



CHAdeMO

CHAdeMO TW activities and 2.0

Utaka Kamishima

High power SWG, CHAdeMO Association

CHAdEMO TWG Activities in 2018-19 : Overview

2018

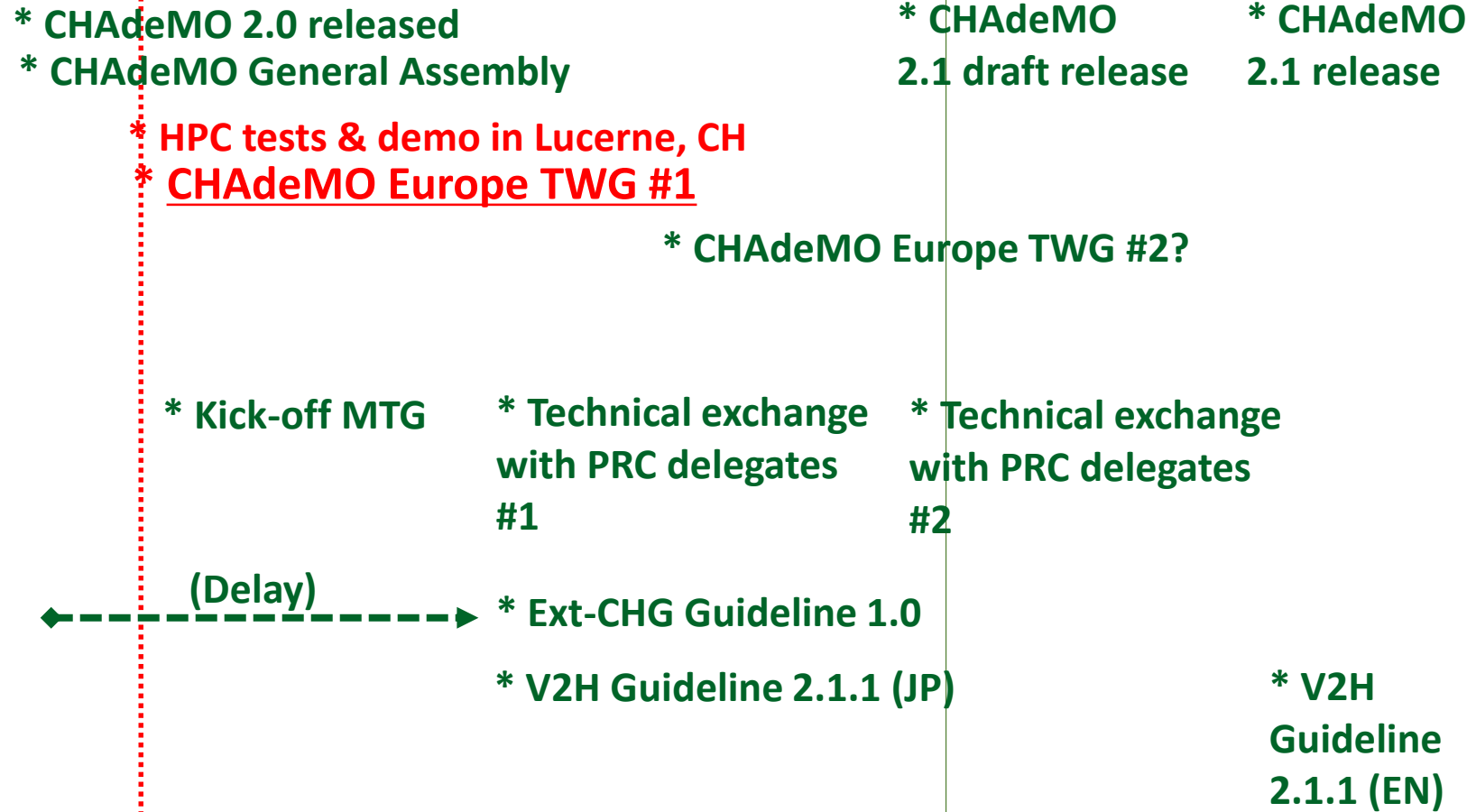
2019

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Specification WG

Active SWGs :

