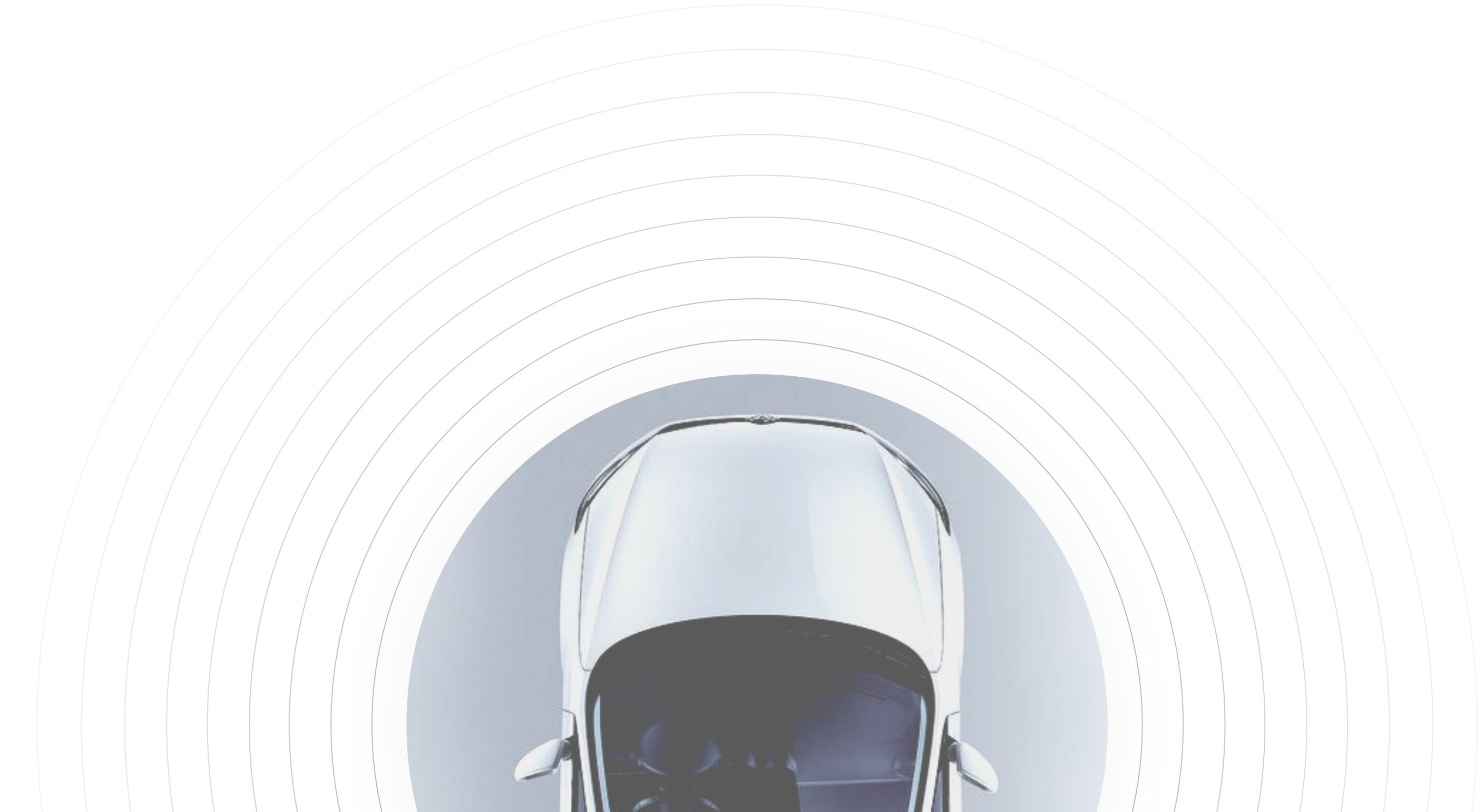


VID

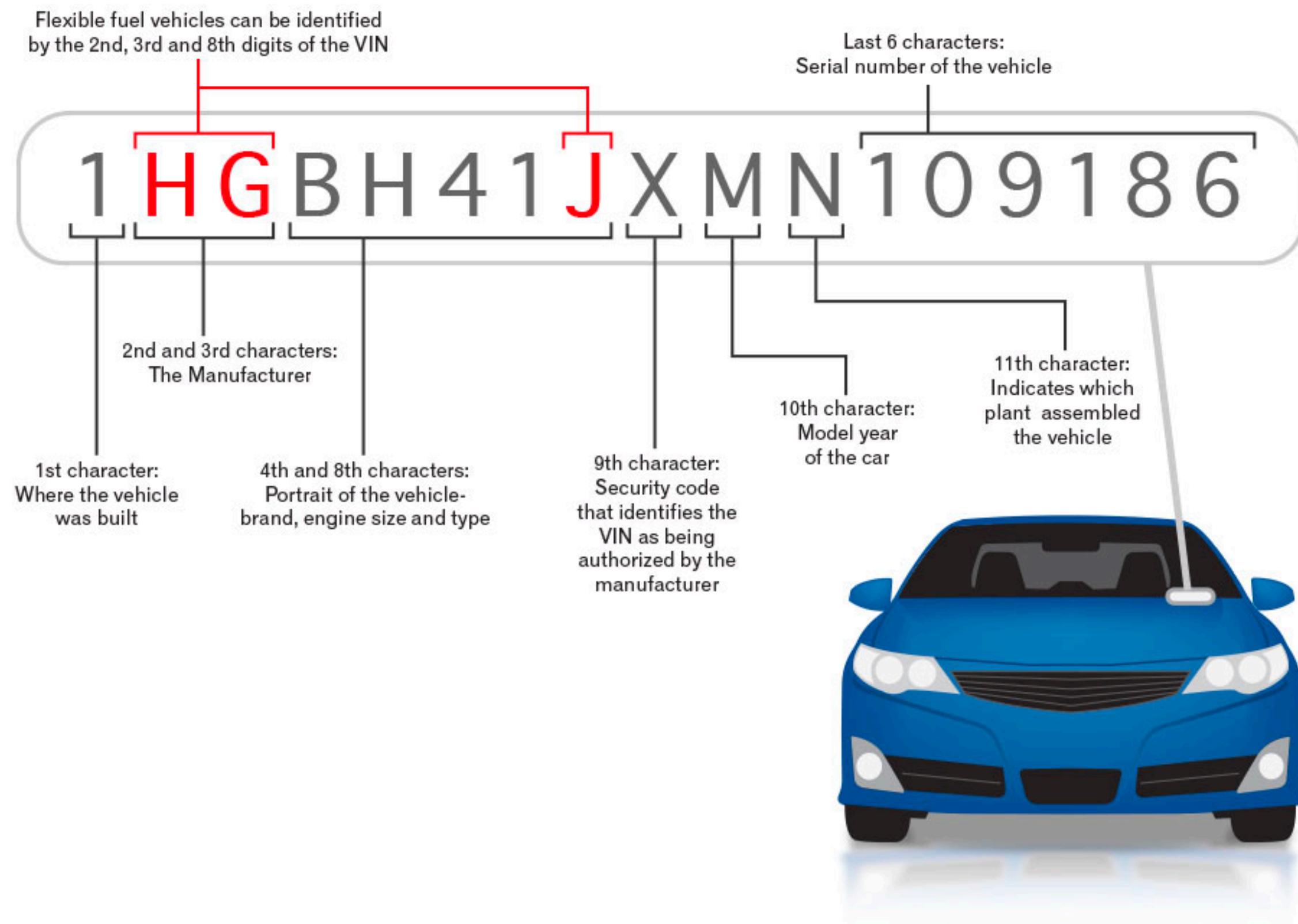
A VEHICLE CREDENTIAL SYSTEM FOR MOBILITY SERVICE AND V2X



00 AGENDA

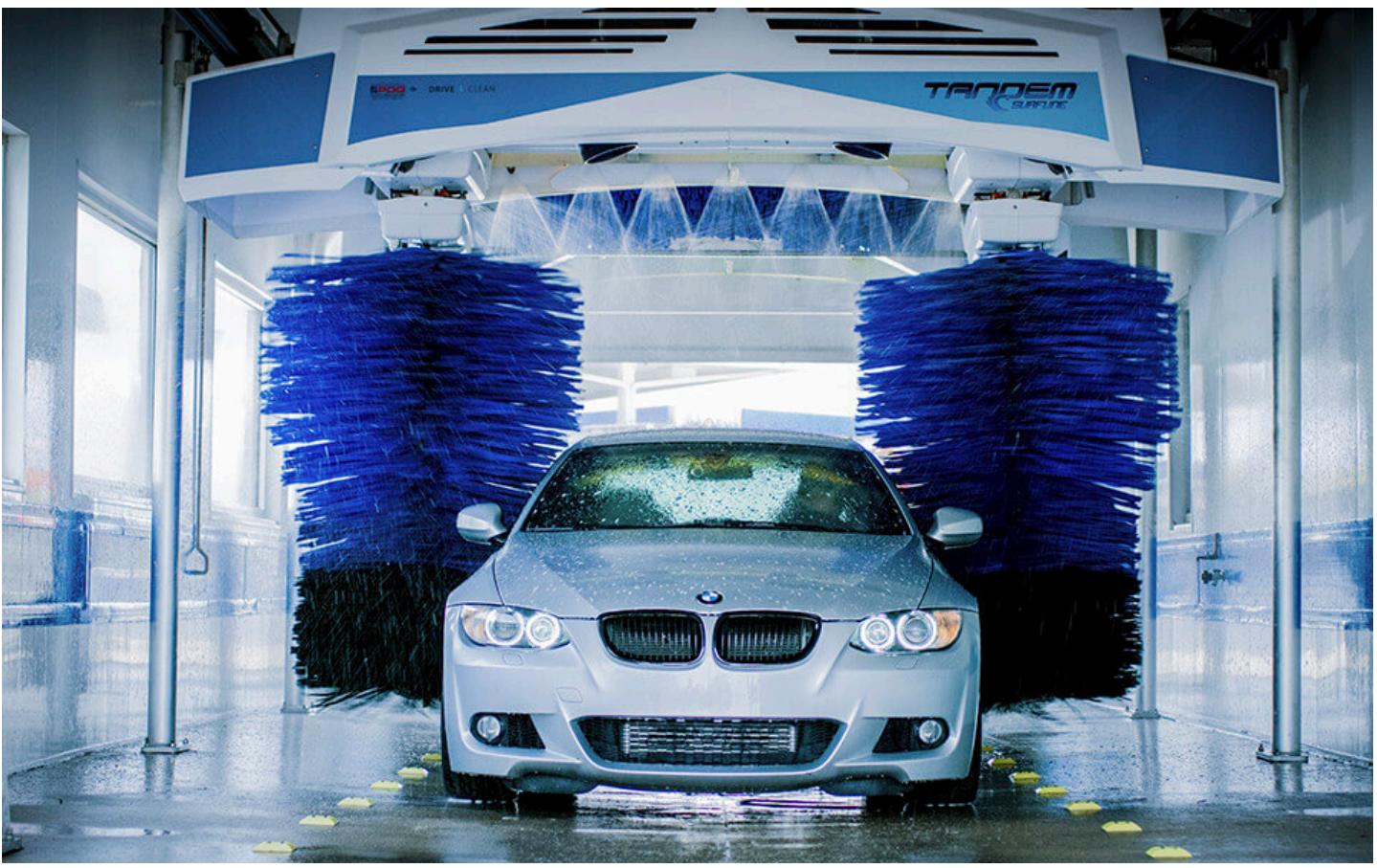
- ▶ Background
- ▶ Proposed Solution
- ▶ Technical Details
- ▶ Demonstration
- ▶ Future Work

