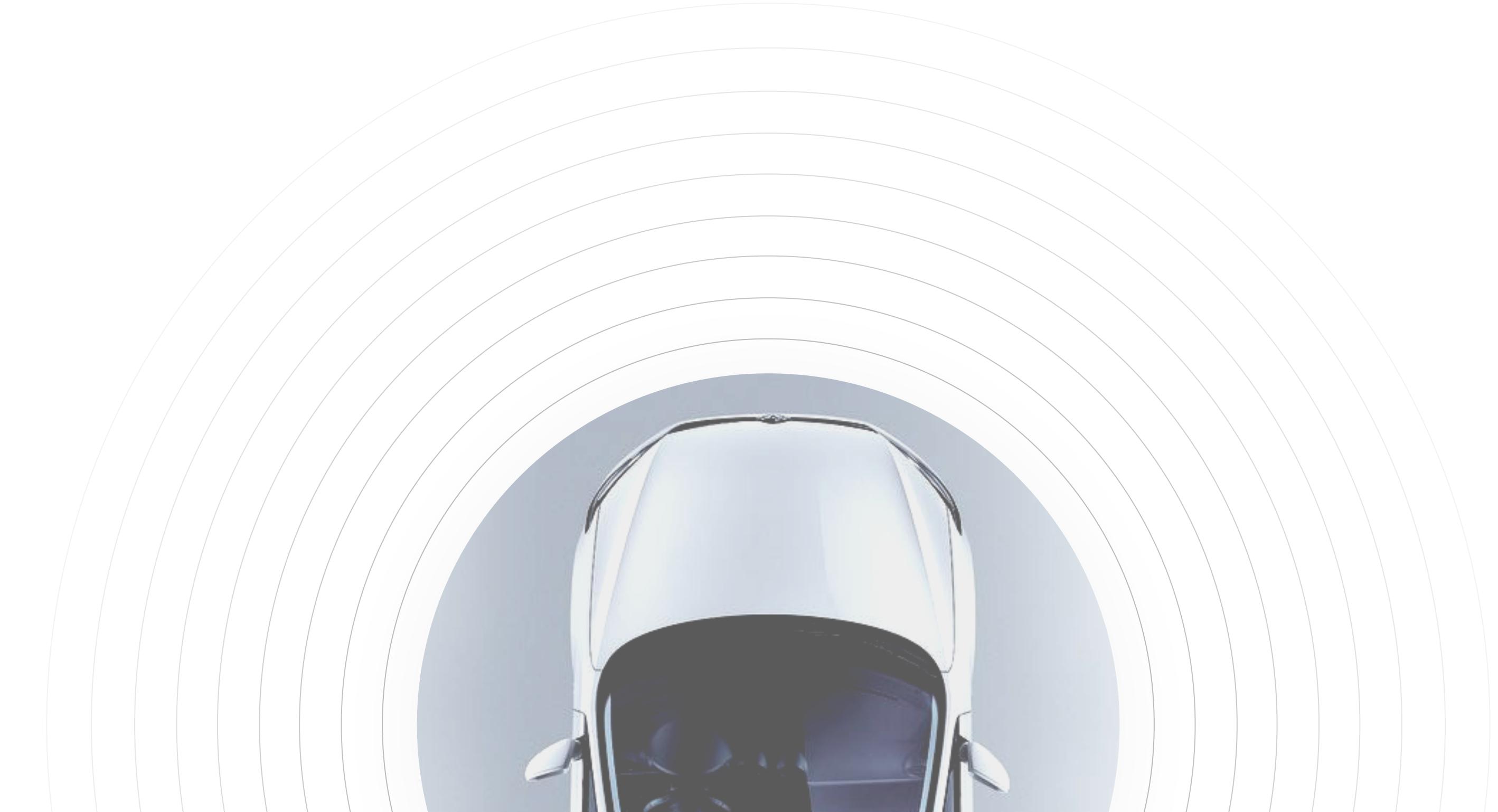


VID

A VEHICLE CREDENTIAL SYSTEM FOR VERIFYING NODES IN MOBILITY

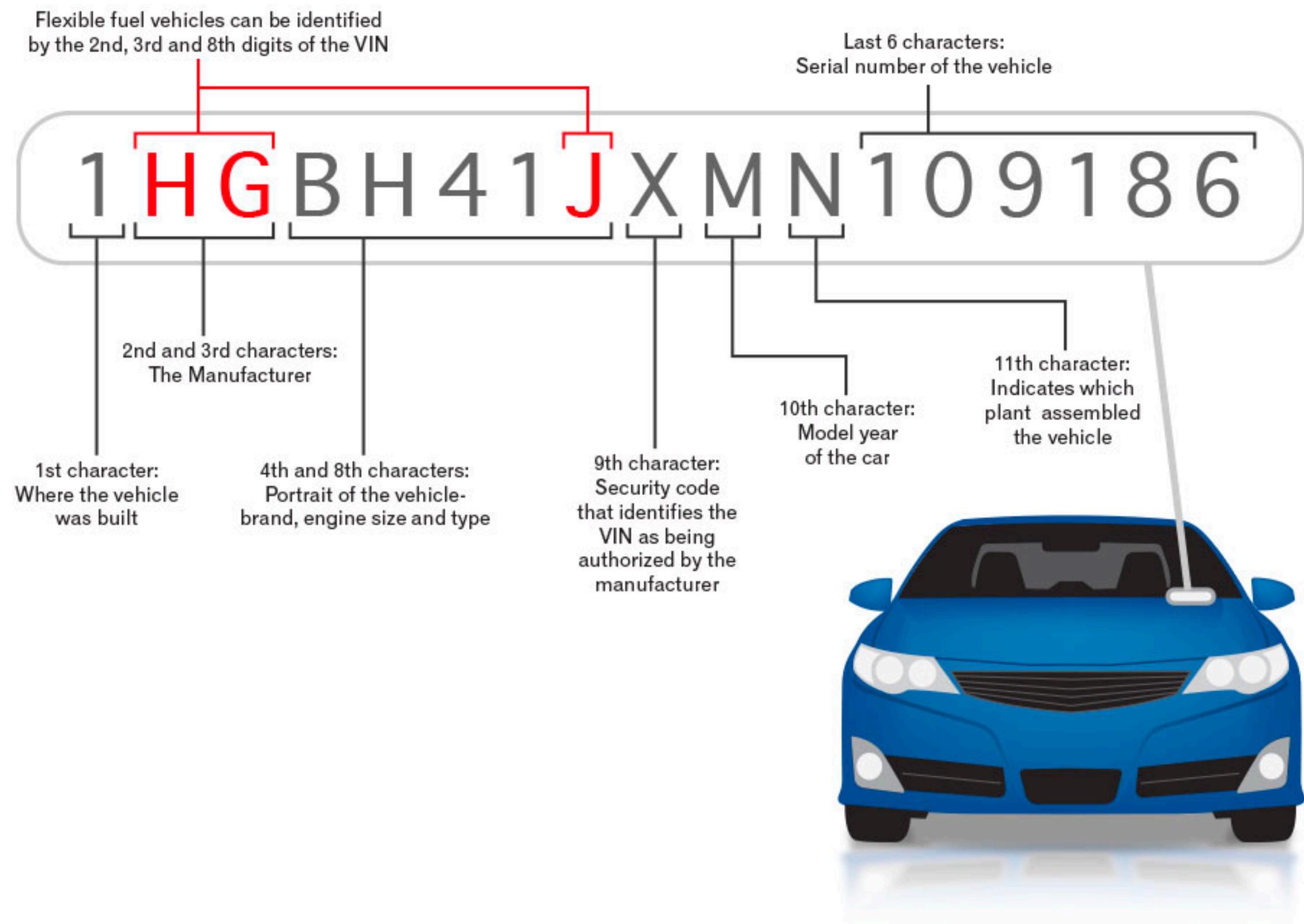


00 AGENDA

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

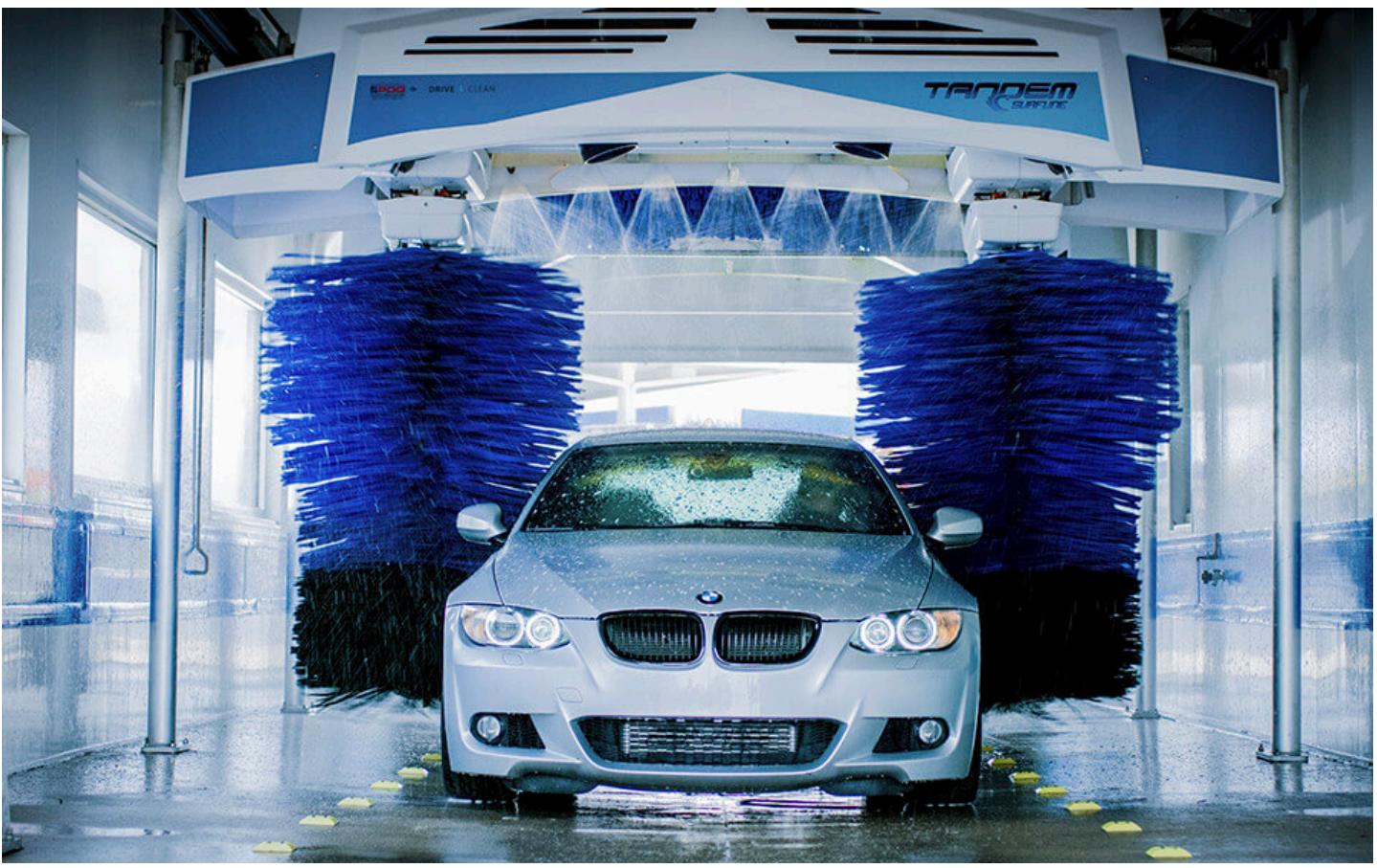
THREE SCENARIOS

