Working Paper **VCTF-01-06**
1st Task Force on Vehicular Communication, 11 May 2023
Provisional agenda item 4

SAE INTERNATIONAL

SAE STANDARDS OVERVIEW

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Introductions

Bill Gouse

- **Head of SAE Delegation / UN ECOSOC / Inland Transport Committee & global SAE Government and Industry activities**

Justin McNew

- **SAE V2X Steering Committee Vice Chair**
- **SAE V2X Core Committee Chair**
- **SAE Cooperative Driving Automation Committee Chair**
- **IEEE 1609 Working Group Chair**

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William Whvte

- **SAE V2X Security Committee Chair**
- **IEEE 1609 Working Group Vice Chair**

Focus Areas for Standards

J3016 & J3063 & J3163 & J3194

J3061 & J3101

SAFETY

J1626/2 & J3092

INTEROPERABILITY

J2735 & J2953

Driver Interface / Human Factors

J2399 & J2808

VEHICLE SYSTEM & PERFORMANCE REQUIREMENTS

J2945/1 & J3155

GUIDELINES & RECOMMENDED PRACTICES

J3018 & J3088

TEST & VERIFICATION METHODS

J3045 & J3029

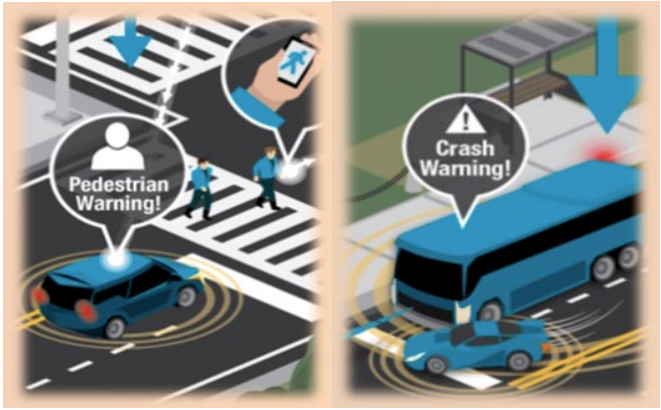
SAE Standards Types

Standard

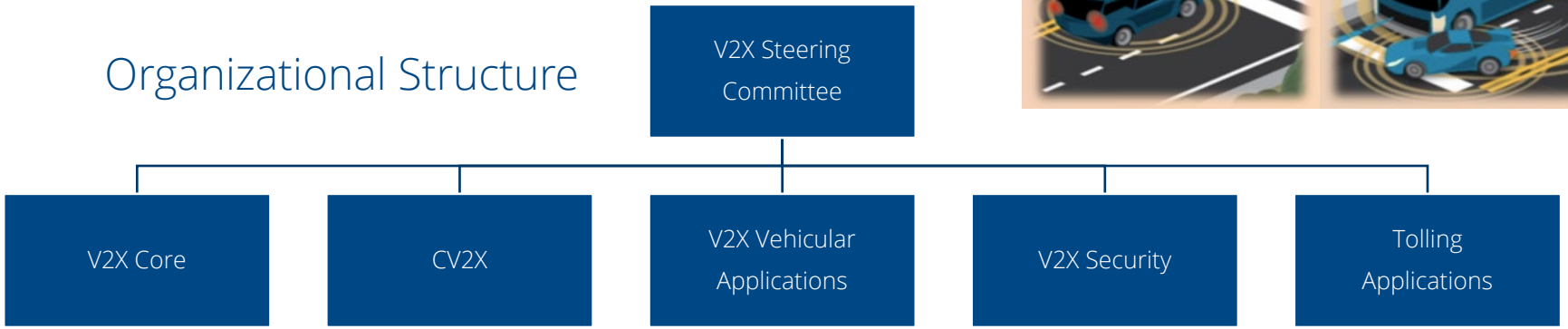
Recommended Practice

Information Report

V2X Standards Overview (McNew)



Organizational Structure



V2X Core

Focuses on technical reports that are cross cutting

- Maintains the SAE J2735 Data Dictionary
- Maintains the SAE J2945/1 and related BSM-application requirements documents
  - E.g., J2945/1A, 1B, 1C