01 VEHICLE IDENTIFICATION NUMBER (VIN)



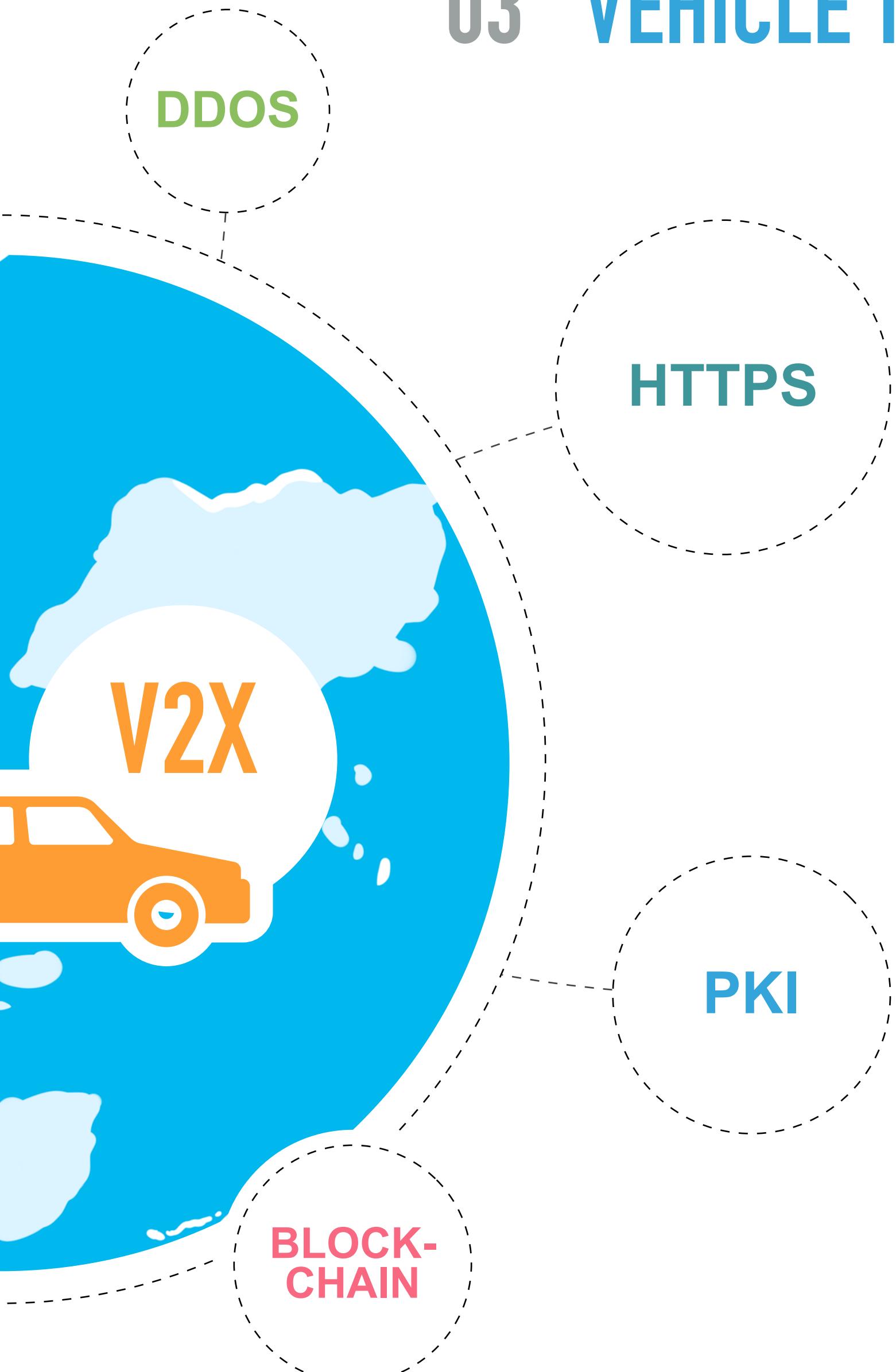
- ▶ A unique code for each car.
- ▶ Drawbacks:
 - *Encoded limited information.*
 - *Require experience to understand it.*
 - *Engraved on car, at risk of being leaked.*
- ▶ Demand: a more **extensible digital ID.**

