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Hybrid Consensus Networks for Scalable and Secure Internet of Vehicles

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Outline

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- PDL and IoV
- Hybrid consensus network (HCN)
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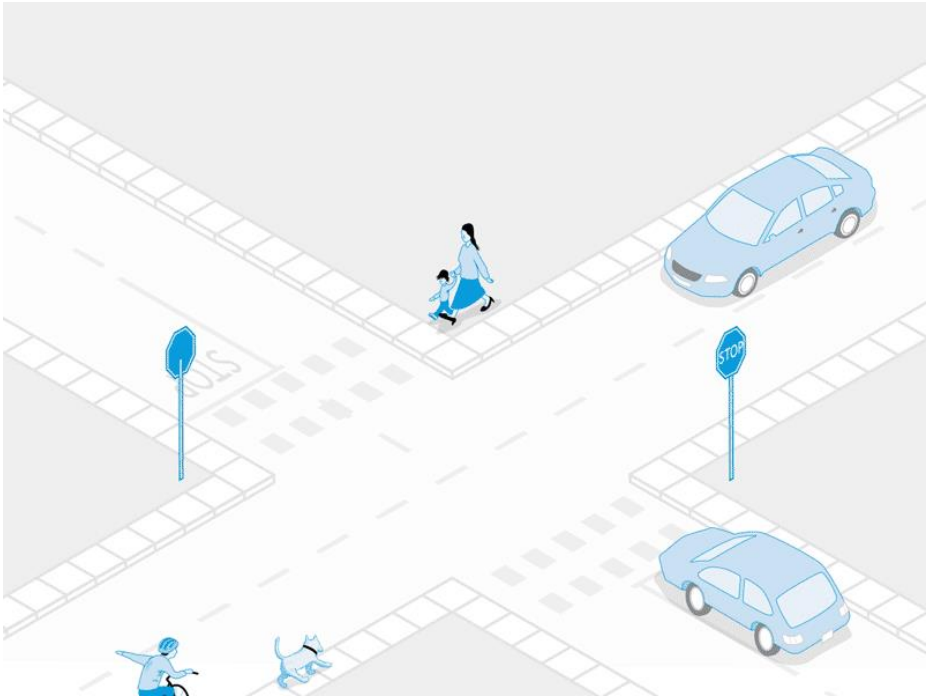
- Privacy perversion
- Conclusion

Introduction

Introduction

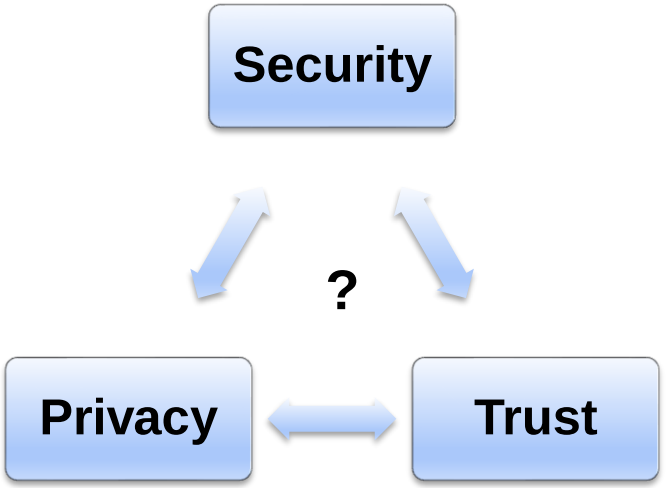
Benefits of IoV

- Reduce traffic congestion
- Reduce pollution
- Increase road safety
- Improve accessibility
- Reduce Stress



Motivation

- Vehicular networks connect CAVs to each other and to various infrastructure elements via multiple types of V2X communications.



Blockchain and PDL

- Blockchain technology as a distributed ledger, provides an effective framework that guarantees transparency, **security**, and decentralization in un**trusted** environment.

- Originally designed for a public decentralized network, but customized as a Permissioned Distributed Ledger (PDL) to address **privacy** concerns.

