



PEV/EVSE Communication SAE Task Force Status

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December 3rd, 2012



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Outline

- Background
 - Major Documents, Summation, Interaction
- Use Case Summary
 - U1 – U5 (Utility programs)
 - U6 & U7 (PEV as DER)
 - U8 & U9 (Customer to PEV/HAN)
- DC Charging
 - Status, Next steps
- Wireless Charging
- Interoperability
- Security
- Diagnostics

1. J2836™ - Use Cases (establishes requirements)
 - ❖ ISO/IEC 15118-1
2. J2847 – Messages, diagrams, etc. (derived from the use case requirements)
 - ❖ ISO/IEC 15118-2
3. J2931 – Communication Requirements & Protocol
 - ❖ ISO/IEC 15118-3
4. J2953 – Interoperability
 - ❖ ISO/IEC 15118-4 (PHY/MAC) & -5 (upper layers)

Summation of SAE Communication Standards

J2836™ – General info (use cases)

- Dash 1 – Utility programs *
- Dash 2 – Off-board charger communications*
- Dash 3 – Plug-in Vehicle Communication as a Distributed Energy Resource
- Dash 4 – Diagnostics
- Dash 5 – Customer to PEV and HAN/NAN
- Dash 6 – Wireless charging/discharging

J2931– Protocol (Requirements)

- Dash 1 – General Requirements**
- Dash 2 – InBand Signaling (control Pilot)
- Dash 3 – NB OFDM PLC over pilot or mains
- Dash 4 – BB OFDM PLC over pilot or mains*
- Dash 5 – Telematics
- Dash 6 – DSRC/RFID (wireless charging/alignment)
- Dash 7 - Security



J2847– Detailed info (messages)

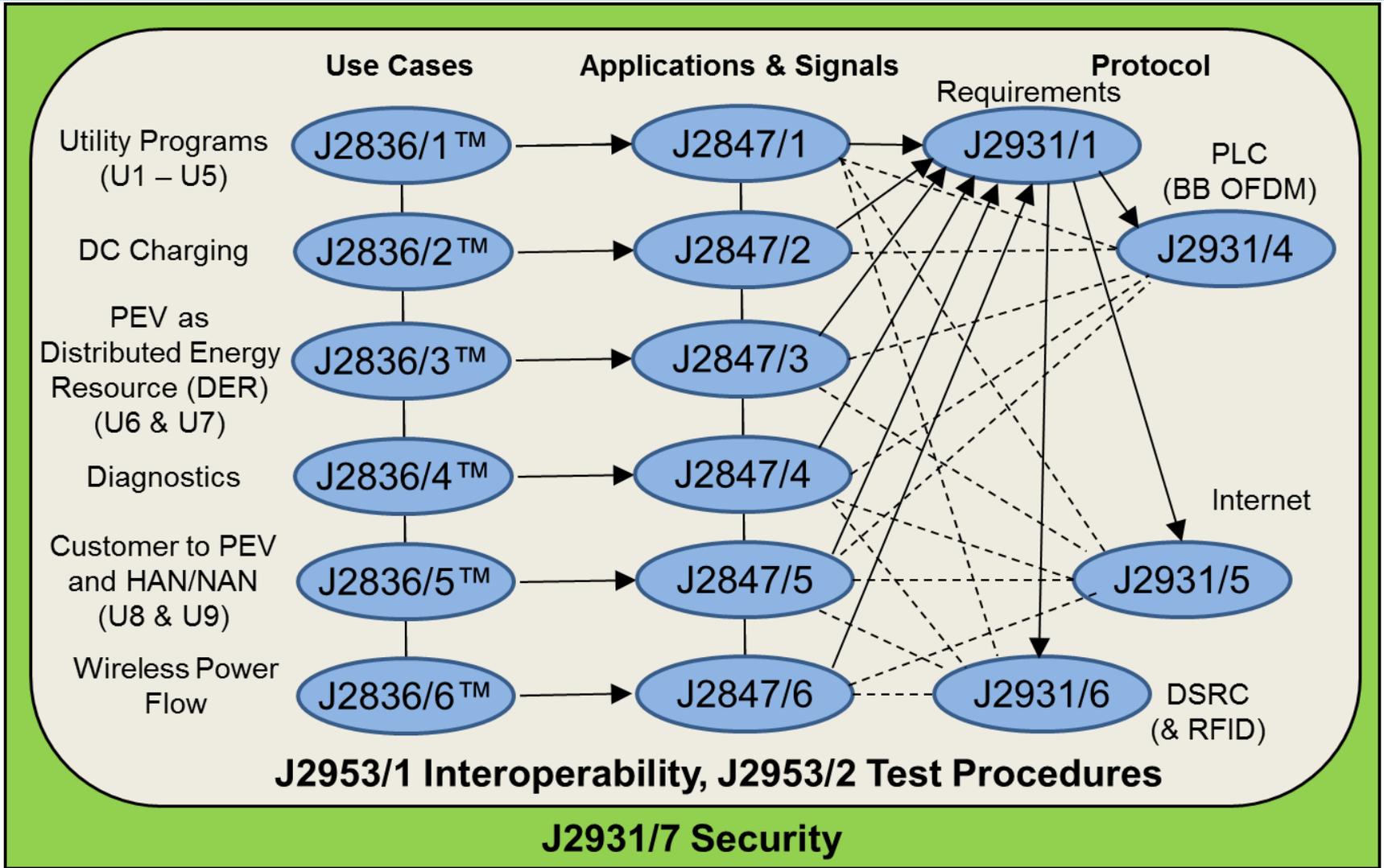
- Dash 1 – Utility programs *
- Dash 2 – Off-board charger communications *
- Dash 3 – Plug-in Vehicle Communication as a Distributed Energy Resource
- Dash 4 – Diagnostics
- Dash 5 – Customer to PEV and HAN/NAN
- Dash 6 – Wireless charging/discharging