01 VEHICLE IDENTIFICATION NUMBER (VIN)



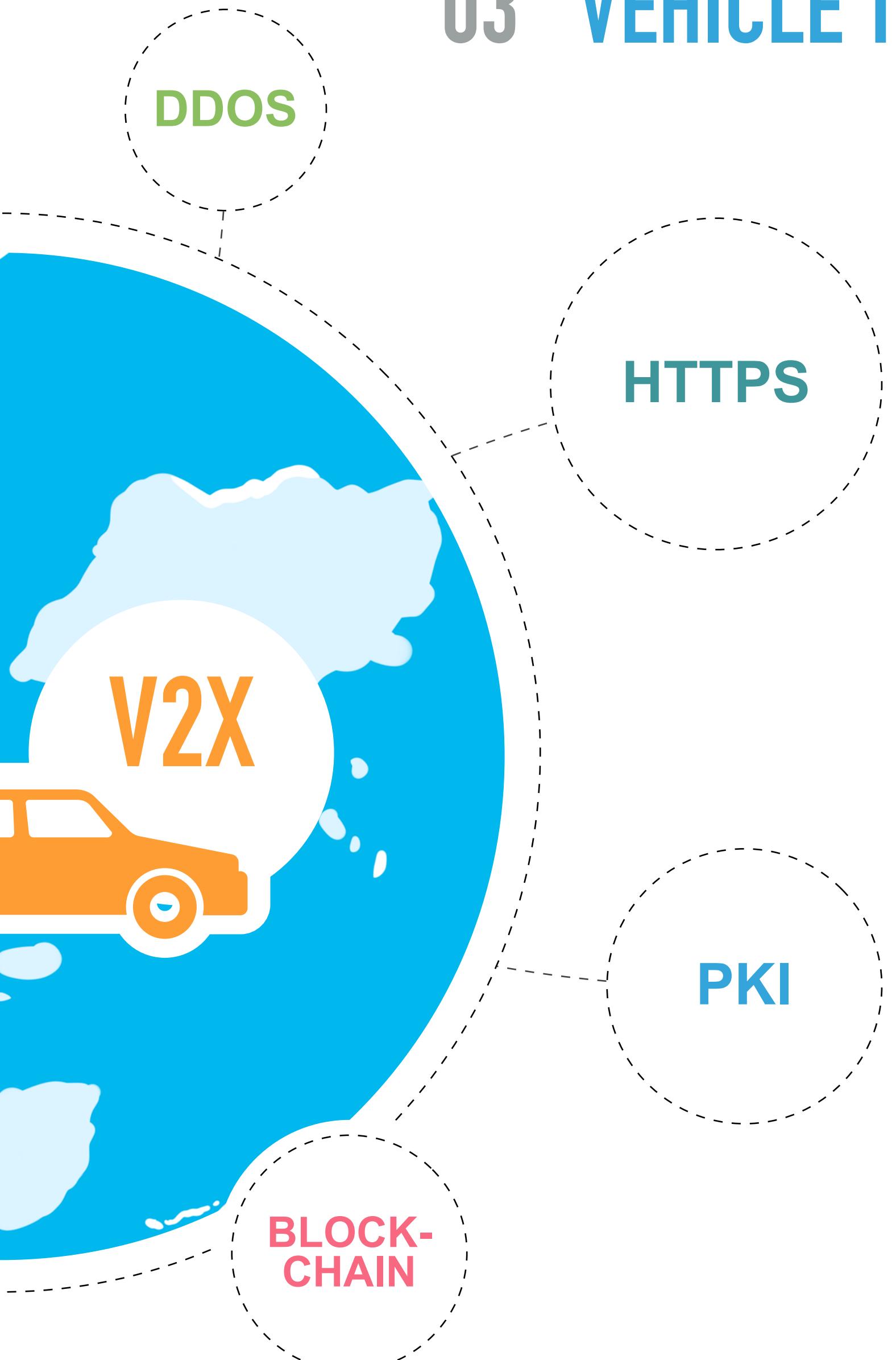
- ▶ A unique code for each car.
- ▶ Drawbacks:
 - *Encrypted limit information.*
 - *Require experience to understand it.*
 - *Engraved car, at risk of being leaked.*
- ▶ Demand: a more **extensible digital ID.**

