

NEMA TS 10

Connected Vehicle Infrastructure

Roadside Equipment

CAT Coalition Technical Resources Working Group

February 12th, 2020

Who is NEMA?



Mission

Help Member Companies....

- Expand market opportunities
- Mitigate barriers and costs
- Enhance business performance

By...

- Developing Standards and promoting code adoption and use
- Advocating for Members and their products
- Providing exclusive industry data, customized research and economic forecasts
- Educating Members on evolving technologies, industry trends and legislative/regulatory conditions

NEMA Transportation Management Systems & Associated Control Devices (3TS) Section



Section Vision

The NEMA 3TS Section and its members are a principal source of technical, training, and educational information essential to the specification and manufacture of reliable transportation management products and their installation, performance, maintenance, and inspection.

NEMA TS10 Goals/Objectives

- Give Infrastructure Owners and Operators (IOOs) the confidence to proceed with “future proof” infrastructure deployment for CV.
- Procure on the basis of user needs and associated requirements
- Give effect to USDOT policy:
 - Preserve the spectrum...
 - Technology neutral...
 - Let the private sector figure it out and get on with deployment...
- Ensure Day One applications include Infrastructure applications

NEMA TS 10 Goals/Objectives

Support Infrastructure Owner/Operator Procurements

RSU device proposed is:

- Designed for extensibility
- Designed to implement future wireless technologies and applications without the need for replacement within RSU service life
- Aimed at reducing Long-Term Total Cost of Ownership

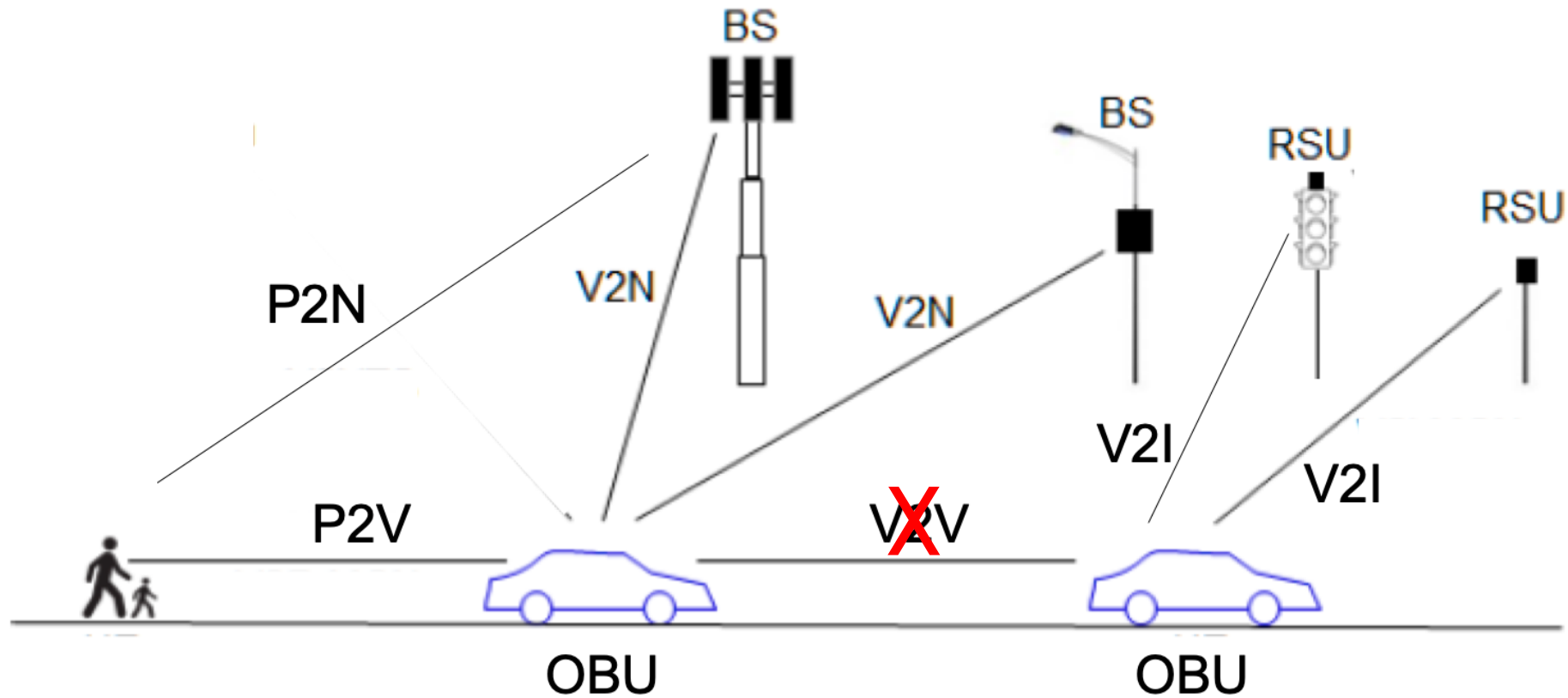
Standard recognizes there are multiple configurations of the RSU device depending on a user agency's procurement needs

NEMA TS 10 supports present and future mobility

Scope of NEMA TS 10

- Describes the following attributes of roadside equipment
 - Physical: hardware platform, mechanical and environmental
 - Software: communications stack, security and minimum set of standard messages
 - Interfaces: terrestrial and wireless
 - Performance: latency and computational capacity