J2953– Interoperability

- Dash 1 – General Requirements
- Dash 2 – Testing and Cert
- Dash 3 –

* Published

Document Interaction



UTILITY PROGRAMS

U1 – U5

Price (TOU, RTP, CPP) – U1, 3 & 4

DRLC – U2

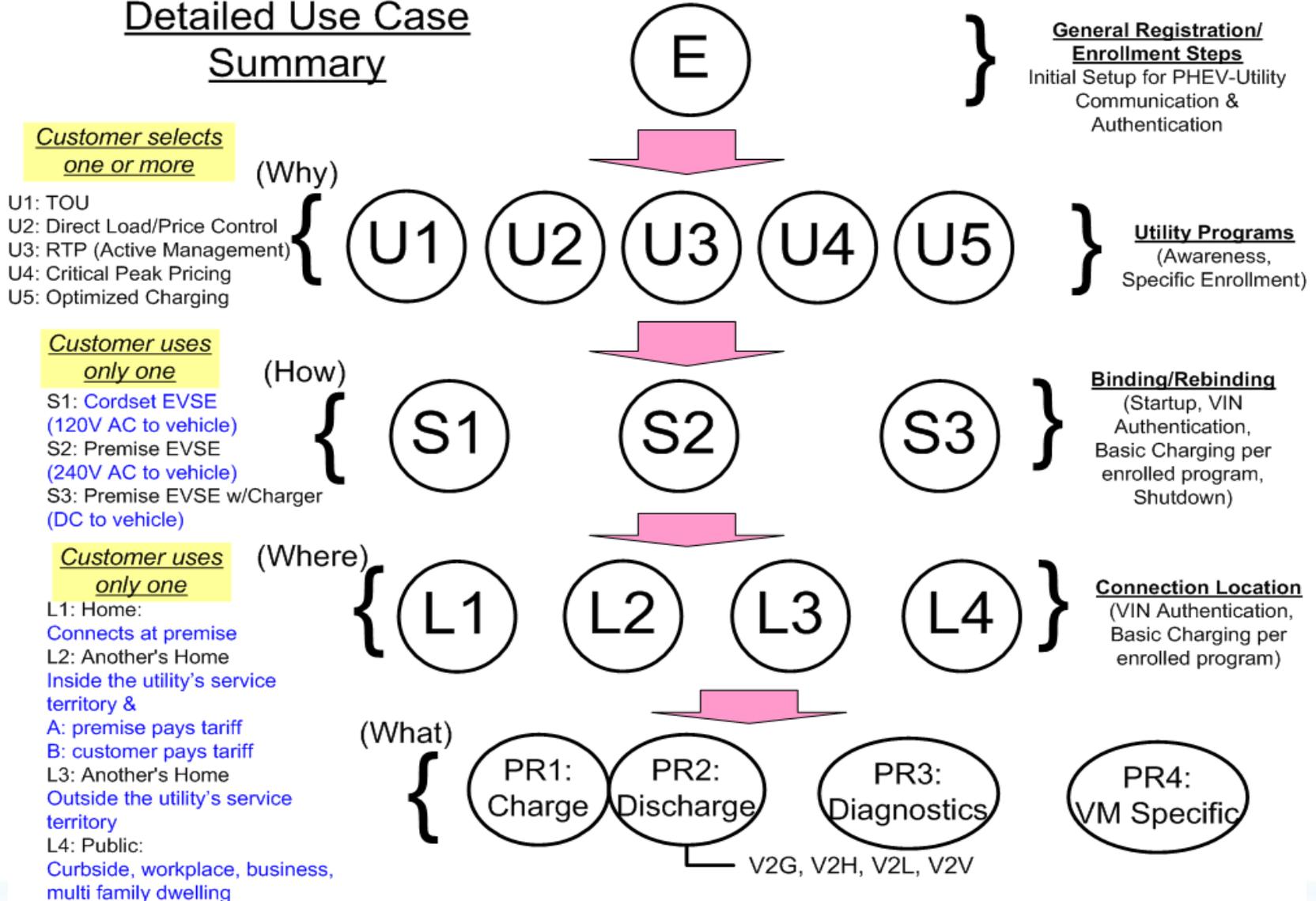
Optimized Charging – U5



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Use Cases U1 – U5

Detailed Use Case Summary



General Registration/ Enrollment Steps
Initial Setup for PHEV-Utility Communication & Authentication

Customer selects one or more

- U1: TOU
- U2: Direct Load/Price Control
- U3: RTP (Active Management)
- U4: Critical Peak Pricing
- U5: Optimized Charging

Utility Programs
(Awareness, Specific Enrollment)

Customer uses only one

- S1: Cordset EVSE (120V AC to vehicle)
- S2: Premise EVSE (240V AC to vehicle)
- S3: Premise EVSE w/Charger (DC to vehicle)

Binding/Rebinding
(Startup, VIN Authentication, Basic Charging per enrolled program, Shutdown)

Customer uses only one

- L1: Home: Connects at premise
- L2: Another's Home Inside the utility's service territory &
- L3: Another's Home Outside the utility's service territory
- L4: Public: Curbside, workplace, business, multi family dwelling