02 CAR ECOSYSTEM



- ▶ There are numerous services through the life cycle of a car.
 - *Like selling, washing, charging, maintenance, etc.*
- ▶ Drawbacks:
 - *Each service provider holds its own identification system*
 - *No unified verification mechanism*
 - *No universal ID can connect all services*
 - *In most cases, ID has to be verified manually*
- ▶ Demand: A unified **flexible verification method**

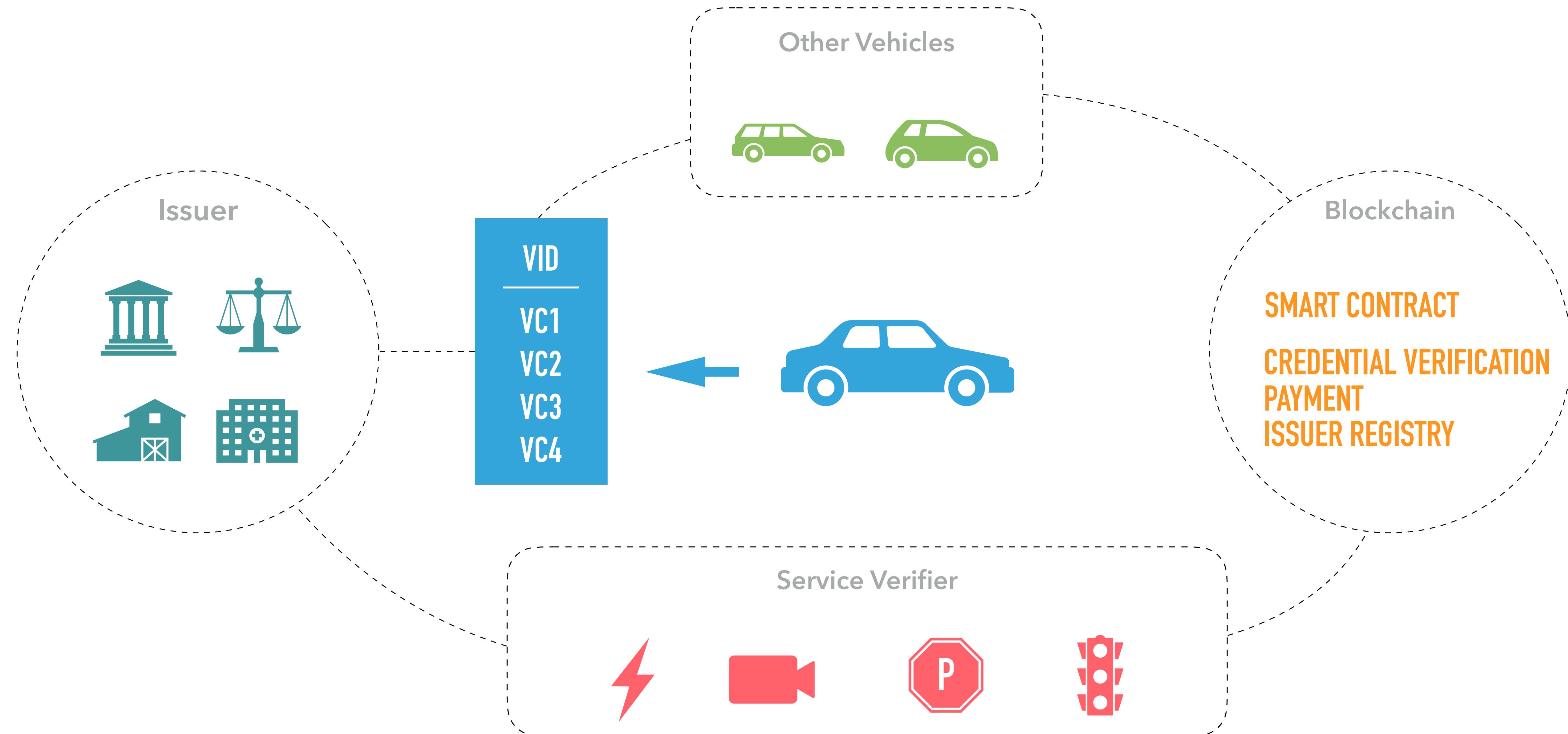
03 VEHICLE TO EVERYTHING (V2X)



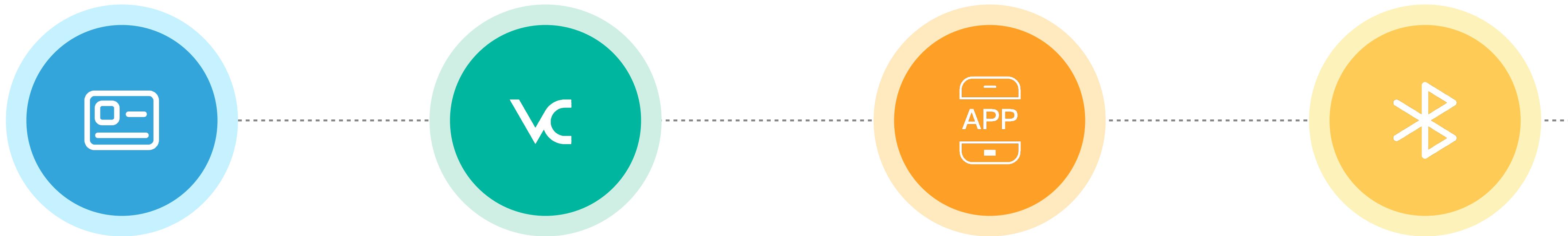
- ▶ V2X is booming for automotive industry, especially in self-driving cars.
- ▶ Critical problems merge:
 - *How could we determine a node is trustable or faulty?*
 - *How to defend DDoS attack?*
- ▶ A good reference is PKI architecture of HTTPS protocol
- ▶ We are inspired to build a decentralized PKI architecture on blockchains

VID OVERVIEW

VID OVERVIEW



VID APPLICATIONS - CHARGER AND 4S STORES



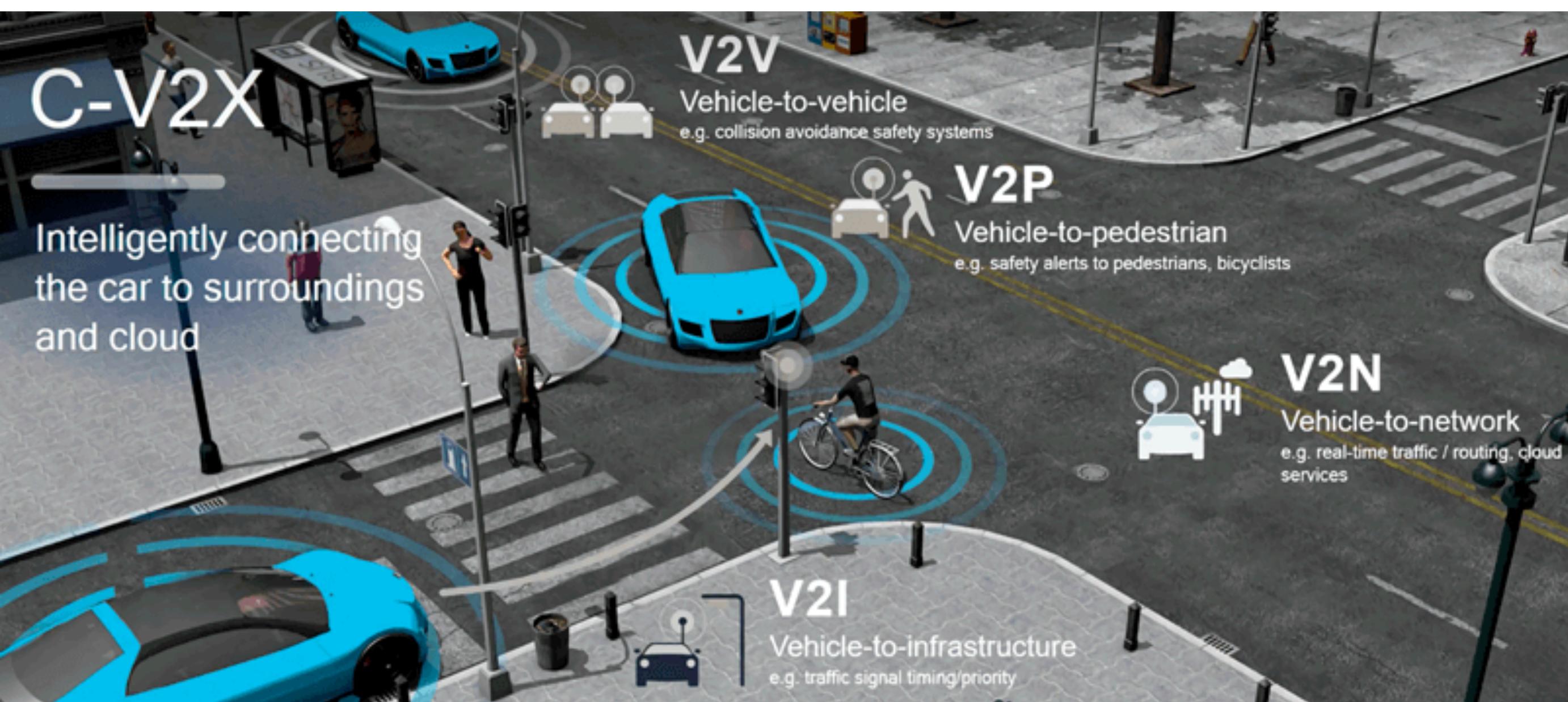
A car, a store, and charger supplier and a charger all have their own ID.

