

## A1.3 Travel-time Information

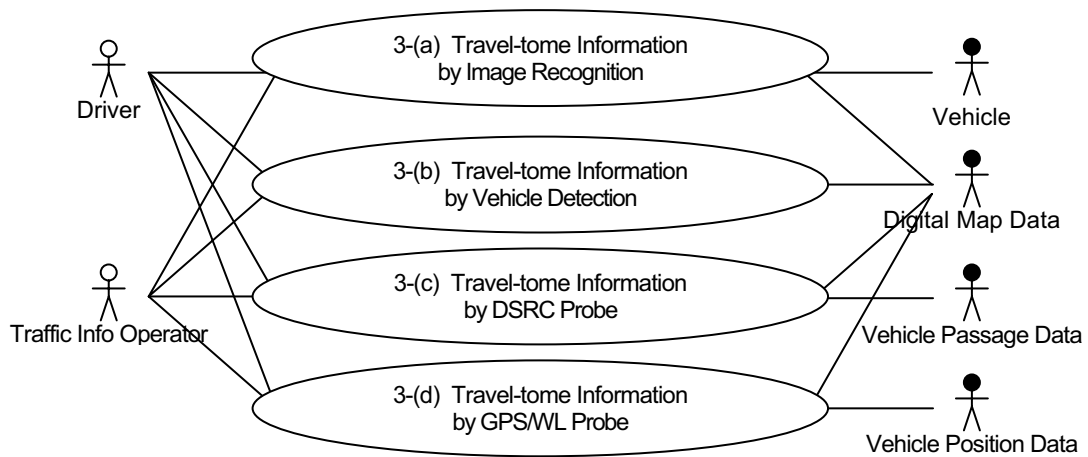
### 1) Service Requirements and Use Cases

#### (1) 2nd Stage

- (i) Analyzing/estimating travel-time between the interchanges and the junctions on the whole expressway network excluding disturbing factors,
- (ii) Travel-time information dissemination to the drivers en-route/in-advance as needed,
- (iii) Information update every 15 minutes for dissemination,
- (iv) Compiling/storing/providing data for travel-time information.

The following four alternative use cases are to be considered in the discussion.

**Figure A1.3.1 Use Case Diagram of Travel-time Information**



Source: VITRANSS 2 Study Team

### 2) Message Sequence Diagram

The message sequence diagram (MSD) of the use cases above are shown in the following pages.