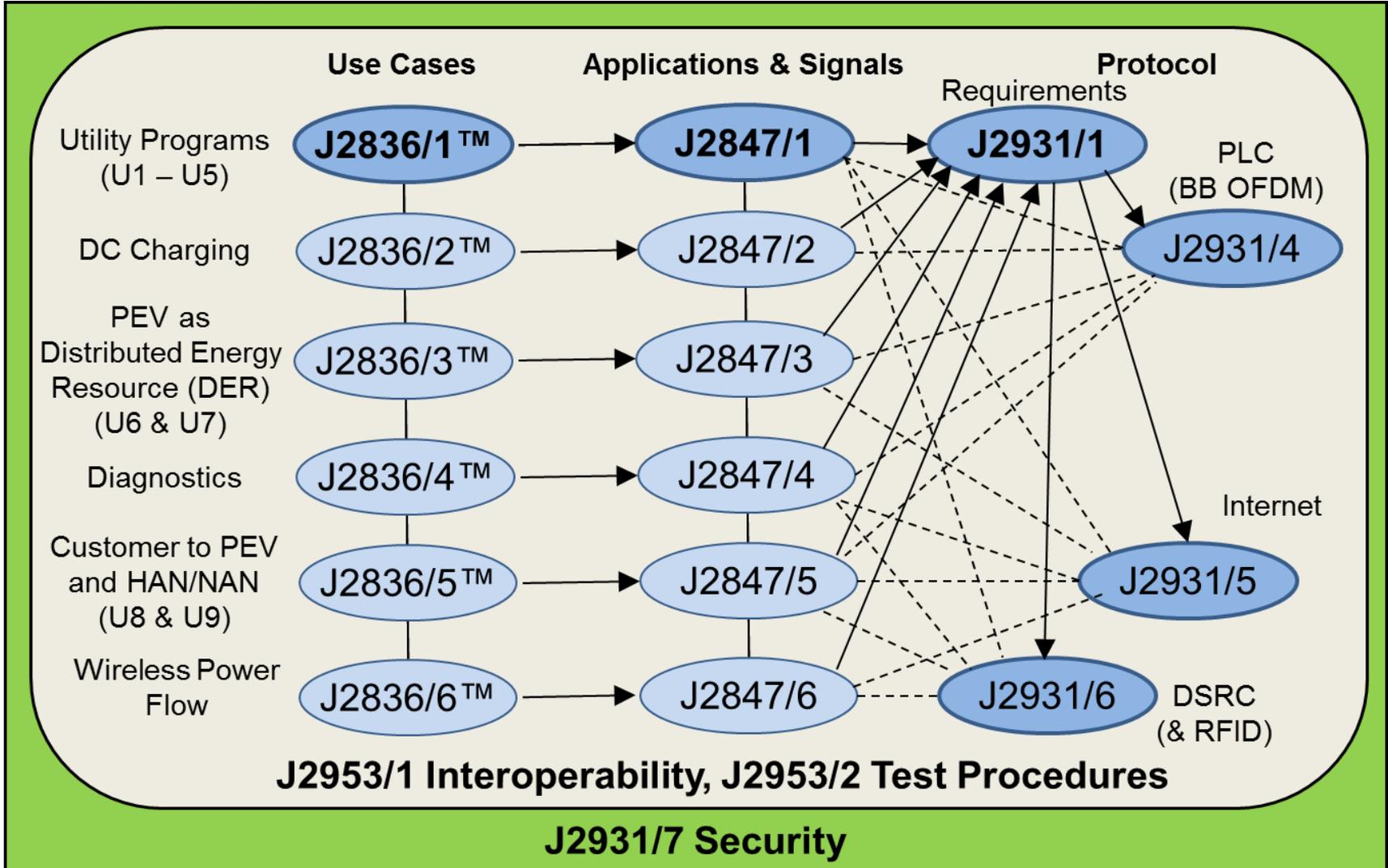
Connection Location
(VIN Authentication, Basic Charging per enrolled program)

(What)

- PR1: Charge
- PR2: Discharge
- PR3: Diagnostics
- PR4: VM Specific

V2G, V2H, V2L, V2V

U1 – U5 (J2836/1™)



Use Cases 1 thru 5 - Status

J2836/1™ - Use Cases

- No updates planned

J2847/1 – Signals/messages/sequence diagrams

- Slav Berezin is new lead
- Dan Mepham updated with SEP2 DRLC, need to continue with other SEP2 function sets.

J2931/1 - Requirements

- No changes planned



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PEV AS A DISTRIBUTED ENERGY RESOURCE (DER)

