Traffic Message Channel Codes: Impact and Use within the Coalition

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Upcoming Events

Automated Vehicle Policy and Regulation
A State Perspective Workshop
May 18, 2016 • 9:00 AM to 3:30 PM
● Howard Frank Auditorium/Robert. H. Smith School of Business University of Maryland, College Park, MD

THE NATIONAL RESEARCH ENERGY LABORATORY
GOLDEN, COLORADO

THE I-95 CORRIDOR COALITION
Connected and Automated Vehicles: What Public Agencies Need to Know
June 21-22, 2016 at the Maritime Institute Conference Center, Linthicum (Near BWI Airport), Maryland
I-95 Vehicle Probe Project Background

• Phase I
  – Initiated in 2008 – July 1
  – Initial 2500 miles (1500 freeway, 1000 arterial)
  – Maine to Florida, Purchase once - all share

• Phase II
  – Several states all in
  – 2016 ~ 40,000 miles
  – Three vendors
  – Leading edge tools
Disclaimer

• “Material obtained … from consultation with industry experts, literature review, first-hand experience with manipulating various implementations of TMCs, and lessons learned through the Vehicle Probe Project (VPP) re-compete process.”

• Material and recommendations provided with respect to use of TMC codes within the industry - not any particular vendor.
What is a TMC code?

• **Traffic Message Channel** code:
  – Shorthand method to communicate a location
  – Breaks the roadway network into links and nodes
  – Developed by traffic industry to relay traffic data with low-bandwidth channels
  – Used extensively in commercial traffic data
  – Until the VPP, not widely used in government in North America
How to read a TMC code

The following TMC can be broken down
110N04615

110 - The area code/ region
N – The direction of travel
04615 – Defines road and segment in linear manner

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Internal/ External</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>I</td>
<td>S, E, CCW</td>
</tr>
<tr>
<td>- *</td>
<td>E</td>
<td></td>
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<tr>
<td>P</td>
<td>I</td>
<td>N, W, CW</td>
</tr>
<tr>
<td>+ *</td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>

* TeleAtlas only
Example from the VPP Project

TMC Codes defined for:
- Freeways
- Principal Arterials
- Some Minor Arterials
- Freeway-to-freeway ramps
- Special use lanes
  - If separate roadway

Not defined for:
- Individual lanes
- Most minor arterials and below

TMC Codes break the network into logical segments for reporting traffic
Why study TMC codes?

• *Tech questions from VPPI*
  – Length of segments not always useful for application
  – New roadways took a long time to be reflected
  – Codes not available for all roadways types

• *Programmatic issues:*
  – Availability of base maps
  – Licensing concerns
  – Conflation to agency LRS
“Traffic Message Channel (TMC) Codes: Impact and Use within the Coalition”

• White Paper funded by MCOM1 (2011)
• Published ~ December 2015
• Addresses:
  – TMC Background
  – TMC Code Governance
  – TMC Implementation Issues
  – TMC Pros and Cons
  – Recommendations and Key Findings
Executive Summary

• **TMCs are a good thing!!!!!!!**
  – Standards based, industry maintained
  – Recommended for Traveler Info and Performance Measures
  – Minor differences in technical implementation

• **VPP Phase II Resolutions**
  – New roadways added in a timely fashion
  – Alternate segmentation schemes available
    • Provides higher granularity, and more coverage

• **Conflation may be required**
TMC Background

- VPPI – TeleAtlas TMC codes were used
- VPPII – TeleAtlas & Navteq TMC codes
TMC Code Governance

• Standards
  – Maintained by the Traveler Information Services Association (TISA), hosted in ERTICO (ITS Europe)
  – Serve as guidelines to create TMC tables containing roadway points and corresponding segments

• The North American TMC Code Alliance (NATMCCA) maintains the American and Canadian TMC Table
What is a TMC Table?

- Provides locations where roadway is broken into segments usually at intersection, political borders, or natural features
- TMCs are descriptive of road intersections
- Defines points, connecting points creates segments in TISA standards.
- Tables are proprietary, maps of TMC tables available from mapping vendors
TMC Layers

TMC Standard – Ertico / TISA
How to create TMC Tables – ISO standards

North America TMC Code Alliance
Predominant TMC Tables in use in North America – HERE & TomTom

Electronic Map Makers
Distribute and license digital maps with TMC elements
– TeleAtlas (TomTom) and Navteq (HERE)

Traffic Data Vendors
Traffic Data Products delivered in TMC Coding – INRIX, HERE, TomTom & others

Standards Layer

TMC Table Layer (descriptive)

Map Layer (Lat & Lon)

Traffic Data Layer
Flavors of TMC

Minor Differences At End Points
TMC Pros and Cons

Pros
• Not data intensive
• Maintained by industry consortium
• Maintained to TISA standard
• Backwards / forward compatible
• Tools / mapping layers available
• Serves traveler info and performance measures
• Very cost effective to implement
• Only national standard available

Cons
• Segments may be too long or tool short for specific application
• Not available on all facilities (HOV/HOT, ramps, lower classifications)
• Tables owned by NATMCCA
• Update process may be lengthy
• Some apps may require conflation to agency LRS
Backward/forward compatibly
Backward/forward compatibly
New intersection

Forward / Backward compatibility preserved at the TMC point layer
TMC Length Differences

Outliers due to TMC set version differences

99%+ agree
Key Findings

• TMC’s will continue to enable cost-effective and stable data delivery
  – TMC traffic data ‘sweet spot’ are performance measures and traveler information on freeway and other principle arterials

• Alternative segmentation schemes are available by each vendor (available in appendix)
  – Alternate segmentation schemes enable applications requiring greater spatial resolution

• New standard unlikely
Alternate Segmentation Schemes

• Pros
  – More responsive – can create new segments faster
  – Higher granularity, fully controlled by vendor

• Cons
  – Vendor Specific – may be proprietary or open source
    • Cannot be easily ported to new data source or maps
  – Not standard, tools (apart from vendor) lacking
  – Conflation may be required
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Recommendations for the Coalition

- Use TMCs for long-term analysis, traveler info, sharing of data, higher level facilities
- Use non-TMC methods as needed, conflation may be required
- I-95CC provide a forum for best practices
- Encourage open standards when possible
- Continue developing and sharing TMC educational material
Questions?
TMC Code Report or Webcast Questions

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Thank You