Figure A1.3-(a).MSD Travel-time Information by Image Recognition

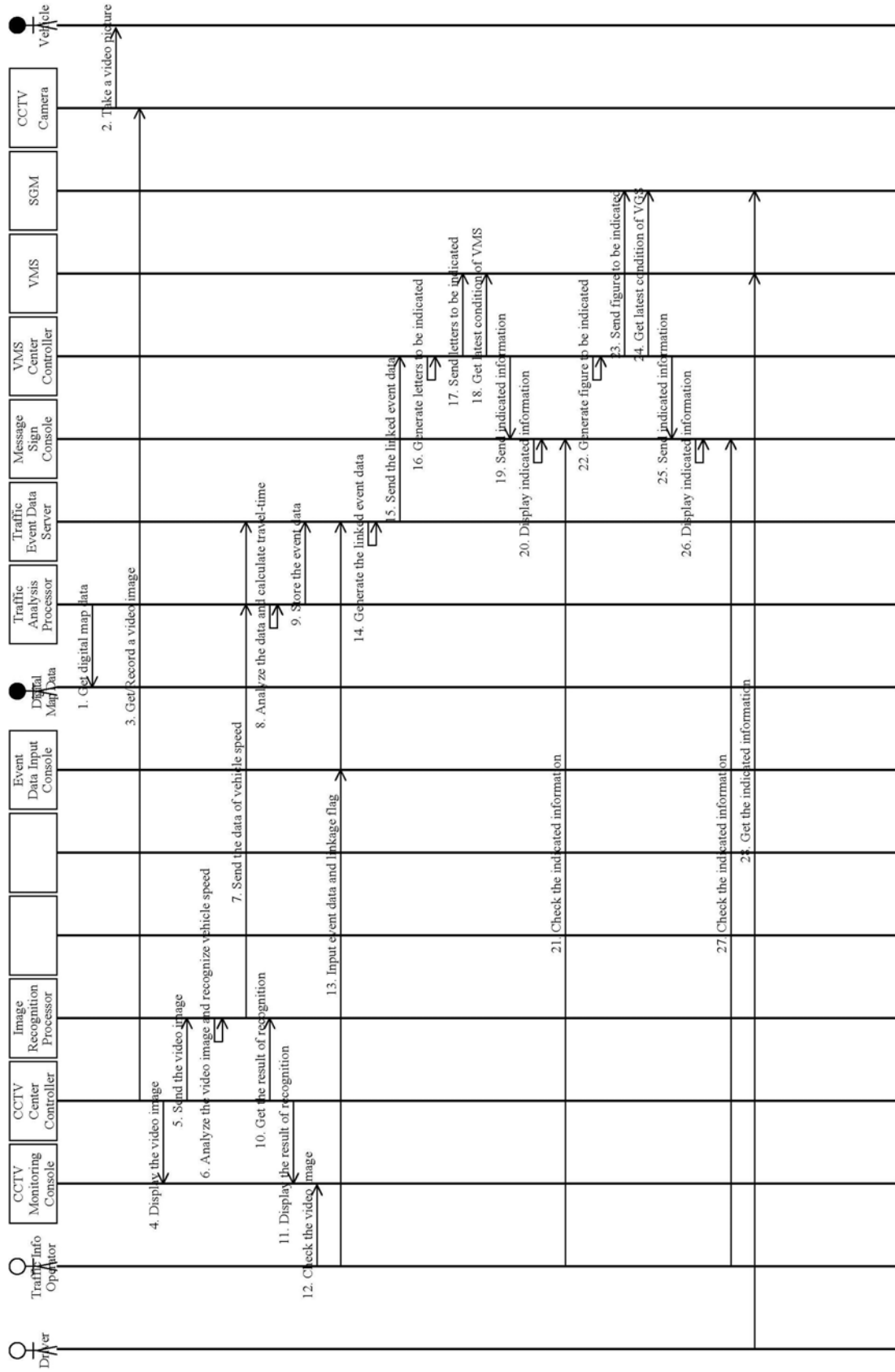