U6 & U7

Use Cases U6 & U7

Use Case Summary

Customer selects one or more

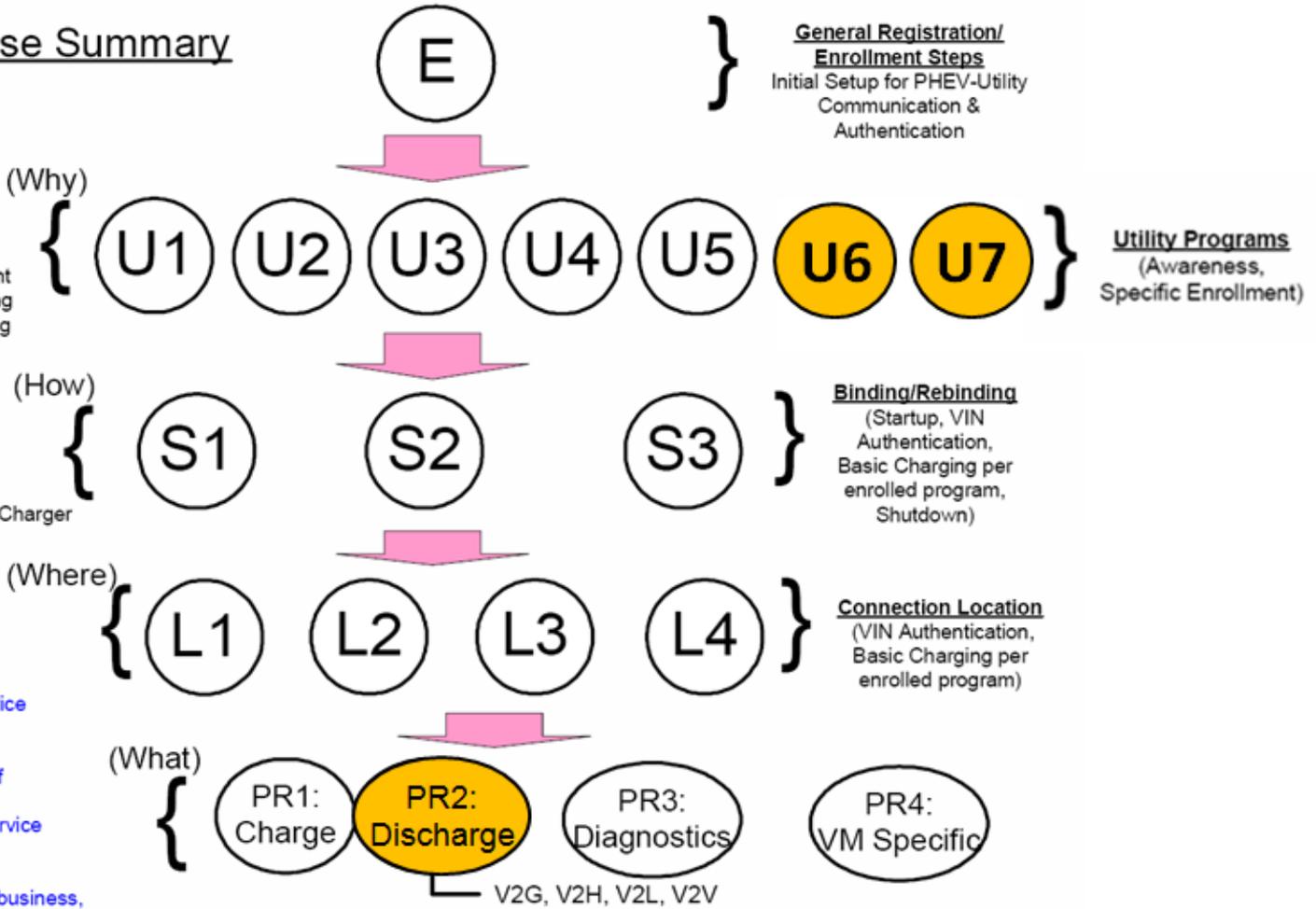
- U1: TOU
- U2: Direct Load/Price Control
- U3: Active Management
- U4: Critical Peak Pricing
- U5: Optimized Charging

Customer uses only one

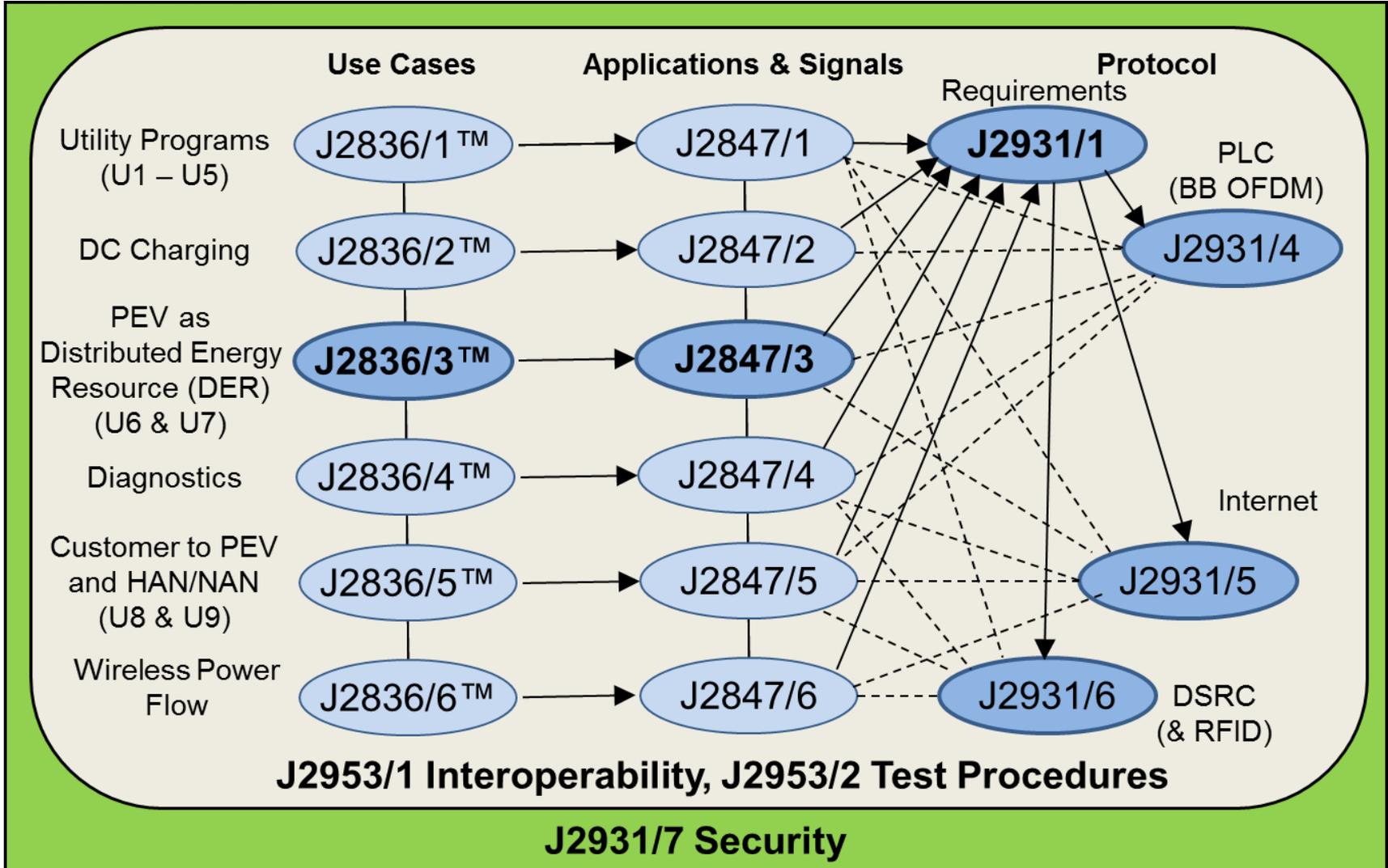
- S1: Cordset EVSE (120V AC to vehicle)
- S2: Premise EVSE (240V AC to vehicle)
- S3: Premise EVSE w/Charger (DC to vehicle)

