



5G Automotive Association

pioneering digital transformation
in the automotive industry





5G V2X 自动驾驶实践

5G V2X Autonomous Driving Practice

黄刚 总经理

President Huang Gang

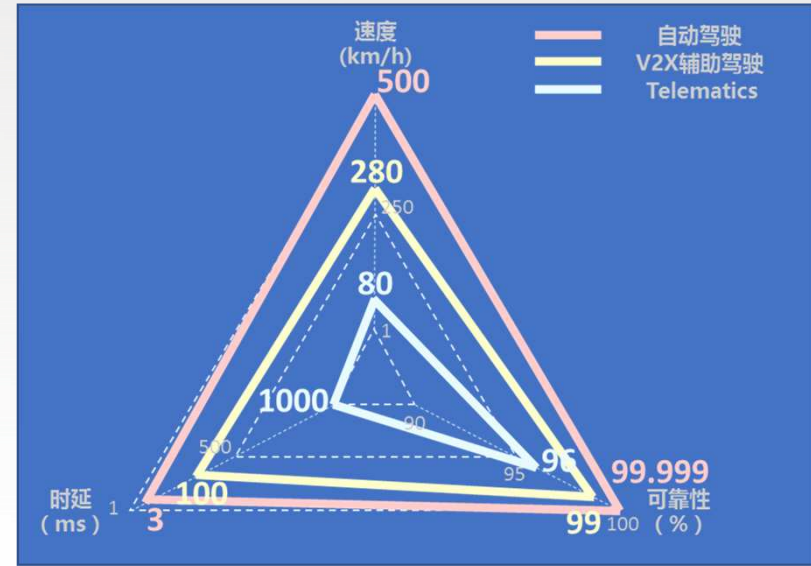
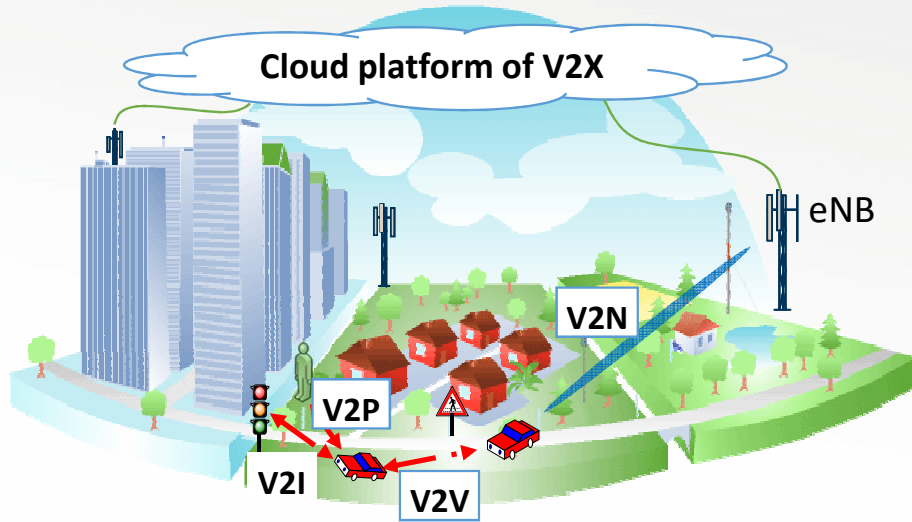
中移智行网络科技有限公司

CMIM

2018.6

车联网已由车载信息服务向自动驾驶发展

Connected service has shifted from information service to Autonomous Driving



阶段一 Phase I :

Telematics 车载信息服务
Info-tainment

➤ 2G / 3G / 4G

阶段二 Phase II :

智能辅助驾驶 (安全、节能)
ADAS(Safe & Efficient)

➤ 4.5G (LTE V2X , 3GPP)

➤ DSRC(US: WAVE , EU: ETSI)

阶段三 Phase III :

自动驾驶及智能交通
(Autonomous Driving and Intelligent Transportation)

➤ 5G (含LTE演进 LTE evolution)

