Smart EV & V2X Embedded Solutions

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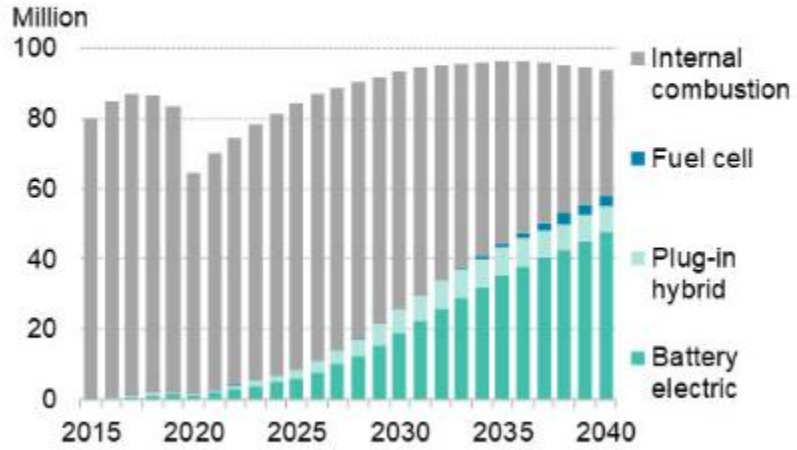
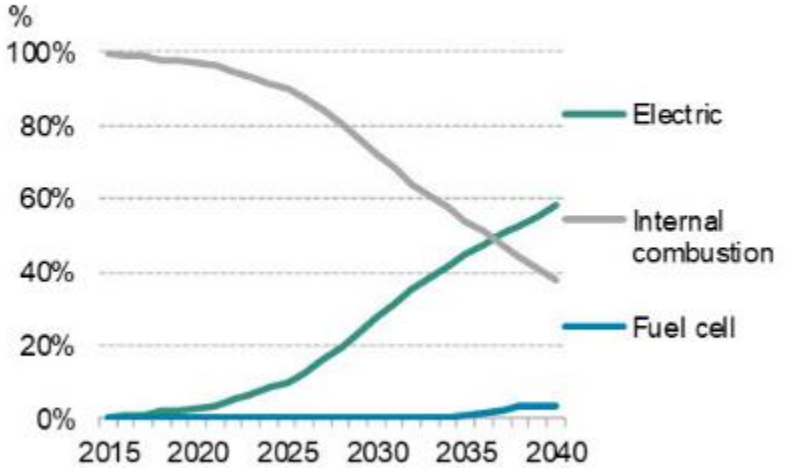
EV Will Dominate

