = Irrelevant.
		Sign embedded	0 - 1	The Sign embedded signal indicated whether the detected signal is embedded on a truck or on a larger sign. 0 = Not Embedded 1 = Embedded
		Sign Loc Lane	-4 to 3	This signal indicates the location of the sign in terms of lane.



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				-4 = unknown -3 to -1 = number of lanes left 0 = ego lane 1 to 3 = number of lanes right
		Sign status	0 – 7	This signal indicates the status of the detected sign. 0 = Invalid 2 = New 5 = updated Others = reserved
		Sign Location	0 – 1	This signal indicates if the detected sign is an overhead sign or a regular on ground sign.
		Supplementary signs	Number-encoded descriptors	Suppress SBLM's activation: when a valid sign is accompanied by a supplementary sign.  Not suppress SBLM's activation: no supplementary sign present.
		Sign Confidence	0 - 1	Quality factor expressing the confidence of the sign's recognition. The SBLM pattern shall not activate if the confidence is not higher than a specified threshold.
		Timestamp	Varying counter	Change of the timestamp value represents the arrival of a new image frame.
		Enabling signal	Enable, Suppressed	Camera failure, lack of configuration, faulty input signals, switched off ignition result in suppression of the SBLM feature. Otherwise, the feature is enabled.  Enable: Enabled Disable: Suppressed
		Lane Max Detected Range	0 – 50 meter	Maximum detected lane range. Used as confirmation that an intersection is present
		Region Configuration	NA, EU, CH	Enable with different configurations for NA, EU or China
		Ambient light	DARK, LIGHT, TWILIGHT, TUNNEL ON/OFF	Enable: DARK, TWILIGHT, TUNNEL ON Disable: LIGHT, TUNNEL OFF
		SbLM feature configuration	OFF, ON	SBLM feature should be suppressed if the configuration for activating SBLM is OFF for the vehicle
>>Feature<< Autolights	Input	Enabling conditions	ON, OFF	The SBLM feature shall be enabled when the conditions for the feature >>Autolights<< are met.  Enable: ON Disable: OFF
Environmental conditions	Input	Ambient light	Night, Twilight, Day	Enable: Night, Twilight Disable: Day
		Snow, Rain	Clear, not clear	Enable: Clear Disable: not clear
		Other	Temperature conditions, EMI, Vibration, Humidity, Dust	
>>Feature<< Camera Based Dynamic Bending	Output	Beam pattern request	SBLM active / not active	SbLM active: CbDB is not predictive SbLM not active: CbDB can be predictive



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Tell-tale	Output	Fault tell-tale	Tell-tale's activation command	Activate tell-tale: When a signal fault is recognized Deactivate tell-tale: No failure
>>Feature<< Lighting Fusion / Arbitration	Output	SbLM Beam Pattern, light class, DBL offset, SBL intensity	SbLM ON, Off	Activation of SbLM

**Table 4: Feature Interfaces**





# 4 FEATURE MODELING

## Scenarios

There are 4 activation scenarios of the Sign based Light Mode.

There are 4 different traffic signs indicating starting road situations where enhanced illumination is desirable – Stop, Yield (give way), Roundabout signs and Pedestrian Crossing.

For north American variant: No Roundabout situation. For Chinese variant, only the Pedestrian crossing situation is available.

Although the triggers for activation differ, their resultant vehicle's behaviour is the same, namely activation of a light mode with broadened light distribution in front of the car with increased visibility on the sides.

The distance advance before the sign is reached must be sufficiently large to have the light distribution adjusted by reaching the traffic scenario to improve the visibility and comfort of driving as a result.

The internal operation of SBLM determining when the activation situation has finished differs for the signs.

It is based on time and vehicle speed, and thus the travelled distance, for Stop, Yield and Pedestrian crossing signs, whereas steering wheel angle and yaw rate are additionally considered in case of the Roundabout scenario.

Traffic signs accompanied by supplementary signs indicating a certain distance ahead where the actual sign is present are ignored. As well as warning signs such as the warning roundabout sign, which indicates an upcoming roundabout in a few hundred meters.

The feature is activated only if it is night. The ambient light is measured by the camera to provide this information.

The feature is operational in both, left- and right-hand drive conditions and only when a valid image from the camera is available.



# Feature Document

## 4.2 Use Cases

### Use Case Diagram



Figure 5: Use case environment

### 4.2.2 Use Case Actors

Actor	Description
Driver	The driver is the main user of the feature.

Table 5: Feature Actors

#### 4.2.2.1 Use Case SpecificationsSummary Use Case

##### ###F\_SbLM\_U0001\_V1A### Stop/Yield Sign scenario

Actors	Driver
Description	The driver drives with auto headlights at night, and with the low-beam active, passes a Stop or Yield sign at an intersection at low speed. The camera detects the sign, and the SbLM light mode is activated when the vehicle passes the sign, and deactivated after the intersection is passed.
Precondition	P1 Vehicle with AFS headlamps capable of changing light distribution.
	P2 Speed-dependent light modes ON.
	P3 The vehicle's ignition is in RUN, and the vehicle is not driving in reverse.
	P4 Camera Sign Detection Active.
	P5 SbLM enabled, and factory configured
	P6 No Faults that would suppress the feature occurred.



## Feature Document

Post-condition		
Priority		
Main Flow		
	M1	Vehicle approaches intersection at low speed
	M2.1	Camera detects the STOP sign at intersection.
	M2.2	Camera detects YIELD sign at intersection.
	M3	SbLM light mode is fully activated just as vehicle is passing the sign.
	M4	Vehicle traverses intersection
	M5	SbLM light mode is deactivated after intersection traversed and the light mode restores to conventional mode.
Post-Condition		
Exception Flows		None
Related Activity Diagram		U0001

### ###F\_SbLM\_U0002\_V1A### Roundabout Sign scenario

Actors		Driver
Description		The driver drives with auto headlights at night, and with the low-beam active, passes a Roundabout sign at a roundabout at low speed. The camera detects the sign, and the SbLM light mode is activated when the vehicle passes the sign, and deactivated after the roundabout is passed.
Precondition	P1	Vehicle with AFS headlamps capable of changing light distribution.
	P2	Speed-dependent light modes ON.
	P3	The vehicle's ignition is in RUN, and the vehicle is not driving in reverse.
	P4	Camera Sign Detection Active.
	P5	SbLM enabled and factory configured in <b>European region</b>
	P6	light distribution restored to conventional mode.
	P7	No Faults that would suppress the feature occurred.
Post-condition		
Priority		
Main Flow		
	M1	Vehicle approaches intersection at low speed
	M2	Camera detects Roundabout sign at roundabout.
	M3	SbLM light mode activated just as vehicle passes sign.
	M4	Vehicle traverses roundabout
	M4.1	Vehicle takes first exit, without turning into the roundabout
	M4.2	Vehicle takes exit after turning into the roundabout
	M5	SbLM light mode is deactivated after roundabout traversed and the light mode restores to conventional mode.
Post-Condition		
Exception Flows		None
Related Activity Diagram		U0002

### ###F\_SbLM\_U0003\_V1A### High speed scenario

Actors		Driver
Description		The driver drives with auto headlights at night, and with the low-beam active, passes an intersection with Stop, Yield, or Roundabout sign at high speed, where the SbLM light distribution would not be relevant, and does



