U.S. Department of Transportation
Federal Highway Administration

Office of Safety and Operations
Research and Development

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A Web-Based and Open-Source Tool to Simplify Traveler Information Message Development for Connected Infrastructure

OVERVIEW

The U.S. Department of Transportation's (USDOT) open-source traveler information message (TIM) Creator tool[1] simplifies the creation of SAE International® J2735™[2] TIM messages that support connected and automated vehicle (CAV) applications.[3] TIMs are used to communicate roadway and traveler information similar to the information from road signs or dynamic message sign units such as work zone, speed, or event notices.[2] The tool provides a user-friendly, browser-based interface for defining message content, location, and timing parameters (figure 1). Users can create, edit, and validate messages, then export ASN.1 Unaligned Packed Encoding Rules (UPER)-encoded outputs[4] for deployment through roadside units, traffic management systems, or other connected infrastructure tools such as Vehicle-to-Everything (V2X) Hub℠.[5]

KEY BENEFITS

Key benefits of the tool include the following:

- Allows engineers or technicians new to V2X to create connected infrastructure messages with approximately 75 cm of positional accuracy.
- Supports SAE J2735[2] message structure to ensure SAE standards compliance and interoperability.
- Enables definition of message content, location, duration, and priority for accurate traveler information delivery.
- Generates output in JavaScript® Object Notation (JSON)[7] and ASN.1 UPER formats[4] for interoperability and deployment.
- Can be used for direct or network V2X-connected intersections or road segments.

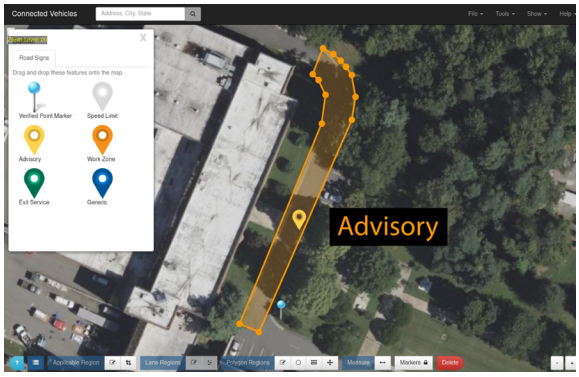

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Figure 1. Screenshot. TIM Creator tool user interface.[1,6]

Step-by-Step Quick User Guide

The following steps show a high-level approach to creating and configuring a TIM:

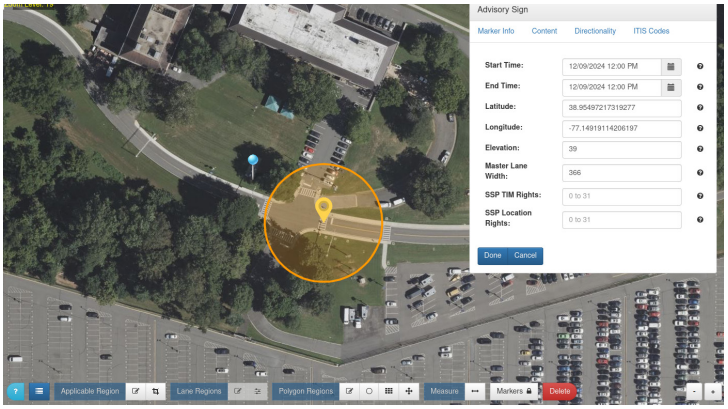
1. Go to https://webapp.connectedvcs.com/tim/ and use the search bar to locate the desired target area.[1]
2. Open the Show menu in the top-right corner and select Builder to open the editing panel.
3. In the Road Signs tab, drag a Road Sign marker (one per message) and a verified Point marker to a surveyed location.
4. Click each marker to open the configuration dialog and verify or update latitude, longitude, and elevation values.
5. Toggle Draw Region from the bottom control panel to define the message region using Application, Lane, or Polygon Regions (figure 2 and figure 3). Click once to add nodes and double-click to finish.
6. Use Edit Region to adjust nodes and refine geometry as needed.
7. Click a region node to open Region Configuration, set attributes (e.g., lane number or area), and click Done.
8. Toggle Draw Applicable Region to define the applicable region, click and drag to create a rectangular area, and then use Edit Applicable Region to adjust its position or size.
9. Go to File → Save to save the work. To reopen a saved zone, select Tools → Clear Map, then File → Open, and choose the saved file.

Saved files created using the TIM Creator tool[1] can be reopened at any time to make adjustments. Files are stored in JSON format[7] and can also be viewed or edited in a standard text editor.

CREATING AN UPER-ENCODED TIM

Once users have defined and verified the message regions, they can create an ASN.1 UPER-encoded message[4] for use with intelligent transportation systems (ITS)[8] and CAV applications.[3]

1. Open the TIM Creator tool[1] and load the zone to be encoded.
2. Select Tools → Encode/Deposit from the top menu to open the encoder.
3. A JSON[7] message will appear in the Message section of the encoder if there are no errors. Verify the contents.
4. Select the desired Message Type at the bottom of the encoder. For most applications, choose TIM or Frame+TIM.
5. Select the preferred node offsets encoding. To save bandwidth, Tight is recommended. The Enable Elevation option is checked by default.
6. Click Encode to generate the message. If successful, the ASN.1 UPER[4] Hex fields populate with the encoded data.



Source: FHWA.

Figure 2. Screenshot. An example of a circular region definition.[1]

Source: FHWA.

Figure 3. Screenshot. Application, lane, and polygon region buttons and icons.[1]

7. To use the encoded message, copy the ASN.1 UPER[4] Hex and paste it into a roadside unit, load it in a network V2X platform, or use a tool such as V2X Hub,[5] which facilitates communication between ITS[8] and CAV[3] applications.

Messages can be validated using the Message Validator tool[9] to ensure compliance with SAE standards such as J2735[2] today and J2945/A™ in a potential future version.[10] For more details, see the Help tab in the tool or visit the project's GitHub® repository: https://github.com/usdot-fhwa-stol/connectedvcs-tools.[11]

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