Global annual passenger vehicle sales by drivetrain

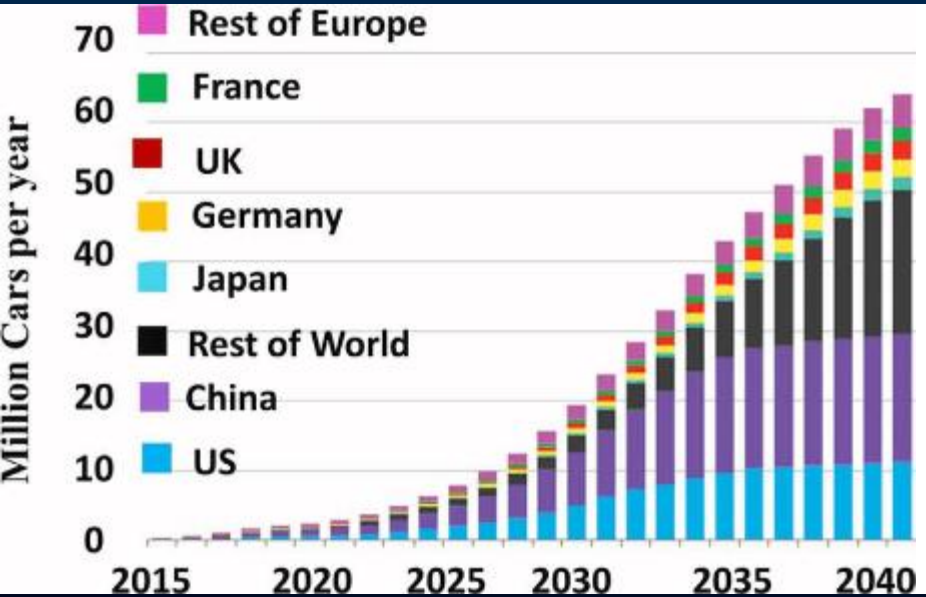


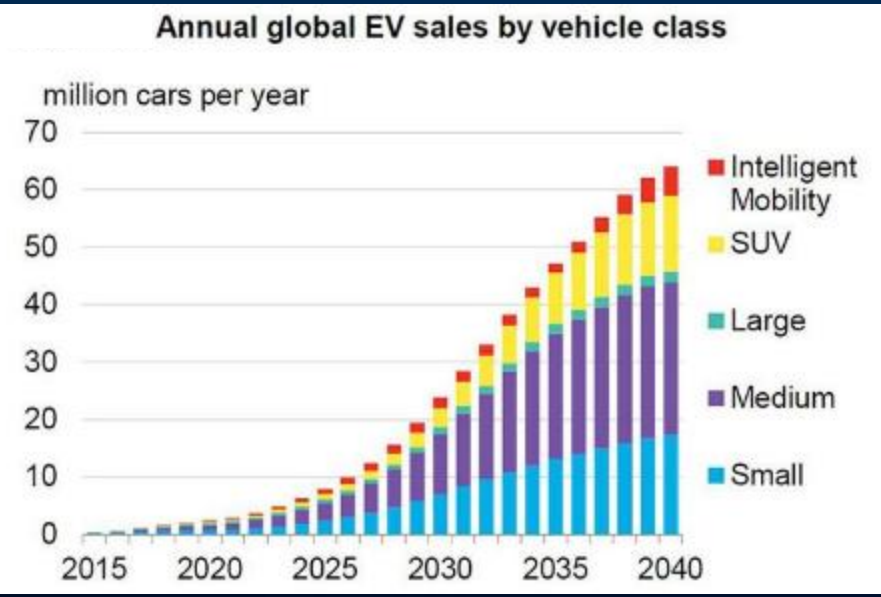
Global share of total annual passenger vehicle sales by drivetrain



Source: BNEF. Note: Electric share of annual sales includes battery electric and plug-in hybrid.

Global EV Market Foresight





Source: Bloomberg New Energy Finance

31% of Vehicles on the Road Will be EV in 2040

In 2040...


67%
Bus


47%
Moto


24%
Commercial

Source: 工業技術與資訊

Driving Forces of EV Market Growth

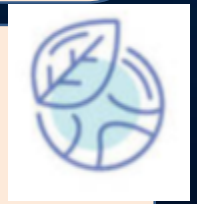
User Altitude

- ✓ Driving range
- ✓ Charging utility
- ✓ Cost/incentive

Manufacturers Strategy

- ✓ More fashion alternatives
- ✓ More competitive price
- ✓ More promotion programs

Policy/Regulation



- ✓ CO_2 emission standard
- ✓ Carbon neutrality Commitment
- ✓ Tax & finance incentive