V2X Core Technical Committee https://standardsworks.sae.org/standards-committees/v2x-core-technical-committee			
J2735	V2X Communications Message Set Dictionary	WIP	Revision Underway (Standard)
J2540/1/2/3	ITIS Phrases	Published	Multiple Standards
J2945	~~Dedicated Short Range Communication (DSRC)~~ V2X Systems Engineering Process Guidance for SAE J2945/X Documents and Common Design Concepts™	WIP	• Revision Underway (Standard) • First ballot closing this month
J2945/1	On-Board System Requirements for V2V Safety Communications	Published	Standard
J2945/1A	Vehicle Level Validation Test Procedures for V2V Safety Communications	Published	Recommended Practice
J2945/1B	On-Board V2V Safety Systems Requirements for Non Light Duty Vehicles	Published	Standard
J2945/1C	V2X Message Sets Relating to School Bus Slowing and Stopping	WIP	In development
J2945/3	Road Weather Applications	Published	Standard
J2945/4	Road Safety Applications	WIP	Passed MVC Ballot
J2945/7	Positioning Enhancements for V2X systems	Published	Information Report
J2945/A	Standard for Lane-Level and Road Furniture Mapping for Infrastructure-based V2X Applications	WIP	First ballot closing this month (moved from Infrastructure Applications Technical Committee)
J2945/C	Requirements for Probe Data Applications	Published	Standard
J3268	Listing of Provider Service Identifiers and Associated Application Technical Reports	Published	Information Report
J3269	Vehicular precise positioning system reference architecture	WIP	In development
J3270	Test Procedures for Precise Positioning Systems for Passenger Vehicles	WIP	In development
J3289	SAE V2X ASN.1 Modules – Organization and Management Rules	Published	Information Report

CV2X

Focuses on communications systems lower layers

C-V2X Technical Committee https://standardsworks.sae.org/standards-committees/c-v2x-technical-committee			
J3161	LTE Vehicle-to-Everything (LTE-V2X) Deployment Profiles and Radio Parameters for Single Radio Channel Multi-Service Coexistence	WIP	Revision underway (Standard)
J3161/1	On-Board System Requirements for LTE-V2X V2V Safety Communications	WIP	Revision underway (Standard)
3161/1A	Vehicle Level Validation Test Procedures for V2V Safety Communications	Published	Recommended Practice
J3161/2	LTE Vehicle-to-Everything (LTE-V2X) Deployment Profiles and Radio Parameters for 10 MHz Channel	WIP	In development

V2X Vehicular Applications

Focuses on vehicle-centric functionality

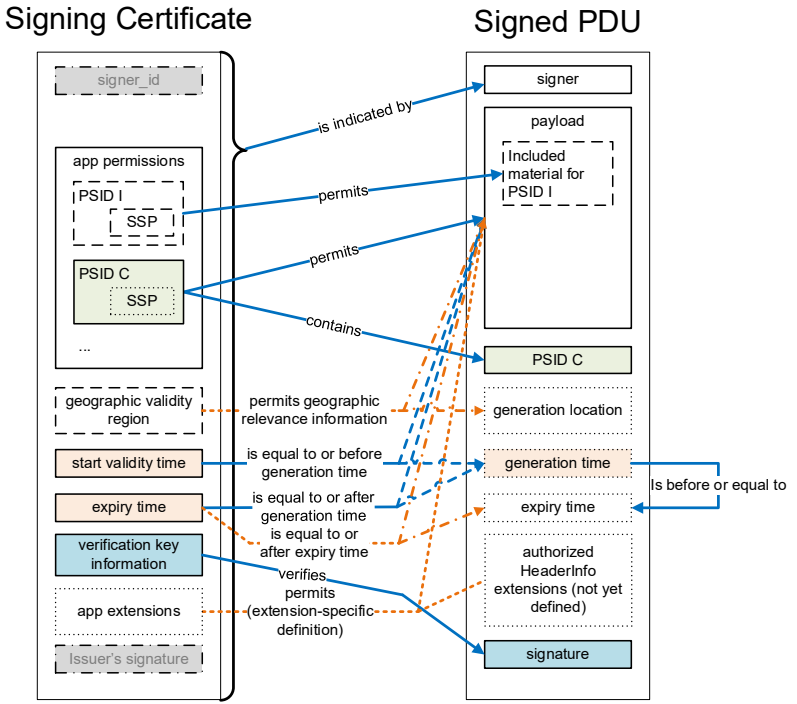
V2X Vehicular Applications Technical Committee https://standardsworks.sae.org/standards-committees/v2x-vehicular-applications-technical-committee			
2945/2	V2V Safety Awareness	Published	Recommended Practice
J2945/6	Performance Requirements for Cooperative Adaptive Cruise Control and Platooning	WIP	Nearing completion / final TC balloting
J2945/8	Cooperative Perception System	WIP	In development
J2945/9	Vulnerable Road User Safety Message Minimum Performance Requirements	WIP	• Revision underway (Recommended Practice) • First ballot comment resolution • May be published as a Standard
J2945/D	Road user-to-Road User Courteous Communication	WIP	In development
J3224	V2X Sensor-Sharing for Cooperative and Automated Driving	Published	Standard
J3186	Application Protocol and Requirements for Maneuver Sharing and Coordinating Service	Published	Standard
J3292	Automated Vehicle Marshalling System	WIP	In development