After claiming, the car receives VCs (verifiable credentials) from 4S store and charger supplier.

VC from 4S allows the car have complimentary services in other chain store (via app).

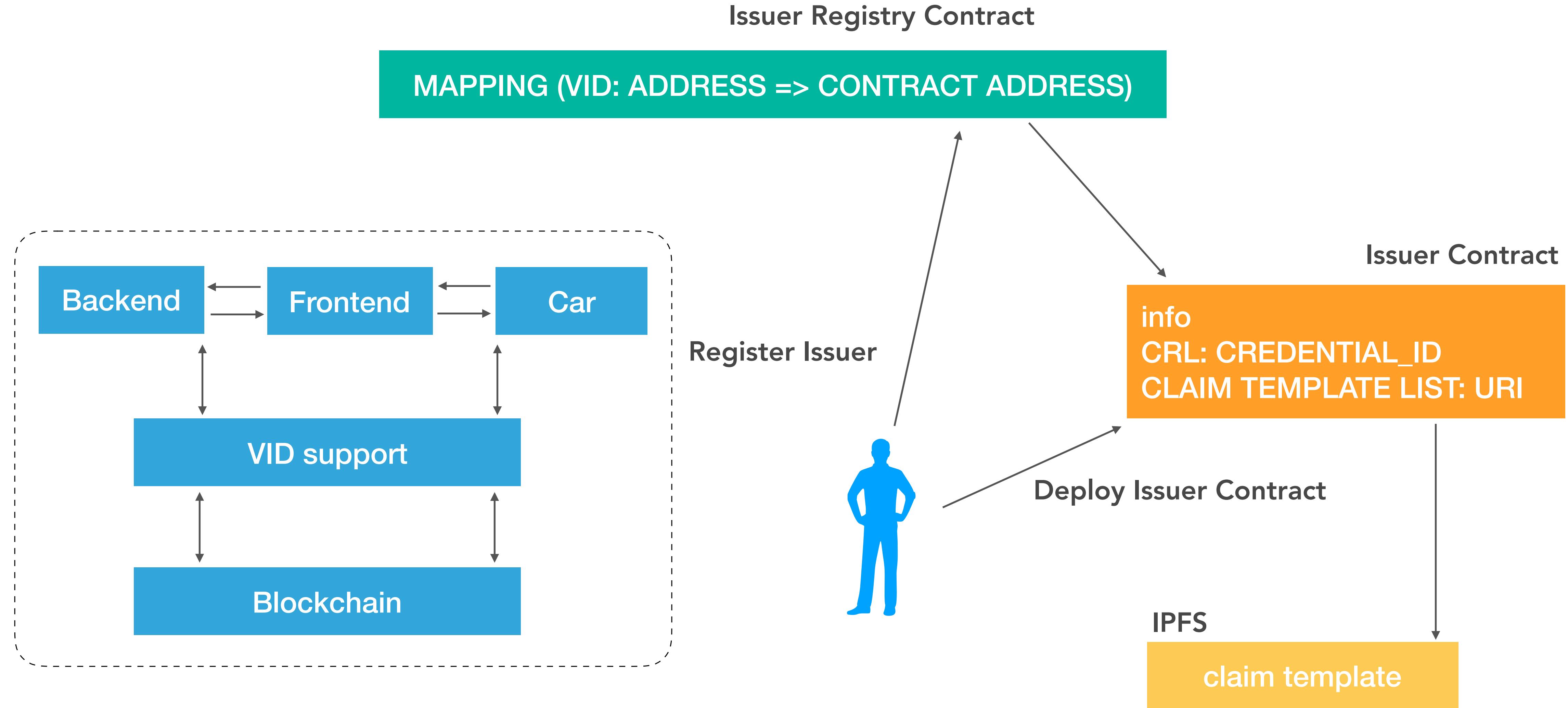
VC from charger supplier allows the car use any authorized chargers (via bluetooth).

