Connected Vehicle Blueprint

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AKRAINO
EDGE STACK

Blueprint Proposal: Connected Vehicle Blueprint

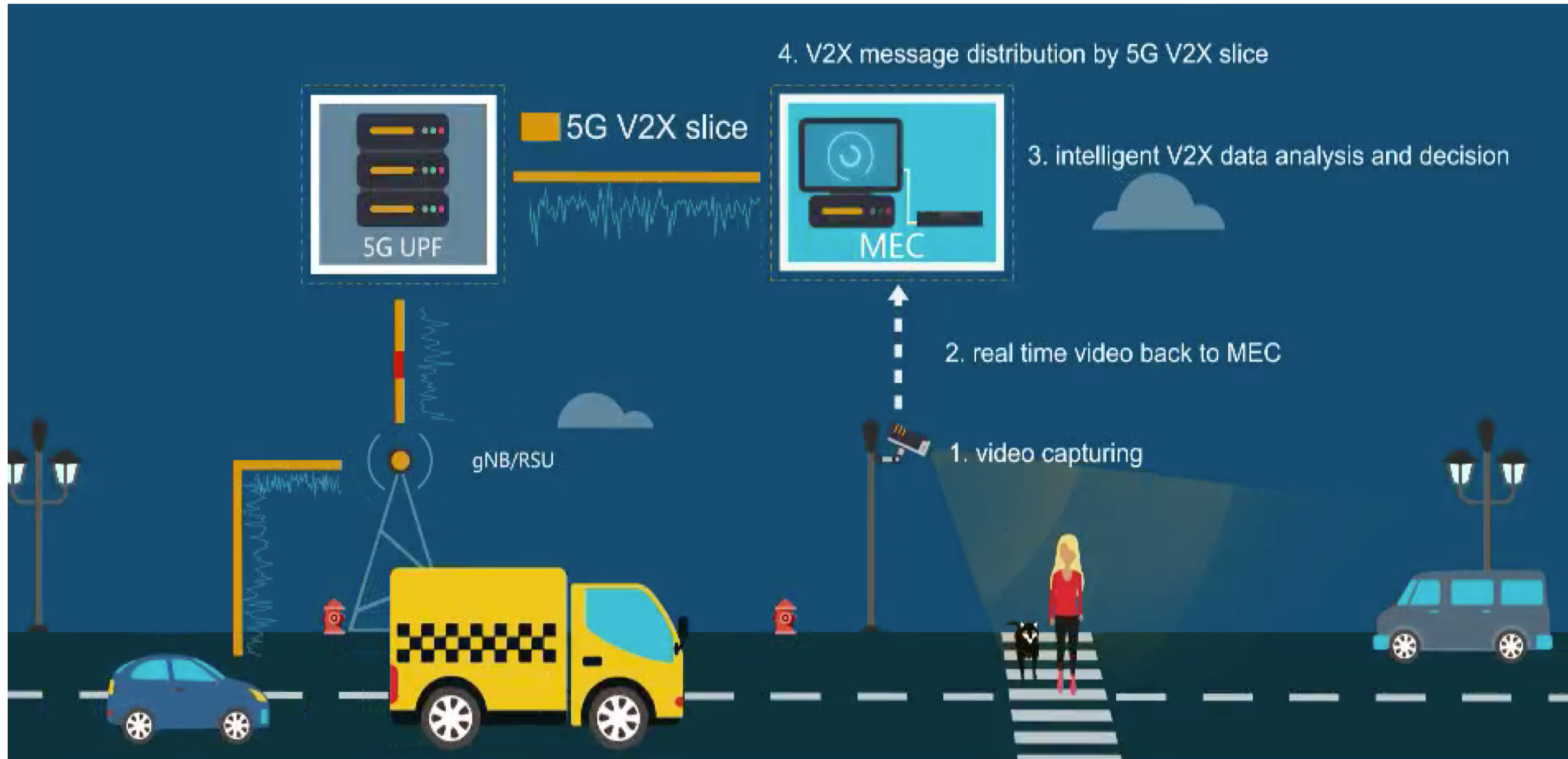| Case Attributes	Description	Informational
Type	New Blueprint for the Edge	
Blueprint Family - Proposed Name	It is a independent blueprint, NOT a blueprint family yet.	
Use Case	MEC platform used for Connected Vehicle.	
Blueprint proposed Name	Connected Vehicle Blueprint	
Initial POD Cost (capex)	The Minimum Configuration: 4 Servers in total MEC Platform(1 Server) + 1 App Server(1 Server)+ 2 Simulators(2 Server)	
Scale & Type	Up to 4 Arm/X86 server	
Applications	The MEC platform which can be used to connect vehicles, the general data flows are itemized below: 1) Grab the traffic/vehicle information 2) Dispatch the traffic/vehicle information to the corresponding edge process unit. Note well: The dispatch policy can be configurable. 3) Process the data in the Edge or Cloud and figure out the suggested action item for the vehicle driver 4) Send the suggested action items to the vehicle driver	
Power Restrictions	Less than 6KW. The Maximum Power consumption for each server is around 1500W, 1500 * 4 = 6000W	
Infrastructure orchestration	o Docker + K8s o VM and OpenStack/StarlingX	
PaaS	Tars	
Network	OVS, DPDK, VPP	
Workload Type	Bare metal, VM, Container	
Additional Details	OpenNESS	