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**

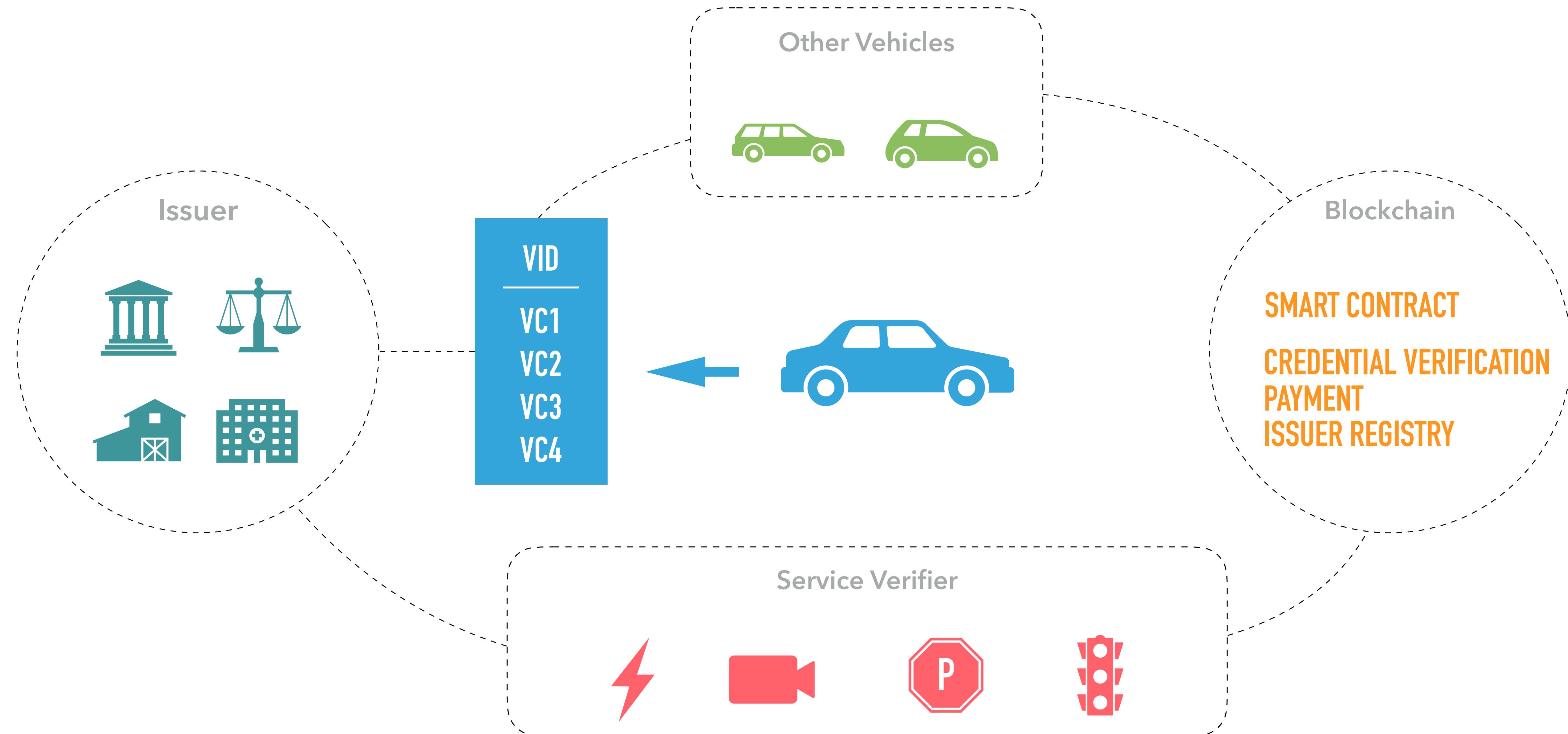
03 VEHICLE TO EVERYTHING (V2X)



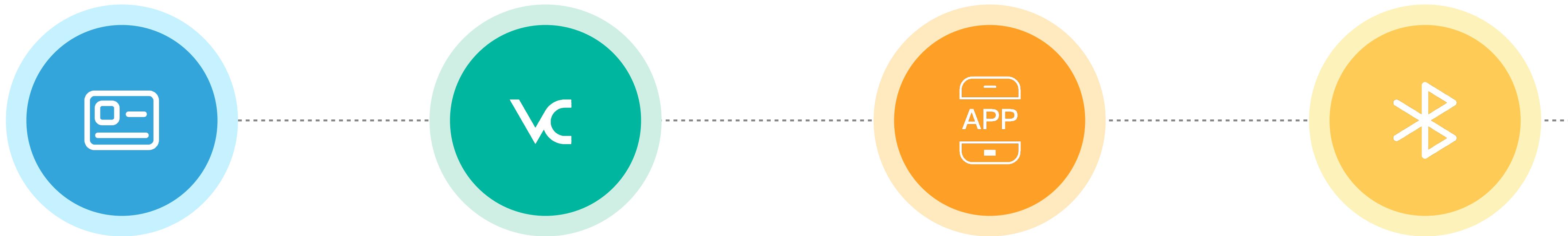
- ▶ V2X is booming for automotive industry, especially in self-driving cars.
- ▶ Critical problems merge:
 - *How could we determine a node is trustable or faulty?*
 - *How to defend DDoS attack?*
- ▶ A good reference is PKI architecture of HTTPS protocol
- ▶ We are inspired to build a decentralized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

VID OVERVIEW

VID OVERVIEW



VID APPLICATIONS - CHARGER AND 4S STORES



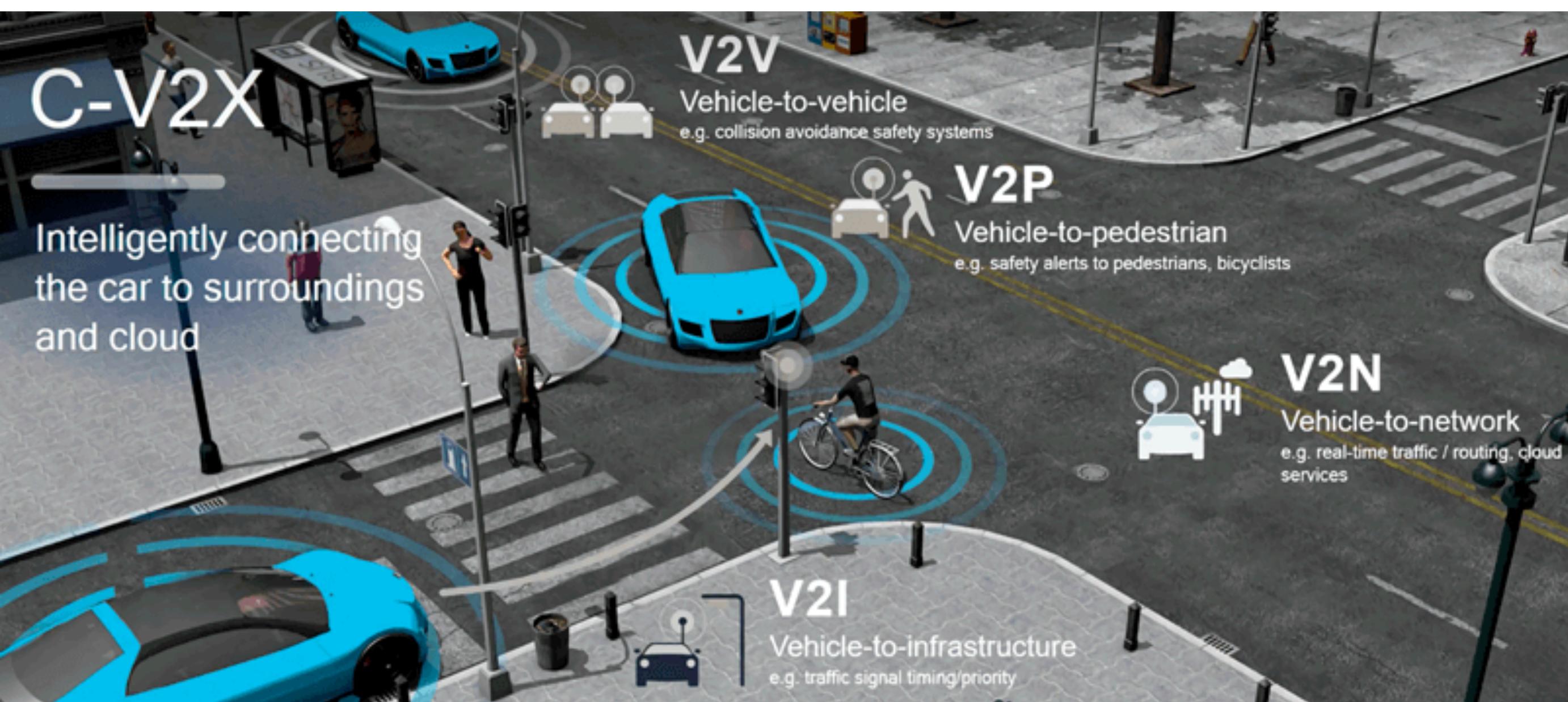
A car, a store, and charger supplier and a charger all have their own DID.