## Feature Document

		not activate. SbLM ignores the sign and does not change the light distribution.
<b>Precondition</b>		
	P1	Vehicle with AFS headlamps capable of changing light distribution.
	P2	Speed-Dependent Light Modes ON.
	P3	The vehicle's ignition is in RUN, and the vehicle is not driving in reverse.
	P4	Camera Sign Detection Active.
	P5	SbLM enabled and factory configured
	P6	No Faults that would suppress the feature occurred.
<b>Post-condition</b>		
<b>Priority</b>		
<b>Main Flow</b>		
	M1	Vehicle approaches intersection at high speed
	M2.1	Camera detects the STOP sign at intersection.
	M2.2	Camera detects YIELD sign at intersection.
	M2.3	Camera detects ROUNDABOUT sign at roundabout.
	M3	SbLM light mode not activated when vehicle passes sign at high speed.
	M4	Vehicle traverses intersection without change in light distribution
<b>Post-Condition</b>		
<b>Exception Flows</b>		None
<b>Related Activity Diagram</b>		U0003

### ###F\_SbLM\_U0004\_V1A### Irrelevant signs scenario

<b>Actors</b>		Driver
<b>Description</b>		The driver drives with auto headlights at night, and with the low-beam active, passes an irrelevant sign at low speed. SbLM ignores the sign and does not change the light distribution. The sign may be irrelevant because a supplemental sign is attached, or because it is positioned where it is not relevant for the driver, or because it is an entirely irrelevant sign type.
<b>Precondition</b>	P1	Vehicle with AFS headlamps capable of changing light distribution.
	P2	Speed-Dependent Light Modes ON.
	P3	The vehicle's ignition is in RUN, and the vehicle is not driving in reverse.
	P4	Camera Sign Detection Active.
	P5	SbLM enabled and factory configured
	P6	No Faults that would suppress the feature occurred.
<b>Post-condition</b>		
<b>Priority</b>		
<b>Main Flow</b>		
	M1	Vehicle approaches sign at low speed
	M2.1	Camera detects Roundabout/Stop/Yield sign with supplemental sign.
	M2.2	Camera detects irrelevantly positioned Roundabout/Stop/Yield sign, where the sign only affects an on-ramp path, not the host vehicle.
	M2.3	Camera detects irrelevant sign type
	M3	SbLM light mode not activated as vehicle passes sign.
	M4	Vehicle passes sign with no change in light distribution
<b>Post-Condition</b>		
<b>Exception Flows</b>		None
<b>Related Activity Diagram</b>		U0004



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### ###F\_SbLM\_U0005\_V1A### Stop-and-go traffic scenario

<b>Actors</b>		Driver
<b>Description</b>		The driver drives with auto headlights at night, and with the low-beam active, passes a relevant sign at an intersection in a traffic jam, coming to a complete stop before passing the sign. The camera detects the sign, and the SbLM light mode is activated before the vehicle passes the sign, when it is close by. After the vehicle passes the sign, deactivation occurs normally according to the sign, or after a fail-safe timeout, whichever comes first.
<b>Precondition</b>		
	P1	Vehicle with AFS headlamps capable of changing light distribution.
	P2	Speed-Dependent Light Modes ON.
	P3	Camera Sign Detection Active.
	P4	SbLM enabled and factory configured
	P5	No Faults that would suppress the feature occurred.
<b>Post-condition</b>		
<b>Priority</b>		
<b>Main Flow</b>		
	M1	Vehicle approaches intersection at low speed
	M2	Camera detects relevant sign.
	M3	Vehicle approaches sign in stop-and-go traffic
	M4	SbLM light mode activated when vehicle is within appropriate threshold distance to the sign
	M5	Vehicle traverses intersection
	M6.1	SbLM light mode is deactivated after intersection traversed, as described in F_SbLM_U0001 and F_SbLM_U0002, respectively.
	M6.2	SbLM light mode is deactivated and the light mode restores to conventional mode after timeout, before intersection is traversed, if vehicle has not travelled sufficiently far before the timeout expires.
<b>Post-Condition</b>		
<b>Exception Flows</b>		None
<b>Related Activity Diagram</b>		U0005

### ###F\_SbLM\_U0006\_V1A### Behaviour in case of malfunctioning system

<b>Actors</b>		Driver
<b>Description</b>		User drives the vehicle in dark conditions, when a system control signals failure occurs. This evolves a failure procedure and activation of an AFS tell-tale warning the driver about system's error. The active tell-tale may be discarded by the driver, but it must appear again when car's ignition is started next time.
<b>Precondition</b>	P1	Vehicle located in a country, where SbLM is operational.
	P2	Vehicle fitted with a camera with sign-detection capabilities.
	P3	Vehicle with AFS headlamps capable of changing light distribution.
	P4	SBLM is configured in the vehicle
	P5	HMI Light switch installed with OFF, POS, LB, AUTO positions.
	P6	Tell-tale located on car's instrument cluster.
	P7	Ignition OFF.
	P8	Headlights OFF.
<b>Post-condition</b>		
<b>Priority</b>		
<b>Main Flow</b>	M1	User enters the vehicle.



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	M2	User uses HMI Ignition switch to request RUN state.
	M3	User sets HMI Light switch to request AUTO position.
	M4	Headlights ON.
	M5	>>Feature<< SbLM is enabled.
	M6	System control signal failure is detected, a fault that would cause SBLM to be suppressed has occurred
	M7	>>Feature << SbLM is disabled.
	M8	AFS tell-tale informing driver about the system's fault is displayed.
	M9.1	Driver leaves the AFS fault tell-tale ON.
	M9.2	Driver discards the AFS fault tell-tale.
	M10	Ignition OFF.
	M11	Headlights OFF.
<b>Post-Condition</b>	PC1	Ignition ON.
	PC2	AFS fault tell-tale appears again.
<b>Exception Flows</b>		None
<b>Related Activity Diagram</b>		U0006

### ###F\_SbLM\_U0007\_V1A### Multiple signs scenario

<b>Actors</b>		Driver
<b>Description</b>		The driver drives with auto headlights at night, and with the low-beam active, passes more than one of the relevant sign types at low speed. The camera detects the signs, and the SbLM light mode is activated when the vehicle passes the first of the signs, and deactivated after all the situations corresponding to the detected signs have been left by the vehicle.
<b>Precondition</b>	P1	Vehicle with AFS headlamps capable of changing light distribution.
	P2	Speed-dependent Light Modes ON.
	P3	Camera Sign Detection Active.
	P4	SbLM enabled and configured on the vehicle
	P6	The vehicle's ignition is in RUN, and the vehicle is not driving in reverse.
<b>Post-condition</b>		
<b>Priority</b>		
<b>Main Flow</b>		
	M1.1	Vehicle approaches intersection at low speed
	M1.2	Vehicle approaches a roundabout at low speed
	M2	Camera detects relevant signs of more than one type
	M3	SbLM light mode activated just as vehicle passes the first of the relevant signs.
	M4	SbLM light mode stays active as long as at least one of the sign scenarios are still valid (as described in F_SbLM_U0001_V1A and F_SbLM_U0002_V1A)
	M5.1	Vehicle traverses intersection
	M6	SbLM light mode is deactivated and the light mode restores to conventional mode.
<b>Post-Condition</b>		
<b>Exception Flows</b>		None
<b>Related Activity Diagram</b>		U0007



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### ###F\_SbLM\_U0008\_V1A### Pedestrian Crossing Light Mode