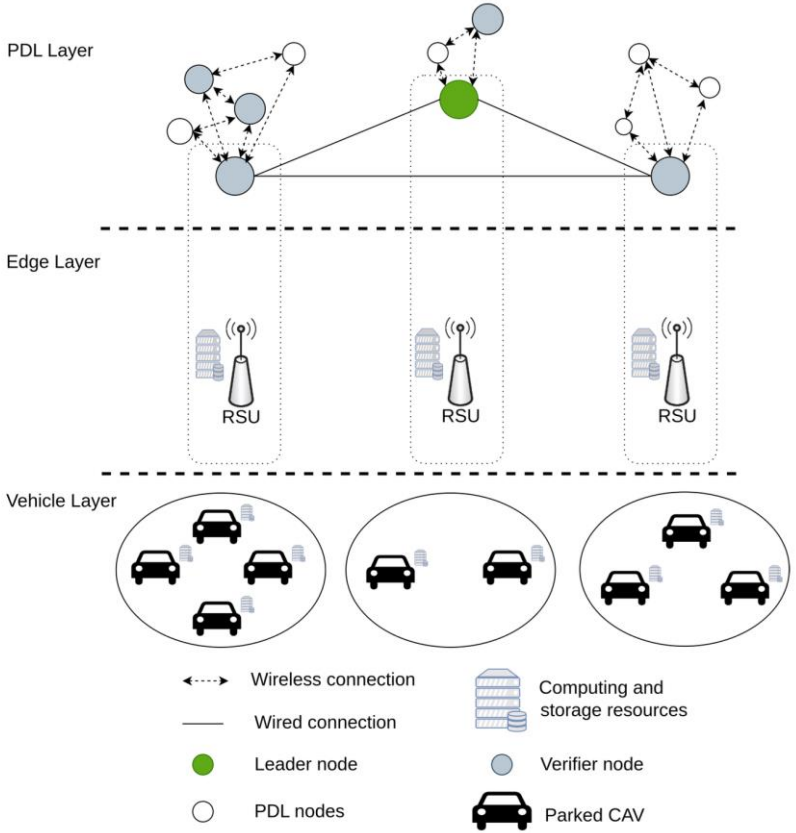
- PDLs are **scalable** and particularly well-suited for IoV applications, which require **low latency**, and secure data exchange.

PDL and IoV

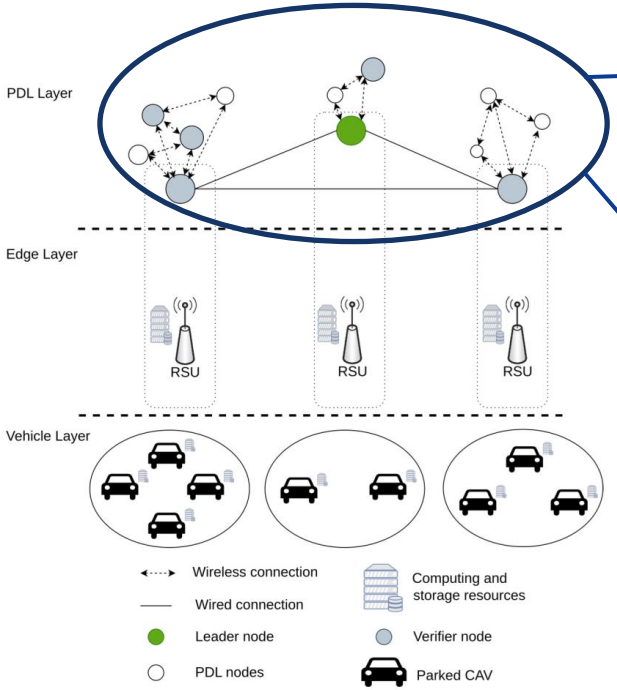
- IoV applications demand **low-latency** processing to enable real-time decision-making and ensure timely responses to critical events.
- PDL **consensus mechanism** leads to data processing and validation **delays**!
- VEC servers -> wired consensus networks
- CAVs computation capability -> **ETSI** propose -> wireless consensus network (WCN)
- CAVs mobility, interference and signal loss -> Challenge