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).

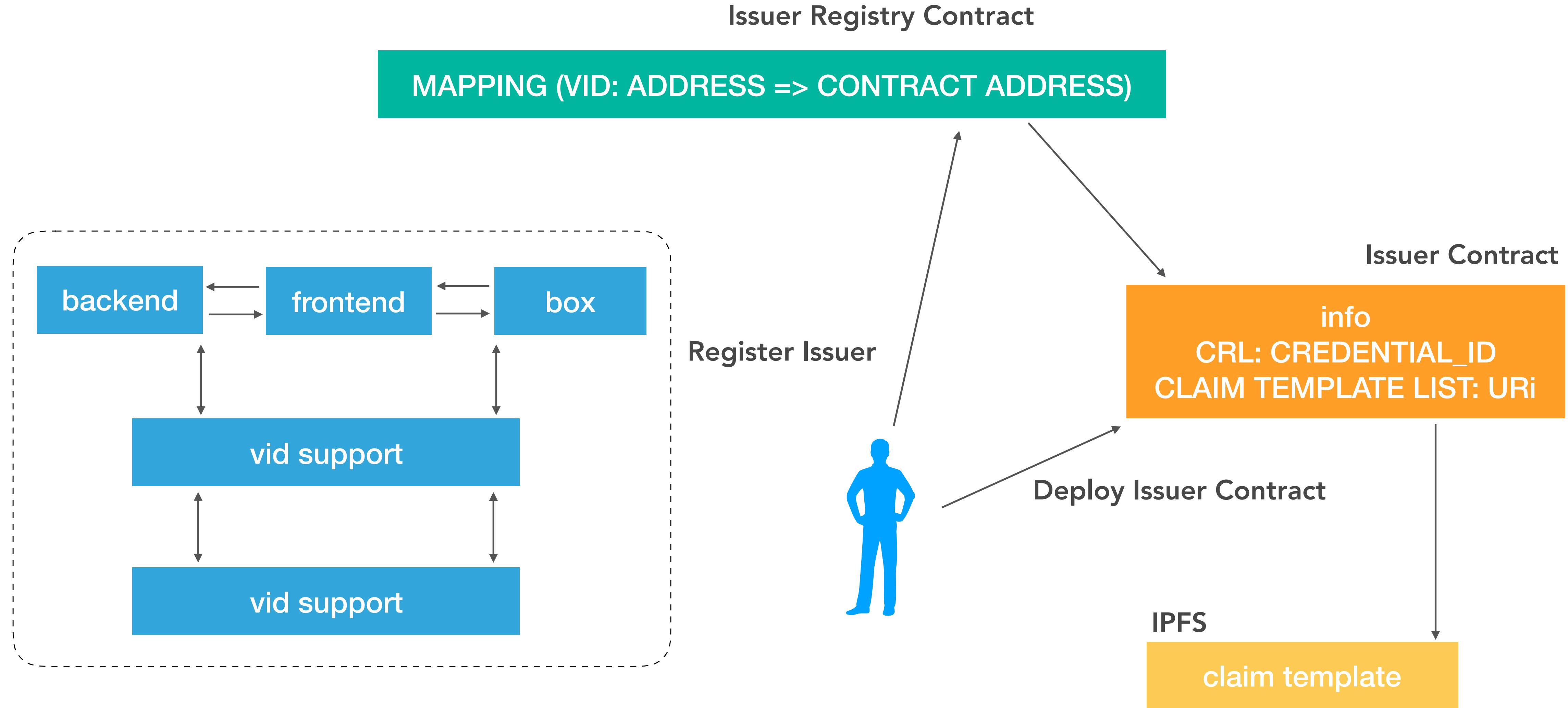
VC from charger supplier allows the car use any authorized chargers (via bluetooth).

VID APPLICATIONS - IN V2X

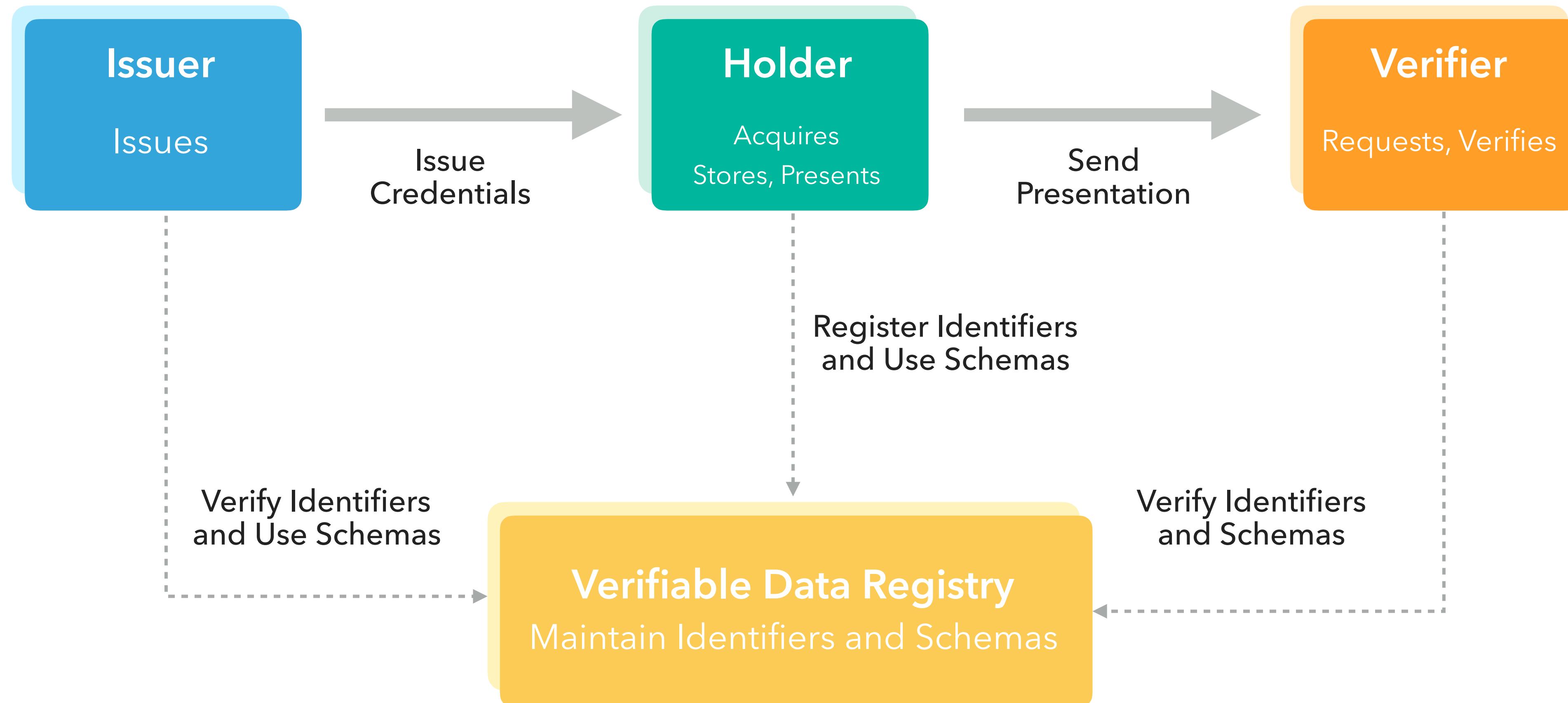


- A V2X supplier issues VC to all trustable identities.
- Among all these identities, V2X connections are feasible without trust issue.
- The supplier can deprive all VC of a faulty node.