Customer uses only one

- L1: Home: Connects at premise
- L2: Another's Home Inside the utility's service territory & A: premise pays tariff B: customer pays tariff
- L3: Another's Home Outside the utility's service territory
- L4: Public: Curbside, workplace, business, multi family dwelling



U6 & U7





Use Cases U6 & U7 Status

Hank McGlynn

J2836/3TM - **In Formatting**, expected publication Nov, 2012

- U6 - Basic Distributed Energy Resource (active power or bidirectional power conversion)
- U7 - Advanced Distributed Energy Resource (adds the communications required to take advantage of four quadrant power conversions)

J2847/3 – starting soon

- Include DER Function Set (SEP2)
- Add any DER functions in OpenADR & others - for HAN (if not SEP2), both public & private EMS

J2931/1 – no changes



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CUSTOMER TO PEV AND HAN

U8 & U9



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Use Cases U8 & U9

Detailed Use Case Summary



**General Registration/
Enrollment Steps**
Initial Setup for PHEV-Utility
Communication &
Authentication

**Customer selects
one or more**

(Why)

- U1: TOU
- U2: Direct Load/Price Control
- U3: RTP (Active Management)
- U4: Critical Peak Pricing
- U5: Optimized Charging



Utility Programs
(Awareness,
Specific Enrollment)

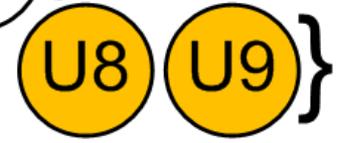
**Customer uses
only one**

(How)

- S1: Cordset EVSE (120V AC to vehicle)
- S2: Premise EVSE (240V AC to vehicle)
- S3: Premise EVSE w/Charger (DC to vehicle)



Binding/Rebinding
(Startup, VIN
Authentication,
Basic Charging per
enrolled program,
Shutdown)

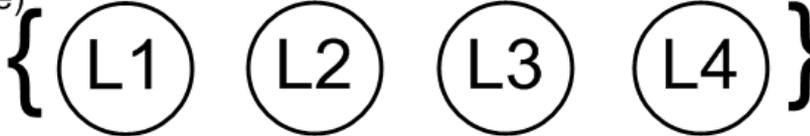


Customer Programs
(Mobile apps, Special
OEM features)

**Customer uses
only one**

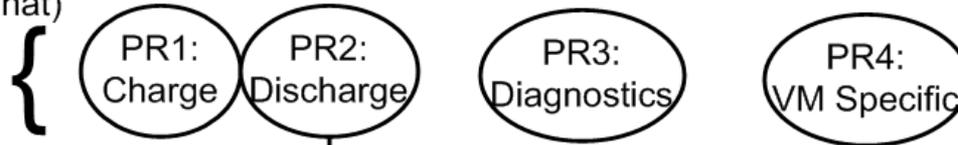
(Where)

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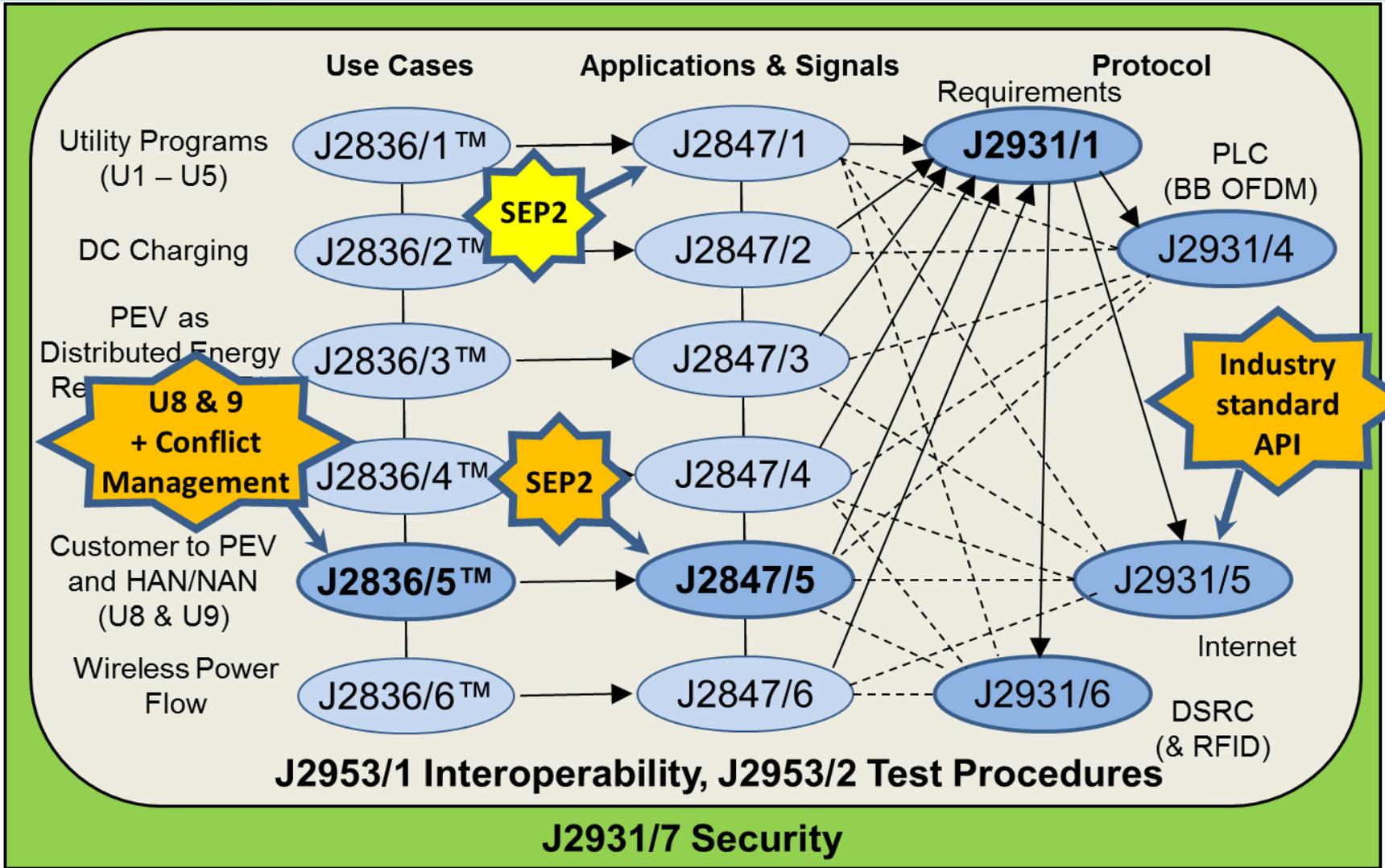
Connection Location
(VIN Authentication,
Basic Charging per
enrolled program)

