

**TISA Guideline: Lane numbering**

## **Guideline for lane numbering**

**Version 1.0**

**18 July 2018**

**TISA Guideline: Lane numbering**

Document Control Sheet

Document Title: TISA Guideline: Lane numbering  
 Document reference: SP18002  
 Issues: 22/08/2018  
 Status: Final  
 Editor: sven.baselau@tomtom.com

Version history of this document

| version | date       | Comment  |
|---------|------------|--|
| 01      | 19-07-2017 | Initial version  |
| 02      | 21-02-2018 | Version for TAWG final review  |
| 03      | 18-07-2018 | Refining Rule 6 and Rule 7 according to the comments in the 4wk review |
| 1.0     | 22-08-2018 | Final editing by EO  |

## TISA Guideline: Lane numbering

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### 2 Purpose of the document

This document provides a guideline how TPEG applications can number the lanes of roads. The numbering schema allows TPEG applications to address individual lanes along a road and to have a more fine-granular location description. The schema is applicable to all applications which are using the road network in a digital map. The map needs to support lane level information and provide at least the number of lanes for road stretches.

The numbering schema was introduced during the development of the TPEG2-VLI specification ([1]). Also in this application the first implementation has been made.

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### 3 Guidelines

Lane numbering is a way to address each lane of a road stretch individually and assigns each lane a unique number until the physical road layout changes. A physical road layout changes in cases where new lanes start or existing lanes end.

The lane numbering schema should follow these rules:

- Rule 1. Lanes are numbered from the curb to the middle of the road.  
Right hand traffic lanes are therefore numbered from the right to the left relating to the driving direction. Left hand traffic lanes are numbered from left to right relating to the driving direction.
- Rule 2. The lowest possible number is 0 and only consecutive integer numbers are used.
- Rule 3. Hard shoulder is always number 0
  - a. Leftmost lane in case of left hand driving (if exists)
  - b. Rightmost lane in case of right hand driving (if exists)
  - c. Additional hard shoulders are numbered consecutively (also applicable for hard shoulders next to the divider)
- Rule 4. First drivable lane for vehicles is number 1  
Applicable in case of no hard shoulder or just one hard shoulder
- Rule 5. All lanes which are physically available count
- Rule 6. Lanes, which are temporarily closed or opened, keep their original number
- Rule 7. If physical layout changes then the location must be split.
- Rule 8. Lane numbers are per driving direction.

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### 4 Proposed implementation

The proposed implementation of lane numbering in TPEG applications is as a data structure according to Figure 1 and Table 1.