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单车自动驾驶局限多

Number of limitations in singular autonomous driving approach

Sense

感知



=



感知受限

Limited Sensibility

Decision

决策



=



计算复杂

Complex Calculation

Control

控制



=



多车协作难

Costing Coordination



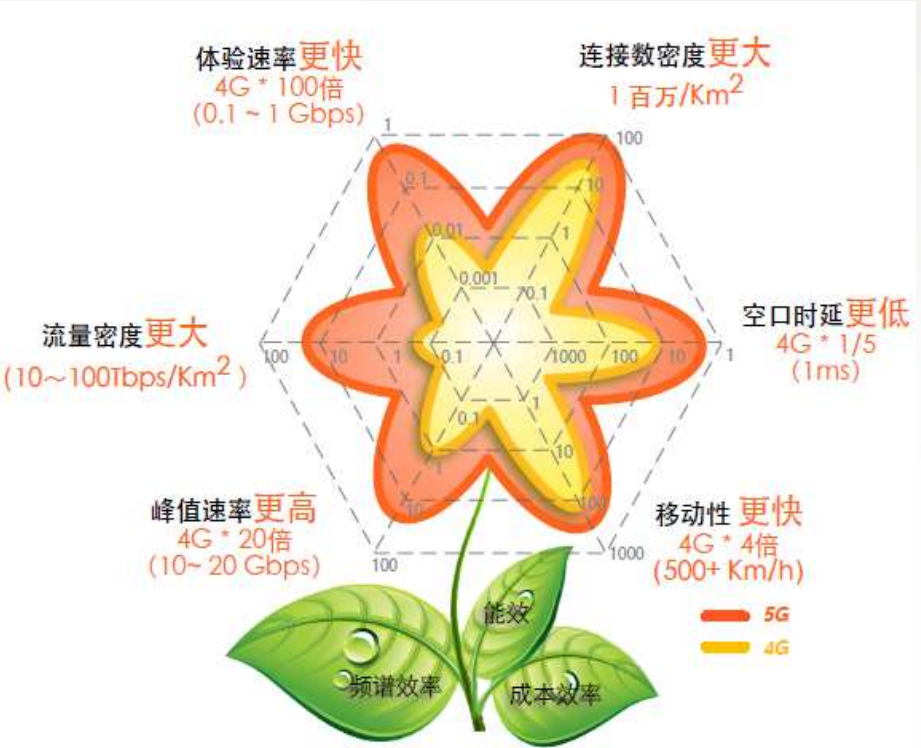
5G 超强能力辅助垂直行业发展

5G advanced support for vertical industry

更快的网络传输速率

Faster transmission

>1Gbps
4G x 10~100



5G之花

更高的连接密度

More Intensified connection

>1百万连接数/km²
4G x 5

更低的网络时延

Lower Latency

~1ms
4G x 1/5



5G V2X分级体系可以解决自动驾驶痛点 Layered-decision system for 5G-V2X



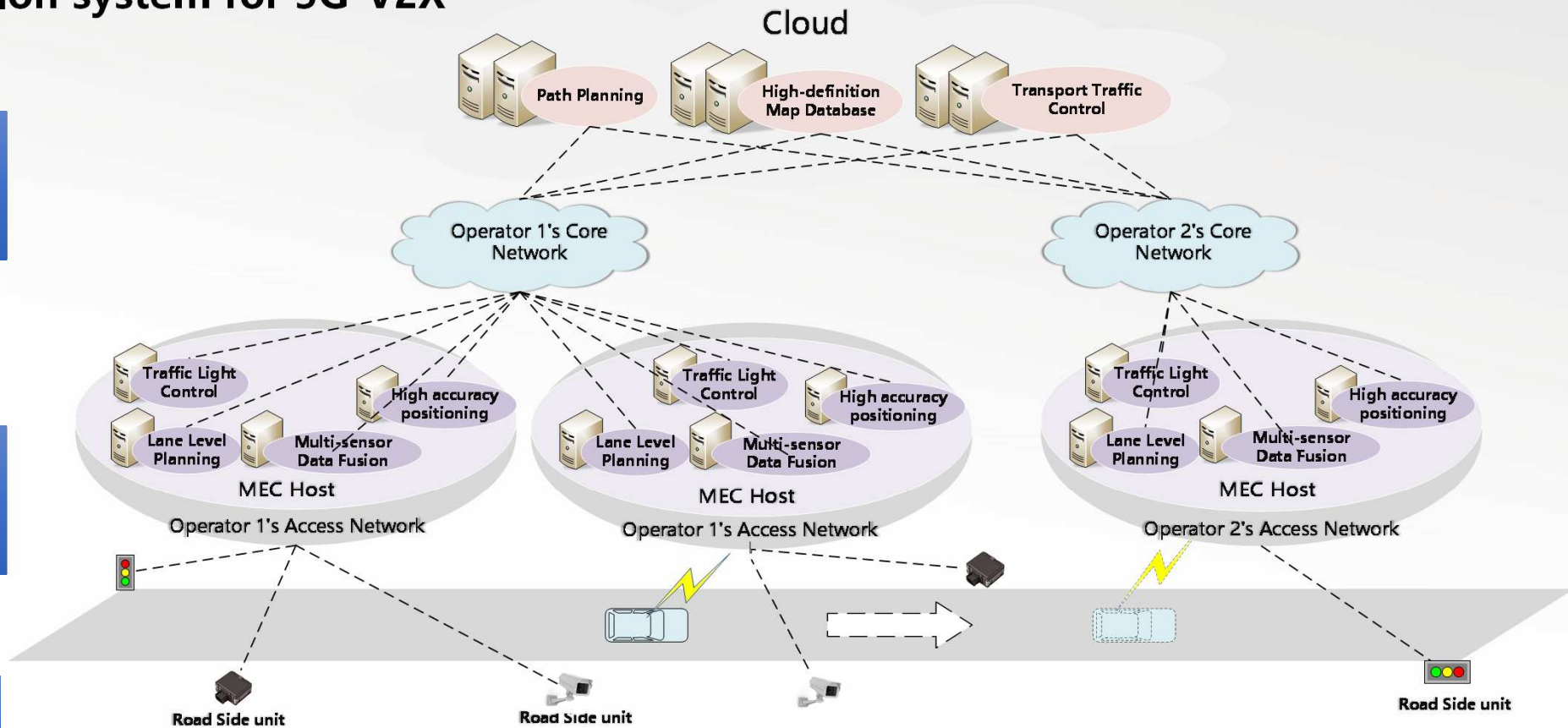
全局协作控制层
核心云
Full-scaled core cloud



区域控制层
边缘云
Regional edge cloud



车载终端层
Terminal devices



在车载终端、边缘云、核心网侧、云端分别实现终端层、区域控制层、道路协同控制层以及应用服务层的各项软件功能。 On terminal end, edge cloud and core cloud respectively achieving functions of terminal layer, regional layer, road joint controlling layer and application service layer.

ITU立项“网联自动驾驶功能框架”推动产业联合

ITU project “Functional Architecture of Network-based Driving Assistance for Autonomous Vehicles”



INTERNATIONAL TELECOMMUNICATION UNION
TELECOMMUNICATION
STANDARDIZATION SECTOR
STUDY PERIOD 2017-2020

SG20-TD774-R3
STUDY GROUP 20

Original: English

