Dear SME,

Thanks for agreeing to help out with this effort. Our task is to match each of the following communication protocols to the requirements that have been extracted from the known use cases. In order to help us get the right information to the right people and to properly summarize things for the CPUC, we're asking for your help in getting some basic information. Please complete the following to the best of your ability.

Section 1: Who and What

Please select your name from the following list or enter it manually: Lance Atkins

Please select your protocol from the following list or enter it manually: CHAdeMO (I

What is the current (approved by standards/industry group) version of your protocol? 2015

When was it approved? September / 2015 Is it currently being revised ? Yes

What is the anticipated date for the approval/release of the next version? September / 2018

Section 2: When and Why

Please input a short narrative of the problem that your protocol was created to address, and when it first was adopted.

The CHAdeMO protocol was initially created during 2005-2009 to provide high-speed DC charging to meet the transportation needs of EV Drivers. A CHAdeMO association was started in 2010 to direct continued development. Following the Great East Japan Earthquake in 2011, the protocol was updated to provide bi-directional power to provide electrical grid support. The protocol was adopted into international standards IEC61851-23/24 and IEC62196-3 in mid-2014, and those standards were then input to the USA standard IEEE 2030.1.1 in 2015. Current protocol work is increasing power levels and expanding V2X functions.

Section 3: Current Status:

Please summarize the current usage and level of adoption of this protocol. If possible, please discuss the number and location(s) of current implementations of the protocol.

CHAdeMO protocol is used in 50 countries on 5 continents with over 13,000 charge points globally. 50 companies have certified 220 different models of devices using 5 third-party certification bodies. Bi-directional vehicle-to-home CHAdeMO products exist commercially in Japan and V2X devices are used in significant V2X demonstrations in USA, Denmark, Netherlands and Japan. USA V2X demonstrations include 13 vehicles at the LA AFB and 80 vehicles in Hawaii.

Section 4: Actors Currently in Play:

In order to decouple protocol specific nomenclature and to reduce the number of actors to the minimum relevant number, we've come up with the following list. Please indicate what actors are able to communicate directly with each other by using your protocol.

	EV Driver (EVD)	Power Flow Entity (PFE)	Utility Customer of Record (UCR)	EV Battery System (EVBS)	EV Power Converter System (EVPC)	Energy Connection System (ECS)	Energy Meter (EM)	Building Management System (BMS)
EV Driver (EVD)	-	☐	☐	☐	☐	☐	☐	☐
Power Flow Entity (PFE)	☐	-	☐	☐	☐	☐	☐	☐
Utility Customer of Record (UCR)	☐	☐	-	☐	☐	☐	☐	☐
EV Battery System (EVBS)	☐	☐	☐	-	✓	☐	☐	☐
EV Power Converter System (EVPC)	☐	☐	☐	✓	-	☐	☐	☐
Energy Connection System (ECS)	☐	☐	☐	☐	☐	-	☐	☐
Energy Meter (EM)	☐	☐	☐	☐	☐	☐	-	☐
Building Management System (BMS)	☐	☐	☐	☐	☐	☐	☐	-

Please add any notes needed to clarify the above table

CHAdeMO protocol version 1.0.1 currently standardized in IEEE 2030.1.1 allows the EVBS and EVPC to communicate over a commonly standardized DC connector to manage energy and power flow. VGI related interactions and settings from other actors would be made at the device housing the EVPC.

What physical layer(s) does this protocol use for communication between devices?

The CHAdeMO protocol uses a 2 wire CANbus connection within the commonly standardized CHAdeMO connector to link the EVBS and EVPC devices .

What language is used for communicating between devices (i.e. html, xml, etc.)

CHAdeMO protocol is based on CANbus communications standardized as ISO11898. CANbus has been used in vehicles since the late 1980's, and communication chip sets are widely produced in high volume by multiple manufacturers to meet the demands of today's vehicles which contain multiple CANbus devices per vehicle.

Section 5: Actors Anticipated to be in Play (As appropriate):

If the next version of your protocol is expected to allow for additional communications, please indicate them in the following.

	EV Driver (EVD)	Power Flow Entity (PFE)	Utility Customer of Record (UCR)	EV Battery System (EVBS)	EV Power Converter System (EVPC)	Energy Connection System (ECS)	Energy Meter (EM)	Building Management System (BMS)
EV Driver (EVD)	-			✓	✓			
Power Flow Entity (PFE)		-						
Utility Customer of Record (UCR)			-					
EV Battery System (EVBS)	✓			-	✓			
EV Power Converter System (EVPC)	✓			✓	-			
Energy Connection System (ECS)						-		
Energy Meter (EM)							-	
Building Management System (BMS)								-

Please indicate any additional functionality or limitations to functionality that are germane to the consideration of this protocol:

CHAdeMO version 1.2 with higher power and multi-outlet dynamic power sharing is completed with updates to IEEE 2030.1.1 in progress. CHAdeMO version 2.0 is in progress with considerations to incorporate additional VGI settings from the EV Driver via the EVBS and additional messages related to IEEE 2030.5 functions.

What physical layer(s) does this protocol use for communication between devices?

The CHAdeMO protocol uses a 2 wire CANbus connection within the commonly standardized CHAdeMO connector to link the EVBS and EVPC devices .

What language is used for communicating between devices (i.e. html, xml, etc.)

CHAdeMO protocol is based on CANbus communications standardized as ISO11898. CANbus has been used in vehicles since the late 1980's, and communication chip sets are widely produced in high volume by multiple manufacturers to meet the demands of today's vehicles which contain multiple CANbus devices per vehicle

Section 6: DC, Single Phase, or Polyphase:

Does your protocol include functionality to manage the flow of DC energy?	Yes
Does your protocol include functionality to manage the flow of AC energy?	Yes
Does your protocol include functionality to manage the flow of polyphase AC energy?	Yes
Does your protocol include functionality to manage the flow of energy from the vehicle back to the grid?	Yes

If needed, please add any explanatory details to the answers in section 6:

CHAdeMO indirectly controls the flow of AC energy and reverse energy flow to the g