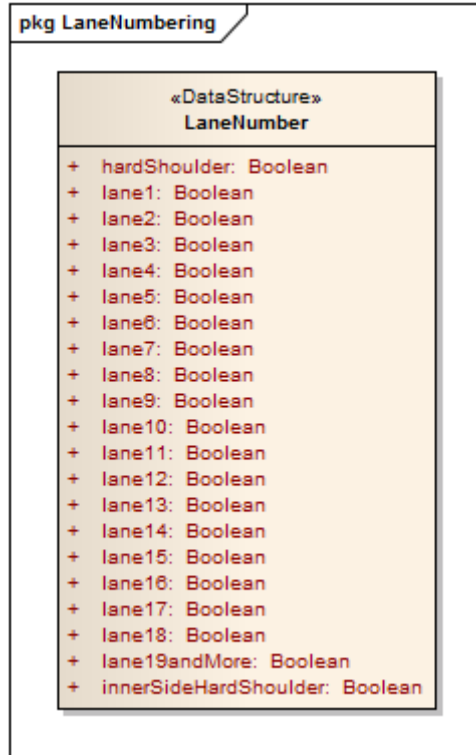


Figure 1: Lane numbering data model

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| Name                  | Type    | Multiplicity | Description   |
|-----------------------|---------|--------------|---|
| hardShoulder          | Boolean | 1            | true, if the hard shoulder exists and is selected           |
| lane1                 | Boolean | 1            | true, if the lane is selected                               |
| lane2                 | Boolean | 1            | true, if the lane is selected                               |
| lane3                 | Boolean | 1            | true, if the lane is selected                               |
| lane4                 | Boolean | 1            | true, if the lane is selected                               |
| lane5                 | Boolean | 1            | true, if the lane is selected                               |
| lane6                 | Boolean | 1            | true, if the lane is selected                               |
| lane7                 | Boolean | 1            | true, if the lane is selected                               |
| lane8                 | Boolean | 1            | true, if the lane is selected                               |
| lane9                 | Boolean | 1            | true, if the lane is selected                               |
| lane10                | Boolean | 1            | true, if the lane is selected                               |
| lane11                | Boolean | 1            | true, if the lane is selected                               |
| lane12                | Boolean | 1            | true, if the lane is selected                               |
| lane13                | Boolean | 1            | true, if the lane is selected                               |
| lane14                | Boolean | 1            | true, if the lane is selected                               |
| lane15                | Boolean | 1            | true, if the lane is selected                               |
| lane16                | Boolean | 1            | true, if the lane is selected                               |
| lane17                | Boolean | 1            | true, if the lane is selected                               |
| lane18                | Boolean | 1            | true, if the lane is selected                               |
| lane19andMore         | Boolean | 1            | true, if the lane and potential further lanes are selected  |
| innerSideHardShoulder | Boolean | 1            | true, if an inner side hard shoulder exists and is selected |

*Table 1: Lane numbering model*

The lane numbering model allows to address the hard shoulder on both sides of the road separately. The number of lanes which are explicitly addressable is 18 and if more lanes are available then those lanes are addressed together with a single reference.

The model allows to address any combination of the available lanes and not just lanes which are neighboring. The usage as a data structure allows to easily integrate lane numbering into existing and future TPEG application data models.

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### 5 Examples

The following drawings are presenting examples of physical road layouts and how the numbering schema can be applied in such situations.

#### Example 1

Description and applied rules:

- Numbering from left to right if left hand driving
- Hard shoulder has number 0
- First accessible lane for vehicles is number 1



#### 5.1 Example 2

Description and applied rules:

- Numbering from right to left if right hand driving
- Hard shoulder has number 0
- First accessible lane for vehicles is number 1



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### 5.2 Example 3

Description and applied rules:

- Additional lanes are continuing the numbering
- Removed lanes are not taken into account anymore



### 5.3 Example 4

Description and applied rules:

- If hard shoulder does not exist then number 0 is not used



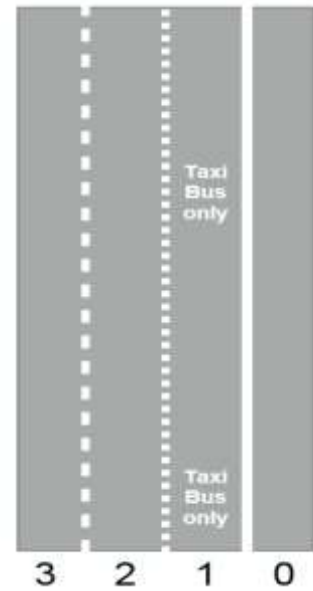


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#### 5.4 Example 5

Description and applied rules:

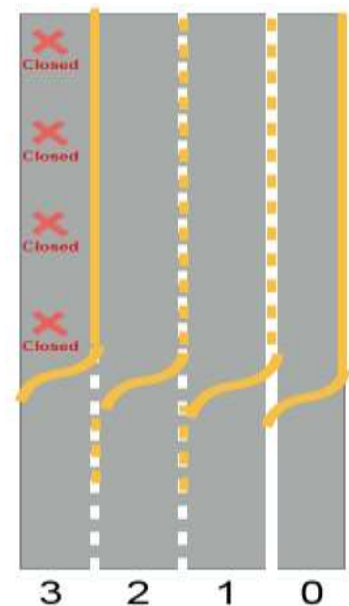
- Lanes which are restricted for special vehicles do not interrupt the counting