Question(s): 3/20

Cairo (Egypt), 6-16 May 2018

TD

Source: Rapporteur Q3/20

Title: Proposed new WI - Recommendation Y.NDA-arch "Functional Architecture of Network-based Driving Assistance for Autonomous Vehicles"

Purpose: Proposal

Keywords: Y.NDA-arch, Network-based driving assistance, Multi-access edge computing, Autonomous vehicles, Functional architecture

Abstract: Revised C328 text based on Q3/20 discussion on May 2018 SG20 Meeting.

2018年5月完成立项，计划2019年底之前完成标准发布。Set-up was finished by May 2018, Release of the standard is expected before the end of 2019

形成了跨行业（汽车、交通、通信、IT）、融合云管端的5G自动驾驶架构的基本共识。

A cross-industry(automotive, transportation, Telematic, IT) , cloud-channel-device integrated consensus of 5G autonomous driving



5G V2X应用获得工信部“绽放杯” 一等奖 Awarded the First Prize in “Blooming Cup” by MIIT



发起5G自动驾驶联盟 开展V2X领先计划

Proposer of 5G Autonomous Driving alignment Execute the Advance plan in 5G V2X

汽车企业
Automotive

一汽FAW 东风DF 长安Changan 北汽BAIC 上汽 SAIC
广汽GAIC 吉利Geely 比亚迪 BYD 奇瑞Chery

高校研究
Research
institution



公共交通
Public
Transportation



通信行业
Telematic



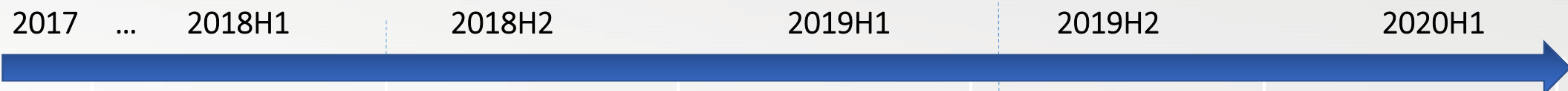
联合近百家产业合作伙伴，共同推动5G V2X发展

Promoting the development of 5G V2X in the alignment with nearly 100 partners.