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Assessment Criteria

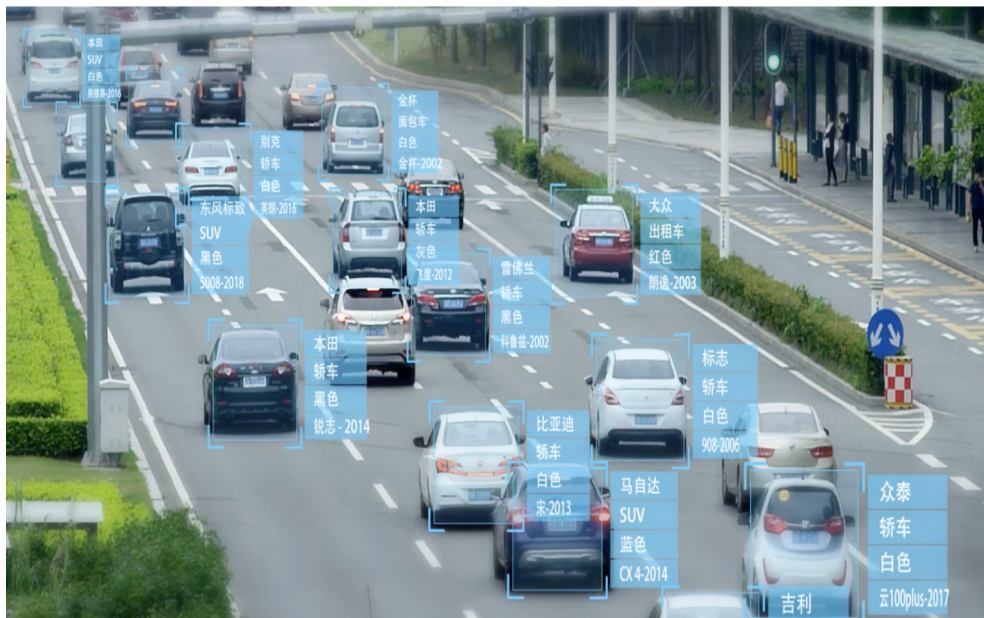| Criteria	Connected Vehicle Blueprint
Each initial blueprint is encouraged to take on at least two committers from different companies	Tencent, Arm, Intel, Nokia
Complete all templates outlined in this documents	Detailed in this slide
A lab with exact configuration required by the blueprint to connect with Akraino CI and demonstrate CD. User should demonstrate either an existing lab or the funding and commitment to build the needed configuration.	A test and simulation lab will be provided in Tencent Cloud Silicon Valley.
Blueprint is aligned with the Akraino Edge Stack Charter	All opensource, Edge use case, Aligned with the Akraino Charter
Blueprint code that will be developed and used with Akraino repository should use only open source software components either from upstream or Akraino projects.	Yes, all open source.
For new blueprints submission, the submitter should review existing blueprints and ensure it is not a duplicate blueprint and explain how the submission differs. The functional fit of an existing blueprint for a use case does not prevent an additional blueprint being submitted.	A edge platform for deploying connected vehicle application does not exist in Akraino yet.