Actors		Driver
Description		The driver drives with auto headlights at night, and with the low-beam active, passes more than one of the relevant sign types at low speed. The camera detects the signs, and the SbLM light mode is activated when the vehicle passes the first of the signs, and deactivated after all the situations corresponding to the detected signs have been left by the vehicle.
Precondition	P1	Vehicle with AFS headlamps capable of changing light distribution.
	P2	Speed-dependent Light Modes ON.
	P3	Camera Sign Detection Active.
	P4	SbLM enabled and configured on the vehicle
	P6	The vehicle's ignition is in RUN, and the vehicle is not driving in reverse.
Post-condition		
Priority		
Main Flow		
	M1.1	Vehicle approaches intersection at low speed
	M1.2	Vehicle approaches a pedestrian crossing sign at low speed
	M2	Camera detects the sign as relevant
	M3	SbLM light mode activated before the pedestrian crossing is reached.
	M4	SbLM light mode stays active for a few meters after the pedestrian crossing is passed.
	M5	SbLM light mode is deactivated and the light mode restores to conventional mode.
Post-Condition		
Exception Flows		None
Related Activity Diagram		U0008

#### 4.2.2.2 User Level Use Cases

### 4.3 Operation Modes / States



# Feature Document

## 4.3.1 Use case U0001

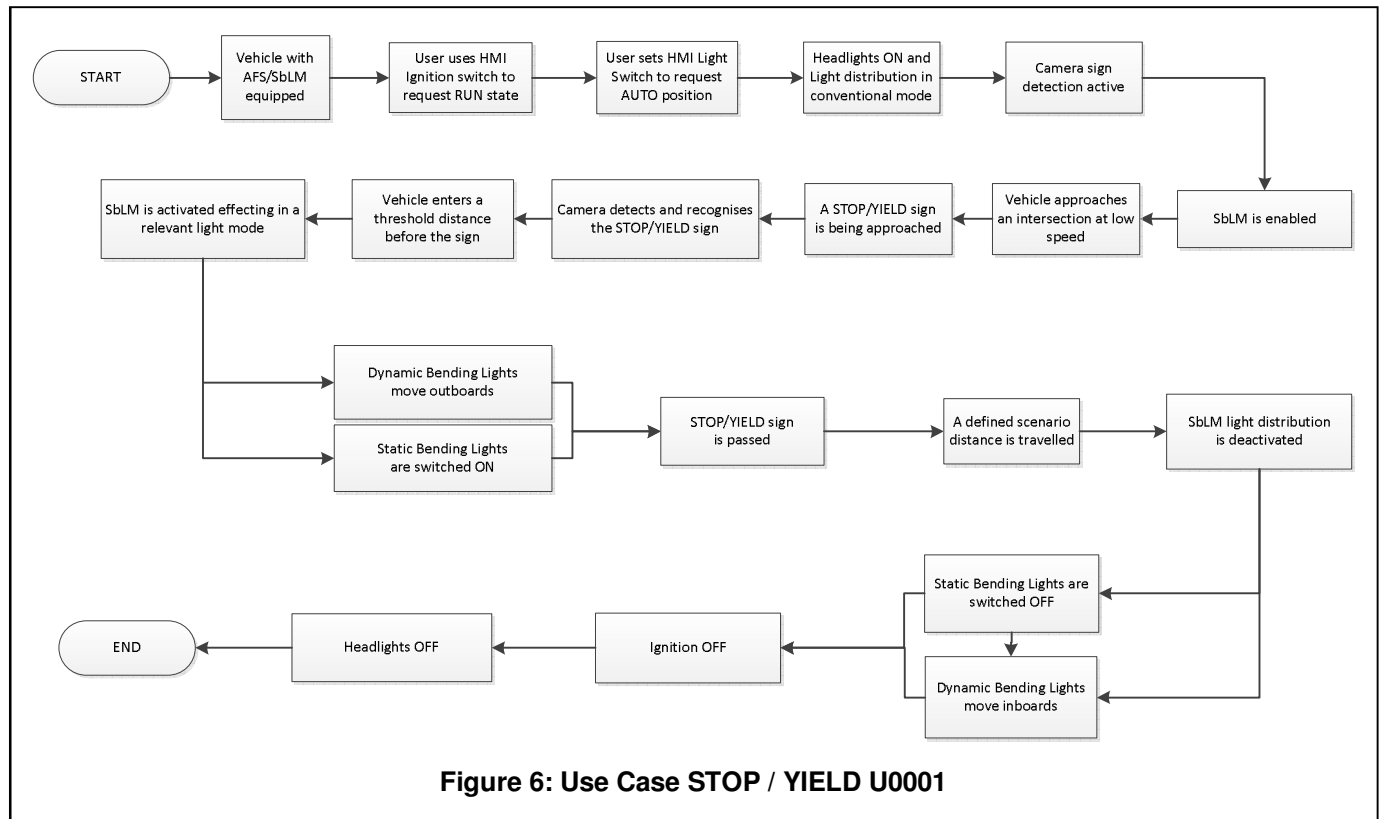


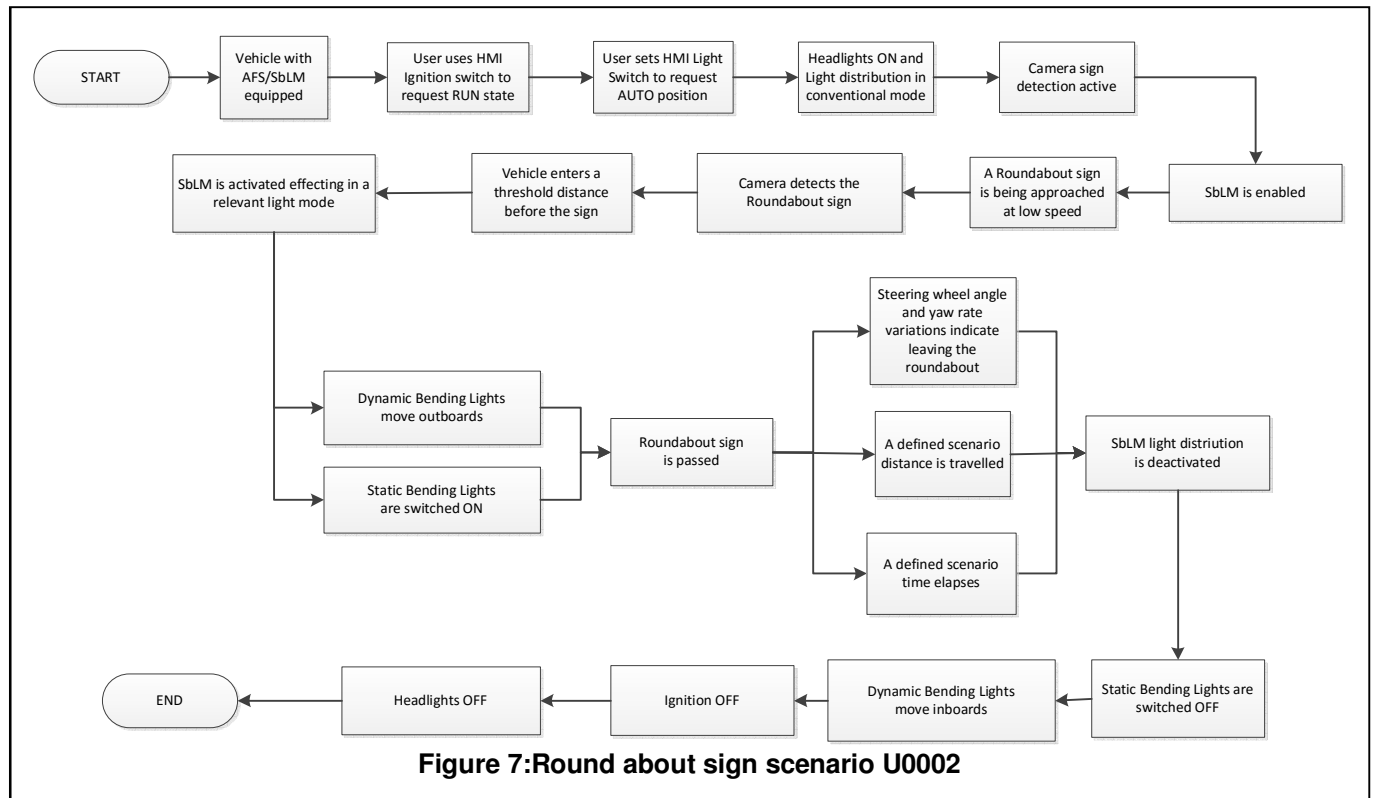
Figure 6: Use Case STOP / YIELD U0001



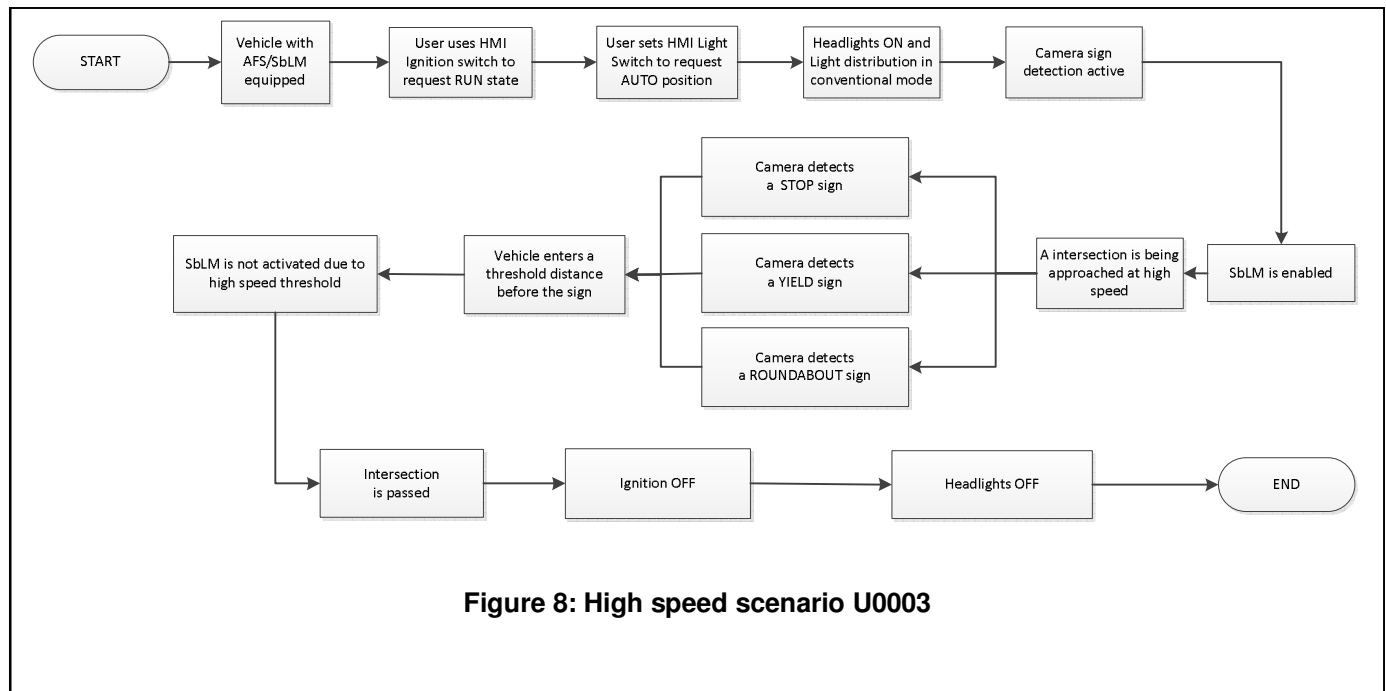


# Feature Document

## 4.3.2 Use case U0002



## 4.3.3 Use case U0003





# Feature Document

## 4.3.4 Use case U0004

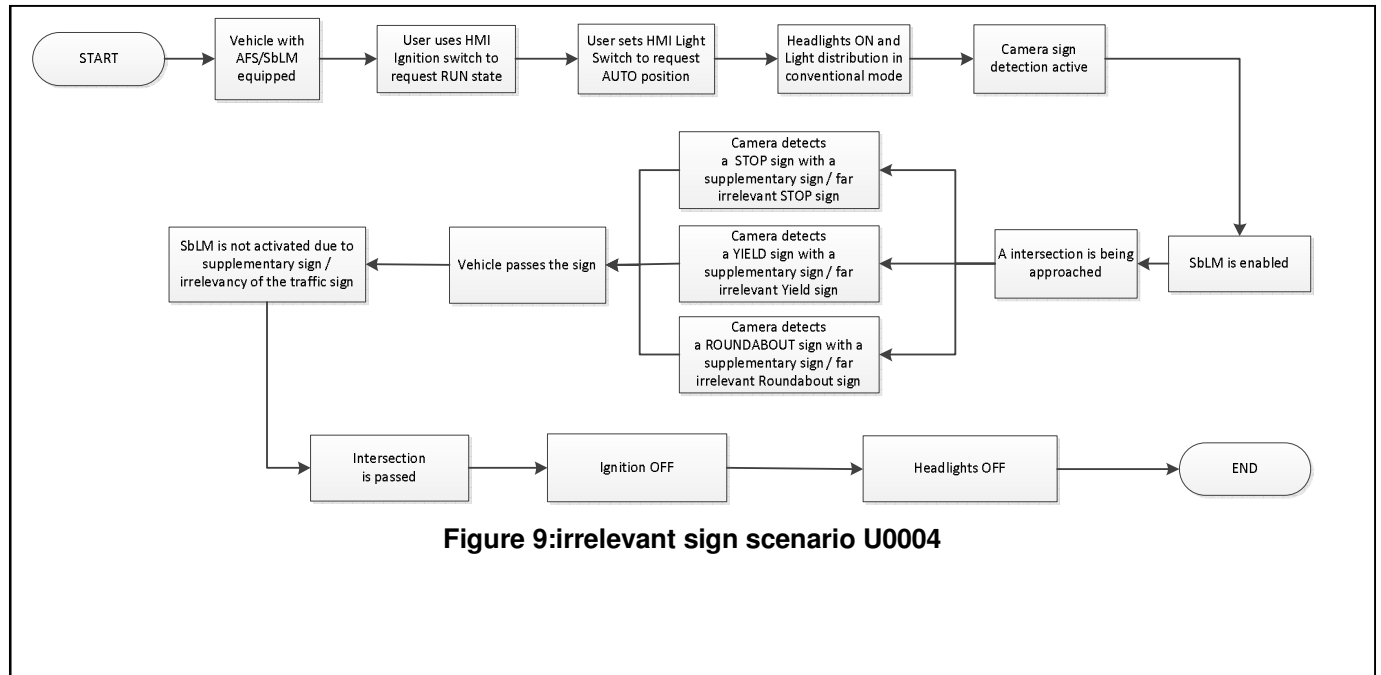


Figure 9:irrelevant sign scenario U0004

## 4.3.5 Use case U0005

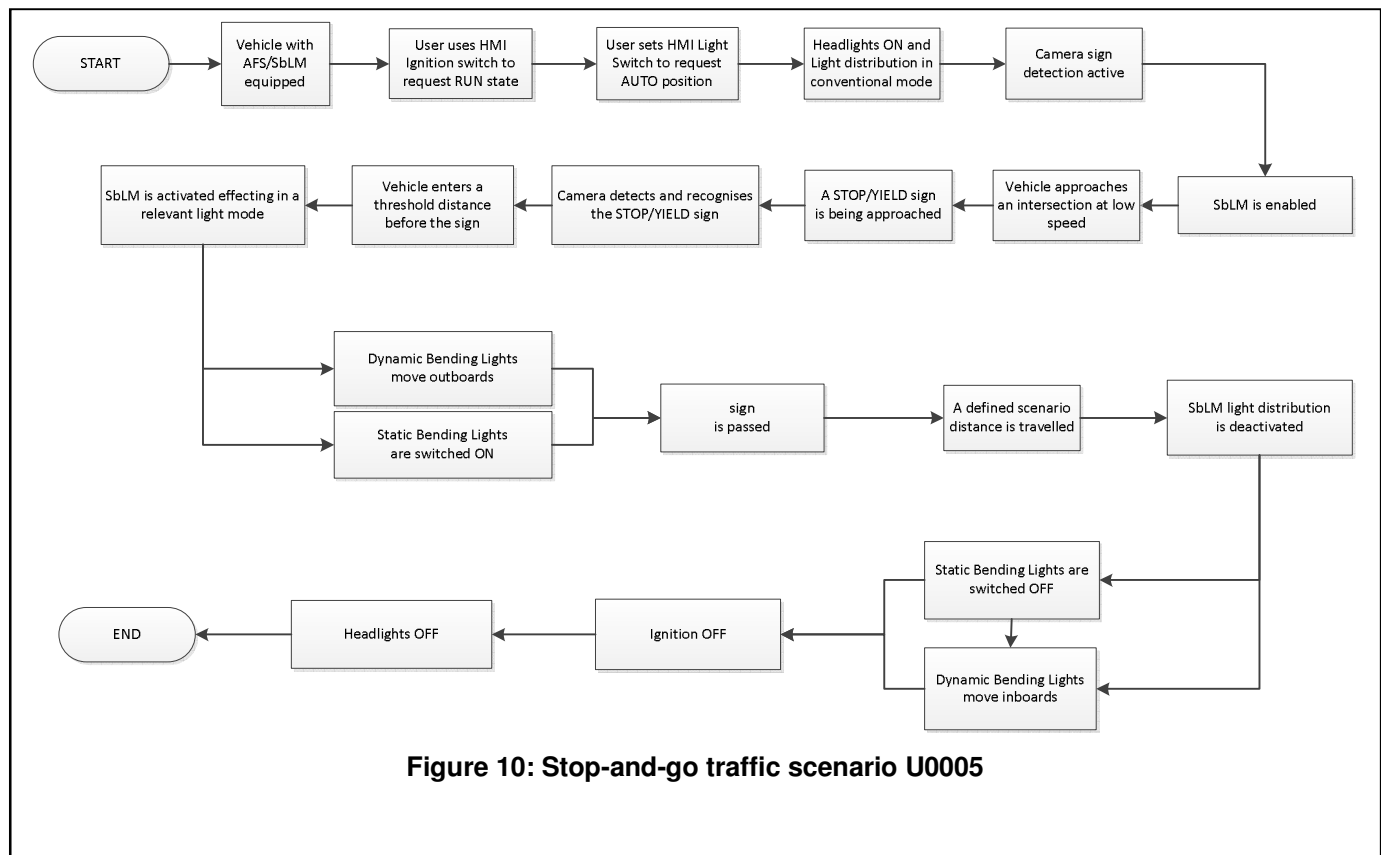


Figure 10: Stop-and-go traffic scenario U0005



# Feature Document

## 4.3.6 Use case U0006

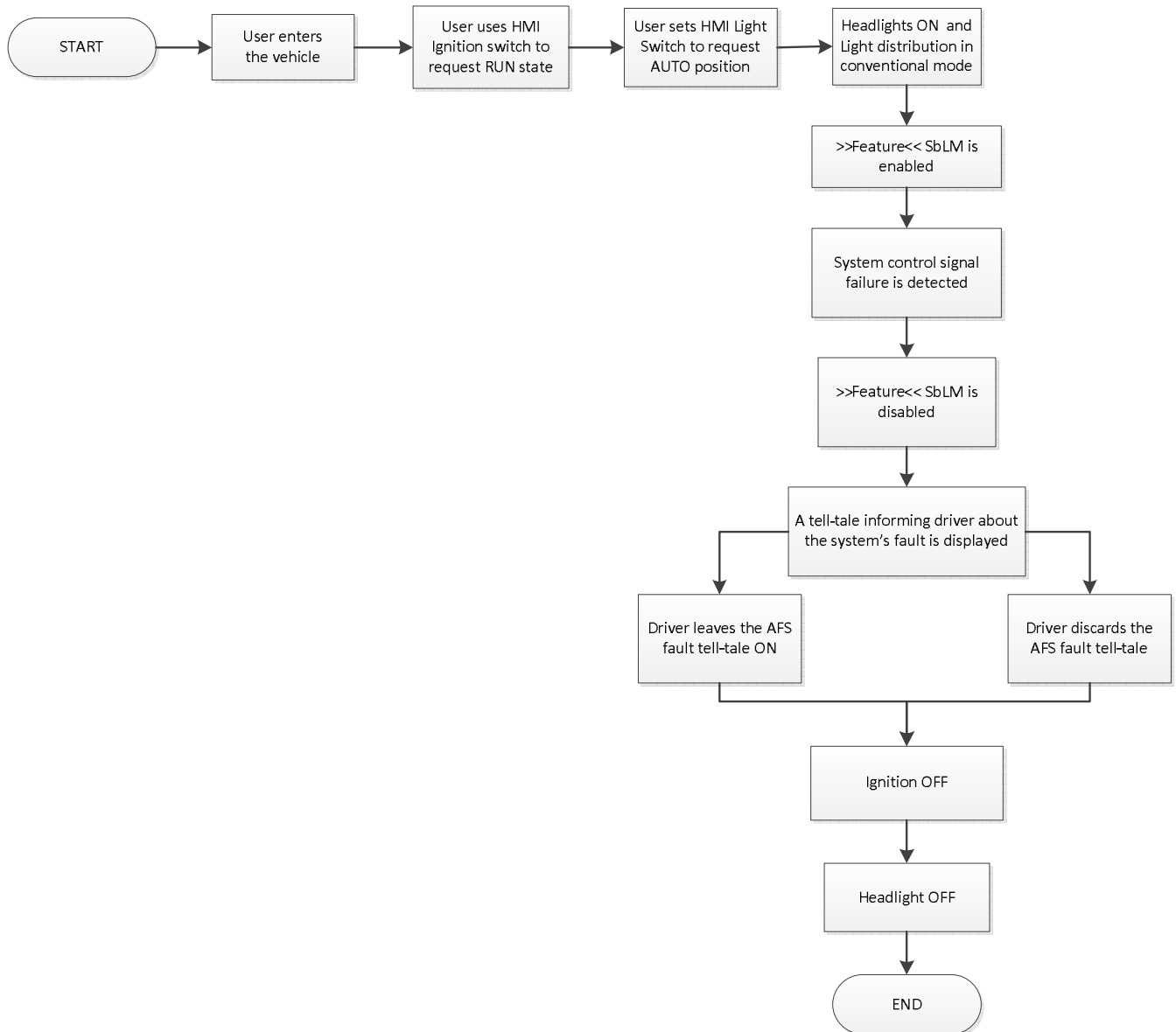


Figure 11: Behaviour in case of malfunctioning system



## Feature Document

### 4.3.7 Use case U0007

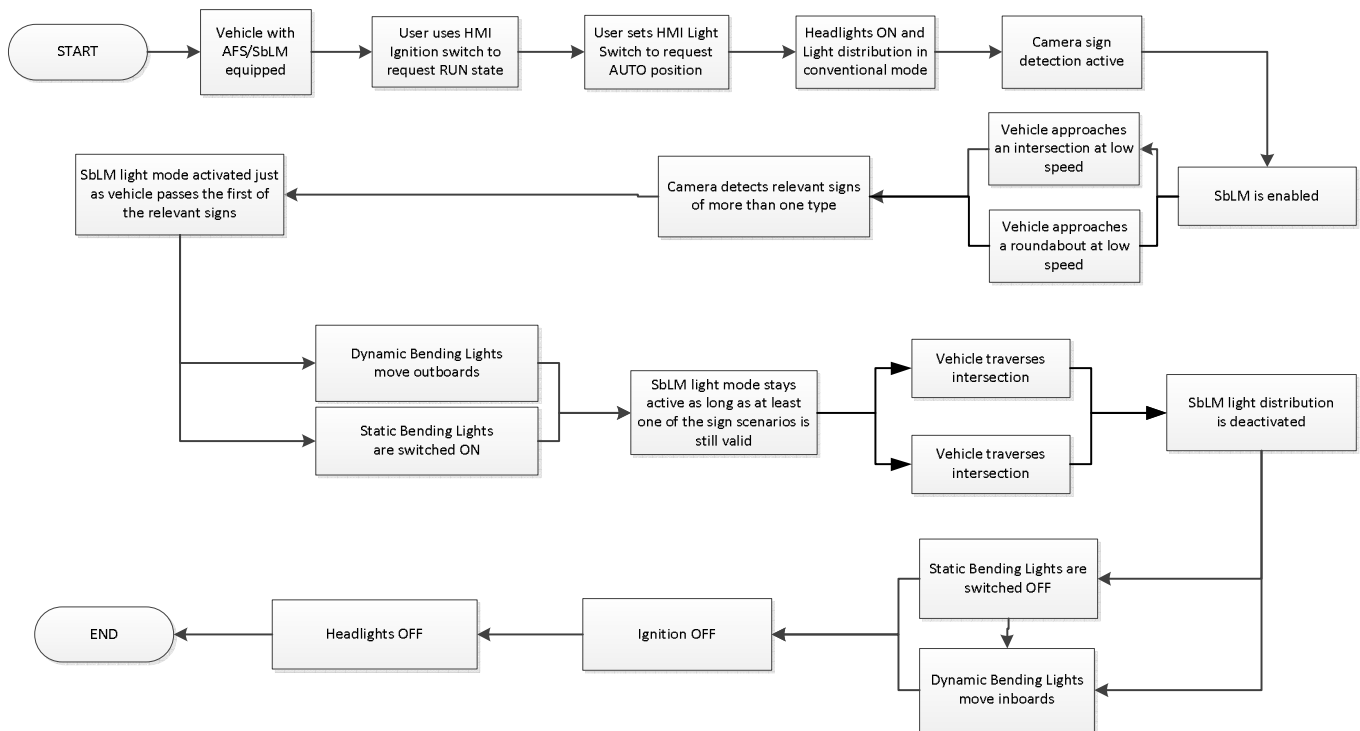