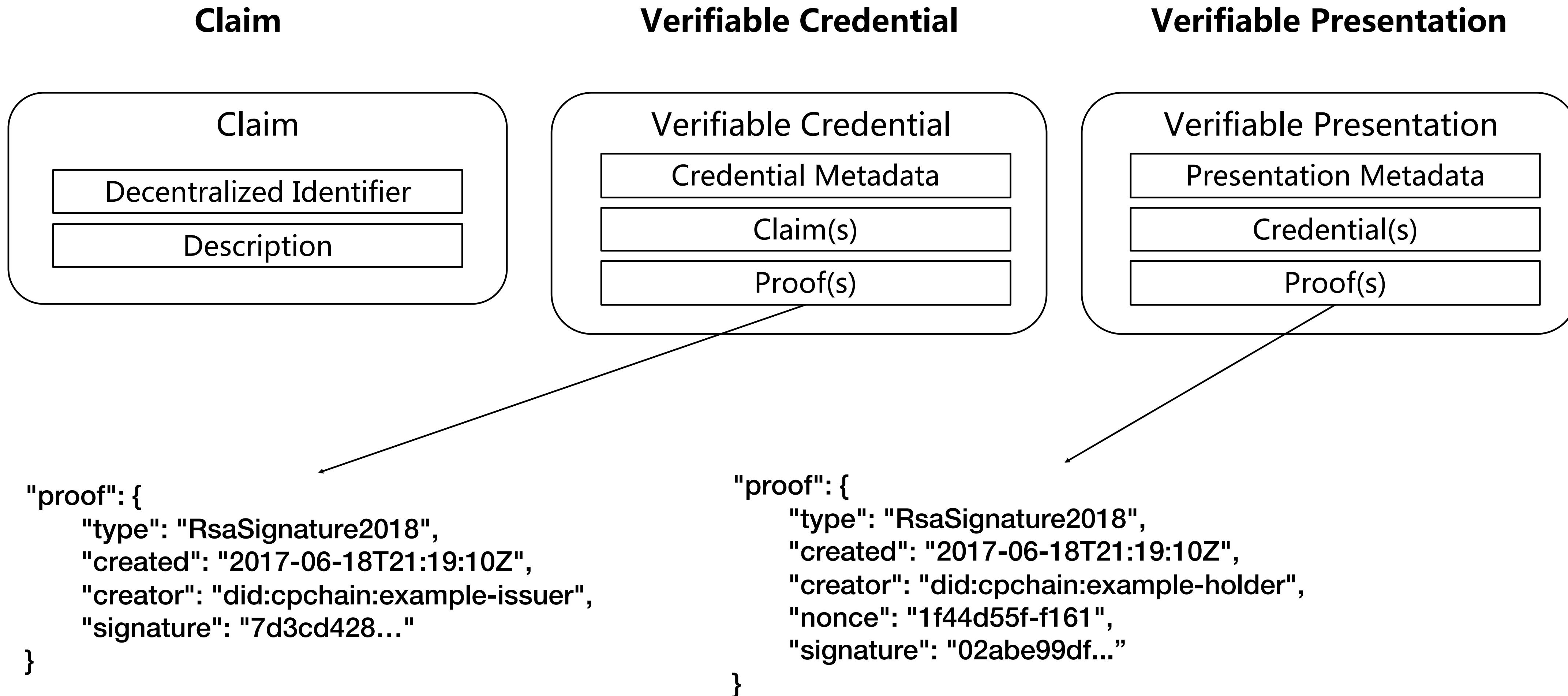
ARCHITECTURE



THREE ROLES

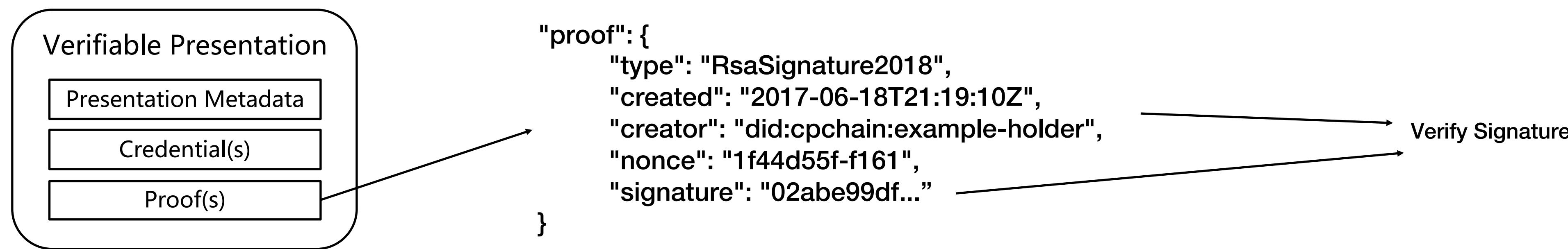


VC-BASED AUTHORIZATION

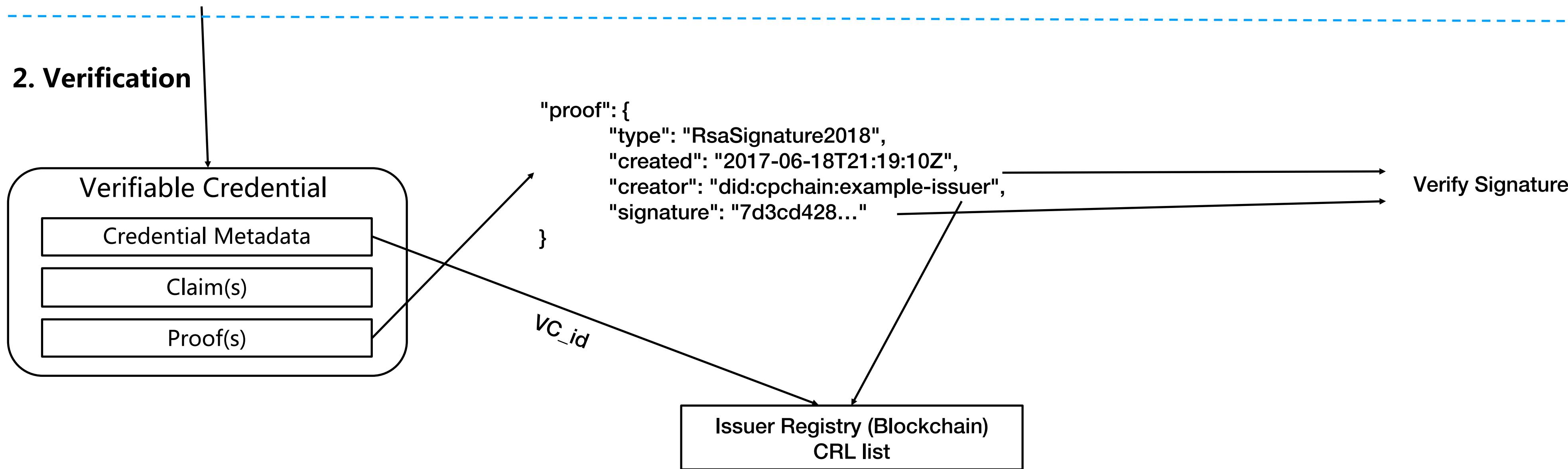