(What)



V2G, V2H, V2L, V2V

U8 & U9 Status



Use Cases U8 & U9

George Bellino & Venkatesh Donthy

J2836/5™

- U8 – Customer to PEV
- U9 – Customer/PEV to HAN/Utility (premises)

J2847/5

- SEP2
- Include signals for advanced PEV/Customer functions
 - SoC info, Start/stop charge control, Preheat/cool cabin/battery
 - More...

J2931/1 – any changes?

J2931/5 – include the Application Interface (API)

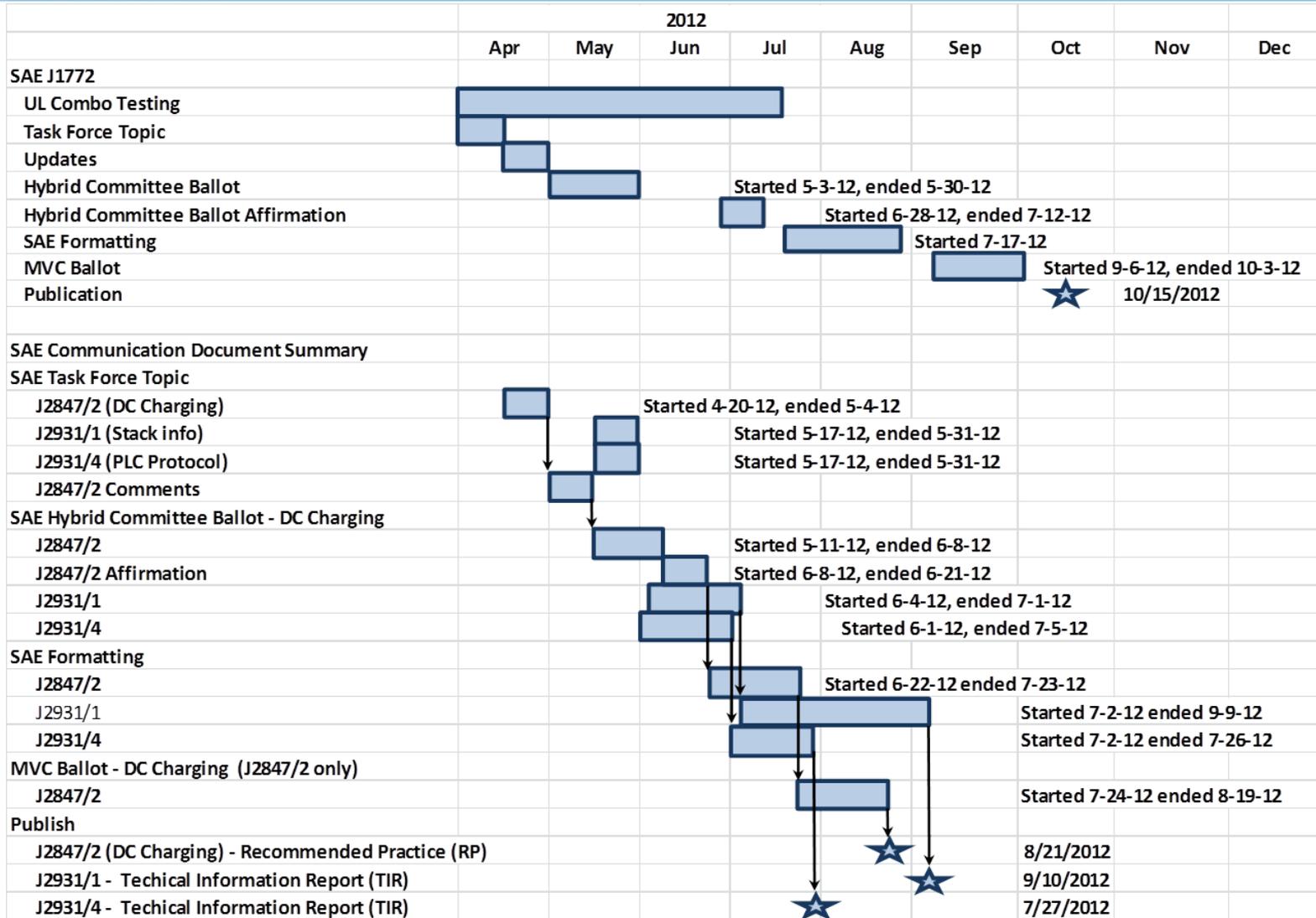
- Complete the Use Cases 1st, then the API.