#### 5.5 Example 6

Description and applied rules:

- Temporarily closed lanes do not change the numbering

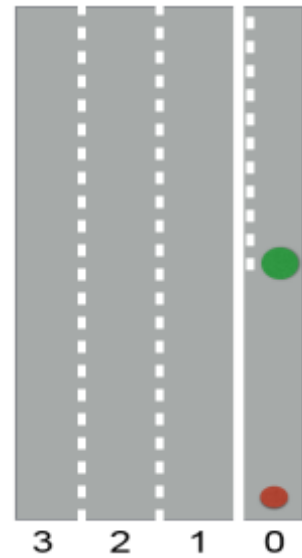


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### 5.6 Example 7

Description and applied rules:

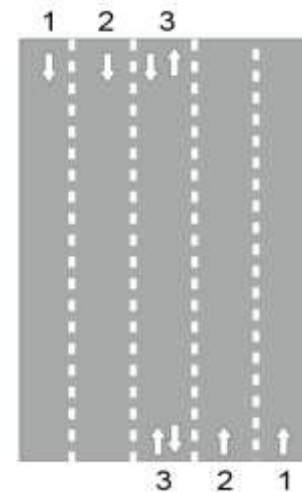
- A running hard shoulder does not affect the numbering



### 5.7 Example 8

Description and applied rules:

- Lanes drivable in both directions are counted for each direction separately

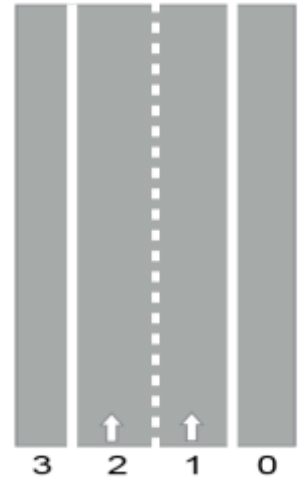


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### 5.8 Example 9

Description and applied rules:

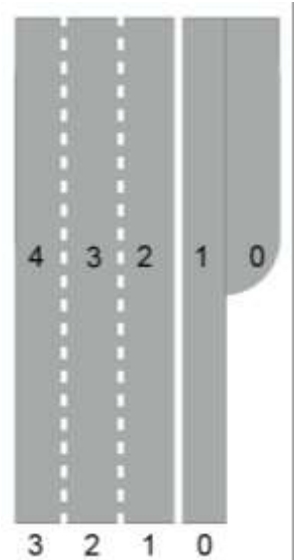
- Another hard shoulder exists next to the divider



### 5.9 Example 10

Description and applied rules:

- Additional lanes next to lane 0 (other side of lane 1) should lead to a split of the location and might require a new TPEG message

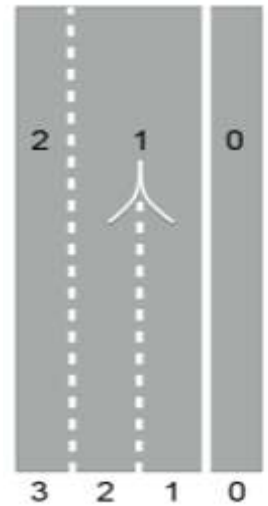


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**5.10 Example 11**

Description and applied rules:

- A merge of lanes should lead to a split of the location and might require a new TPEG message



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### 6 References

- |     |   |
|-----|---|
| [1] | Intelligent Transport Systems (ITS) — Traffic and Travel Information (TTI) via Transport Protocol Experts Group, Generation 2 (TPEG2) - Part 26: Vigilance location information (TPEG2-VLI_1.0/002) |
|-----|---|