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开展三阶段5G试验，打造商用产品能力

5G experiment has marched into Phase III: Development of pre-commercialization



多城市、每城市7站规模
Multi-cities, 7 stations per city

1.技术试验：2015~2018（中国信息通信研究院牵头组织）
Technical experiment: 2015-2018 (Led by CAICT)

依托工信部专项三 Aligning with MIIT

规模试验网建设
2018年6月-2020年6月
Scaled-test network
2018.6-2020.6

2.规模试验：2018~2020（中国移动牵头组织）
Scaled experiment: 2018-2020 (Led by CMCC)

规模试验（5大城市，共500站） Scaled-experiment（5 cities, 500 stations in total）
杭州、广州、苏州、武汉、上海，7月份启动NSA，11月份启动SA
Hangzhou, Guangzhou, Suzhou, Wuhan, Shanghai NSA initiated in July, SA in November

依托发改委专项 Aligning with NDRC

业务示范网建设
Construction of the demo network

3.业务示范：2018~2020（中国移动牵头组织）
Business demo: 2018-2020 (Led by CMCC)

业务示范（另选12大城市，共500站） Business Demo (In other 12 major cities)
北京、雄安、天津、重庆、南昌、成都、福州、深圳、南宁、沈阳、郑州、兰州，开展自动驾驶、人工智能等培训
Beijing, Xiongan, Tianjin, Chongqing, Nanchang, Chengdu, Fuzhou, Shenzhen, Nanning, Shenyang, Zhengzhou, Lanzhou; Training sessions for Autonomous Driving and AI

中国5G网络将在2019年预商用，2020年进行商用
5G network will be ready for commercial use by the 2nd half of 2019 to the 1st half of 2020



搭建5G V2X智能交通环境

Form up an intelligent transportation environment for 5G-V2X

8 个开放道路
8 Open Roads



北京 Beijing



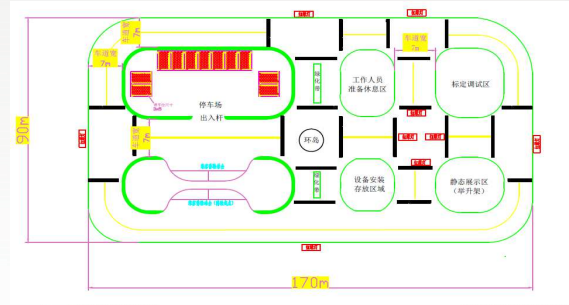
重庆 Chongqing



上海 Shanghai、深圳 Shenzhen、长沙 Changsha、长春 Changchun、广州南沙区 Nansha, Guangzhou、福州平潭 Pingtan, Fuzhou



四个封闭区域
4 Concealed Areas



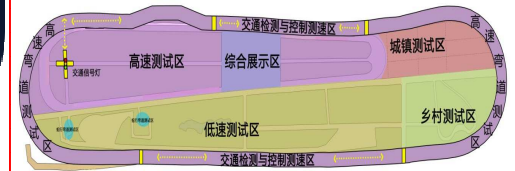
北京北邮宏福校区 (BUPT)



襄阳汽车试验场
(Xiangyang, Hubei)



重庆汽研院(CIRA)



长安大学渭水校区
(University of Changan)

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智慧交通，安全出行

Intelligent Transportation escorts a safe journey



彰显5G技术能力
Highlight 5G tech

助力智能汽车产业发展
Boost development of
automotive industry

推动工业信息化变革
Promote info-reform
Of industry

“0” 事故、“0” 拥堵
“No “ Accident,
“No” Traffic Jam



上海宣言：零排放、零伤亡、零障碍

Shanghai Declaration: No emission, no casualties, no barrier

中国智能网联汽车产业创新联盟V2X工作组：CAICV-V2X:
基于V2X车路协同，构建“零拥堵、零排放、零事故”的智
能交通系统

An intelligent traffic system “No jam, no emission, no accident”
based on V2X

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中国移动和您共创智慧出行新时代

CMCC "And" you march towards to a new
episode of intelligent transportation