Figure A1.3-(b).MSD Travel-time Information by Vehicle Detection

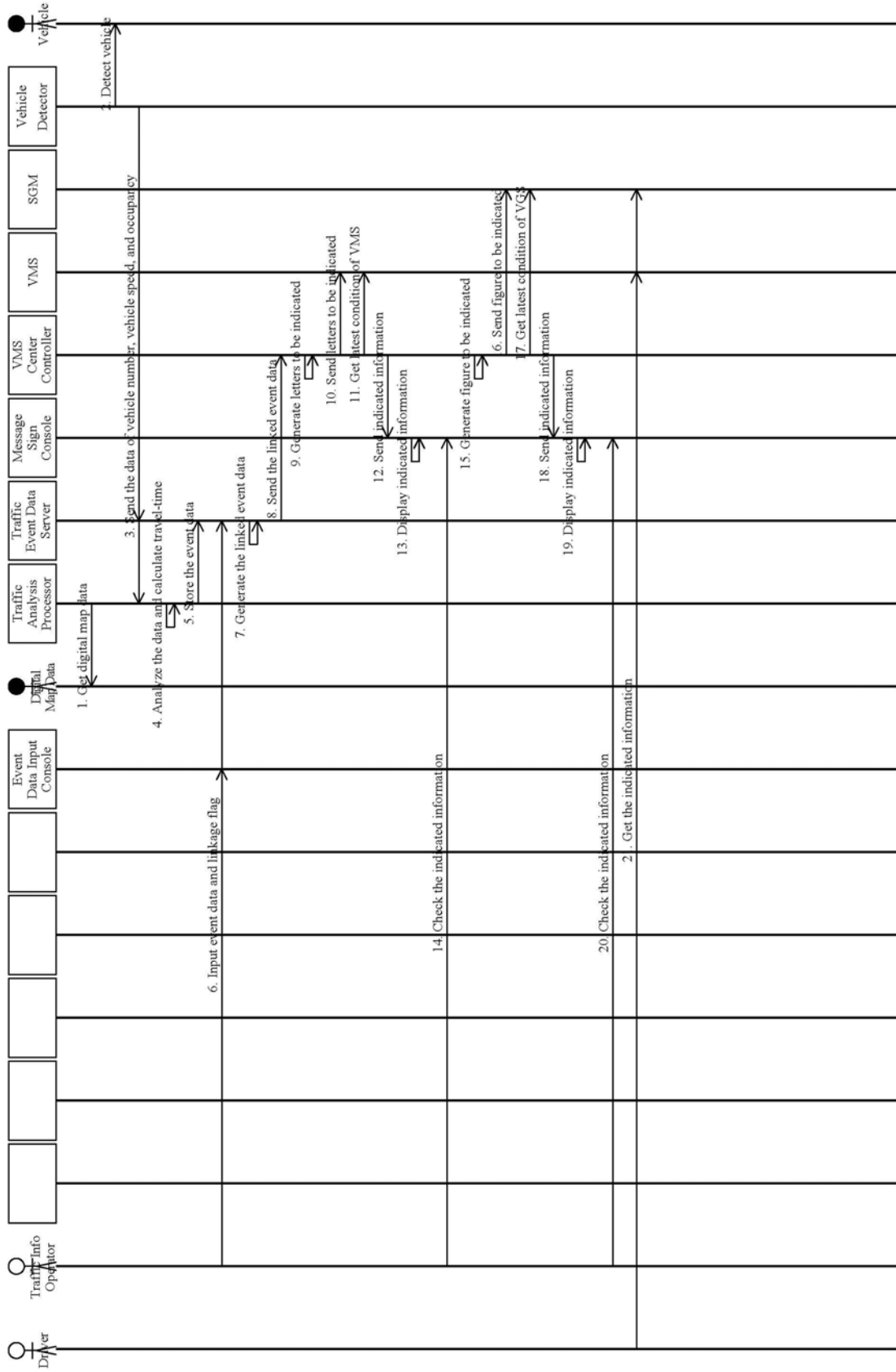


Figure A1.3-(c).MSD