VID APPLICATIONS - IN V2X

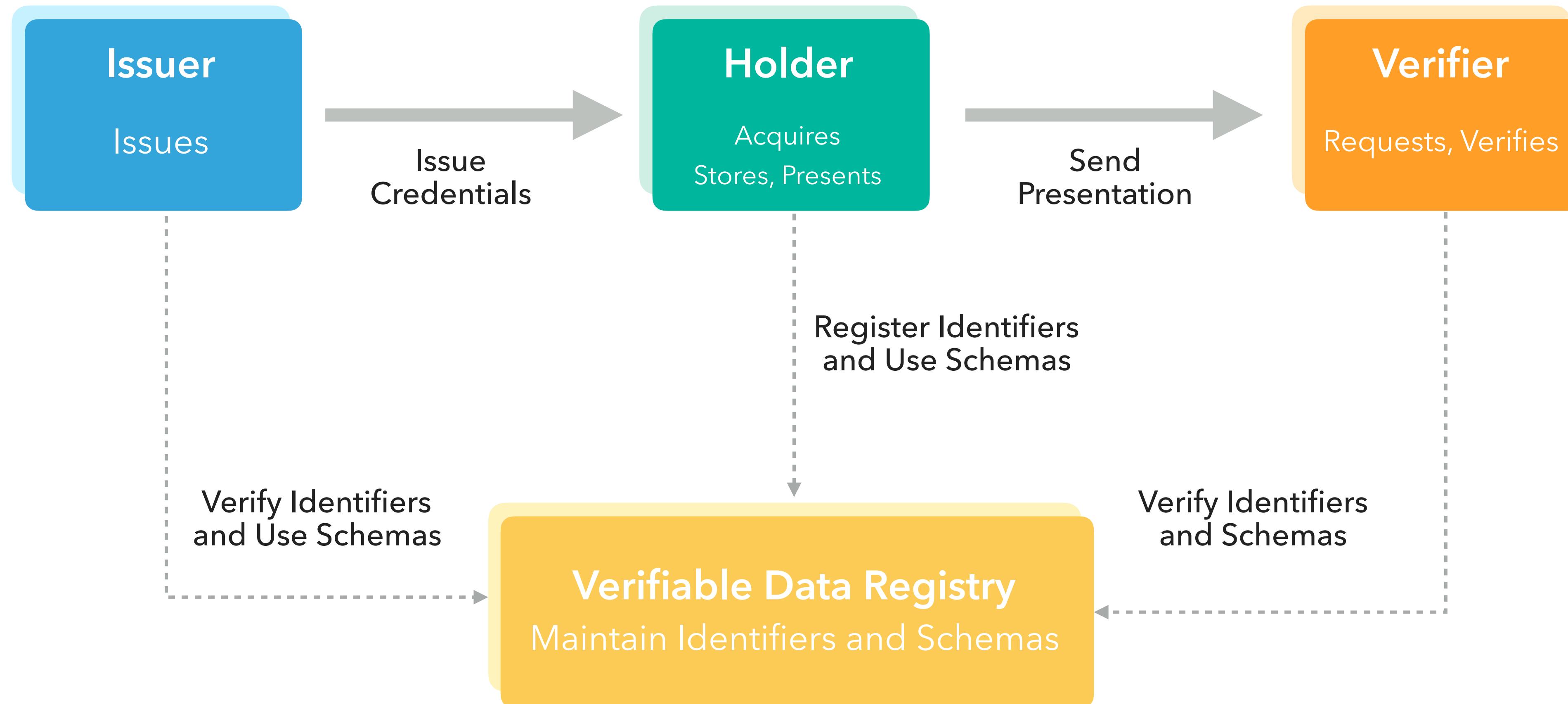


- A V2X supplier issues VC to all trustable identities.
- Among all these identities, V2X connections are feasible without trusted 3rd party.
- The supplier can revoke all VCs of a faulty node.