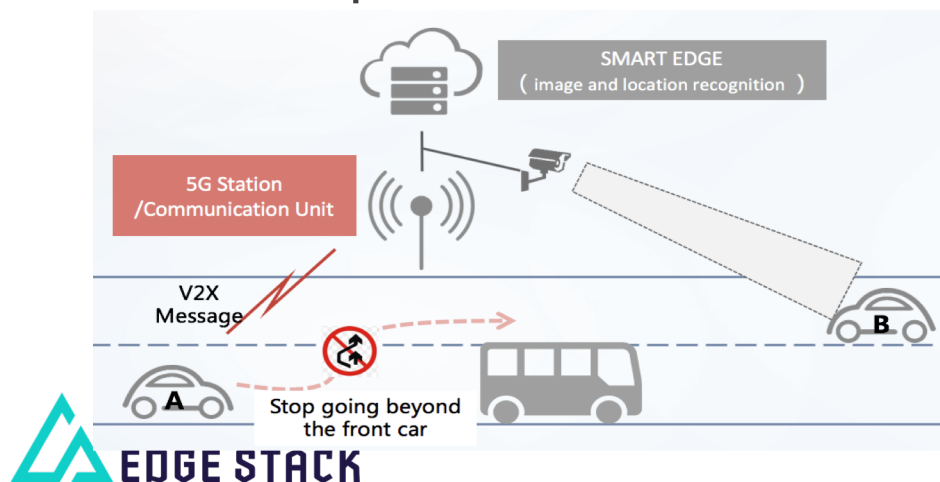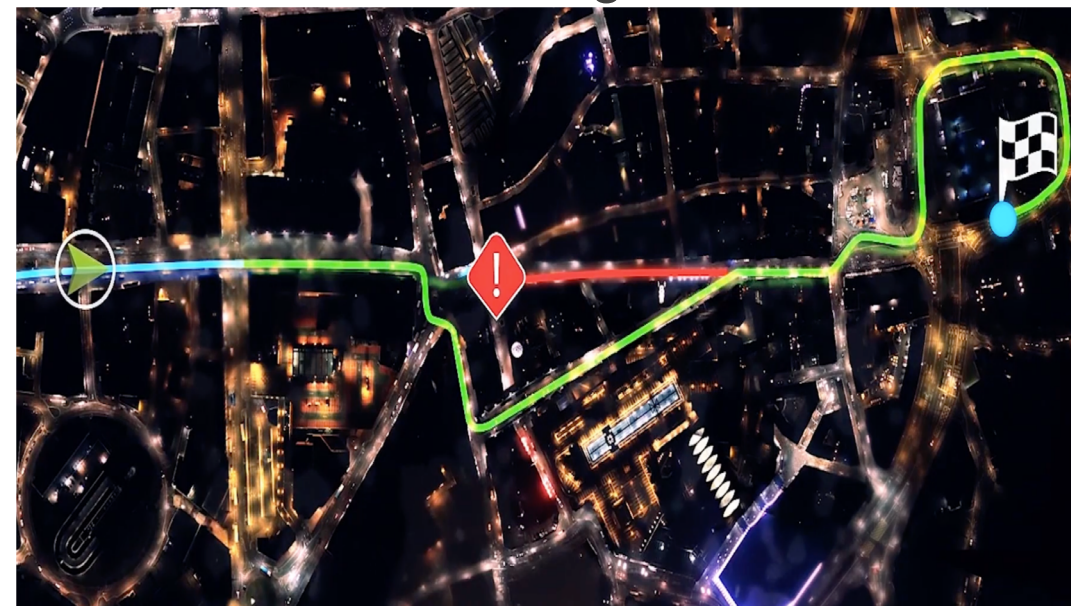| Criteria	Connected Vehicle Blueprint
Name of the project is appropriate(no trademark issues etc.); Proposed repository name is all lower-case without any special characters.	Connected Vehicle Blueprint
Project contact name, company, and email are defined and documents	Robert Qiu, Tencent robertqiu@tencent.com
Description of the project goal and its purpose are defined.	Establishing an MEC edge platform for connected vehicle use cases.
Scope and project plan are well defined.	Target for Release2, 30 July,2019.
Resource committed and available	There is a team, resources and lab in place.
Contributors identified	Tencent, Arm, Intel, Nokia
Initial list of committers identified (elected/proposed by initial contributors)	Tencent, Arm, Intel, Nokia
Meets Akraino TSC policies	The project will operate in a transparent, open, collaborative, and ethical manner at all the times.
Proposal has been socialized with potentially interested or affected projects and/or parties	o Have already reached a consensus with sponsors. o Talk with chair/co-char
Cross Project Dependencies.	OpenStack, K8s, Docker, DPDK, OpenNESS, OVS et al.