Figure 12. Behaviour in case of detection of multiple relevant signs

### 4.3.8 Use case U0008



## Feature Document

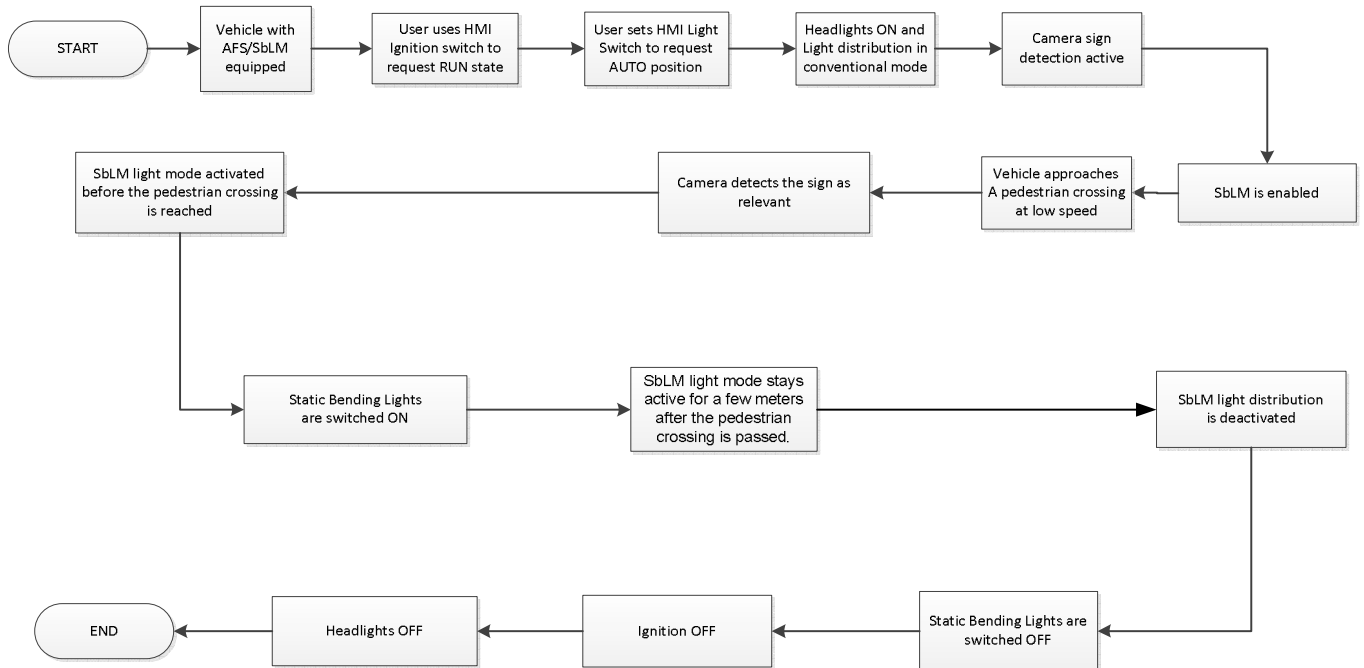


Figure 13. Pedestrian Crossing Light Mode



## Feature Document

### 5 FEATURE REQUIREMENTS

Preliminary notes on legal matters:

- AFS lamps must be considered equivalent to a pair of dipped-beam headlamps and if it provides main-beam functions it shall be considered equivalent to a pair of main-beam headlamps (5.25)

ECE R123

- 6.22 AFS (Regulation 123):
  1. Relevant part of the AFS is regulated to 6.1 (dipped beam) or 6.2 (main beam)
  2. Tell-tales as indicated in 6.1.8 or 6.2.8 plus an extra non-flashing tell-tale activated in case of AFS failure → Tell-tale mandatory for the main-beam, dipped-beam mandatory if kink or whole beam are moved to produce bend lighting or when one or more LED modules break

#### 5.1 Functional Requirements

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##### ###F\_SbLM\_R00001### Compliance to ECE legal regulations in Europe

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The feature operates as part of AFS as defined in ECE R123, and therefore shall operate within the limits of the ECE requirements for AFS.

ASO approved CDP/R

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##### ###F\_SbLM\_R00018### Compliance to SAE legal regulations in North America

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The feature operates as part of AFS as defined in SAE J2838 – Full adaptive forward lighting systems, and therefore shall operate within the limits of the SAE requirements for AFS.

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##### ###F\_SbLM\_R00002### Relevant traffic sign types

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The feature shall react to the following three signs:

- Stop sign



- Yield (Give



Way) sign

- Roundabout sign (Only in



European application)

- Pedestrian Crossing Sign:



## Feature Document



Or equivalent applicable in the concerned region.

