**3GPP TSG-SA WG6 Meeting #39-bis-e S6-202002**

**e-meeting, 12th – 20th October 2020 (revision of S6-201856)**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.286** | **CR** | **0025** | **rev** | **1** | **Current version:** | **16.4.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Support for HD map dynamic information | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, Hisilicon | | | | | | | | | |
| ***Source to TSG:*** | S6 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eV2XAPP | | | | |  | ***Date:*** | | | 2020-09-28 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To support advanced/remote driving use case, the support for HD map dynamic information is introduced. This is solution#18 specified in TR 23.764. | | | | | | | | |
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| ***Summary of change:*** | | Added a new feature with related procedures to support HD map dynamic information | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The new feature to support HD map dynamic information will not be supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 9.x (new), 9.x.1 (new), 9.x.2 (new), 9.x.3 (new), 9.x.4 (new), 9.x.5 (new), 9.x.5.1 (new), 9.x.5.2 (new), 9.x.6 (new), | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **Y** |  | Other core specifications | | | | TS 23.434 CR 0027 | | |
| ***affected:*** | |  | **N** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **N** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* First Change \* \* \* \*

## 9.x Support for HD map dynamic information

### 9.x.1 General

The V2X application specific server can be responsible for managing HD maps and providing the HD map information to the V2X application specific client on V2X UE (e.g host vehicle for advanced/remote driving). As per a proximity range set by the application layer, the VAE layer support providing the dynamic information (i.e. location information) required for HD maps management to the V2X application specific server.

This feature is feasible for scenarios where host vehicle is in advanced/remote driving mode with slow to moderate speed and deployed in areas like campus (e.g. autonomous shuttle vehicles), factories or ports (e.g. autonomous/remotely controlled guided vehicles).

This feature utilizes the following procedures:

- V2X application specific server subscription for HD map dynamic information with VAE server.

- VAE server tracking UE location with support from SEAL's location management server.

- VAE server management of dynamic UE location based group.

- VAE server obtaining dynamic information from the UEs in proximity range.

- VAE server notification of HD map dynamic information to V2X application specific server.

NOTE: The details of the usage (e.g. distribution to V2X UE) of HD maps by V2X application specific server is out of scope of this specification.

### 9.x.2 Information flows

Editor's note: Information flows are FFS.

### 9.x.3 Subscription for HD map dynamic information

Figure 9.x.3-1 describes the procedure for subscription for HD map dynamic information.

Pre-condition:

- V2X application specific server has registered with VAE server 1 which is responsible for the host vehicle.



Figure 9.x.3-1: Subscription for HD map dynamic information

1. The V2X application specific server sends a subscribe HD map dynamic information request to the VAE server 1. The request includes the V2X UE ID of the host vehicle, application defined proximity range information.

2. The VAE server 1 stores the subscription information.

3. The VAE server 1 sends subscription response to the V2X application specific server.

4. The VAE server 1 obtains and initiates tracking the host vehicle location from the location management server 1 as specified in 3GPP TS 23.434 [6].

### 9.x.4 Management of dynamic UE location based group

Figure 9.x.4-1 describes the procedure for management of dynamic UE location based group.

Pre-condition:

- VAE server 1 has received tracking information of the host vehicle as per procedure specified in 3GPP TS 23.434 [6].



Figure 9.x.4-1: Management of dynamic UE location group

1. Dynamic UE location based group creation or update is triggered (e.g. notified of the UE location of host vehicle) via the step 4 in clause 9.x.3 for the V2X UE ID of the host vehicle.

2. VAE server 1 uses its associated LMS 1 to obtain the dynamic UE list and the corresponding location information in the application defined proximity range by providing the UE location of the host vehicle as specified in 3GPP TS 23.434 [6].

3. VAE server 1 determines the list of other VAE servers 2..N operating in the same location as per clause 9.10.2.1.

4. For each VAE server determined in step 4, VAE server 1 requests the dynamic UE list and its corresponding location information for the application defined proximity range by providing the UE location of the host vehicle.

5. The VAE server(s) 2..N obtain UE information corresponding to the UE location and application defined proximity range from its corresponding LMS 2..N as specified in 3GPP TS 23.434 [6].