Blueprint Concept

4. V2X message distribution by 5G V2X slice

5G V2X slice

3. intelligent V2X data analysis and decision

5G UPF

MEC

2. real time video back to MEC

gNB/RSU

1. video capturing

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Value proposition in real use cases

Identified and track "bad" car

Smart Navigator

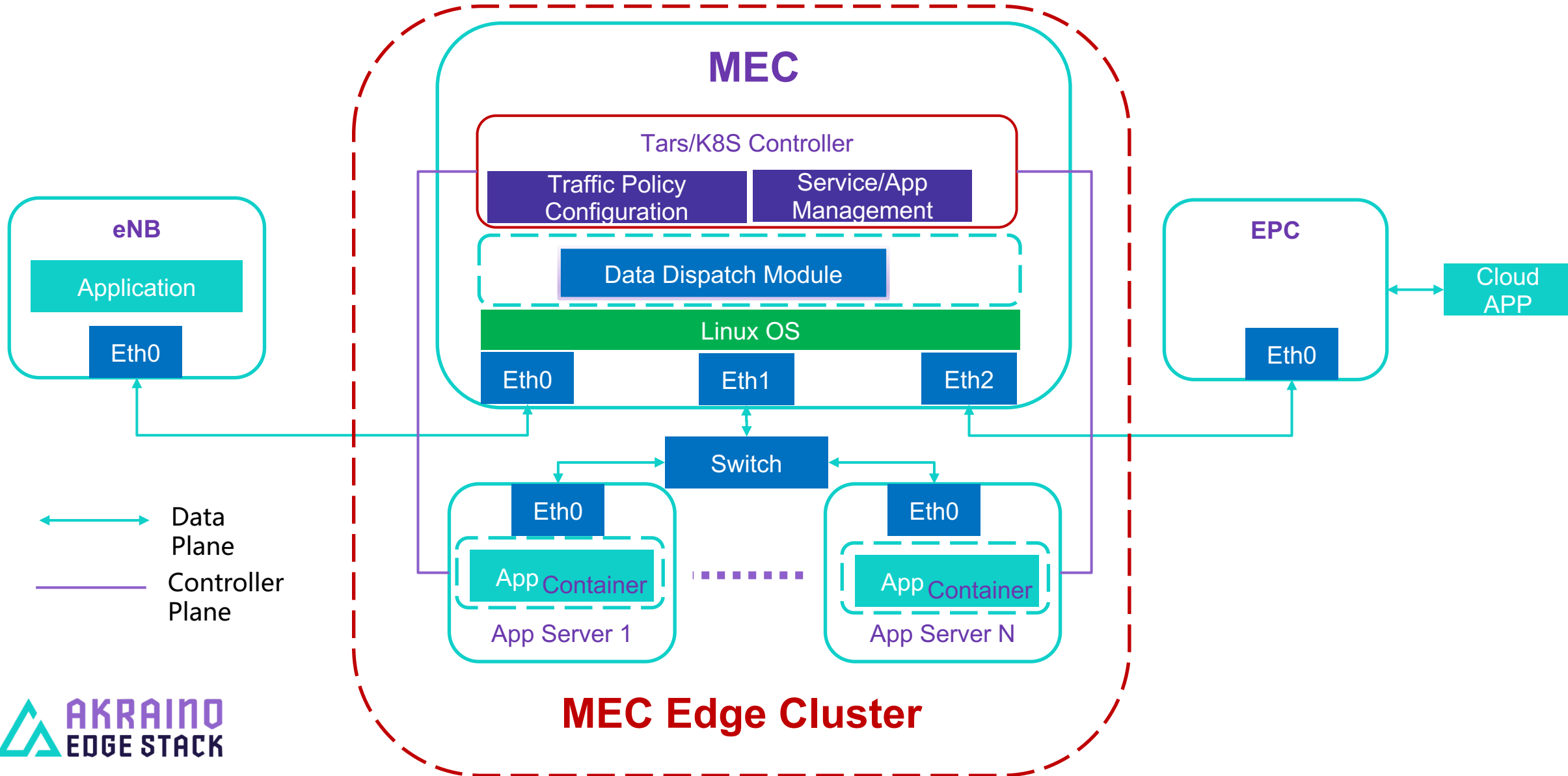## Improve Safe Drive

Reduce violating traffic rules

Special Parking Zone, Max 5 Mins

Technical Architecture - 1

UE

eNode

UPF

Dispatch

Connected Vehicle MEC Platform

Dispatch Module
Dispatch Policy Configuration
Dispatch based on policy

Vehicle Applications
App_1   App_2
App_3   other App

Management/Orchestration
Cluster Management
APP Management/ Orchestration

Tars

IaaS(OpenStack/StarlingX + VM)   IaaS(K8S +Container)