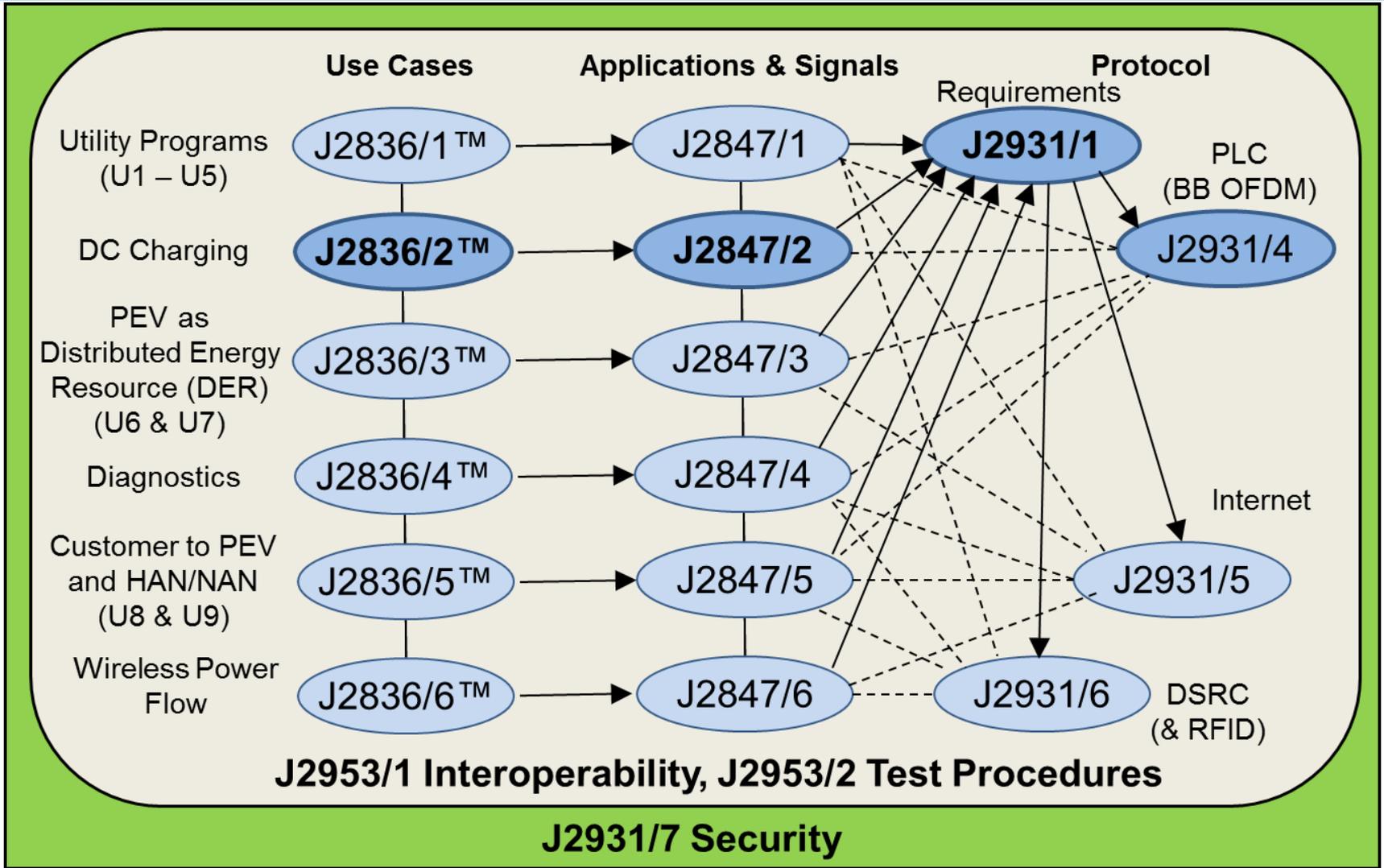
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DC CHARGING

Document publication status



DC Charging Documents



Status

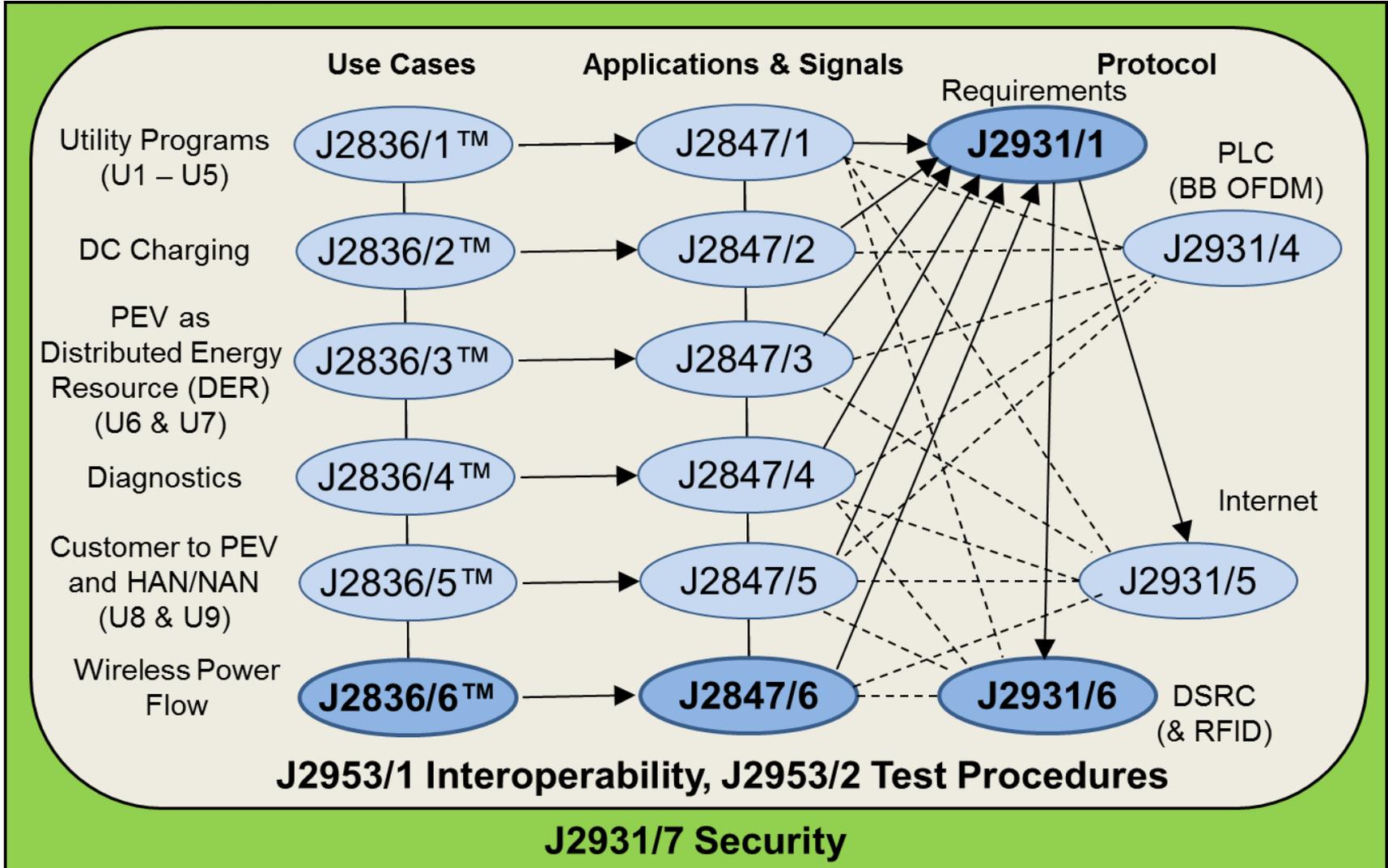
- Documents are published
- Combo connector/inlet is UL certified
- We are moving into the implementation phase
 - Effort is included in the interoperability plan