6. As per the agreement between the V2X SPs, if the V2X UE IDs are not shareable, then VAE server(s) 2..N may replace the V2X UE IDs with temporary V2X UE IDs.

7. The VAE server(s) 2..N sends get response with UE list in the UE location and application defined proximity range to VAE server 1.

8. If VAE server 1 has no dynamic UE location group for the V2X UE ID, the VAE server 1 creates a dynamic UE location based group with the UE list received from its LMS and other VAE server(s) 2..N. Further VAE server 1 stores the dynamic UE location based group. Otherwise, the VAE server 1 updates the dynamic UE location group with the latest UE information. The V2X UEs whose locations are no more within the application defined proximity range are removed from the dynamic UE location group.

### 9.x.5 Obtaining dynamic information of the UEs in proximity range

#### 9.x.5.1 Subscription procedure within V2X SP

Figure 9.x.5.1-1 describes the subscription procedure within V2X SP to obtain dynamic information from the UEs in application defined proximity range.

Pre-condition:

- VAE server 1 is tracking the host vehicle and has created the dynamic UE location based group as per procedure in clause 9.x.4.



Figure 9.x.5.1-1: Subscription procedure within V2X SP

1. The VAE server 1 managing the dynamic UE location group sends subscribe dynamic information request to the VAE clients who are part of the dynamic UE location group. These VAE clients (V2X UEs) belong to the same V2X SP as the host vehicle. The request consists of reporting configuration (e.g. frequency of reporting, event based).

2. The VAE client(s) store the subscription information.

3. The VAE client(s) send a subscription response to the VAE server 1.

#### 9.x.5.2 Subscription procedure across V2X SPs

Figure 9.x.5.2-1 describes the subscription procedure across V2X SPs to obtain dynamic information from the UEs in application defined proximity range.

Pre-condition:

- VAE server 1 has created the dynamic UE location based group as per procedure in clause 9.x.4.



Figure 9.x.5.2-1: Subscription procedure across V2X SPs

1. The VAE server 1 managing the dynamic UE location group sends subscribe dynamic information request to the VAE server(s) who's V2X UEs are part of the dynamic UE location group. The request consists of temporary V2X UE IDs, reporting configuration (e.g. frequency of reporting, event based).

2. As per the agreement between V2X SPs, if V2X UE IDs are not shareable, then VAE server 2 determines the V2X UE IDs corresponding to the temporary V2X UE IDs provided in step 1.

3. The VAE server 2 performs subscription procedure as specified in clause 9.x.5.1 with the VAE client(s).

4. The VAE server 2 sends a subscription response to the VAE server 1.

NOTE: VAE server 1 initiates this procedure with other VAE servers operating in the area.

#### 9.x.5.3 Notification procedure

Figure 9.x.5.3-1 describes the notification procedure of dynamic information from the UEs in application defined proximity range.

Pre-condition:

- VAE server 2 has received the notification of dynamic information from its subscribed VAE client(s).



Figure 9.x.5.3-1: Notification procedure

1. As per subscription procedure in clause 9.x.5.1 and clause 9.x.5.2, the VAE client(s) and VAE server 2 (of another V2X SP) send notification of dynamic information to the VAE server 1. The notification includes the nearby UE information (e.g. vehicles, pedestrians), distance with nearby UEs, UEs location information. As per agreement between V2X SPs, if V2X UE IDs are not shareable, then VAE server 2 includes the temporary V2X UE IDs in the notification.

2. The VAE server 1 prepares the HD map dynamic information including the aggregate information from different VAE clients.

### 9.x.6 Notification of HD map dynamic information

Pre-conditions:

- V2X application specific server has performed subscription as per procedure in clause 9.x.3 with VAE server 1.

- VAE server 1 has prepared the HD map dynamic information as per procedure in clause 9.x.5.3.



Figure9.x.6: Notification for HD map dynamic information

1. The VAE server 1 sends notification of HD map dynamic information to the V2X application specific server. The notification includes the aggregated information of all the UEs in the application defined proximity range of the host vehicle.

2. The V2X application specific server updates the HD map information with the HD map dynamic information received in step 1.