ACT EXPO, MAY 2018

A Complete Portfolio for EV Charging Infrastructure

MD & HD Charging 101: Costs and Considerations for Developing Charging Infrastructure

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Electric Vehicle Infrastructure

ABB EVI Mission Statement

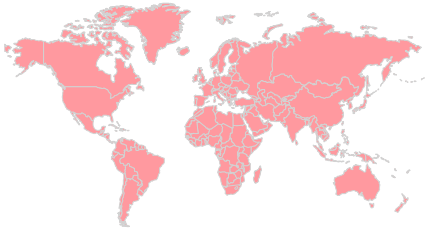
We offer fast charging solutions for Electric Vehicles…

…up to 600 kW…

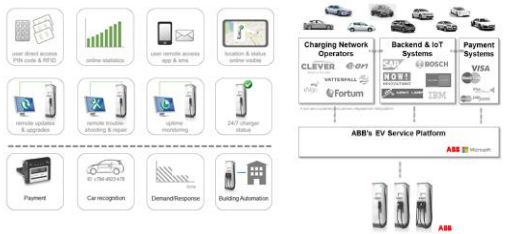
…based on open industry standards...

…around the world...

EVI present in 50+ countries



…with ABB Ability ™ connectivity…

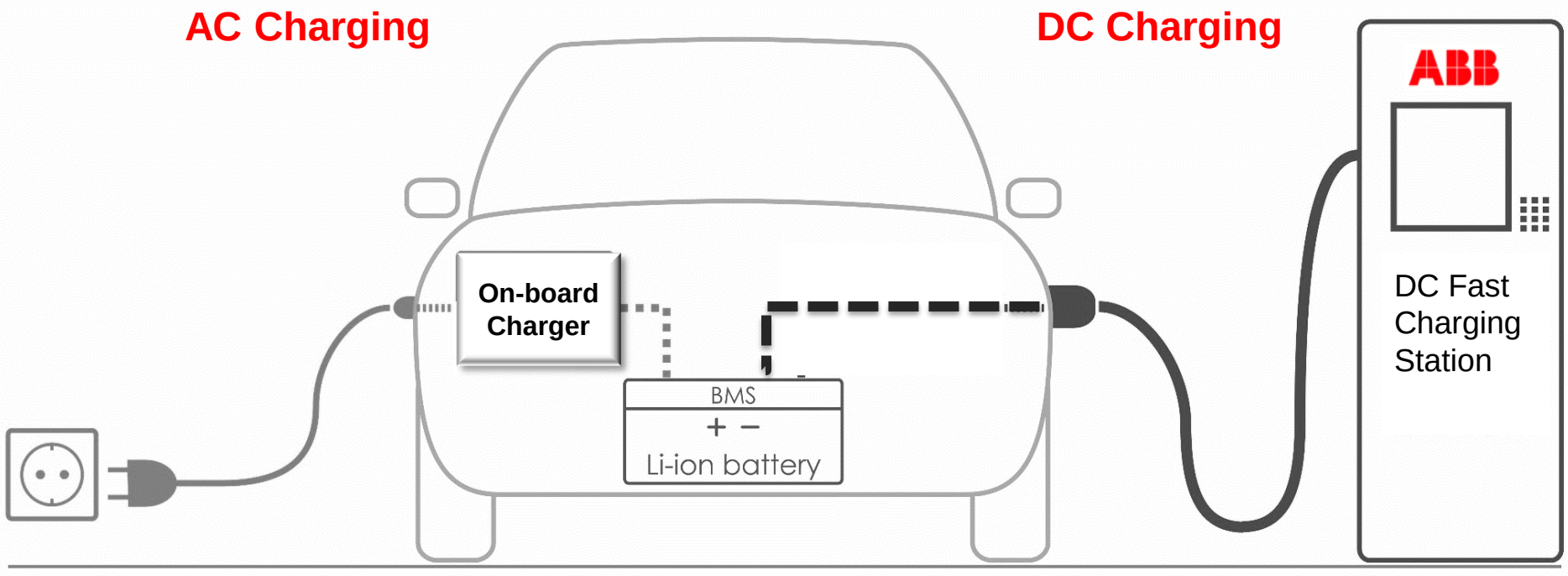


…using ABB technologies…

…and OpEx + 24/7/365 local service.

What is EV Charging?

On-board versus Off-board charging equipment



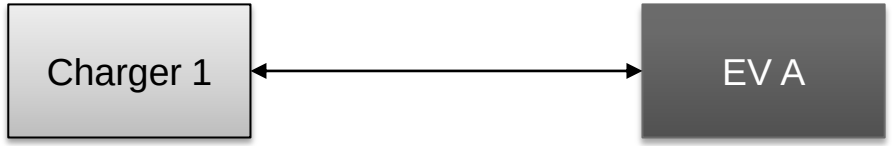
Every vehicle needs to have it's own onboard equipment

Infrastructure investment is shared with hundreds of users

What is CCS?