WIRELESS CHARGING

J2954 – Jesse Schneider's Task Force

J2936/6TM, J2847/6 - Mark Klerer is lead

Wireless Charging



Status

- J2836/6™ Use Cases almost ready to ballot
- J2847/6 will start upon completion of use cases.
 - Reference /1 for Utility
 - Reference /2 for base charging (not unique to wireless interface)
 - Reference /3, /4 /5 as applicable

INTEROPERABILITY

J2953/1, /2 – Ted Bohn is lead

J1772TM Control Pilot

& DC Charging are 1st priorities



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DE-FOA-0000239 & ANL

The new FY2011 Vehicle Technologies Program Wide Funding Opportunity Announcement ([DE-FOA-0000239](#)) addresses the development of key technologies in eight areas of interest (AOI), each with specified subtopic areas: advanced fuels and lubricants; lightweighting materials; multi-material lightweight vehicle demonstration; advanced cells and design for electric drive batteries; advanced power electronics and electric machines (APEEM); thermoelectrics and enabling engine technologies; fleet efficiency; and advanced vehicle testing and evaluation

AOI 7: Fleet Efficiency

- *The goal of this effort is to develop and demonstrate technologies that will positively affect efficiency of the fleet of passenger cars and commercial vehicles.*

Area of Interest 8: Advanced Vehicle Testing and Evaluation

- *The objective of this area of interest is for projects to conduct laboratory and field evaluations of advanced technology vehicles and their associated infrastructure and the development of new test procedures and/or modifications of existing test procedures necessary to accomplish these performance evaluations.*
- *The scope of the work shall include baseline performance, accelerated reliability, and fleet testing of state-of-the-art light-, medium-, and heavy-duty advanced technology vehicles and the required vehicle-to-infrastructure interface required for fueling/charging the vehicles."*
- The rest of the RFP on the FOA is at <http://www.greencarcongress.com/2010/12/doevt-20101216.html#more>



SAE EV / EVSE INTEROPERABILITY TESTING – DOE FOA AOI8 Task7

- **ECOtality Project Role:**

- Primary Contractor / Project Manager
- Develop final test procedures for review and approval by SAE J2953 Committee
- Conduct testing
- Procurement of Test Properties

- **SAE Project Role:**

- Subcontractor
- Recruitment of project participants
- Interface to SAE J2953 Committee
- SAE J2953 Committee to develop draft test procedures based on J1772 & J2953
- Quarterly and Final Reports
- SAE Standards for AC and DC level 1 & 2 Interoperability

ANL

- DOE/Dept of Commerce endorsed activity with Argonne National Lab (ANL) as the North American PEV Smart Grid Interoperability Center being the US side of the activity.
- ANL built the interactive demo/display shown in the article, at the event in Washington DC (Dec, 2011).

http://www.transportation.anl.gov/media_center/news_stories/2011_us_eu_ev_centers.html



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SECURITY

J2931/7

Security

- J2931/7 posted to task force (Hina Chaudhry)
- Plan to restart meetings and update soon (Robert Cragie is the new lead)

DIAGNOSTICS

J2836/4™ – Control pilot and Proximity failures are documented

- Do we ballot, then re-open to include more
- or wait for team to work more into the initial release?

- Included:
 - J1772™ - SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler
 - J2836/1™ - Use Cases for Communication between Plug-in Vehicles and the Utility Grid
 - J2847/1 - Communication between Plug-in Vehicles and the Utility Grid Using Smart Energy Profile 2.0

CoS Status

- Ready to be added:
 1. J1772™ - SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler – **Updated with DC Charging**
 2. J2836/2™ - Use Cases for Communication between Plug-in Vehicles and Off-Board DC Charger
 3. J2847/2 - Communication Between Plug-In Vehicles and Off-Board DC Chargers
 4. J2894/1 - Power Quality Requirements for Plug-In Electric Vehicle Chargers
 5. J2931/1 - Digital Communications for Plug-in Electric Vehicles
 6. **New** J2931/4 - Broadband PLC Communication for Plug-in Electric Vehicles
 7. **New** J2836/3™ - Use Cases for Plug-in Vehicle Communication as a Distributed Energy Resource



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THE END

Questions?