Travel-time Information by DSRC Probe

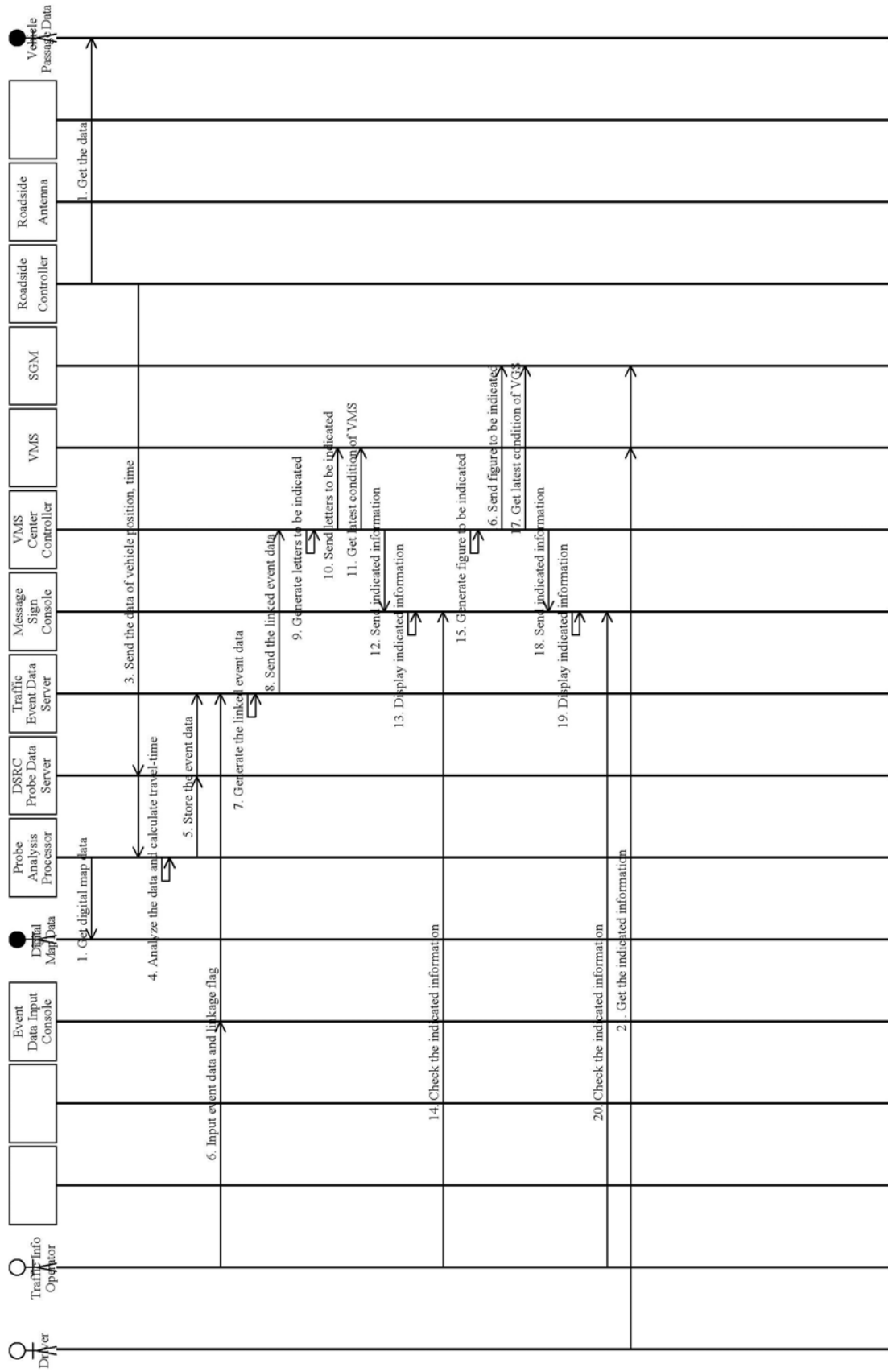
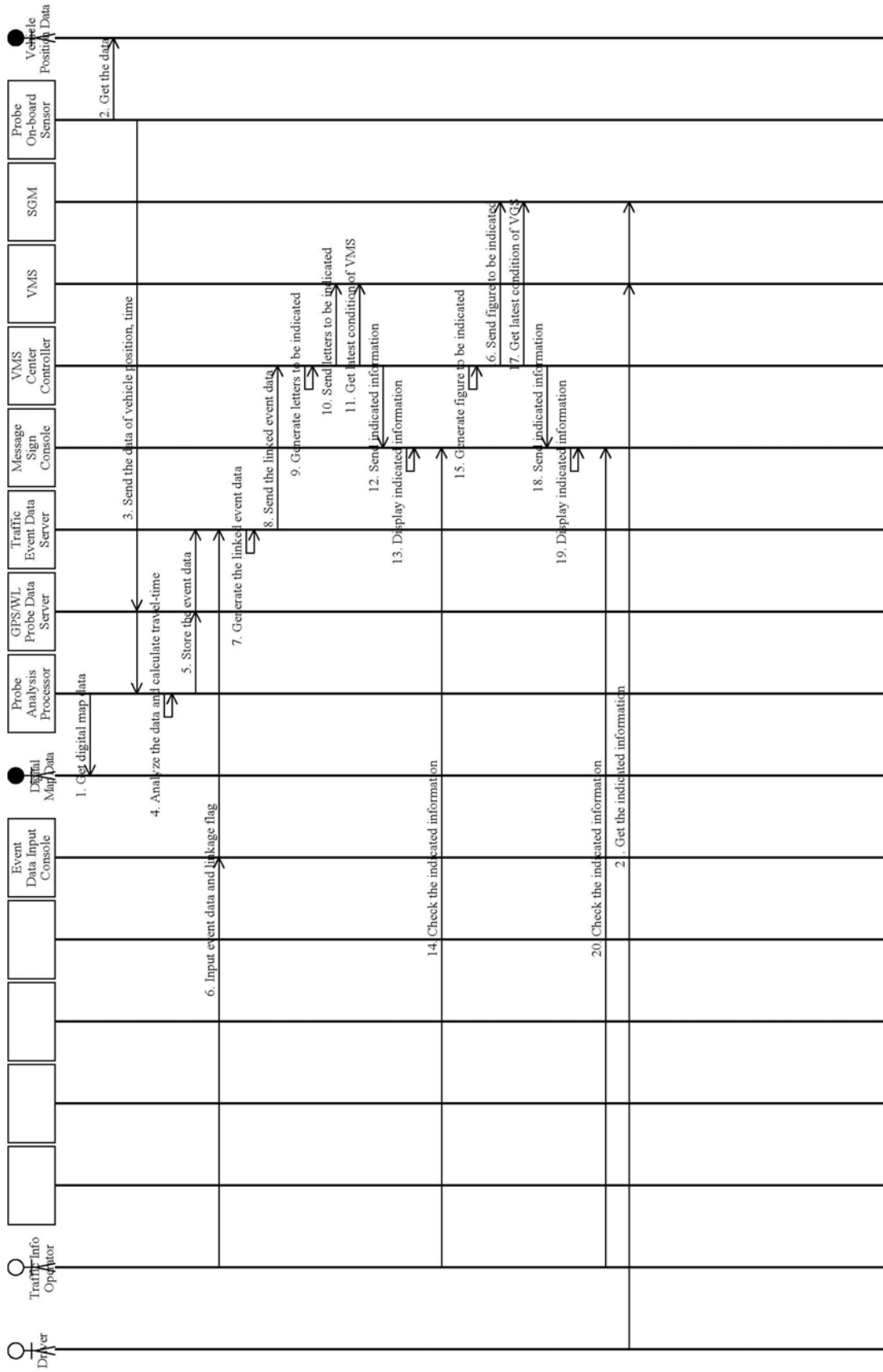