The CV Architecture



Gaps Addressed Via NEMA TS 10

- A Standard for procurement of roadside units (RSUs) that meets identified user needs
- Standardizing a minimal set of messages with a uniform interpretation for safety applications
- Standardizes RSU functions needed by vehicles and vulnerable road users (VRU's)
- Harmonizes communication protocols from the RSU to the central system
- Supports multiple radios simultaneously

Example User Needs in NEMA TS 10

- Automatic emergency vehicle signal preemption
- Red light violation warning
- Pedestrian crossing ahead
- Collision avoidance
- Entering school zone
- Entering work zone
- Wrong way alert
- Slow speed zone alert
- Flooding ahead alert

Functional Requirements in NEMA TS 10

- Requirements traceability matrix back to the corresponding user need
- Minimum level of functionality requirements to support safety applications in a common message format
- Can be used by mobile devices
- Each requirement includes a prior state and a post state

Operational Boundaries

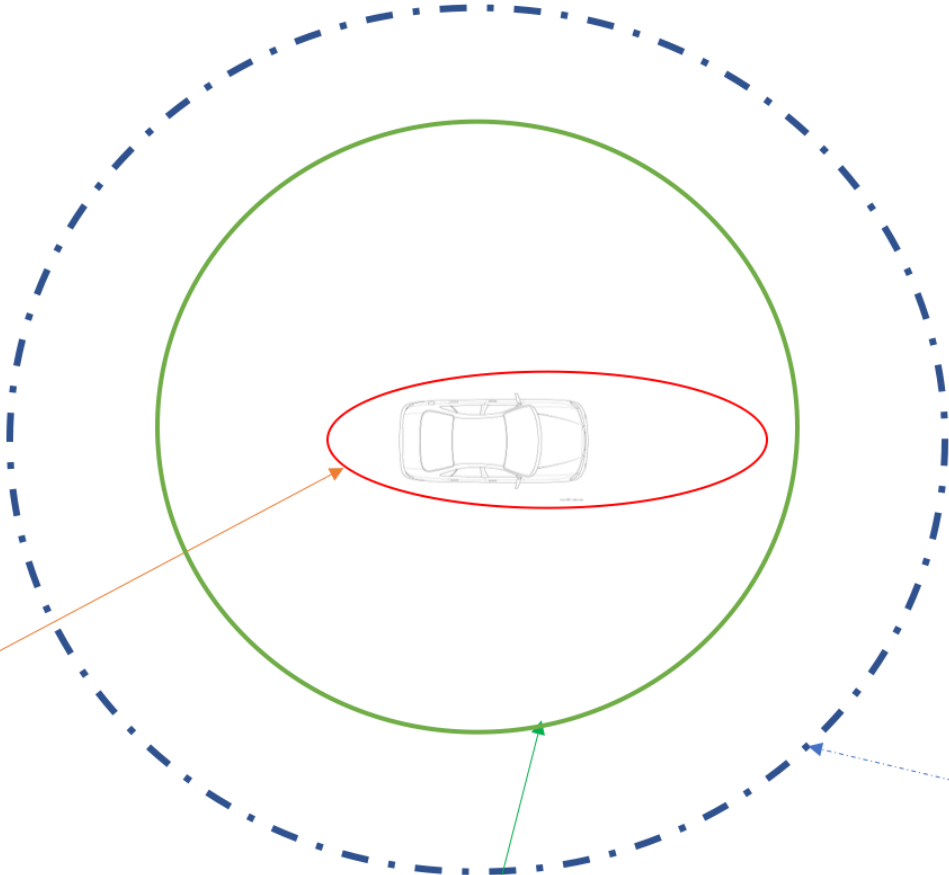
Crash
Avoidance



Alert



Advance
Information



On-board
Sensors

OB1

V2I and V2V

OB2

V2N

OB3

Operational Boundaries: Relating to Data Flows

Flow	Source	Destination	Operational Boundary ID (OB#)	Message	Standard
F1	CU	RSU	-	TSCBM	NTCIP 1202 v3
F2	RSU	Mobile Equipment	2,3	MAP	SAE J2735 2016
F3	RSU	Mobile Equipment	2,3	SPaT	SAE J2735 2016
F4	RSU	Mobile Equipment	2,3	TIM	SAE J2735 2016 SAE J2540-2 2009
F5	RSU	Mobile Equipment	3	PSM	SAE J2735 2016

Testing/Conformance Evaluation in NEMA TS 10

- Requirements to Verification Traceability
 - Is the justification/basis for the requirement clear and valid?
 - Is the requirement well-formed?
 - Is the requirement unambiguous?
 - Is the requirement feasible
 - Is the requirement verifiable
 - Verifiable by what method?

Summary and Key Takeaways

- NEMA TS 10 represents an industry lead effort by the private sector to advance the widespread adoption of connected vehicle infrastructure
- Addresses maintainability, connectivity, communications interoperability, and the ability to address future advances in communications
- Enables the coexistence of multiple communication technologies
- First draft of NEMA TS 10 was completed mid December
- Comments and feedback are welcomed
- Comment period is open until ~~Friday February 28th~~, 2020
Tuesday, March 31st

Thank You

Steve Griffith

Industry Director, PMP

NEMA Transportation Systems Division

Steve.Griffith@nema.org

Alan Clelland

Chair, TS10

Vice President, Applied Information

aclelland@appinfoinc.com