The complexity of interoperability

- Building an end to end system is easy
- You control both systems, you know the details



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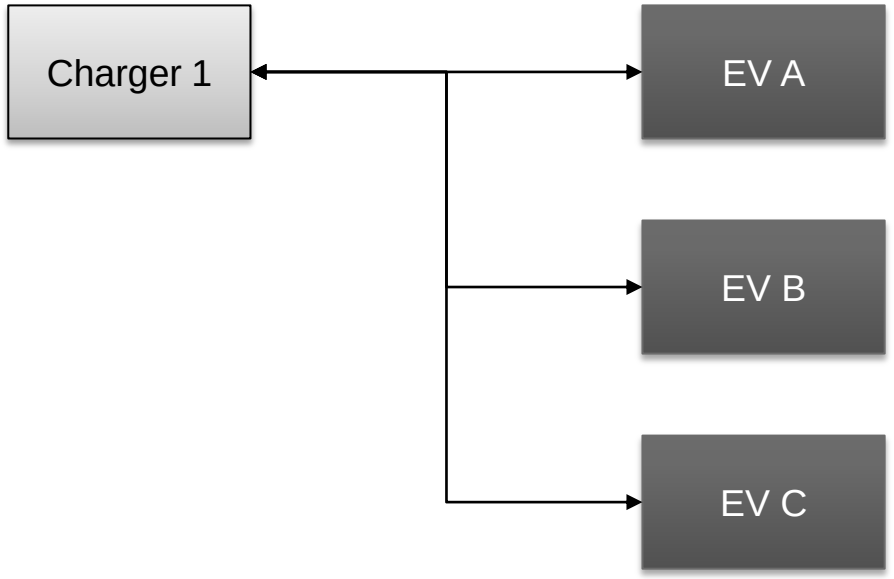
- Building a charger for multiple type of vehicles
  - The charger details are known
  - The inside of the EV is unknown
  - Clear interface description is needed
    - Software & Hardware requirements needed



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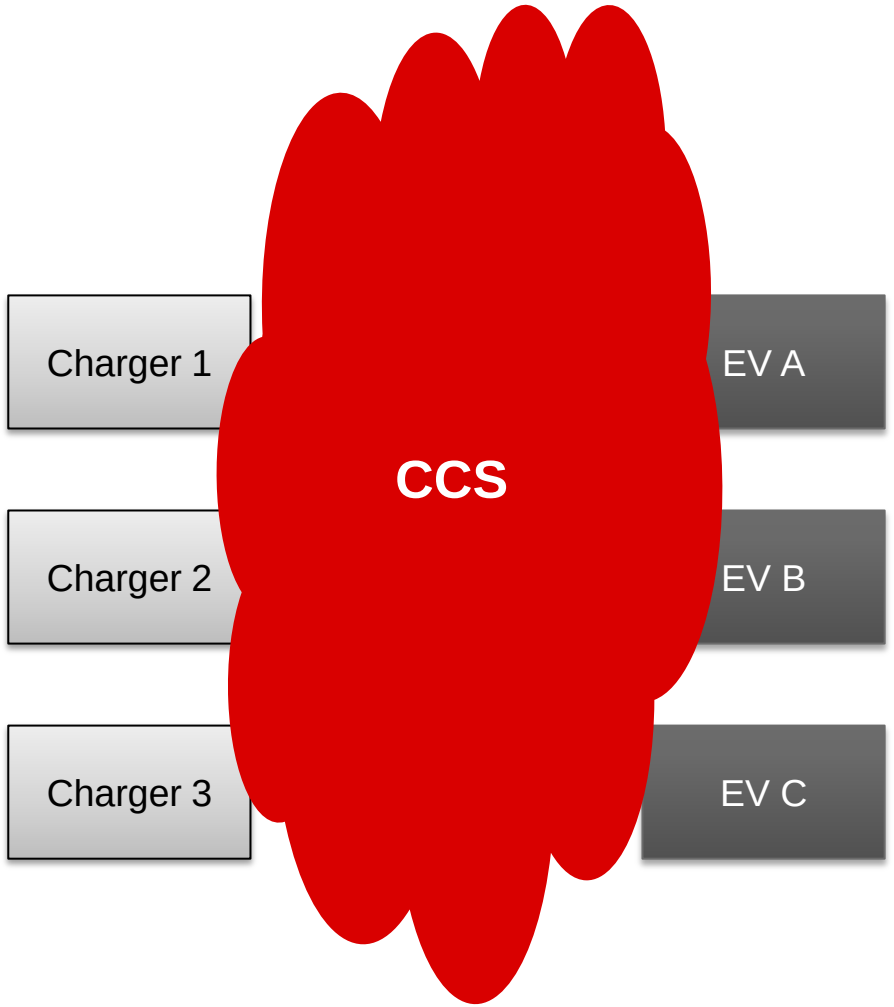
- Multiple charger manufacturers
  - Both are unknown
  - Both need to have an interface description