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### ###F\_SbLM\_R00003### Operating Range

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The feature shall operate within a valid speed range which has to be certified in the headlamp certification class "V" **see also - 2.4.2 Legal constraints**  
Default Vmax = 50 kmph

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### ###F\_SbLM\_R00004### Operating Modes

---

The feature shall operate under the same conditions as conventional AFS. The feature is either on or off, with no special operating modes.

If the driver selects Auto Lights in a vehicle configured with SBLM, in night conditions and no inhibiting conditions exist (See requirement [F\\_SBLM\\_G00009](#)), then the feature should be ON. Otherwise, the feature should remain off.

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### ###F\_SbLM\_R00005### Irrelevant traffic sign rejection

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Signs that are irrelevant to the driver shall be filtered out and ignored. This includes

1. the generic conditions for relevancy outlined in the LROS detection spec
2. Signs with large lateral offset, for example YIELD signs at on-ramps, for which the camera currently lacks the necessary context to classify correctly
3. Signs with supplementary signs indicating distance to actual crosssections, often seen in roads with higher speeds



4. The feature shall ignore all other traffic signs except the ones in described in F\_SbLM\_00002 relevant traffic signs.
5. The feature shall reject irrelevant signs, to the limit of the camera detection and feature detection enhancements based on Lane information.

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### ###F\_SbLM\_G00009### SBLM Enabling conditions

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SBLM shall be enabled if:

- Vehicle conditions



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1. The Vehicle is not driving in reverse.
2. Ignition status in RUN and the start stop lifecycle is normal.
- Camera module conditions:
  1. The camera is not malfunctioning.
  2. Vision alignment is in range
  3. Image processing has finished initialization and camera data is ready.
  4. Vision alignment has started and has completed successfully.
- Fault status conditions:
  1. Vehicle speed signal has no fault, and not invalid
  2. Vehicle yaw rate signal has no fault and not invalid
  3. Steering wheel angle signal has no fault and is not invalid.
  4. Headlight switch signal has no fault
  5. Communication between IPMA module and HCM module (CAN bus) is not impaired.
  6. The headlamps have no detected fault.
- Other conditions:
  1. SBLM is configured for the vehicle.

And is inhibited otherwise.

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## ###F\_SbLM\_G00010### Light Mode Activation

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SbLM shall activate the Sign-based Light Mode

1. When the sign is approached to close distance at low speed
2. Before the sign is passed, so that the SbLM light distribution is just fully reached when the sign is passed

SBLM shall be deactivated when:

1. the relevant intersection is passed, or in case of a roundabout
2. when the roundabout is exited.

Allow for configuration of different sign scenarios, traffic styles, etc.

Tourist mode can be accessed by the feature for Roundabout tracking to have means of changing the turning direction

Tunability with respect to HB state: It shall be tunable if SBLM is allowed to activate while HB is ON.

## 5.2 Interface Requirements

### 5.2.1 HMI

SbLM has no direct HMI, it is part of AFS.

There shall be a cluster option to deactivate "Predictive Lighting" which includes SbLM.

AFS Tell-tale in failure conditions needs to be concerned.

### 5.2.2 Other Systems

SBLM is a part of AFS, its main interface is with the CADS system, where all of the information from the camera and the vehicle is passed to the SBLM.

Refer to "CGEA1.3 IPMA-CCM CADS3.5 Long Range Object Sensor Interface Specification" for more information

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## ###F\_SbLM\_R00017### SBLM Interfaces

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The interface signals include:

Signal	Requirement in CADS LROS Interface Specification
LROSYawRate	CGEA13_CS_CADS3p5_LongRangeObjectSensor-008:Req4v4)
Vision timestamp	CGEA13_CS_CADS3p5_LongRangeObjectSensor-006:Req634v1

Quality Business Planning

GIS1 Item Number: 25.06

GIS2 Classification: Proprietary

FAF03-150-3 (previously form: 3947-A2)





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Vehicle driving side	CGEA13_CS_CADS3p5_LongRangeObjectSensor-004:Req608v2
Gear lever position	CGEA12_CS_CADS_LongRangeObjectSensor-003:Req532v1
Steering wheel angle	CGEA13_CS_CADS3p5_LongRangeObjectSensor-006:Req638v1
Day time status, urban area detection	CGEA13_CS_CADS3p5_LongRangeObjectSensor-008:Req627v5
Road class	CGEA13_CS_CADS3p5_LongRangeObjectSensor-009:Req626v5
Raw sign data	CGEA13_CS_CADS3p5_LongRangeObjectSensor-010:Req641v2
Steerable Path Polynomial Measures	CGEA13_CS_CADS3p5_LongRangeObjectSensor-012p1:Req639v5
Light Subsystem	CGEA13_CS_CADS3p5_LongRangeObjectSensor-016:Req627v11

### 5.3 Quality Requirements

#### 5.3.1 Performance

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##### ###F\_SbLM\_R00007### Sign Detection Performance

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The camera shall detect the relevant signs according to the LROS interface & detection specs. see also:3.2 - Interfaces

The light mode shall be activated before crossing the intersection.

#### 5.3.2 Safety

As SbLM is a subsystem of the AFS base system and an enhanced sensor input for the Speed-dependent light modes functionality - safety relevant cases will be handled by the base system.

#### 5.3.3 Security

No specific security aspects to be considered.

#### 5.3.4 Reliability

### 5.4 Other Requirements

#### 5.4.1 Manufacturing Requirements

No specific assembly aspects to be considered.

#### 5.4.2 Service Requirements

#### 5.4.3 After Sales Requirements

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##### ###F\_SbLM\_R00006### Owners Manual Entry

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An entry in the owners manual shall describe the operation of the feature for the driver.



## Feature Document

### 5.4.4 Process requirements

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#### ###F\_SbLM\_R00008### Homologation

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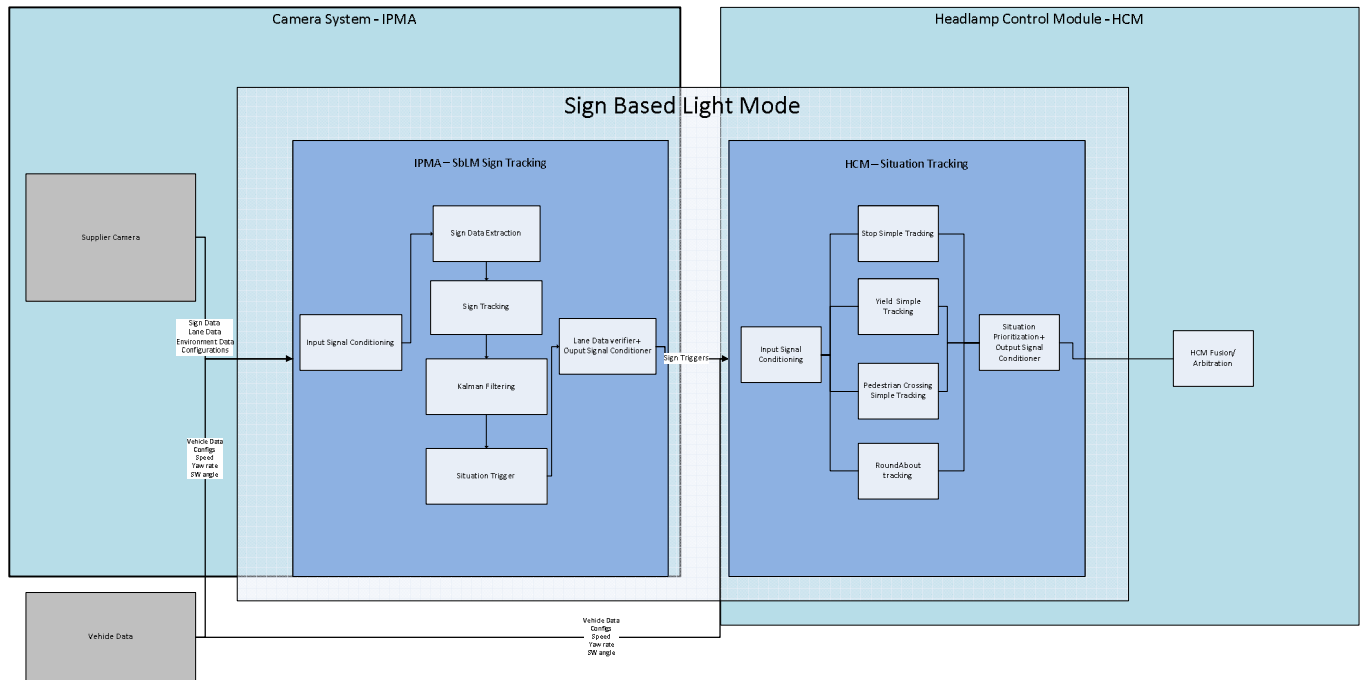
ECE R48 Application for Approval must contain SbLM light distribution mode for legal certification of headlamp system.