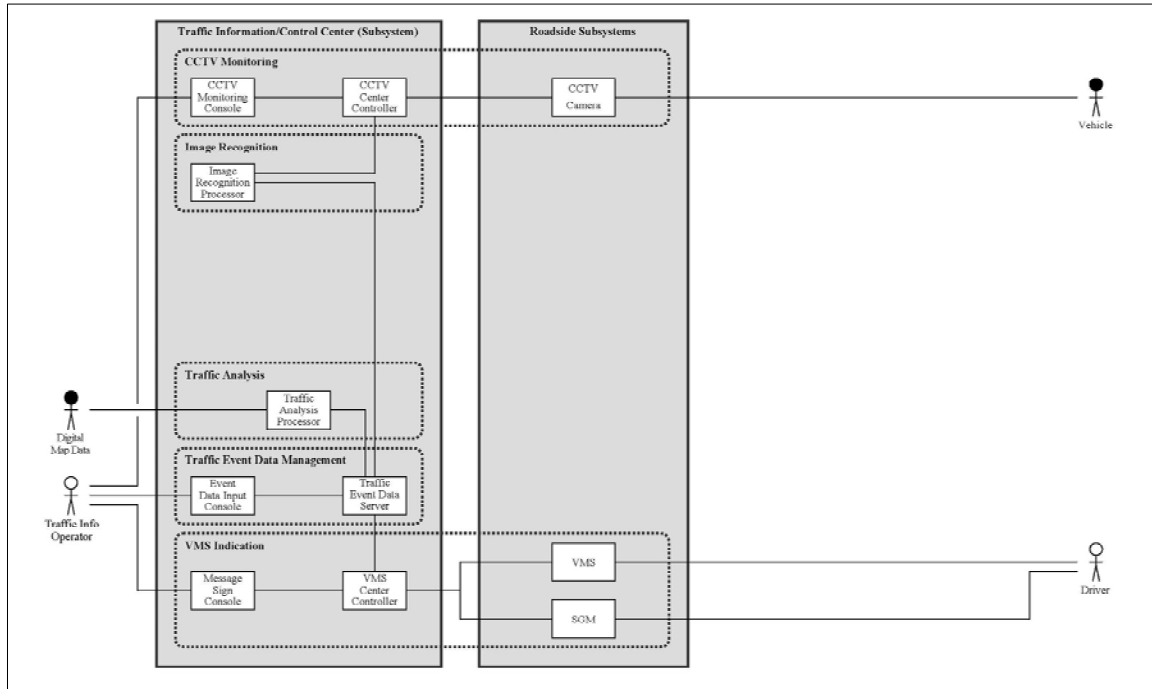
Figure A1.3-(d).MSD Travel-time Information by GPSWL Probe



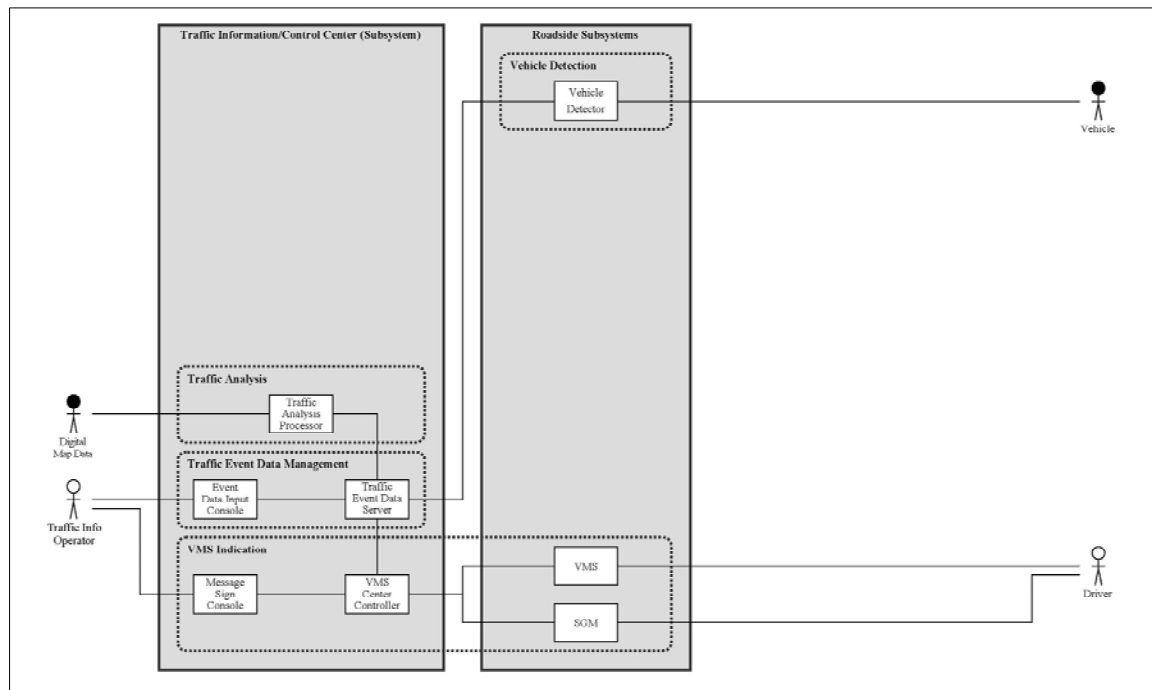
### 3) Collaboration Diagram with Functions/Installation

The collaboration diagrams (CD) are derived respectively from the message sequence diagrams aforementioned.