V2X Security

Focuses on over-the air security and related topics

- **E.g., Misbehavior, certificate usage and revocation**

V2X Security Technical Committee https://standardsworks.sae.org/standards-committees/v2x-security-technical-committee			
J2945/5	Service Specific Permissions and Security Guidelines for Connected Vehicle Applications	Published	Standard
J3286	Identity Management Entity within Security Services	WIP	In development
J3287	V2X Misbehavior Reporting *	WIP	In development



* Coordinated at subject matter expert level with corresponding ETSI and Chinese standards

Tolling Applications

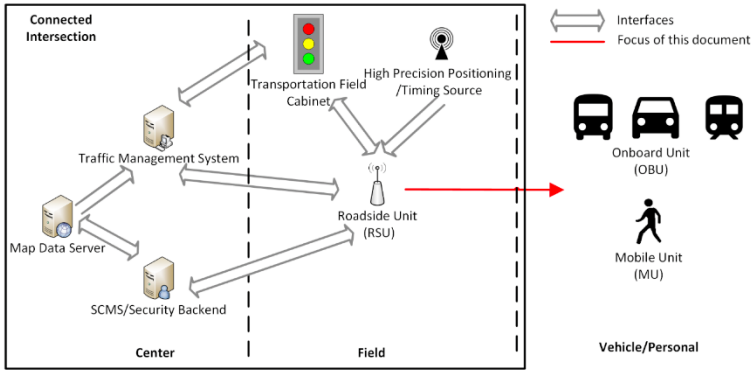
Focuses on fee collection/tolling and road user charging

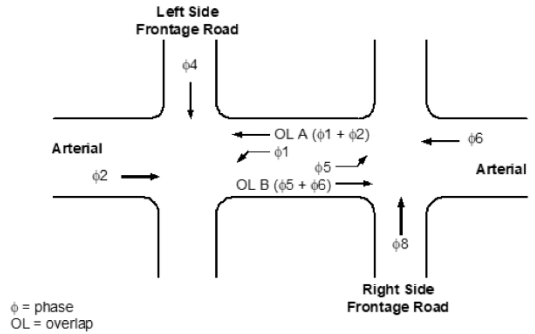
Tolling Applications Technical Committee https://standardsworks.sae.org/standards-committees/tolling-applications-technical-committee			
J3217	V2X-Based Fee Collection	Published	Standard
J3217/R	Road User Charging Systems	WIP	Second ballot comment resolution

SAE Connected Transportation Interoperability (CTI) Committee

Formed to bring IOOs and auto-industry stakeholders together

Connected Transportation Interoperability (CTI) Technical Committee https://standardsworks.sae.org/standards-committees/connected-transportation-interoperability-committee			
J4501/CTI4501	Connected Intersections Implementation Guide	WIP	In development
J3238/1	Testing & Validation of SPaT information broadcast from Connected Intersections to support in-vehicle Red Light Violation Warning	WIP	In development
J3238/2	Testing & Assessment of MAP using RTCM information broadcast from Connected Intersections to support in-vehicle Red Light Violation Warning	WIP	In development
J2945/B	Recommended Practices for Signalized Intersection Applications	WIP	In development
J3258	V2X Infrastructure Support for GNSS Corrections	WIP	In development
J3295	Cooperative Perception Services Concept of Operations	WIP	In development



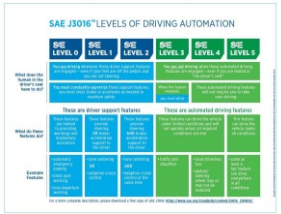


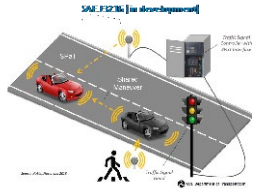
SAE Cooperative Driving Automation (CDA) Committee