# Feature Document

## 6 FUNCTIONAL DECOMPOSITION

### 6.1 Functional Architecture



### 6.2 List of Functions

Function Name	Description	Link to Function Spec	Comments
<b>Sign Tracking</b>	<b>Tracks relevant signs until mode activation – IPMA</b>		<b>Core function</b>
<b>Situation Tracking</b>	<b>Tracks vehicle until mode deactivation - HCM</b>		<b>Core function</b>
<b>Camera Sign Detection</b>	Detects signs on the road with forward looking camera		Auxiliary function
<b>AFS Diagnostics</b>	Diagnostic functions check if AFS operational		Auxiliary function
<b>Vehicle Sensors</b>	Supply vehicle speed, yawrate, steering wheel angle		Auxiliary function
<b>HCM Fusion/Arbitration</b>	Determines output beam pattern based on Sblm input and conventional speed tables		Auxiliary function
<b>Headlamp</b>	Illuminates road with adjustable beam shape		Auxiliary function



# Feature Document

## 7 REQUIREMENTS TRACEABILITY

### 7.1 Traceability Matrix

Req. ID	Requirement Name	Derived from (Parent Requirement)	Satisfied by (Architecture Element)	Verified by (Test Case)
F_SBLM_R00001	Compliance to ECE Legal regulations	-	FNC_SBLM_R00026 FNC_SBLM_R00019 FNC_SBLM_R00025	SBLM_FTPS_PerfComp_10-V1A
F_SBLM_R00002	Relevant traffic sign types	-	FNC_SBLM_R00002	SBLM_FTPS_FCN_10-V1A SBLM_FTPS_FCN_20-V1A SBLM_FTPS_FCN_30-V1A
F_SBLM_R00003	Operating Range	-	FNC_SBLM_R00015	SBLM_FTPS_FCN_40-V1A
F_SBLM_R00004	Operating modes	-	FNC_SBLM_R00024	SBLM_FTPS_FCN_70-V1A
F_SBLM_R00005	Irrelevant traffic sign rejection	-	FNC_SBLM_R00001	SBLM_FTPS_FCN_100-V1A
F_SBLM_G00009	SBLM Enabling conditions		FNC_SBLM_R00015 FNC_SBLM_R00024 FNC_SBLM_R00006 FNC_SBLM_R00007 FNC_SBLM_R00009 FNC_SBLM_G00010 FNC_SBLM_R00028 FNC_SBLM_R00013 FNC_SBLM_R00011 FNC_SBLM_R00012 FNC_SBLM_R00015 FNC_SBLM_R00004	SBLM_FTPS_FCN_90-V1A
F_SBLM_G00010	Light Mode Activation		FNC_SBLM_R00005 FNC_SBLM_R00007 FNC_SBLM_R00008 FNC_SBLM_G00010 FNC_SBLM_R00011 FNC_SBLM_R00012 FNC_SBLM_G00014 FNC_SBLM_R00016 FNC_SBLM_R00028 FNC_SBLM_R00029	SBLM_FTPS_FCN_10-V1A SBLM_FTPS_FCN_20-V1A
F_SBLM_R00017	SBLM Interfaces		FNC_SBLM_00023 FNC_SBLM_R00025 FNC_SBLM_R00004	SBLM_FTPS_Interfaces_10-V1A
F_SbLM_R00006	Owners Manual Entry		-	SBLM_FTPS_PerfComp_20-V1A
F_SbLM_R00008	Homologation		FNC_SBLM_R00026	SBLM_FTPS_PerfComp_10-V1A
F_SbLM_R00007	Sign Detection Performance		FNC_SBLM_R00007 FNC_SBLM_R00030	SBLM_FTPS_PerfComp_10-V1A
F_SbLM_U0001	Stop/Yield Sign Scenario		FNC_SBLM_R00002 FNC_SBLM_R00005 FNC_SBLM_R00013 FNC_SBLM_R00011 FNC_SBLM_G00014	SBLM_FTPS_FCN_10-V1A SBLM_FTPS_FCN_20-V1A
F_SbLM_U0002	Roundabout Sign Scenario	-	FNC_SBLM_R00020 FNC_SBLM_R00021 FNC_SBLM_R00031 FNC_SBLM_R00022	SBLM_FTPS_FCN_30-V1A
F_SbLM_U0003	High Speed Scenario		FNC_SBLM_R00015	SBLM_FTPS_FCN_40-V1A



## Feature Document

			FNC_SBLM_R00023	
F_SbLM_U0004	Irrelevant sign Scenario		FNC_SBLM_R00001	SBLM_FTPS_FCN_50-V1A
F_SbLM_U0005	Stop-and-go traffic Scenario		FNC_SBLM_R00011	SBLM_FTPS_FCN_60-V1A
F_SbLM_U0006	Behavior in case of Malfunctioning system		-	SBLM_FTPS_FCN_70-V1A
F_SbLM_U0007	Multiple sign Scenario		FNC_SBLM_R00003 FNC_SBLM_R00027 FNC_SBLM_R00017	SBLM_FTPS_FCN_80-V1A



## Feature Document

### 8 OPEN TOPICS / KNOWN ISSUES

The following list presents known issues / open topics which have to be discussed or clarified over the course of the on-going requirements engineering.

ID	Issue Description	e-Tracker Reference	Status	Solution
1				
2				



## Feature Document

### 9 REVISION HISTORY

Vers.	Rev. (revision)	Date	Description	Approved by	Responsible
0	001		Initial version		
0	002	10.05.2 016	Corrections applied		
12	000	07.06.2 016	Corrections applied		W Moussa



## Feature Document

### 10APPENDIX





## Feature Document

### 10.1 Data Dictionary

Name	Description	Size [Bits]	Physical Range	Scale	Offset	Interpretati on <sup>1</sup>	Reference	Type <sup>2</sup>	Details

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<sup>1</sup> The default value (which is set by the publisher, if a valid signal is not available) shall be marked by an asterisk \*.

<sup>2</sup> Possible types: (S)ignal Variable, Internal (V)ariable, Calibration (P)arameter, (C)onfiguration Parameter,

*Quality Business Planning*

*GIS1 Item Number: 25.06*

*GIS2 Classification: Proprietary*

*FAF03-150-3 (previously form: 3947-A2)*



# Feature Requirements Specification