- High power
(new HPC coupler)
- External charging
- V2H



High power tests & demo at EVTEC, Lucerne

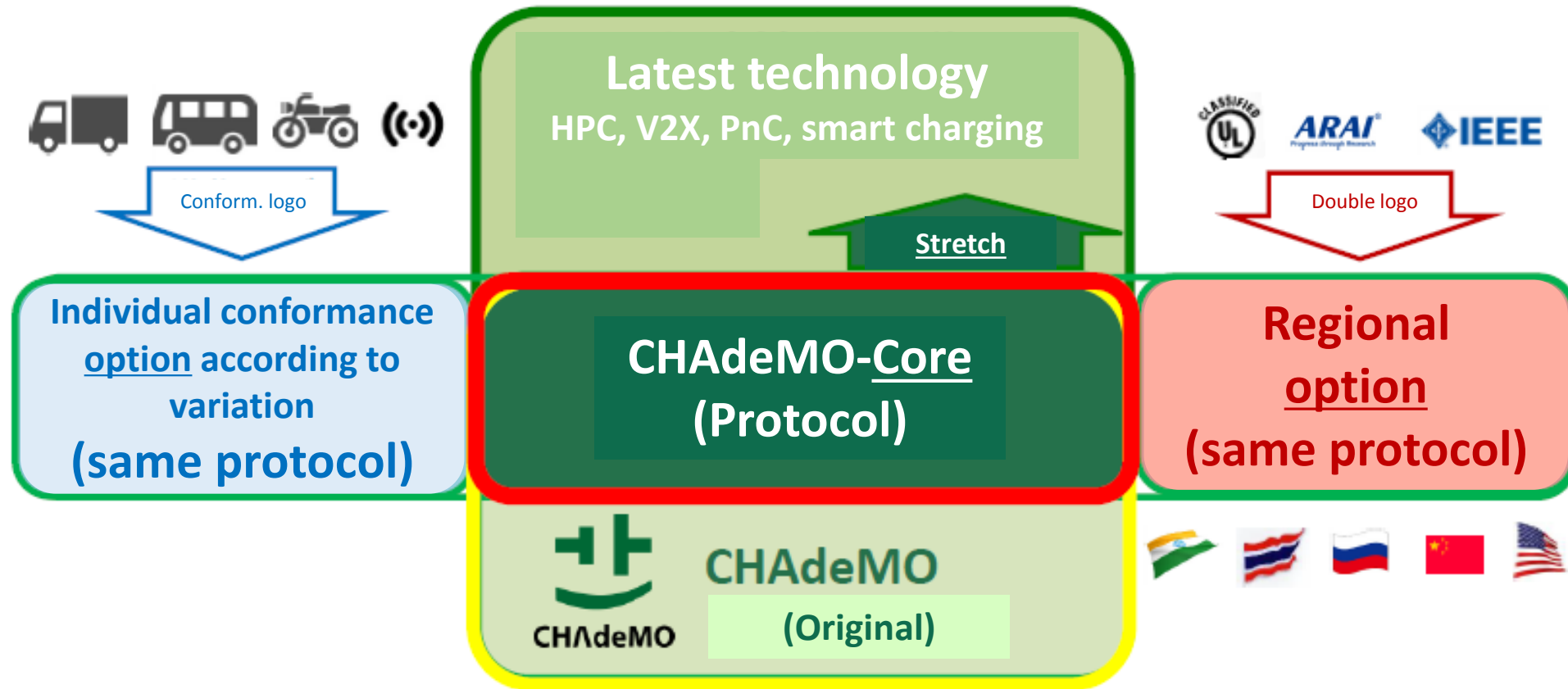


- ✓ No breakdowns of chargers or vehicles.
- ✓ No major issues were observed (some small software fixes).
- ✓ New 1.2/2.0 protocols were checked.
- ✓ Max. power/current was >100 kW/270 A using 'boost-mode'.



'CHAdemoMO-Core' Technology (1)

- **Requirements related to safety and interoperability -> 'Core'**
- Promotion of innovation and the latest technology -> 'Stretch' (Extended Specification)
- Respecting region-specific needs with flexibility and expandability -> 'Options'



Source: <http://www.chademo.com/wp2016/wp-content/japan-uploads/2018GA/CHAdemoMO2018GA.pdf>

CHAdemoMO Confidential

'CHAdeMO-Core' Technology (2)

- **The five 'Core' specifications :**
 - 1. Connection of control pilot (d1) to the power supply of EV contactors**
 - allows automatic shut-off by the DC EV charging station.
 - 2. Connection of control pilot (k) to the AC/DC converter of charger**
 - allows automatic shut-off by the EV.
 - 3. Adoption of CAN communication**
 - for reliable communication and compatibility with other charging standards.
 - 4. Redundant control signals with CAN and hardwire (CP)**
 - for additional safety.
 - 5. CHAdeMO protocol and charging/discharging sequence**
 - for flexibility (more variation) and improved expandability.