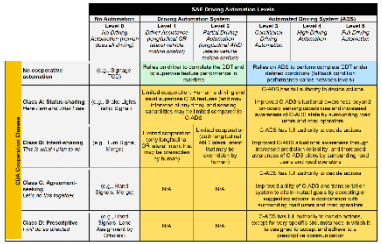
Focuses on connected automated vehicles

Cooperative Driving Automation (CDA) Technical Committee https://standardsworks.sae.org/standards-committees/cooperative-driving-automation-cda-committee			
J3216	Taxonomy and Definitions for Terms Related to Cooperative Driving Automation for On-Road Motor Vehicles	Published	Information Report
J3251	Cooperative perception CDA feature: Jaywalking pedestrian collision avoidance	WIP	Second ballot comment resolution
J3252	Framework for Interoperable CDA Use Case Testing	WIP	First ballot comment resolution
J3256	Infrastructure-based prescriptive cooperative merge	WIP	First ballot comment resolution
J3282	Cooperative infrastructure CDA feature: Cooperative permissive left turn across opposing traffic with infrastructure guidance	WIP	In development
J3316	Cooperative driving automation (CDA) Features: Common reference architecture, nomenclature and template	WIP	In development

Automation + Cooperation







TERMINOLOGY & ARCHITECTURE

SAFETY USE CASES

TEST & VERIFICATION METHODS

Cybersecurity Activities (Whyte)

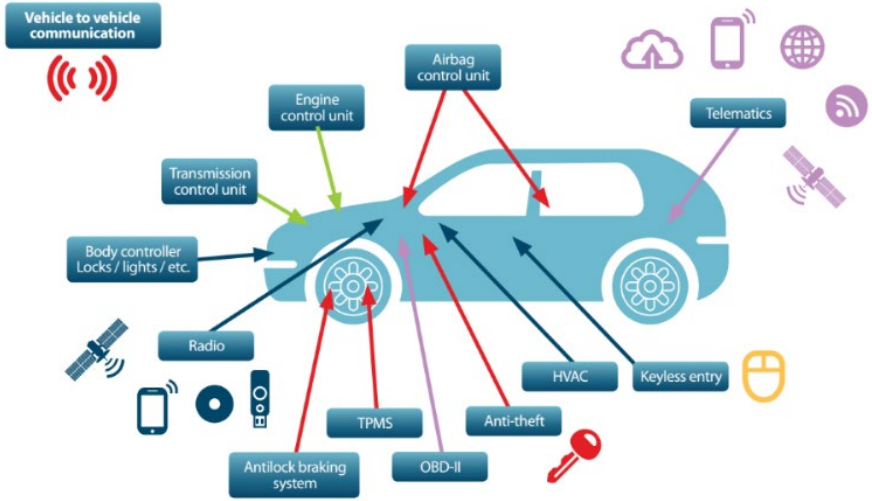
Vehicle Electrical System Security Committee (TEVEES18)

- Coordinates vulnerability and security information sharing

- Vehicle Cybersecurity Systems Engineering Committee (TEVEES18A)
  - Original home of J3061. Cybersecurity Recommended Practice for Cyber-Physical Vehicle Systems -> ISO/SAE 21434
  - Coordinates SAE contributions to SAE/ISO JWG Automotive Cybersecurity Engineering
    - Work Items 8475, 8477
  - Cybersecurity Assurance Testing Task Force (TEVEES18A1) – J3061-2, input to 8477
  - Cybersecurity Maturity Model Task Force (TEVEES18A3) – J3254
  - Supply Chain Bill of Materials Task Force (TEVEES18A4)
- Vehicle Electrical Hardware Security Task Force (TEVEES18B)
  - J3101, Hardware Protected Security for Ground Vehicles
- Request For Comments Cybersecurity Task Force (TEVEES18C)
- ISO-SAE Automotive Security Engineering Committee (TEVEES18D)
  - SAE name for what in ISO is called SAE/ISO JWG Automotive Cybersecurity Engineering
- Trust Anchors and Authentication Task Force (TEVEES18E)
  - J3323, Ground Vehicles Trust Anchors And Authentication Information Report
- Vehicle Security Credential Interoperability Task Force (TEVEES18F)
  - J3201, Guideline for Automotive Environment Cybersecurity Key Management and Credential Distribution, profile of KMIP