Server   Server   Server   Server   Server   Server

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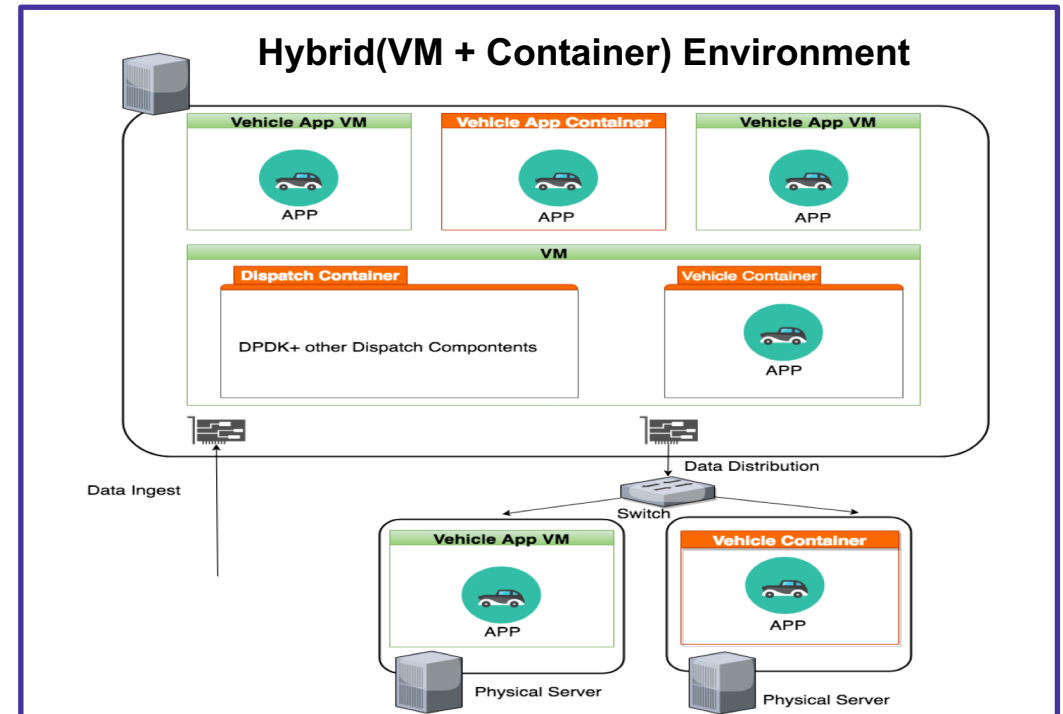