'CHAdEMO-Core' Technology (3)

- Example: adoption in IEC 61851-23-1 (ACD) draft Annex AA:

Wireless CAN

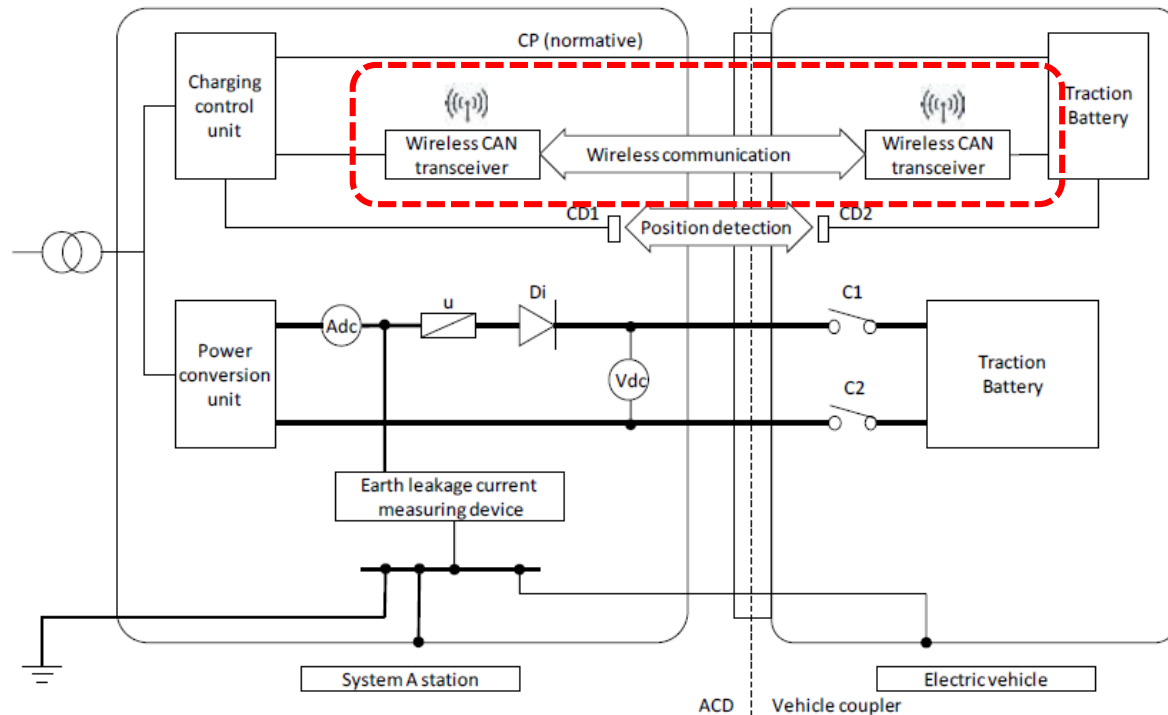


Figure AA.1a Overall schematics of System A station with reverse-current prevention diode D_I , ACD and vehicle