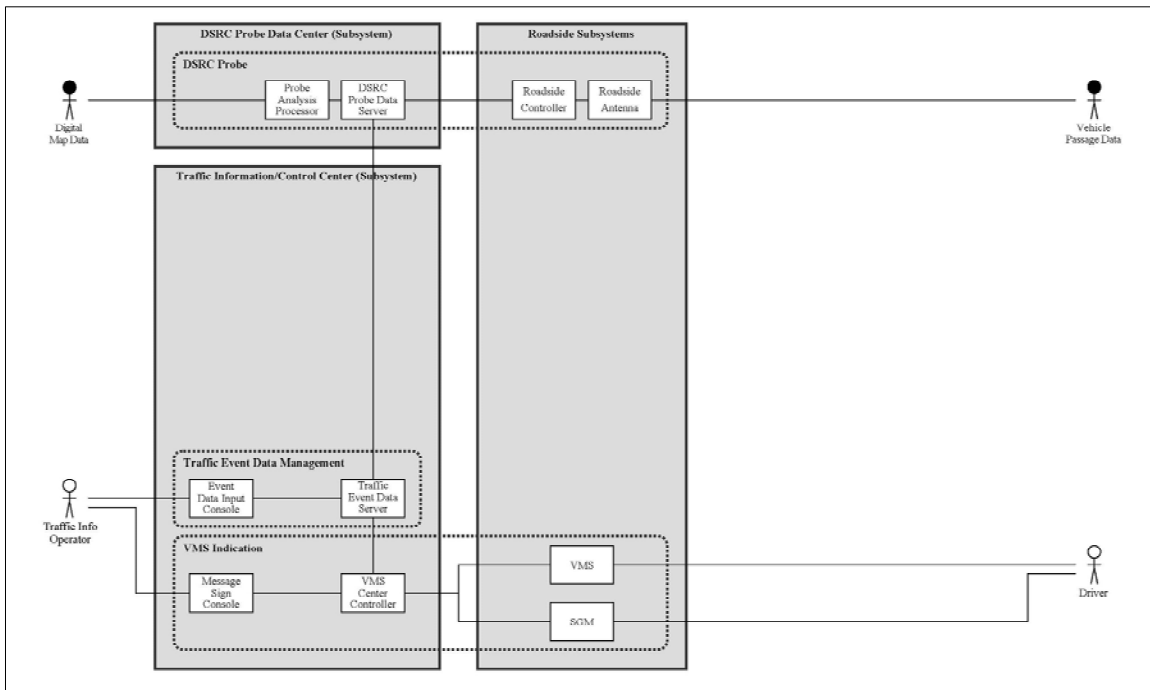
**Figure A1.3-(a).CD Travel-time Information by Image Recognition (Graded as “Not Suitable”)**