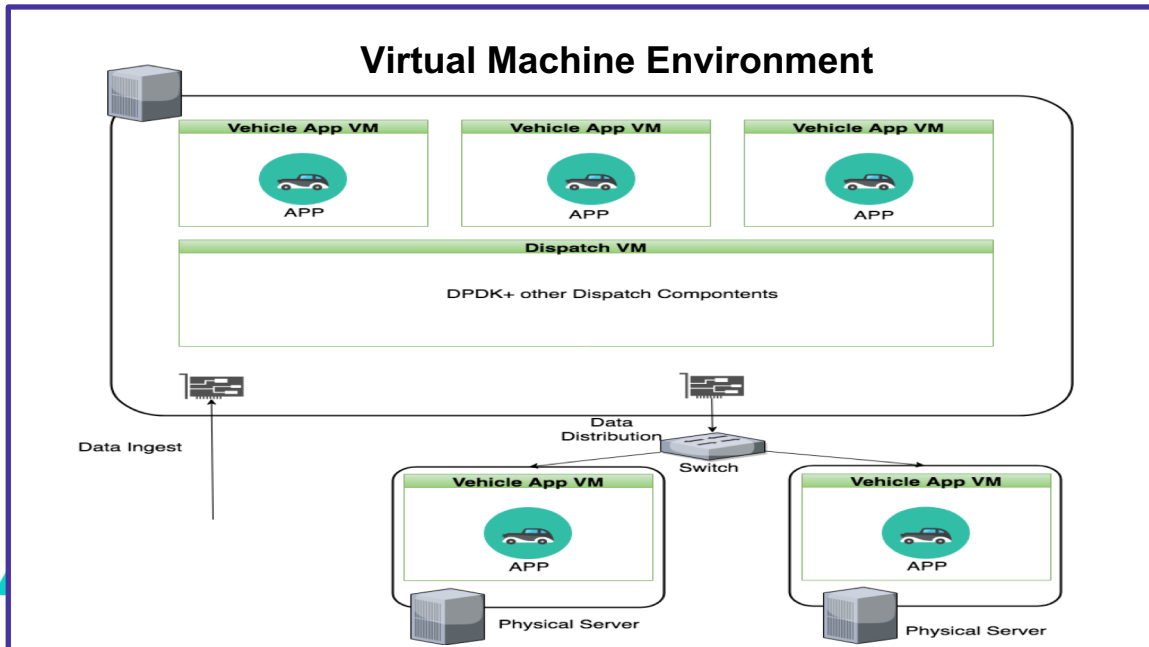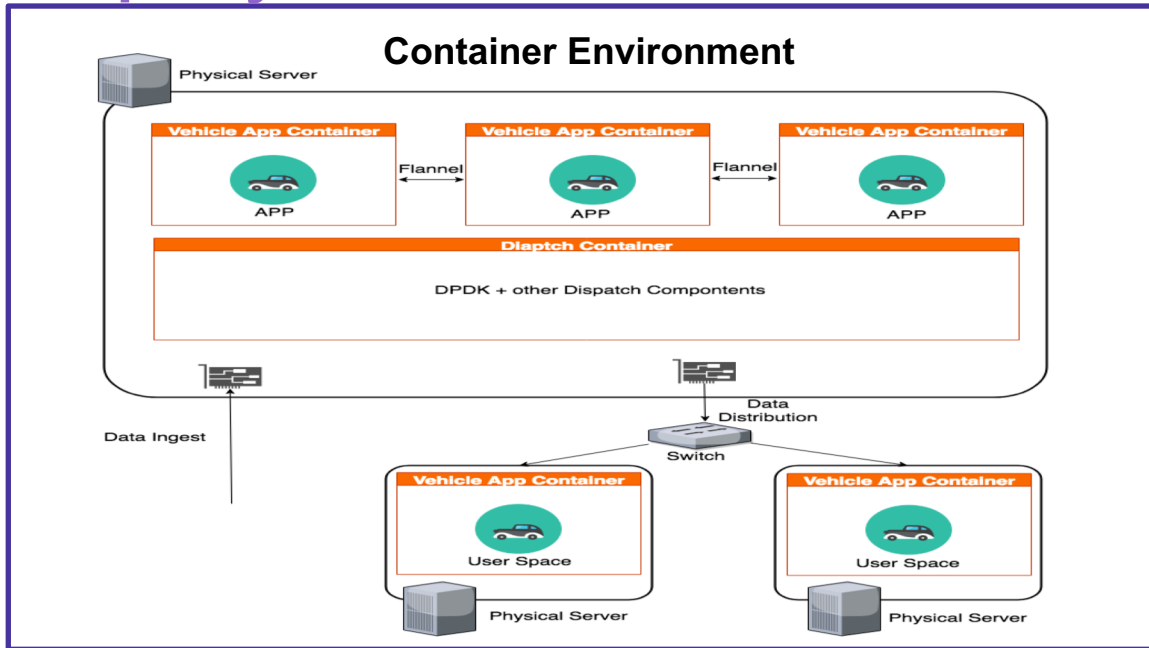
Technical Architecture - 2