EV fast charging and global standardization

ABB leading in major developments this decade

2010
Founding of CHAdeMO

2010
Launch ABB Terra 51

2012
Founding of CCS alliance

2013
Launch CCS & multi-standard Terra 53

2013-2015
Launch global variants Terra 53

2016
First eBus chargers in EU

2018
First eTruck chargers

Pilots → CHAdeMO → First EV's → CCS alliance → IEC 61851-23 → Multi-standard → Global EV spread → E-bus → OppCharge → High power car → E-Truck → DC home → Future

2010
First 50 kW charger in EU

2010
First EV's with DC charging

2012
First demo of CCS charging

2012 - 2013
First nationwide DC networks

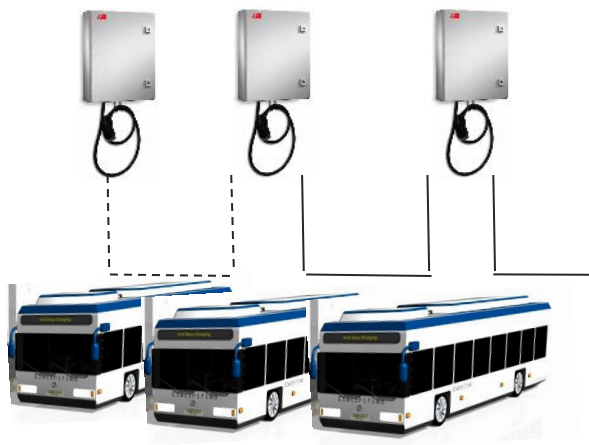
2012, >
Leading Connectivity & uptime

2014, >
DC networks spread globally

2017
Launch of high power for cars

eBus and heavy vehicle charging: 50 kW – 450 kW

Opportunity and Depot charging

Opportunity charging On street	Overnight charging Depot charging
Overhead charging with pantograph	Cable connector charging
Charging standard: OppCharge (SAE J3105-1)	Charging standard: CCS (SAE J1772)
Quickest charge, on-demand, longer routes	Off-peak, load-friendly, wake-up/warm up
	

150 kW: HVC 150P

300kW: HVC 300P

450kW: HVC 450P

50-150 kW

Power converters at distance at convenient location

Compact charge box with cable close to bus parking area

Support of inverted pantograph growing rapidly

VOLVO OPPcharge

MAN

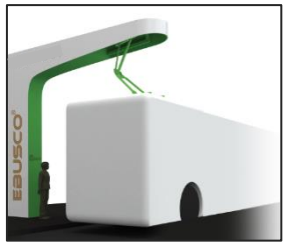
SCANIA OPPcharge

NEW FLYER OPPcharge

NOVA BUS OPPcharge

SOLARIS OPPcharge

VANHOOL

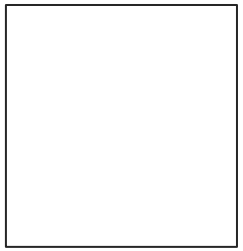


EBUSCO OPPcharge

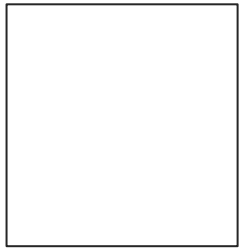
Linkker

HEULIEZBUS OPPcharge

HESS OPPcharge



IVECO BUS OPPcharge



VDL BUS & COACH

Current Bus Integrations

North American OEMs

NEW FLYER OPPcharge

NOVA BUS VOLVO OPPcharge

PROTERRA

*in the works

Cummins GILLIG

J3105 Standard Committee

Update

- **The first revision of the document will integrate at least 2 types of connection (waiting for patent disclosure to confirm)**
  - As of now 4 connection systems are listed (Infrastructure Mounted Pantograph (Top-down), Vehicle mounted pantograph (Bottom-up), Enclosed pin and Socket (Staubli), Blade Connection (Proterra).
  - Connection systems will be presented in sub-documents (J3105-1, -2, -3,…)
- **Two power levels have been defined in the standard:**
  - The Infrastructure-Side Connection (ISC) voltage capability will be in the range of 250 to 1000 VDC. Two tiers of systems are defined:
    - Level 1: The current capability will be up to 600 Amps
    - Level 2: The current capability will be up to 1200 Amps
    - Both tiers will be compatible and be rated for 90% duty cycle.
- Higher power level pushed by North American Transit Authorities future needs: high traffic routes will require 1.2MW chargers (based on studies and simulation)
- **Standard is planned to be released by the end of the year.**