VERIFICATION

1. Authentication

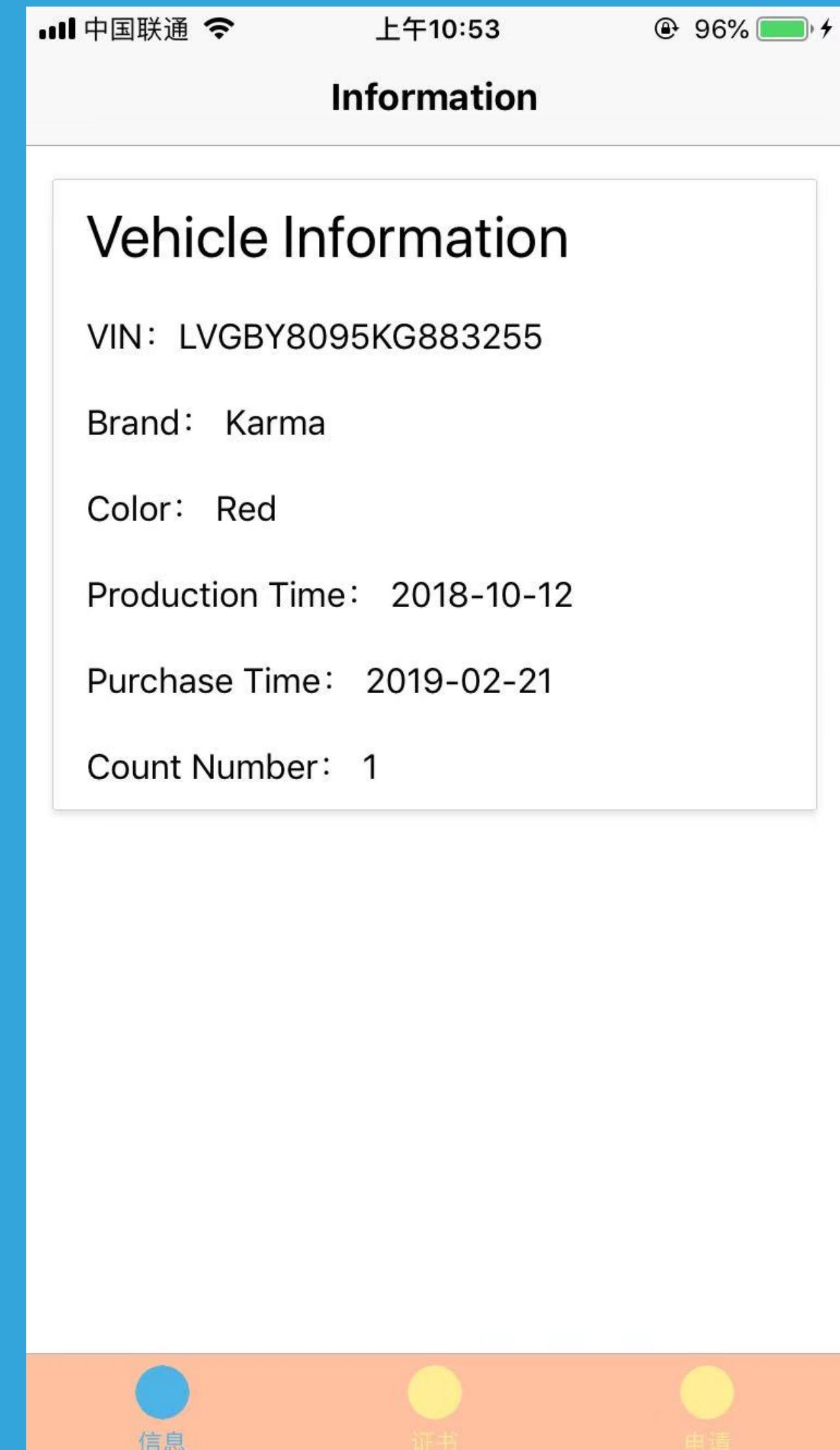
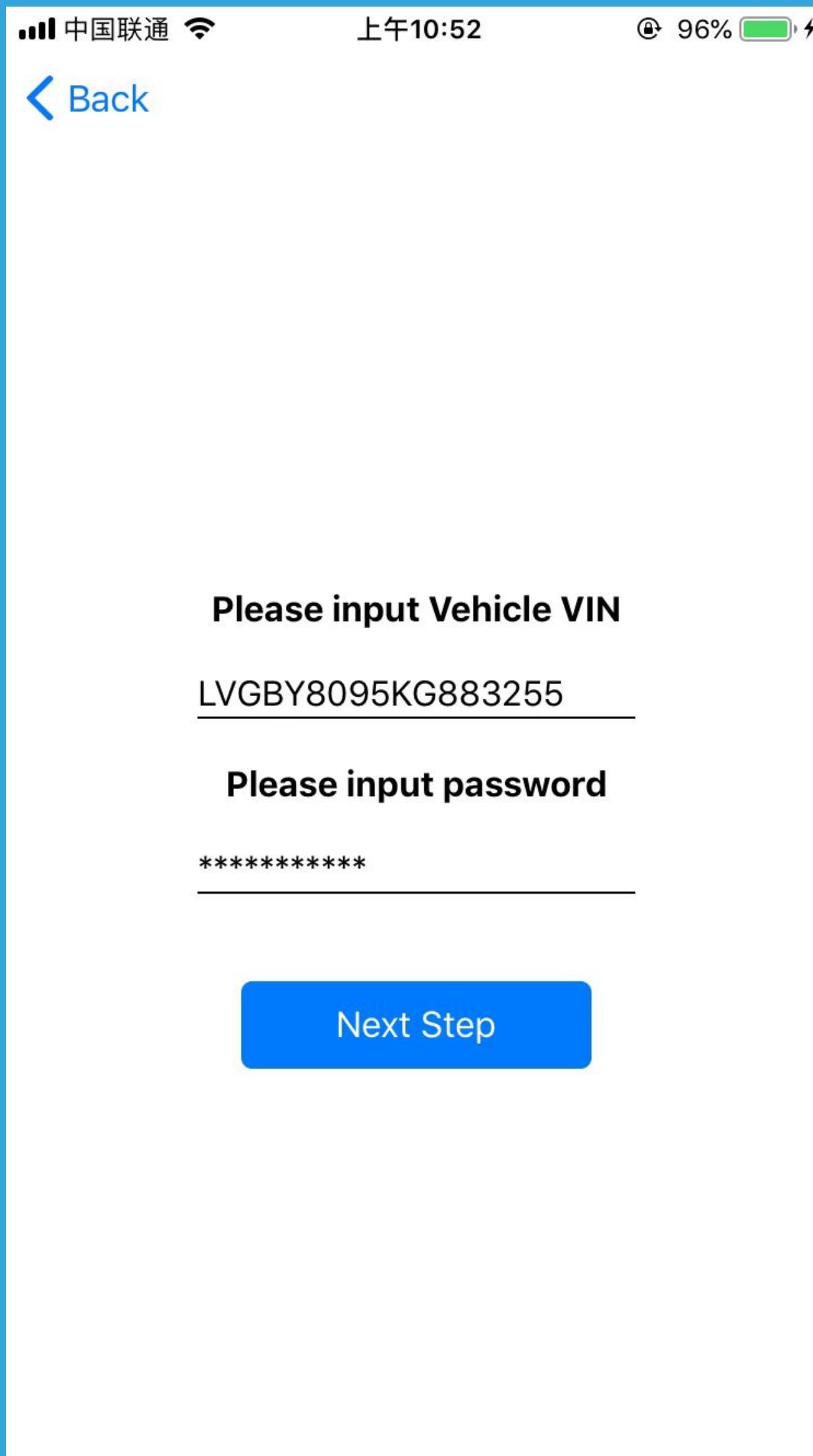
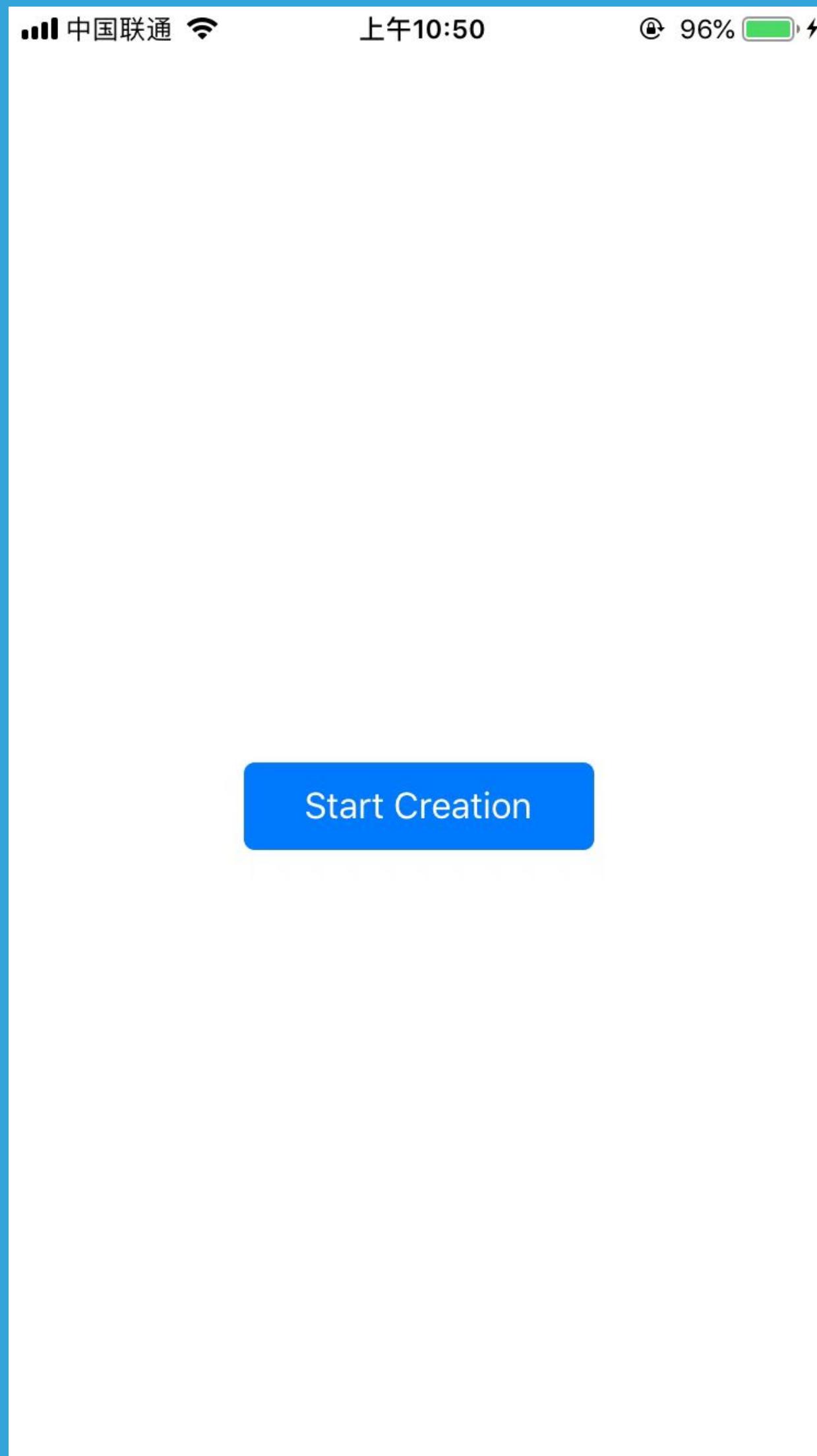


