S1-150154

Discussion on V2X over LTE

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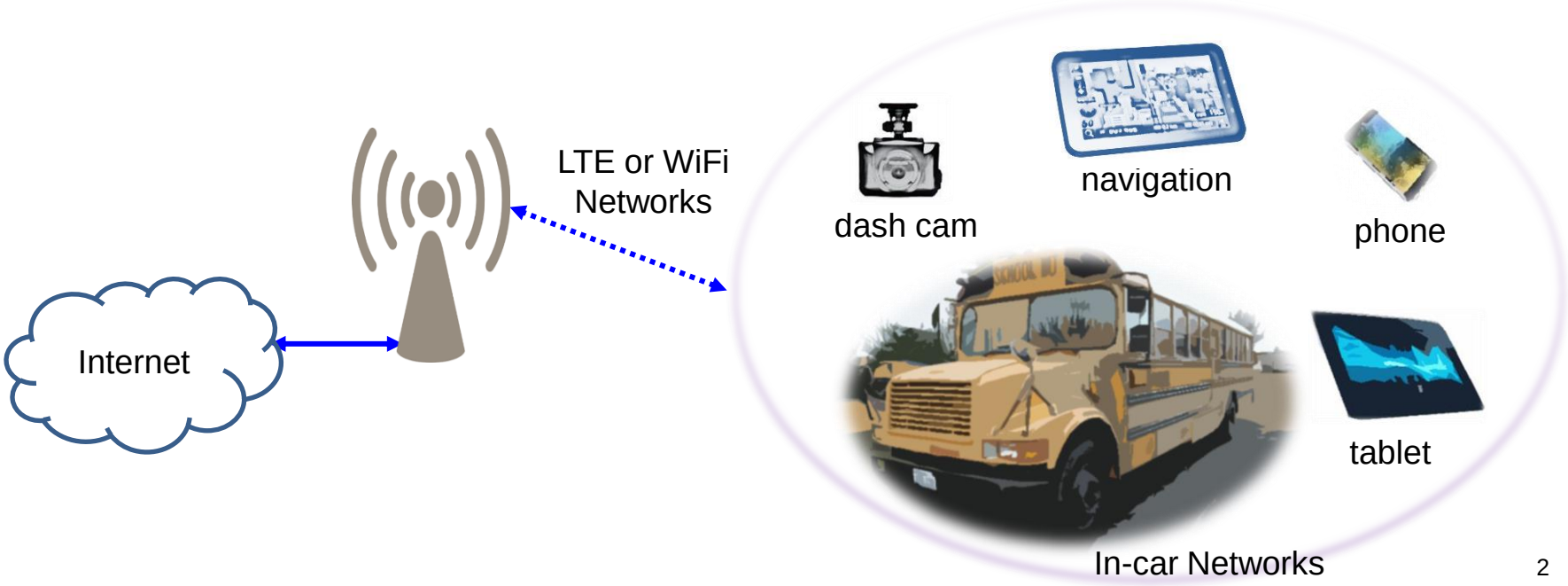
ETRI

Introduction

- **Smart Car (Connected Car)**
  - A vehicle capable of providing internet access to nearby devices both inside and outside of the car
    - Provides road safety: e.g. notification of crashes, notification of safety alerts
    - Provides Infotainment: e.g. real-time automotive navigation, point of interest notification, car video systems
  - Expected market revenue
    - $141 billion by 2020 (ref.: PR Newswire)



V2X over LTE

- **Current V2X Connectivity Technologies**
  - DSRC, WiFi, Bluetooth, 2G/3G
  - Limitations
    - Mobility, latency, data rates, etc.

- **V2X over LTE**
  - Can effectively support V2X
    - High market penetration
    - High data rate
    - Low latency
    - Direct communication (e.g. ProSe)
    - Broadcast communication (e.g. MBMS)