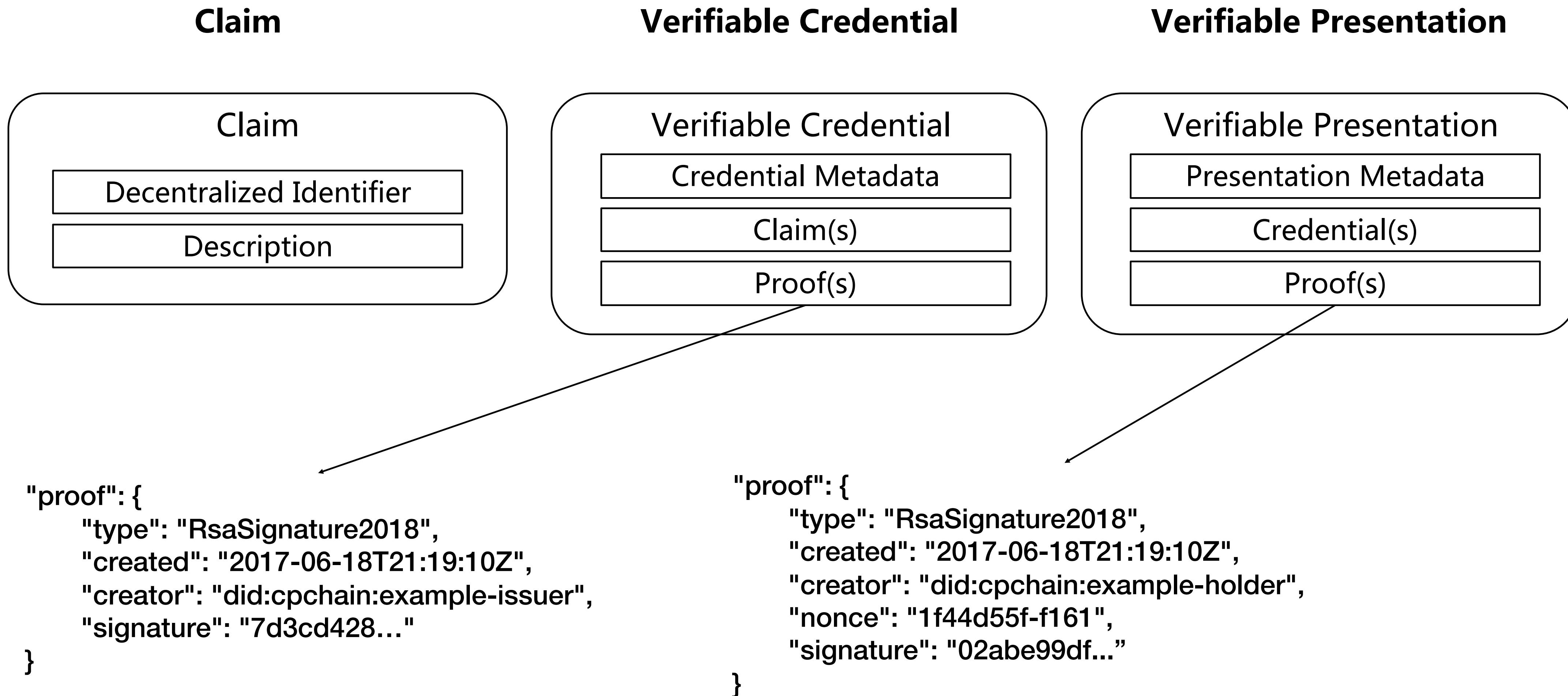
ARCHITECTURE



THREE ROLES

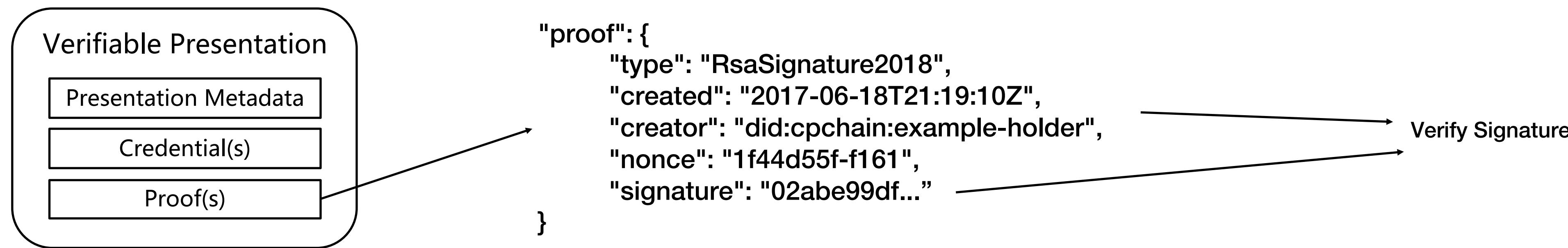


VC-BASED AUTHORIZATION

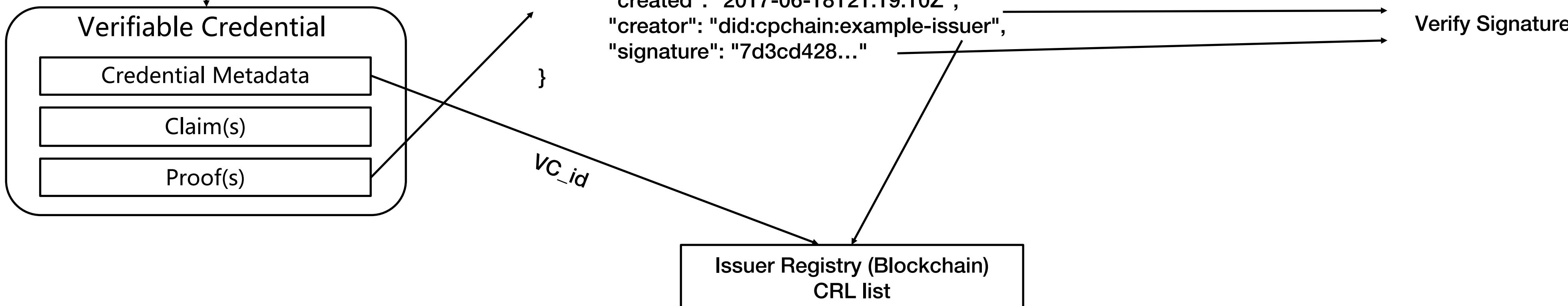


