# YaCHA SECC - CHAdeMO Stack

Accelerate and make CHAdeMO developments more reliable

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Trialog is working on EV charge since more than 10 years and had several opportunities to develop a strong expertise on Electro-Mobility charge protocols like IEC 61851-1, DIN 70121, ISO 15118 and OCPP 1.6/2.0.
In this context, Trialog has developed several communication stacks and and validation tools.

**YaCHA, the SECC CHAdeMO Communication Stack** is one of these stacks. It provides a robust and reliable communication stack to perfom CHAdeMO 0.9 to 1.2 Mode 4 charge with a compatible vehicle over CAN.

If you are using the YaCCS stack for CCS communication: YaCHA is providing the same API and Data Model than YaCCS which greatly facilitate integration of both stacks in the same environment.

## Supported Features

The YaCHA stack supports the following features:

| Function | Current status of the implementation | Details |
|---|---|---|
| **CAN** | 100% | CAN 2.0B, 500kbps, 100ms |
| **CAN messages** | 100% | CHAdeMO 0.9 to 1.2 |
| **CHAdeMO DC state machine** | 100% | |
| **Dynamic charge** | 100% | Only available in CHAdeMO 1.2 |
| **Pause charge** | 100% | Only available in CHAdeMO 1.2 |
| **Charge nominal termination** | 100% | |
| **Charge emergency termination** | 100% | |
| **V2H** | 100% | |

Using YaCHA greatly accelerate the integration of CHAdeMO into a charging station software. All the digital communication (i.e. CAN) and CHAdeMO requirements related to

this communication interface are already fully covered by the stack. The remaining work on your side is to integrate the stack into your software which is responsible to:

- controls the charging station and power transfer
- interacts with the required hardware part of CHAdeMO (Seq1, Seq2, Vehicle Proximity Signal, Vehicle Charge Permission, Plug lock, etc) and provide these information to YaCHA
- uses YaCHA to access the EV data (charge limits, SoC, charge targets)
- provides to YaCHA the EVSE data (charge limits and measures)
- interacts with the YaCHA state machine.

Please notice YaCHA does not support CHAdeMO 2.0 nor future CHAdeMO 3.0. Such development is still under investigation on Trialog side and not scheduled. Such development might become available in a dedicated license.

## Technical Details

The YaCHA SECC stack is developed as a C/C++ programs using the open source Boost library and the Qt libraries (LGPL3+ only):
- C++11 is a minimal requirement
- Boost is known to be compatible with at least GCC, C++0x: 4.4.7
- CAN communication is based on Linux SocketCAN module

The YaCHA SECC stack is regularily used on Linux based OS with kernel 4.9.11 or 5.4:
- Minimal Linux kernel version: 3.4
- Compatible with at least Intel and ARM architectures

Typical hardware: Freescale i.MX287, RAM 128MB.

## Validation and Interopperability

The YaCHA SECC stack is ready to use, validated with the Glodatech test system, the Comemso mini tester, Trialog test cases, and with existing vehicles. It is currently deployed in DC charging stations in France, and under deployement into charging stations by a australian manufacturer.

The interoperability with the following EVs has been covered using a test environment: Mitsubishu Outland, Nissan NV200, Nissan Leaf, Peugeot Ion and Tesla Model S (with adapter).
From Trialog knowledge, this covers most CHAdeMO vehicles in Europe.

# Interopperability

YaCHA is ready to use and already deployed by many manufacturers:

- Deployed in aproximatively **1000 DC stations** in France by **2 manufacturers**
  - Maybe more since we do not have access to all numbers
- Currently under integration and deployment by **1 more manufacturer** in Australia with a focus on the V2H feature
- Deployed in 1 **test lab** in France

YaCHA is fully validated:

- **Unit tests** are automatically checking every new YaCHA release **conformance** according to **CHAdeMO official "Protocol Check Sheet"**
- YaCHA has been tested with the **Glodatech test system**
- YaCHA has been tested with the **Comemso mini-tester test system**
- YaCHA has been tested with Trialog's internal test system
- YaCHA is **regularily testing with cars** in the test lab in France

The interoperability with the following EVs has been covered using a test environment:

| Vehicle | CHAdeMO version |
|---------|-----------------|
| Mitsubishu Outlander | 0.9 |
| Nissan Leaf | 0.9  1.2  V2H |
| Nissan NV200 | 1.2  V2H |
| Peugeot Ion | 0.9 |
| Tesla Model S (with adapter) | 0.9 |

From Trialog knowledge, this covers all CHAdeMO vehicles available in Europe.

# Annual subscription

YaCHA is still actively maintained by Trialog to:

- fix eventual remaining bugs
- test with new electric vehicle models to increase interoperability coverage
- facilitate the usage or the compilation of the stacks
- ensure the correct behaviour regarding the current consensus of the normative group and CHAdeMO users.

**Access to releases**

In order to provide access to corrective and evolutive updates of YaCHA (based on the features listed in the YaCHA datasheet), Trialog is proposing this annual release subscription including:

- Access to corrective releases of YaCHA
- Access to evolutive releases of YaCHA

Trialog will deliver at least **one main release per year** to deploy enhancement of existing features (same feature basis), interoperability updates and fix remaining bugs that might have been detected.

Trialog can share its internal previsional roadmap but does not garanty any delivery planning in the scope of this annual subscription. A dedicated contract can be defined to adapt this roadmap to your company requirements.

### Access to Trialog's hotline

In addition to the access of these releases, this subscription also offers access to Trialog's hotline through an online ticketing system. Your company will have the opportunity to notify Trialog about any issues encountered with the stack. Analysis, demonstration, documentation and steps to reproduce the issue shall be provided by the integrator of the stack. In case Trialog cannot reproduce the specific case of your company, you shall provide means to reproduce it.

Once an issue is properly identified, reproduced and confirmed, the subscription offers access to:

- Blocking bug: fix or patch under 60 working days
- Non-blocking bug: fix under 100 working days
- Minor bug: fix for the next main annual release at least

The definitions below are required to fully understand the scope of the warranty:

| Blocking bug | Bug that "prevents starting a charging session", "prevents finishing a charging session", "prevents unlocking charge plug on EVSE side (if not attached)" or "prevent to perform a power transfer" without any possible workaround. |
|---|---|
| Non-blocking bug | Bug that "prevents to charge at the desired timing or power level". |
| Minor bug | Any other bug not fitting in the 2 cases described above. |
| Fix | A fix is completely eradicating a bug. |
| Patch | A patch provides quick-fix or workaround to a "Blocking bug" in order to make it "Non-blocking bug" or "Minor bug". |

Additionaly to this annual subscription, Trialog can provide a support budget in person.day to provide active support during this analysis phase (detailed investigation, test in labs, etc) and to provide support in general for the integration phase, validation phase and exploitation phase of your solution.

**Activation of the subscription on a yearly basis**

The subscription is done on a yearly basis. The first year of the subscription is already included when buying the stack. Subscription for upcoming years is done in the same conditions if done continuously. In case of interruption, paying for the not covered period is necessary to get the update.

This subscription is strongly recommended by Trialog but does not modify the licence rights that can be acquired from Trialog. Your company will be able to continue to fully use the stack without this subscription. However, without subscription, your company will not get access to any release nor Trialog's ticketing system.

# Contact us

*For more information about **YaCHA, the SECC CHAdeMO Communication Stack**,*
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