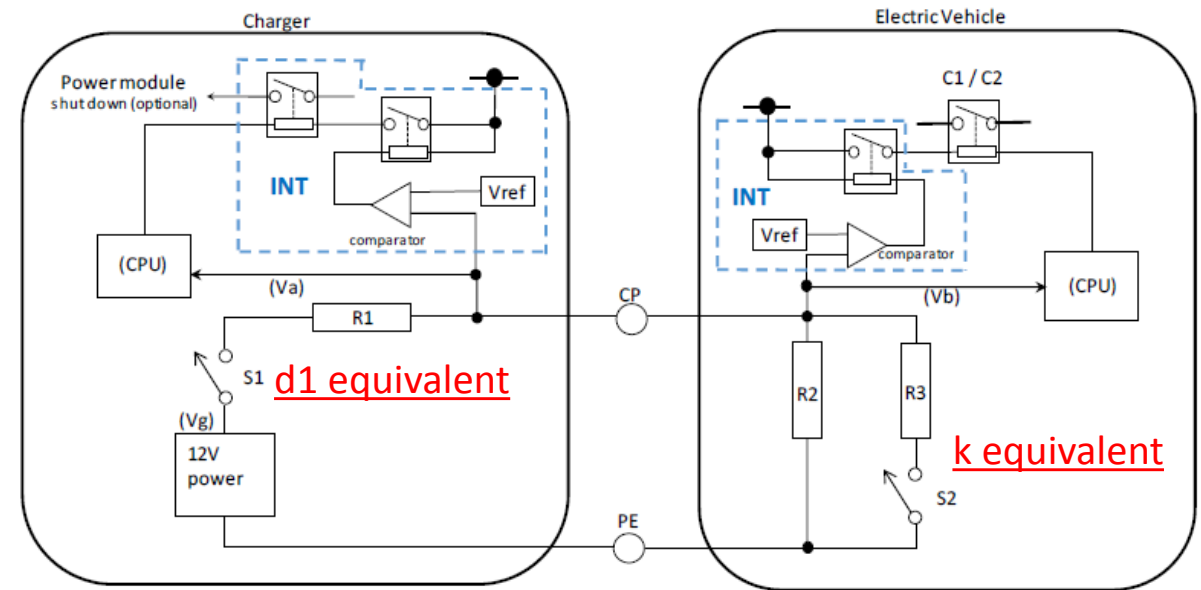


Figure AA.2a Control pilot circuit (option A) of System A station and vehicle

CHAdeMO 2.0 Key points (1)

Type	New/additional requirements	Target	
		EVSE	EV
Functional	The max. system voltage: 500 -> 1000V with high-voltage control.	X	X
	Continuous output of 12V power supply in the proximity detection line to allow Plug & Charge (PnC).		X (opt.)
	New CAN IDs for service code and vehicle ID option for better operability e.g. PnC.	X	X
	20A/s rate limit for the 'available output current' during dynamic control.	X	X
	CAN flag to update the maximum charging time during dynamic control.	X	X
Functional & safety	The upper limit of Y capacitance for systems with voltage $\leq 500V$.	X	X
	The max. height (1.5m) of the holder of charging cable assembly.	X	
Safety	Prohibition to install SPDs between the high-voltage (P and N) lines.	X	X
	Overvoltage protection.	X	
	Double or reinforced insulation between P-N, P-GND and N-GND for systems with voltage $> 500V$.	X	X
	Sequence for allowing the welding check of the EV contactors even in case of EVSE failure (under certain conditions determined by the EVSE manufacturer).	X	X

CHAdeMO 2.0 Key points (2)

Item	New/additional requirement	Target	
		EVSE	EV
Others (clarification and improvement)	The minimum PE conductor size (0.75mm ²).	X	X
	Opto-couplers in the interface circuit can be substituted by other devices e.g. transistors, mechanical relays.	X	X
	EV contactors should be opened within 1 sec. after PE discontinuity.		X
	Transmission of the minimum battery voltage by CAN.		X
	Voltage measurement accuracy for systems with voltage > 500V.	X	
	Recommended judgment criteria (10% or 20A, 1s) for current deviation error detection.		X

CHAdE MO 2.0 Plug & Charge

Example of use case :

From	To	ID	Byte	Data name	Remarks
Charger	Vehicle	H'718	0-1	Service code	
			2-7	Option code	

Note: XX may correspond to:

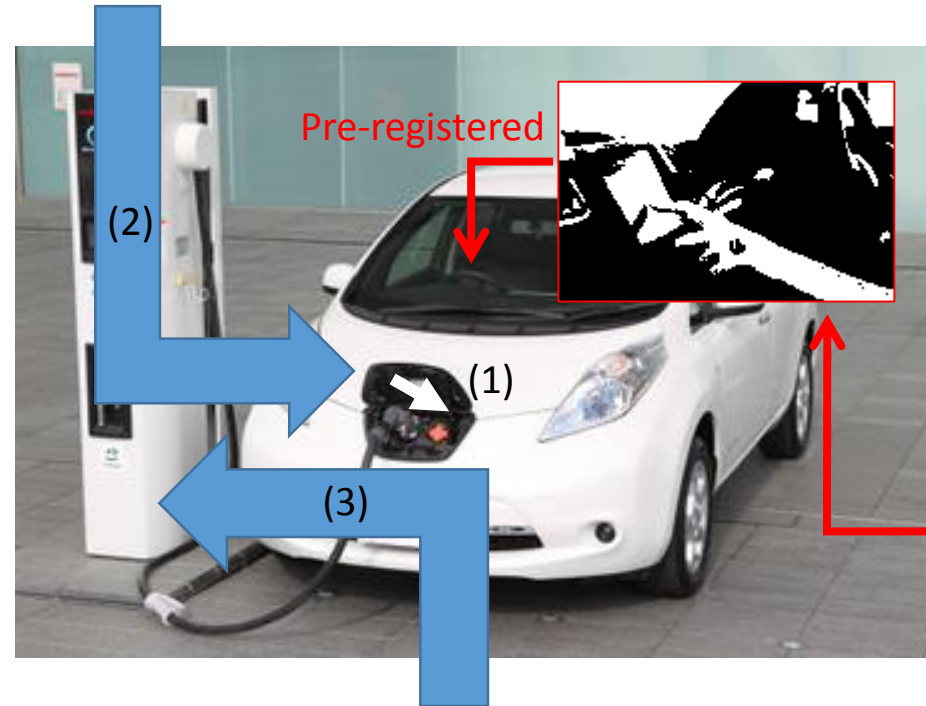
'Request to transmit VIN, charging-network operator ID and user ID.'