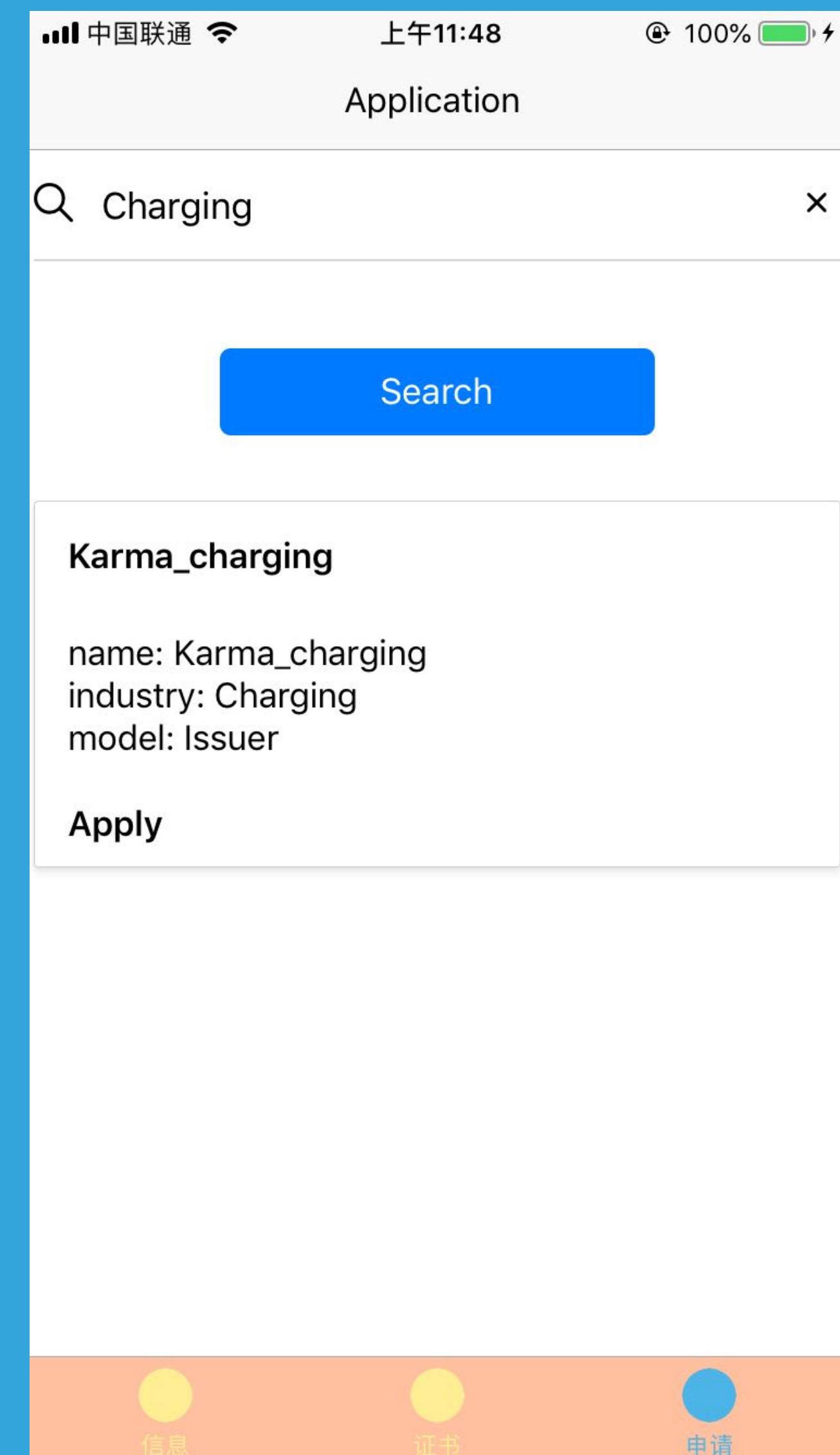
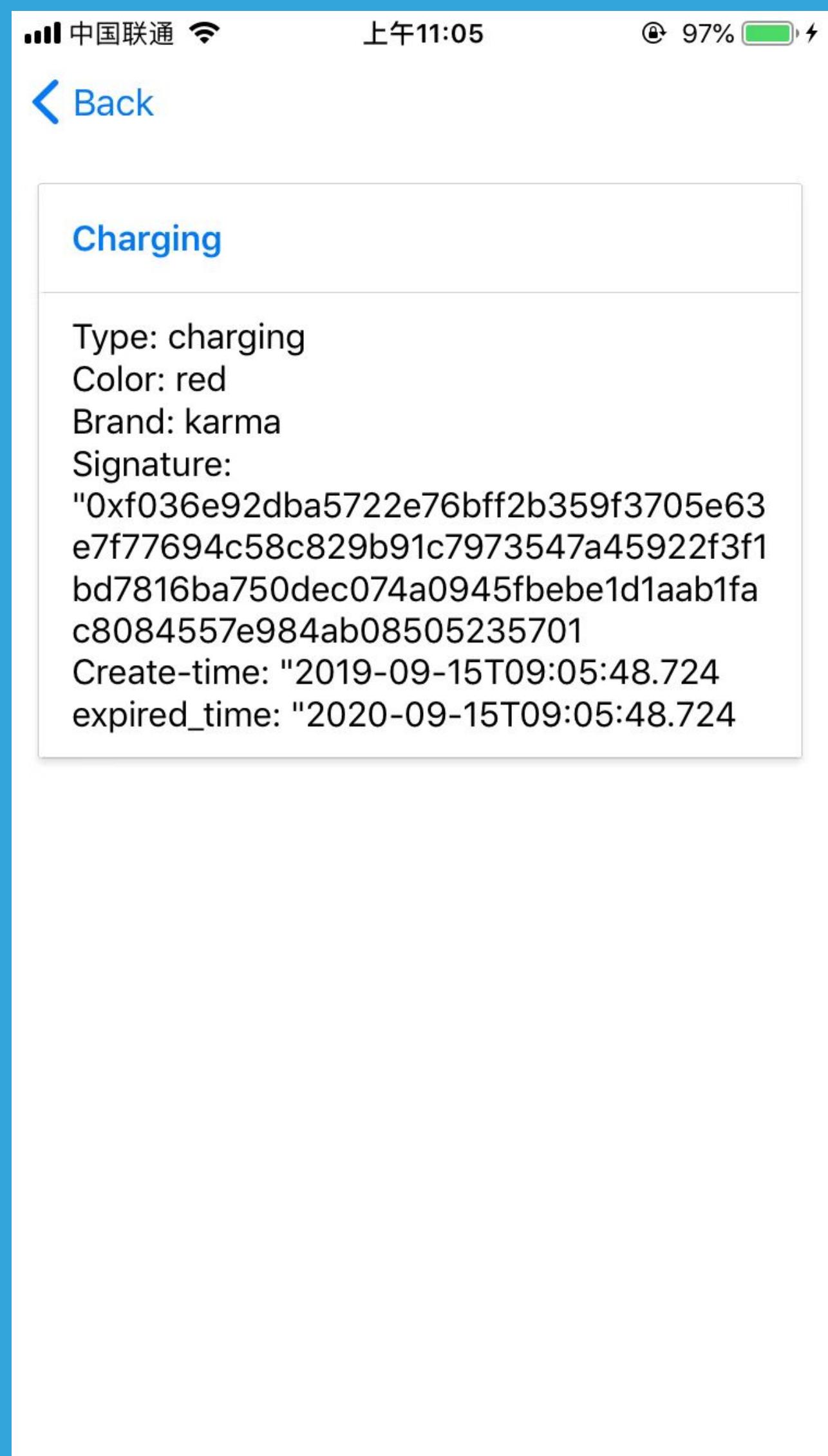