Deployment
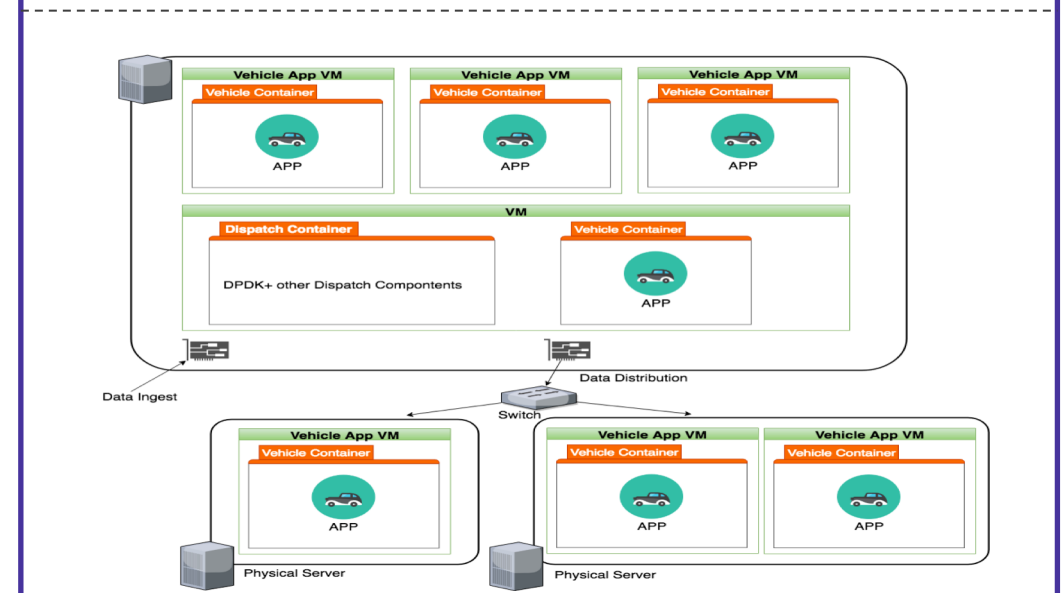
QA-1

› ## What's the difference between the proposed BP architecture and other architectures?

[Answer] This blueprint is NOT a general platform. Our Department is charged of Tencent V2X business, so this BP is pretty focused on the MEC platform which provides service for connected vehicles. The majority parts of this blueprint are Tencent Connected Vehicle MEC platform.   In short term, we will figure out the way(policy) dispatching data to corresponding vehicle edge application as well as the way circling back the process result to the vehicle on the street.   In long term, we will incorporate more high-level connected-vechicle applications which will run on the edge into this blueprint.

In general ,we are establishing all-stack(from hardware to high level software applications) solution for connected vehicle.

QA-2

› Based on the proposal architecture, it looks like the MEC may not be deployed with gNB/RSU or UPF, where will these MEC be typically deployed?

[Answer] The Connected Vehicle MEC platform can be deployed in any place which is next to(NOT far from) the users. It can be a room in the downtown, or it can be a room next to highway. Depending on the country and the detail business requirements (for instance: latency requirements), MEC can be deployed in different places.

For here, MEC should be decoupled with network devices and deploy independently, but MEC should co-work with network devices you mentioned. MEC can receive and send the data back and forth via network devices.

So, we are pretty welcome the network companies to weigh in this blueprints. It will be great if we can incorporate their network device into this blueprint.

QA-3

› What the E2E latency expectation is in this BP.

[Answer]

Up to the uses cases. For instance, Ms second level for auto drive. Second level for road status updates(traffic jam et al).