Other SAE Cyber Security Standards Activities

- Truck and Bus Controls and Communications Network Committee
  - **J1939™**: Serial Control and Communications – Heavy Duty Vehicle Network
- Vehicle Electrical Systems Security
  - **J2101 WIP**: Requirements for Hardware Protected Security for Ground Vehicle Applications
  - **J1939™**, **J1979™**, **J3005™** & **J2534™**: OBD II for Telematics, Vehicle Health Management, Data Access, Vulnerabilities & Cyber Threat Analysis, OTA Updates



J3061 Cyber Security Guidebook -> ISO/SAE 21434

SWITCH TO IEEE CHARTS

Additional SAE Standards of Interest

65 SAE EV, Hybrid, Fuel Cell Vehicle Standards:

Fuel Cell Fueling: J2600, J2601, J2601/1. J2601/2, J2601/3,J2601/4, J2719, J2719/1, J2799, J1766, J2578, J2579

Fuel Cell Testing: J2615, J2616, J2617

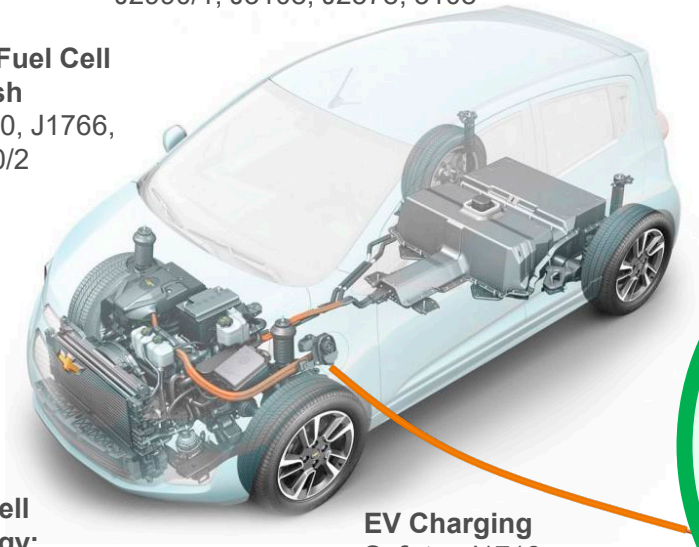
Fuel Cell Systems: J2579, J2594, J3089

Energy Transfer Systems: J2293, J2293/1, J3072

EV, Hybrid, Fuel Cell Vehicle Terminology: J1715, J2574, J2760

EV, Hybrid, Fuel Cell Vehicle Crash Safety: J3040, J1766, J2990, J2990/2

EV, Hybrid, Fuel Cell Vehicle Safety: J1766, J2344, J2910, J2990, J2990/1, J3108, J2578, 3108



EV Charging Safety: J1718, J2953/1, J2953/2, J2953/3

EV, Hybrid, Fuel Cell Vehicle Economy, Range / Power: J2991, J1798, J2758, J2946, J2572, J2907, J2908, J1634, J1711, J2711

EV Charging & Grid Communications: J1772, J1773, J2293, J2836, J2841, J2847, J2894, J2931, J2954, J3068, J3105, J3105-1, J3105-2, J3105-3, J2799

https://www.sae.org/servlets/works/documentHome.do?comtID=TEVHYB
https://www.sae.org/servlets/works/documentHome.do?comtID=TEVFC

* Blue Font Denotes WIP

SAE Low-Speed MicroMobility Devices Committee: J3194

Electric Kick Scooter

Electric Skateboard

Segway

Electric Self-Balancing Unicycles

Emerging and innovative mobility vehicles and devices, sometimes referred to as micro-mobility, are proliferating in cities around the world.

These technologies have the potential to expand mobility options for a variety of people.

Recent formation of the SAE Micromobility Battery Committee which will focus specifically on battery and charging needs – including machine to grid communication

This committee will initially focus on low-speed personal mobility devices and the technology and systems that support them that are not normally subject to the United States Federal Motor Vehicle Safety Standards or similar regulations. These may be device-propelled or have propulsion assistance.

Thank You

FOR:

- **Additional Information**
- **Copy of Standard(s) for use in Regulation or Reference in Companion Document**
- **Joining a Standards Committee or Start a New Committee**
- **Participating as a SAE delegate at the UN in an Informal Working Group, GR, or WP**
- **SAE Technical Conference Organizing, Presenting, Exhibiting, Attending**

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