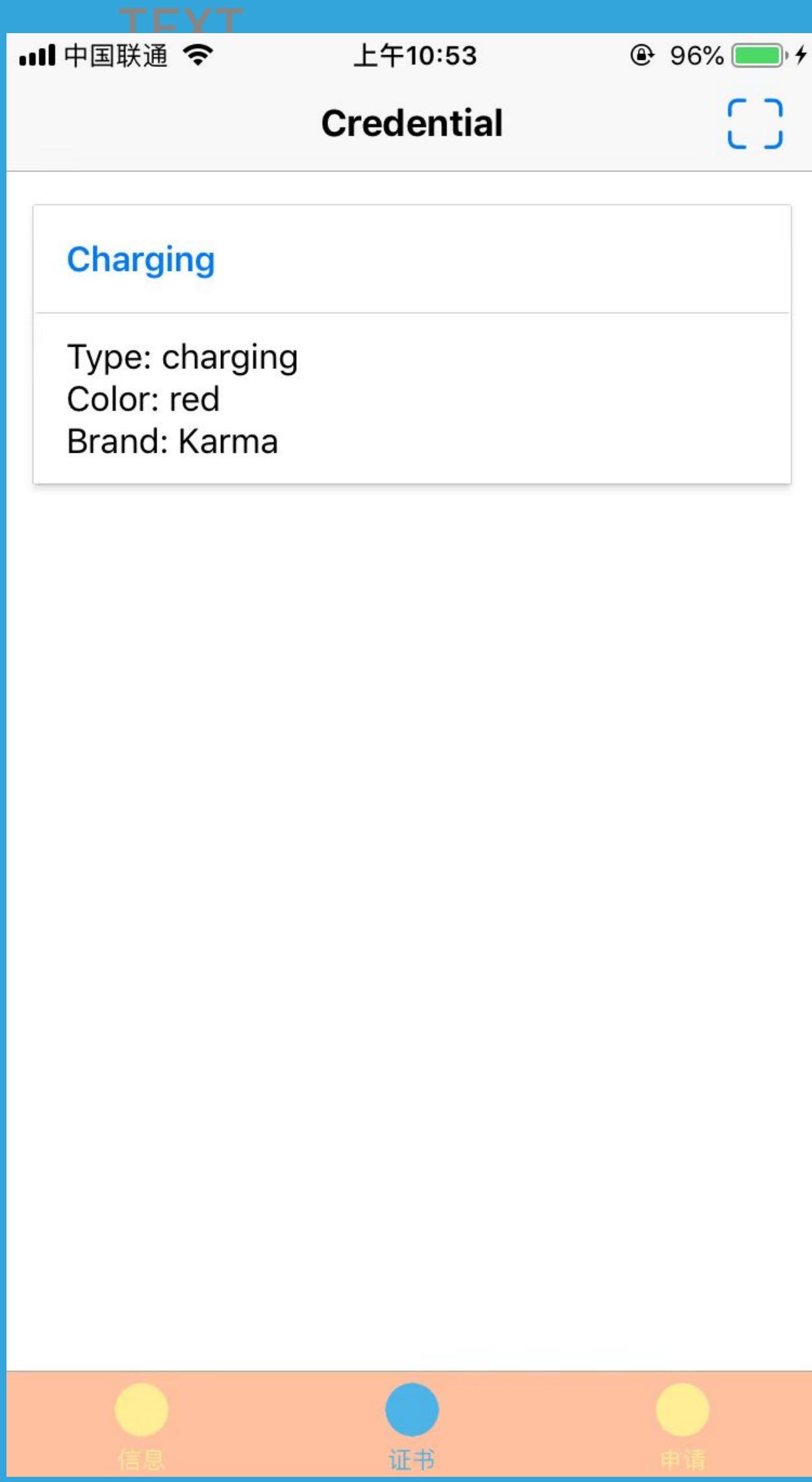
2. Verification



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*