(1) The charger detects the mating of the coupler by proximity detection.

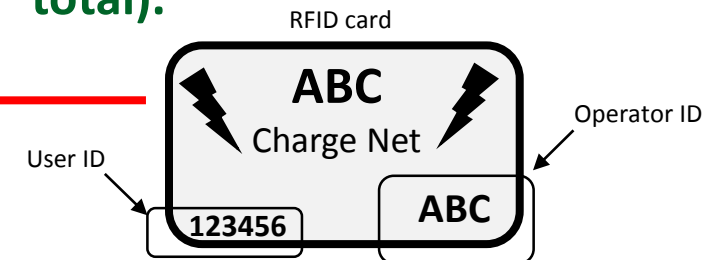
(2) The charger sends 'Service code' = XX to EV, with additional 'Option' codes (max. 6 bytes) if necessary.

.....

(4) The IDs are authenticated and the charging session is started by turning d1 ON.



(3) The EV compatible with the 'Service code' responds by transmitting the VIN and the appropriate IDs to the charger (max. 24 bytes in total).

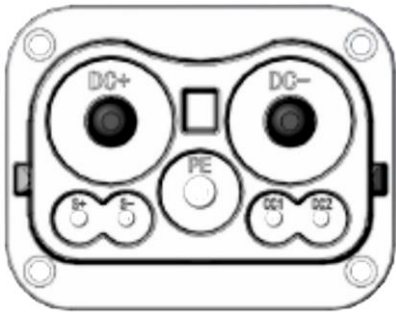


From	To	ID	Byte	Data name	Remarks
Vehicle	Charger	H'710	0-7	Vehicle ID	
		H'711	0-7	Vehicle ID	
		H'712	0-7	Vehicle ID	

High power SWG activity in FY18

- **Feasibility study of the new HPC coupler proposed by China**

- considering the possibility of its adoption as the next-generation coupler for CHAdeMO 3.0 (TBC)... to become the new global standard / universal coupler ?



- ✓ CAN communication
- ✓ Two control pilots
- ✓ Ultra-HPC ready

~~Tentative~~
CHAdeMO 3.0
1 MW Mega-charger
∞
Work in progress



1500V x 600A = 900kWmax.

- other couplers may also be considered: New ? IEC 62196-3 config.FF ? ChargePoint ?

- **List of SWG members:** Toyota, Nissan, Honda, Mitsubishi, Subaru, Isuzu, Yazaki, Sumitomo, Hasetec, Shindengen, NS-TEXENG, Tyco Electronics, TEPCO ... plus more expected.

Ext. charging SWG: CHAdeMO Guideline 1.0

- Draft (JP) is almost ready... English version will follow shortly.



Pantograph charging



Copyright© HASETEC Corporation. All rights reserved.

Wireless charging



EV/PHV/FCV Standard adoption (1)

(DC-charging/V2X capable vehicles in the market)

- 22 OEM/brands, 33 vehicles... and more coming.



* With adapter ** JPN only *** KOR only

EV/PHV/FCV Standard adoption (2)

- **Toyota and Honda FCVs... all equipped with CHAdeMO-V2X.**
- **Plug-in hybrids equipped with CHAdeMO :**
Mitsubishi Outlander PHEV, Toyota Prius PHV **

** JPN only