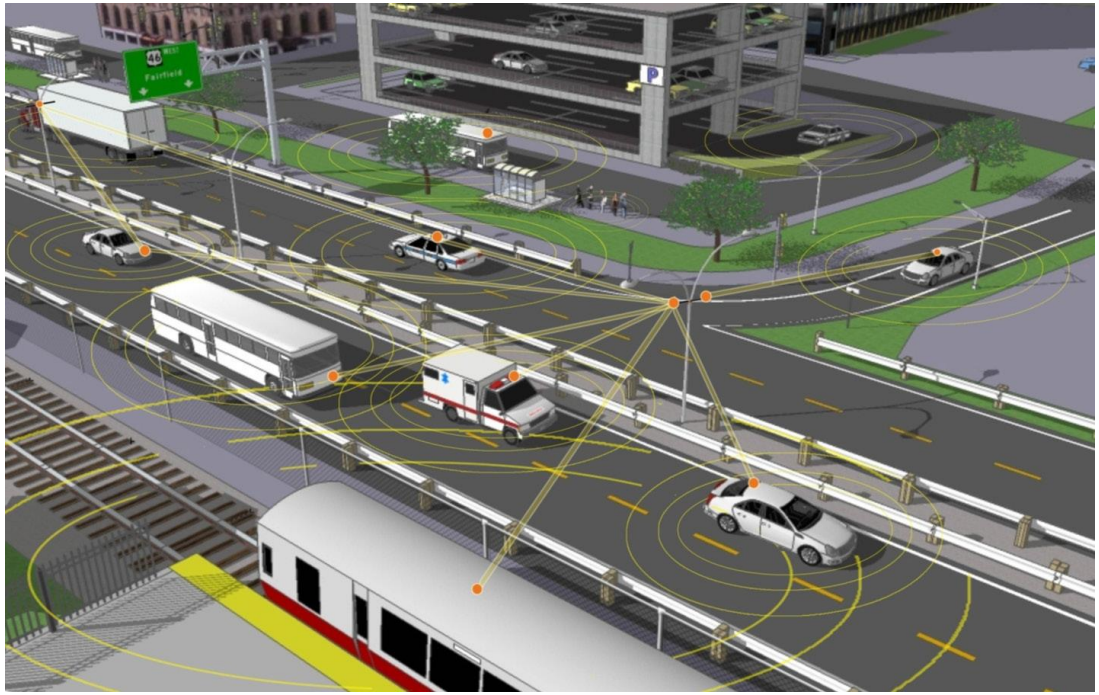
Service Type

- **Safety Service**
  - Provides road safety
    - Emergency vehicle warning
    - Intersection collision warning
    - Collision risk warning
    - Road-work warning

- **Non-safety Service**
  - Provides infotainment
    - Multimedia streaming
    - Weather forecast
    - Point of interest notification

Communication Type

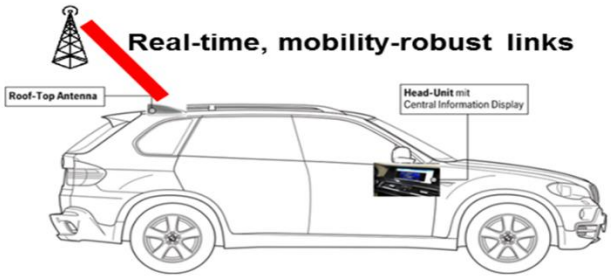
- **V2V (vehicle to vehicle) Communication**
  - CAM (Cooperative Awareness Message)
  - DENM (Decentralized Environmental Notification Message)
- **V2I (vehicle to infrastructure) Communication**
  - Traffic efficiency, Navigation, Cloud Service
- **V2P (vehicle to pedestrian/passenger) Communication**
  - Pedestrian protection

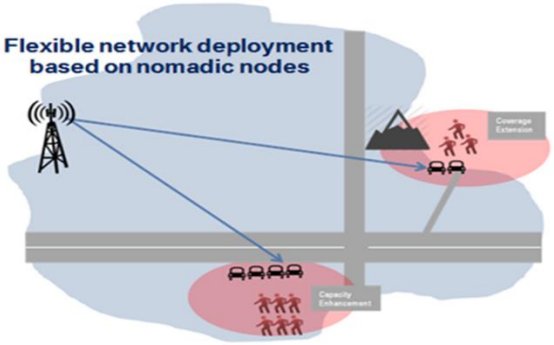


Ref.: NHTSA

Vehicle Type

- **Mobile Device**
  - Reuses UE capability to support V2X
    - Direct communication
    - Cellular communication
- **Mobile Base Station**
  - Provides moving networks
    - e.g. nomadic network node, moving cell
  - Benefits
    - High transmit power
    - High data rate
    - Flexible coverage
    - Demand-driven network deployment
    - Backward compatible (from the UE point)





Ref.: METIS

Summary

- **Objective**
  - To study use cases and identify potential service requirements needed for the 3GPP network to provide V2X
  - This study item should consider the following;
    - Service type
      - Safety service
      - Non-Safety service
    - V2X communication type
      - V2V communication
      - V2I communication
      - V2P communication
    - Vehicle type
      - Mobile device
      - Mobile base station
- **Timeline**
  - SID approval: March 2015
  - SID completion: December 2015