**Figure A1.3-(b).CD Travel-time Information by Vehicle Detection (Graded as “Not Suitable”)**



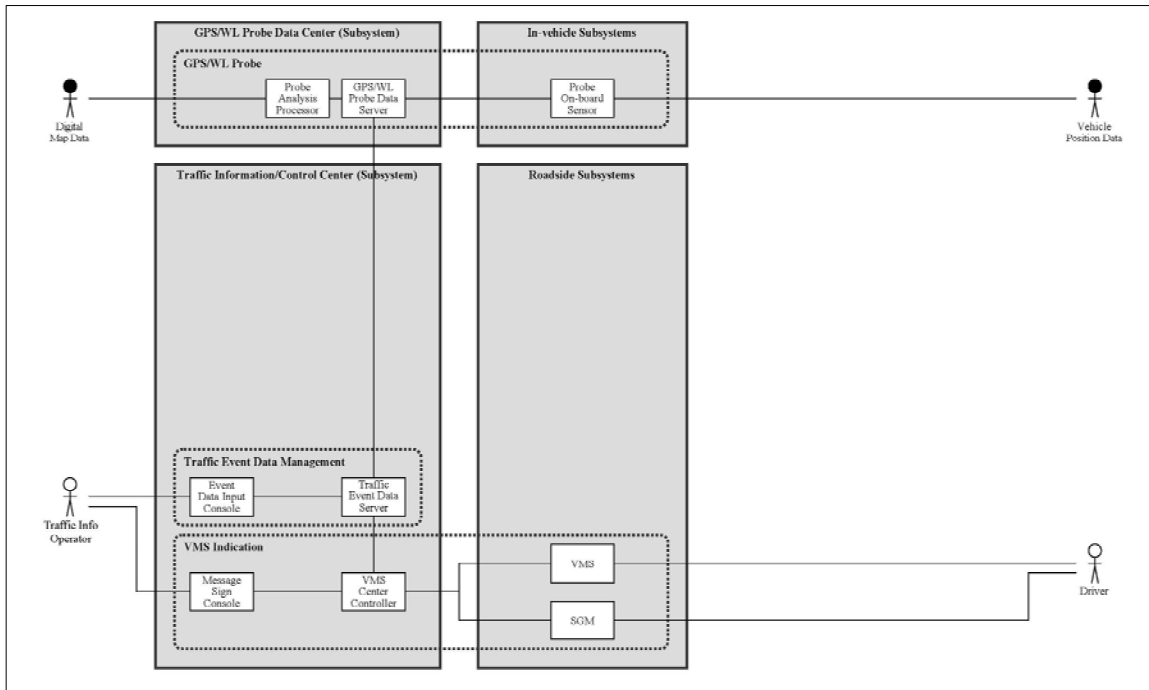
**Figure A1.3-(c).CD Travel-time Information by DSRC Probe (Graded as “Recommended”)**



| Functions & Installation: 3-(c) by DSRC Probe |           |   |
|---|-----------|---|
| Function                                      | Equipment | Installation  |
| DSRC probe                                    | Computer  | DSRC probe data center (2 <sup>nd</sup> ~)  |
|   | Computer  | Toll Management Center (1 <sup>st</sup> ~)  |
| Event data management                         | Console   | Traffic information/control center **   |
|   | Computer  | Traffic information/control center **   |
| VMS indication<br>(→ See Table 9.3.2)         | Console   | Traffic information/control center **   |
|   | Computer  | Traffic information/control center **   |
|   | VMS       | Roadside (1 <sup>st</sup> ~ : short of exit diverging point, entrance point, tollgate, relevant spot) |
|   | SGM       | Roadside (3 <sup>rd</sup> : short of junction)  |

Note, \*\*: Three main centers shall be constructed in the 1st stage (→ See Section 8.4). Management offices shall be implemented every 50–80 km in the 1st–2nd stages keeping pace with the road construction (→ See Figure 8.3.2).

**Figure A1.3-(d).CD Travel-time Information by GPS/WL Probe (Graded as “Useful as a Complement”)**



**Functions & Installation: 3-(d) by GPS/WL Probe**

| Function                              | Equipment | Installation   |
|---------------------------------------|-----------|--|
| GPS/WL probe                          | Computer  | GPS/WL probe data center (2 <sup>nd</sup> ~)   |
|                                       | Sensor    | In-vehicle (2 <sup>nd</sup> ~)   |
| Event data management                 | Console   | Traffic information/control center **  |
|                                       | Computer  | Traffic information/control center **  |
| VMS indication<br>(→ See Table 9.3.2) | Console   | Traffic information/control center **  |
|                                       | Computer  | Traffic information/control center **  |
|                                       | VMS       | Roadside (1 <sup>st</sup> ~ : short of exit diverging point, entrance point, tollgate, relevant spot)) |
|                                       | SGM       | Roadside (3 <sup>rd</sup> : short of junction)   |

Note, \*\*: Three main centers shall be constructed in the 1st stage (→ See Section 8.4). Management offices shall be implemented every 50–80 km in the 1st–2nd stages keeping pace with the road construction (→ See Figure 8.3.2).



## A1.4 Weather Information

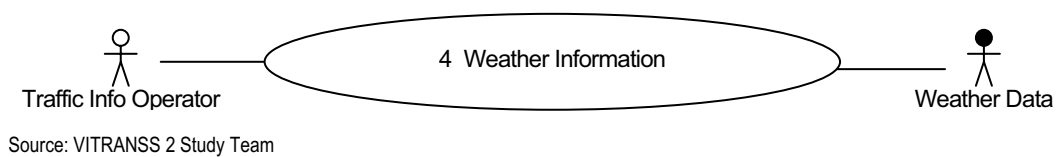
### 1) Service Requirements and Use Cases

#### (1) 1st Stage

- (i) Round-the-clock monitoring of rainfall, wind direction/velocity and temperature at every interchange on the expressway network,
- (ii) Weather information dissemination, as needed, to the drivers en-route/in-advance,
- (iii) Information update every 15 minutes for dissemination,
- (iv) Compiling/storing/providing data for weather information.