VERIFICATION

1. Authentication

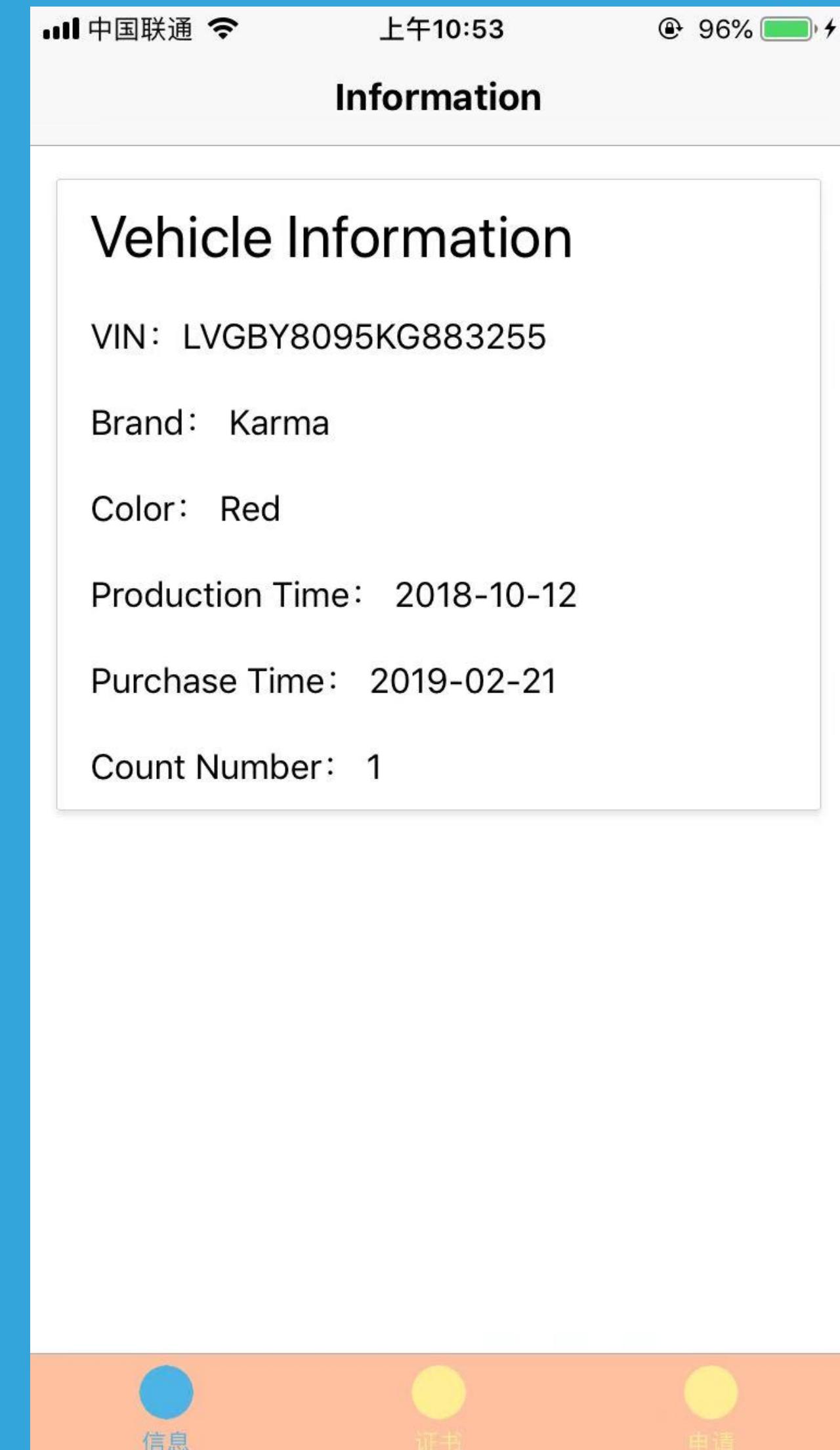
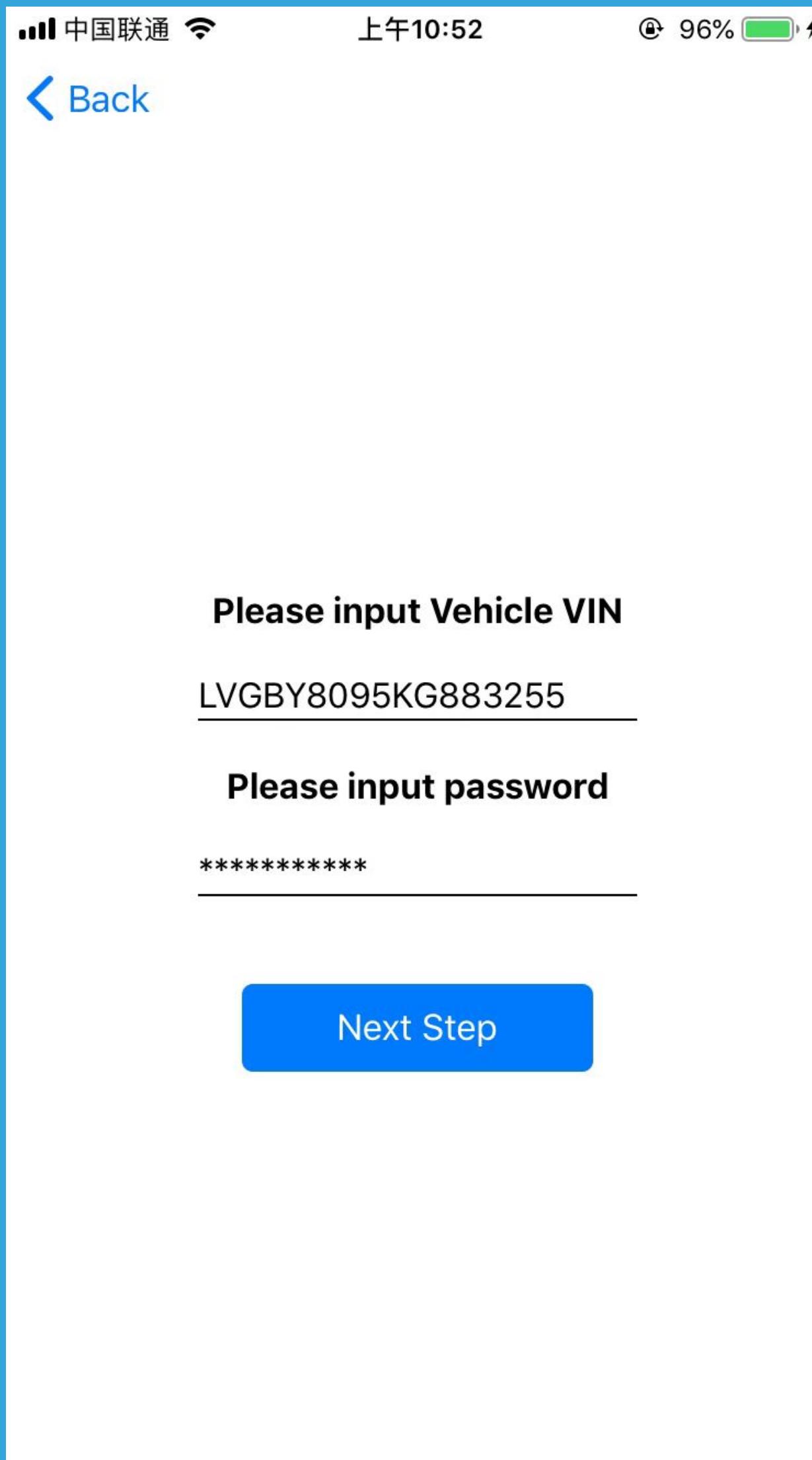
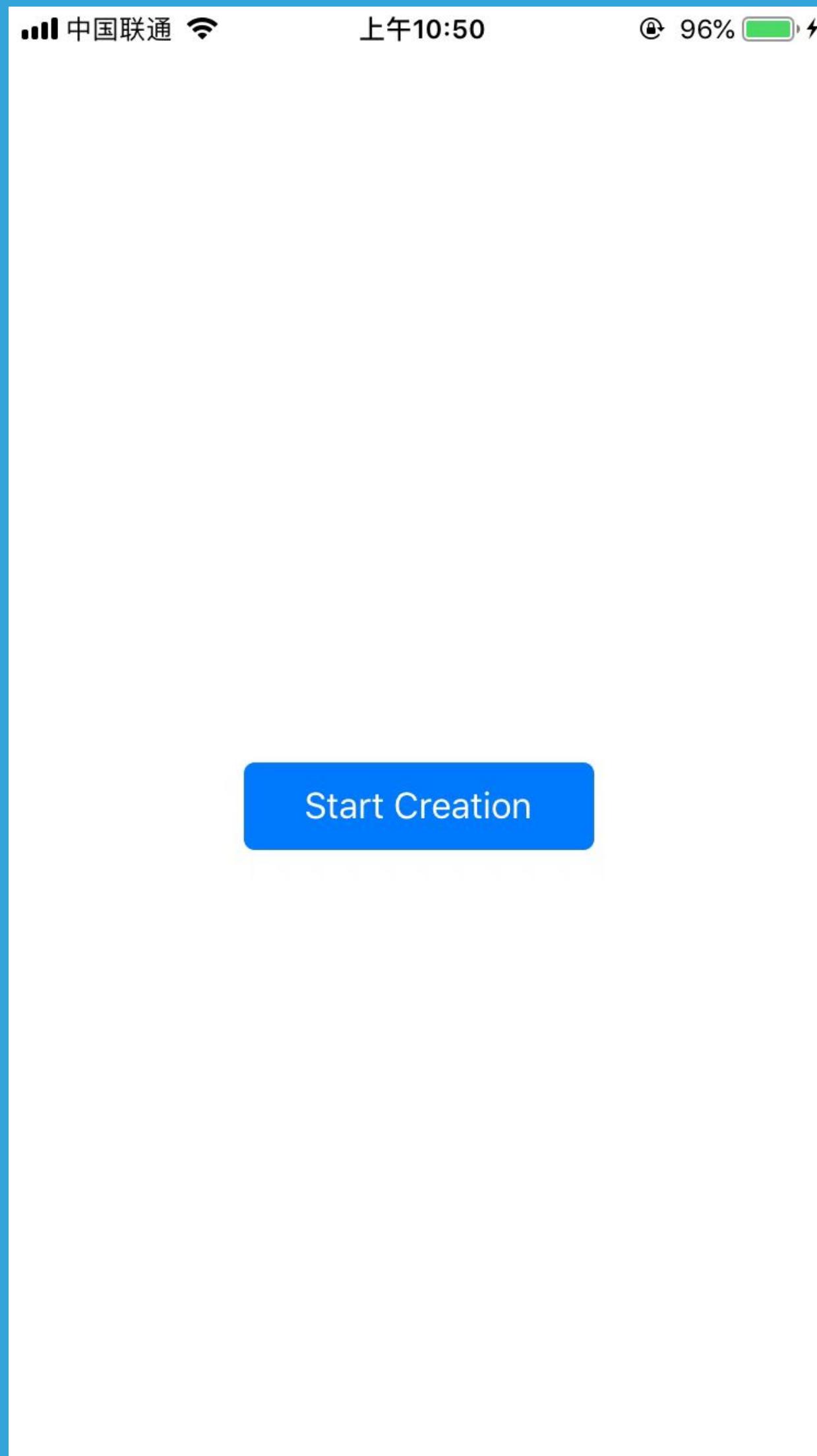