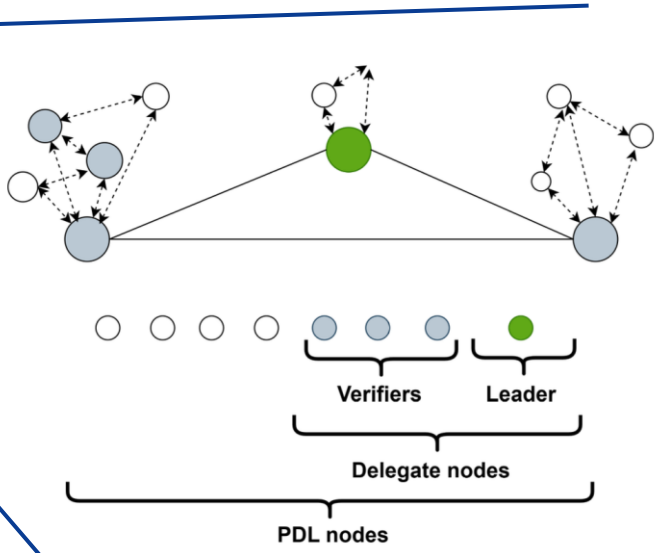
Hybrid consensus network (HCN)

- Multi-layer VEC framework
- Parked CAV as pseudo stationary VEC
- Leveraging CAV's computation power



DPoT (Delegated Proof of Trust)





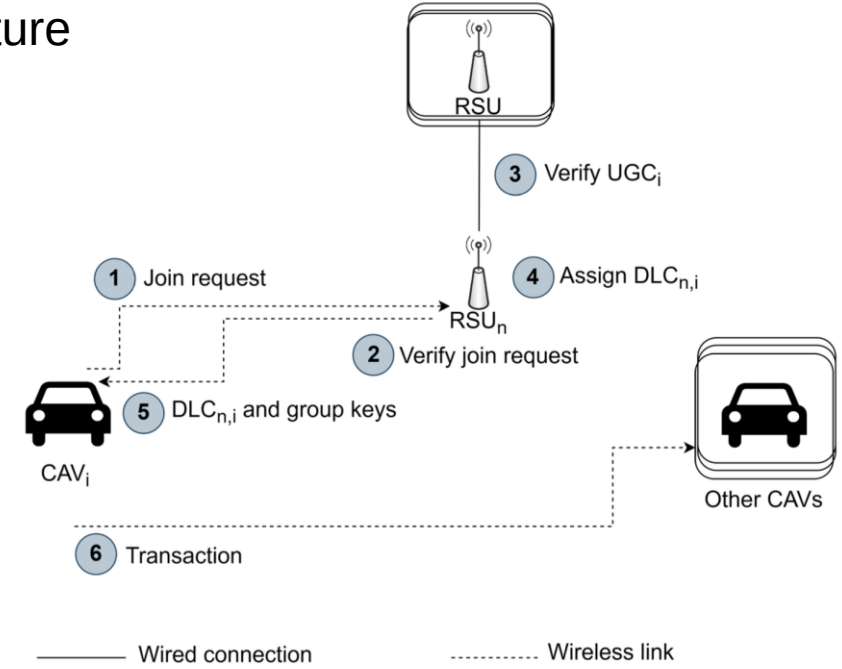
DPoT (Delegated Proof of Trust)

Trust score calculation:

- Communication and Computation reliability
- Increasing transmission power
- Computing on high clock frequency
- Energy sustainability concerns raised by ETSI
- A balance between reliability and energy consumption

Privacy perversion

Anonymous group signature



Conclusion

- We present a novel consensus network, HCN, architecture that integrates parked CAVs into a multi-layer VEC framework.
- HCN leverages the computational capabilities of parked CAVs while adhering to ETSI guidelines.
- Our goal is to enhance the scalability and performance of PDLs for IoV applications.
- We aim to improve reliability and real-time processing in PDL-based IoV networks while enhancing security and privacy.

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Q & A

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THANK YOU!

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