A mandatory use case is to be considered in the discussion.

**Figure A1.4.1 Use Case Diagram of Weather Information**



### 2) Message Sequence Diagram

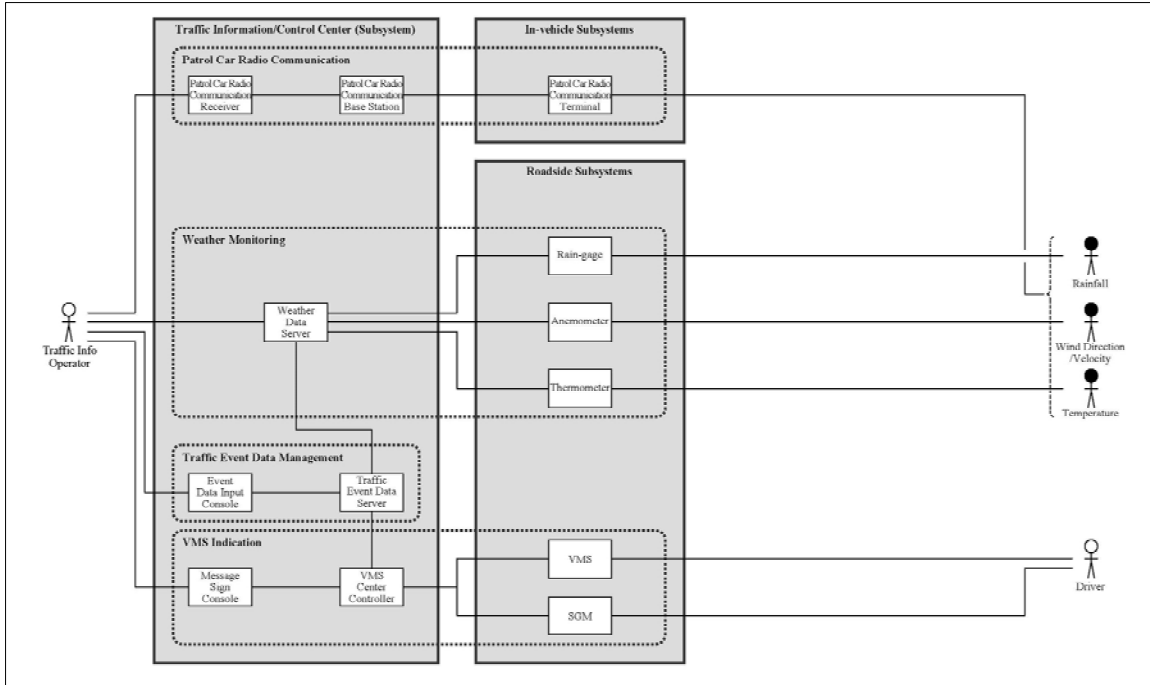
The message sequence diagram (MSD) of the use cases above are shown in the following pages.



### 3) Collaboration Diagram with Functions/Installation

The collaboration diagram (CD) is derived from the message sequence diagrams aforementioned.

**Figure A1.4.CD Weather Information (Graded as “Necessary”)**



| Functions & Installation: 4           |             |  |
|---------------------------------------|-------------|--|
| Function                              | Equipment   | Installation   |
| Weather Sensor<br>(→ See Table 9.3.1) | Anemometer  | Roadside (1 <sup>st</sup> ~ : every interchange)   |
|                                       | Thermometer | Roadside (1 <sup>st</sup> ~ : every interchange)   |
|                                       | Rain gage   | Roadside (1 <sup>st</sup> ~ : every interchange)   |
| Telemeter                             | Transmitter | Roadside (1 <sup>st</sup> ~ : every interchange)   |
|                                       | Receiver    | Traffic information/control center **  |
|                                       | Computer    | Traffic information/control center **  |
| VMS indication<br>(→ See Table 9.3.2) | Console     | Traffic information/control center **  |
|                                       | Computer    | Traffic information/control center **  |
|                                       | VMS         | Roadside (1 <sup>st</sup> ~ : short of exit diverging point, entrance point, tollgate, relevant spot)) |
|                                       | SGM         | Roadside (3 <sup>rd</sup> : short of junction)   |

Note, \*\*: Three main centers shall be constructed in the 1<sup>st</sup> stage (→ See Section 8.4). Management offices shall be implemented every 50–80 km in the 1<sup>st</sup>–2<sup>nd</sup> stages keeping pace with the road construction (→ See Figure 8.3.2).