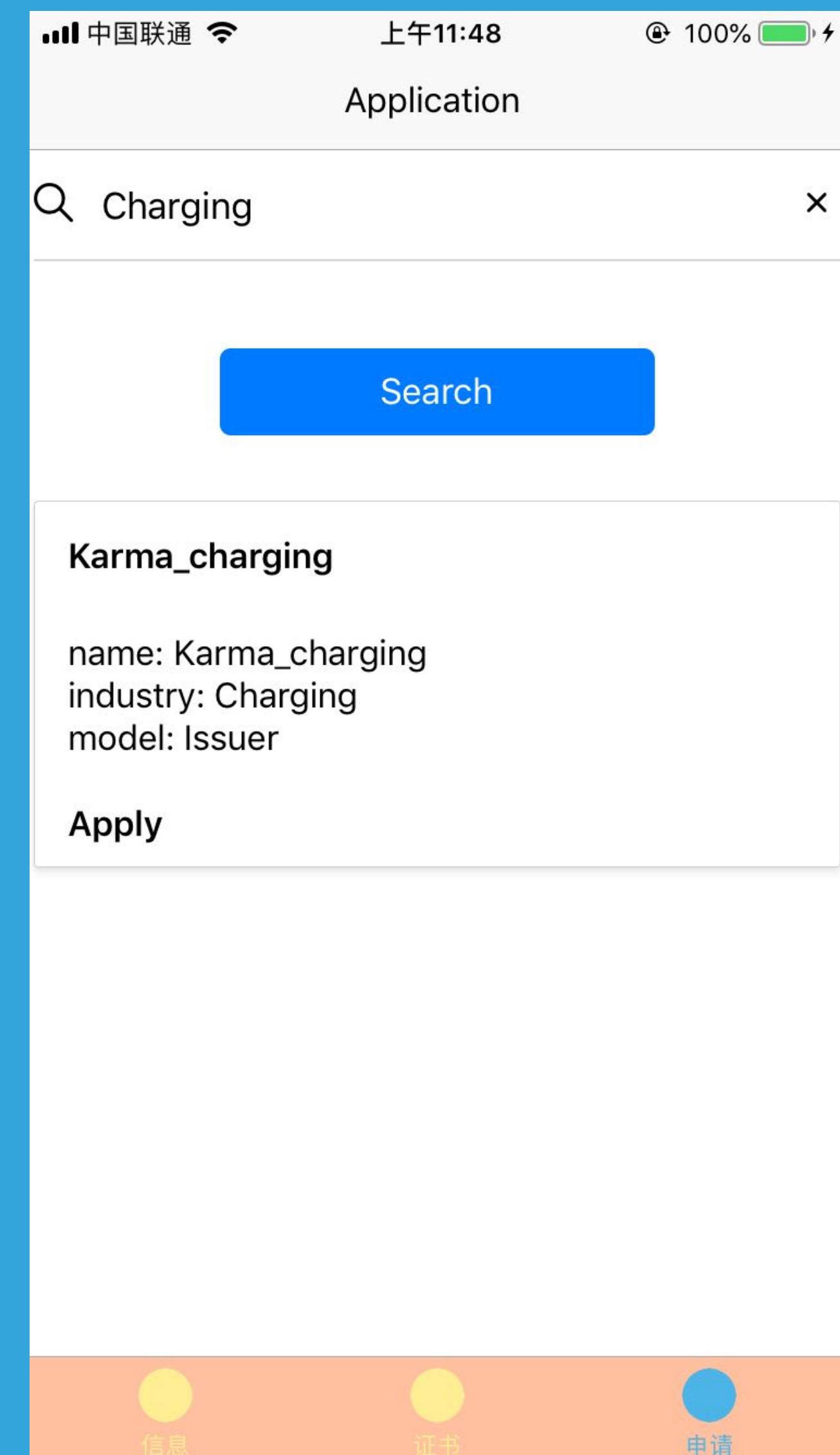
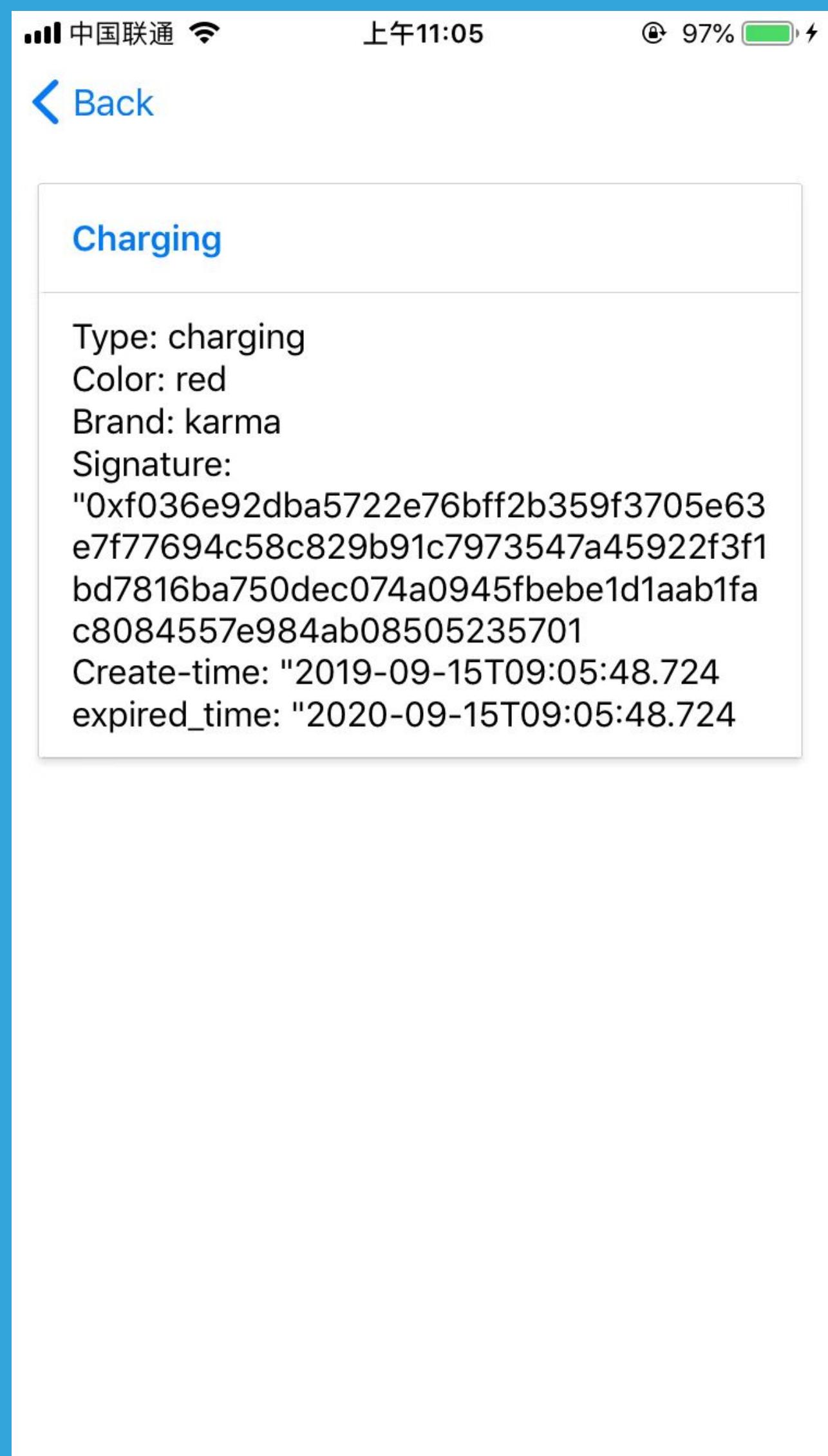
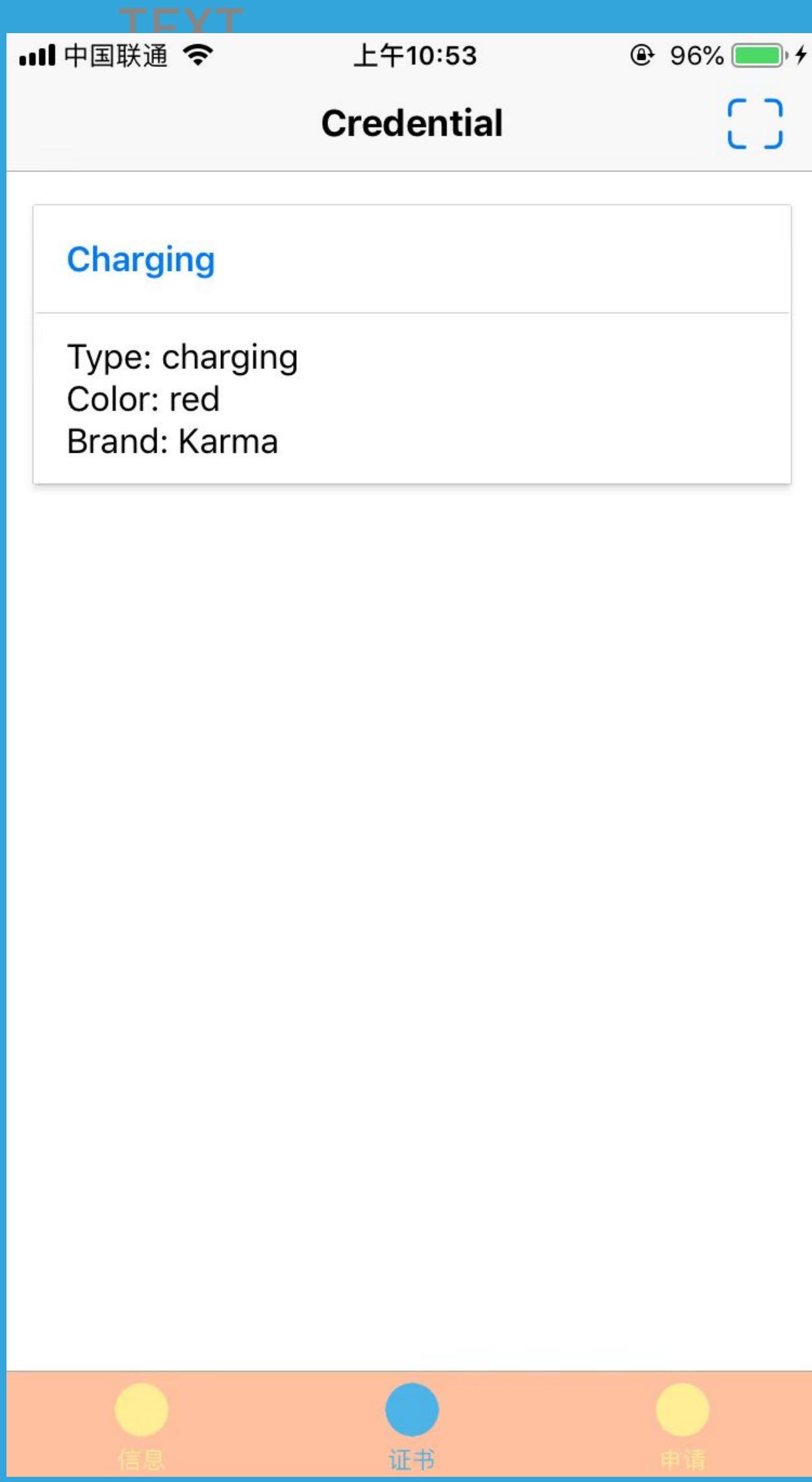
2. Verification



DEMONSTRATION

- ▶ Blockchain: Solidity + Ethereum + Web3.py
- ▶ Backend: Django (Python) + Web3.py
- ▶ Frontend: ClojureScript + ReactNative





FUTURE WORK

- ▶ Vehicle-side integration
 - *Hardware wallet (box)*
 - *Vehicle-side application*
- ▶ Multiple signature algorithms support
 - *ECDSA (supported)*
 - *RSA, SM2, etc.*
- ▶ Multiple chain support
 - *An extra layer for universal VID resolver*

TEXT

Q&A

THANKS!