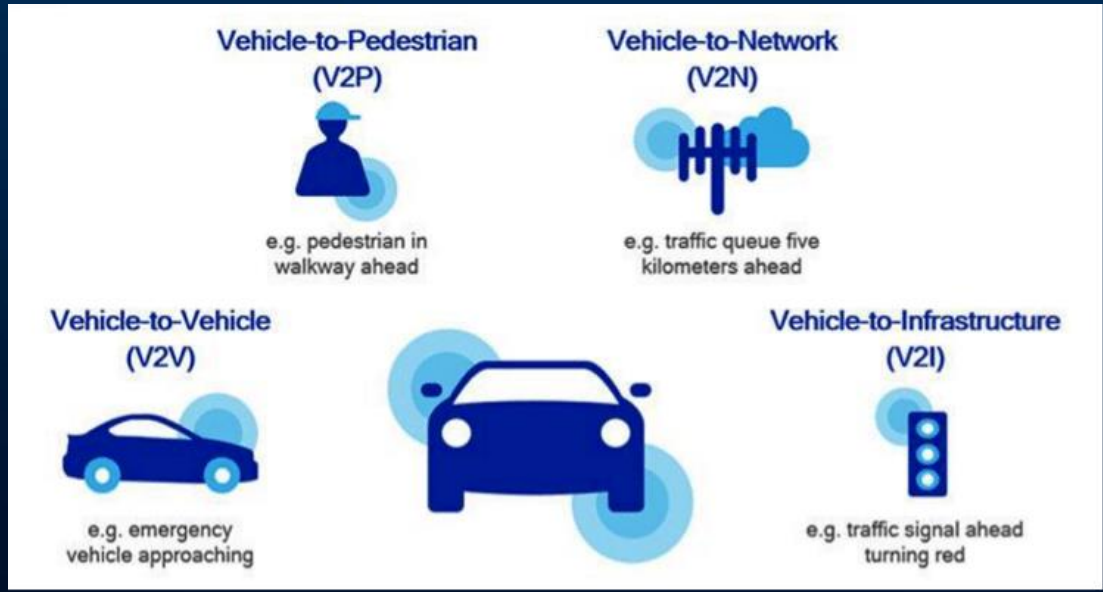
Enterprise Role

- ✓ Support to EV
- ✓ Image
- ✓ Responsibility to Earth
- ✓ Cost down
- ✓ Employees satisfaction

Source: 工業技術與資訊

What is V2X (Vehicle-to-Everything)?

- Vehicle-to-Everything (V2X) communication
  - Revolutionary technology
  - A wireless technology that enables communication between the vehicles, infrastructure, and other devices in the vicinity, grid, home, and network
- This technology helps the vehicle to receive warnings regarding real-time traffic and alerts related to accidents or other hurdles
- V2X-capable vehicles can assist in better traffic management leading to greener vehicles and lower fuel costs



Source: 智享汽車圈

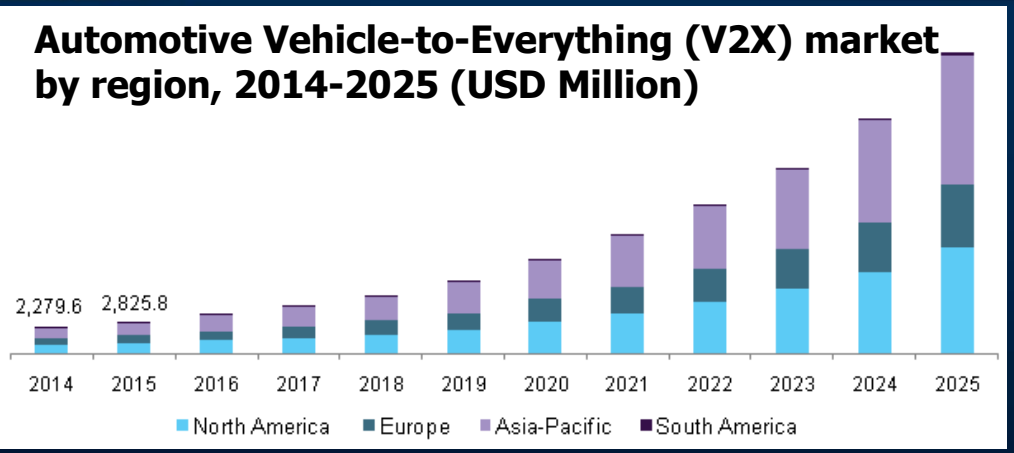
V2X: Pioneer for Fully Autonomous Driving

圖片來源：Qualcomm

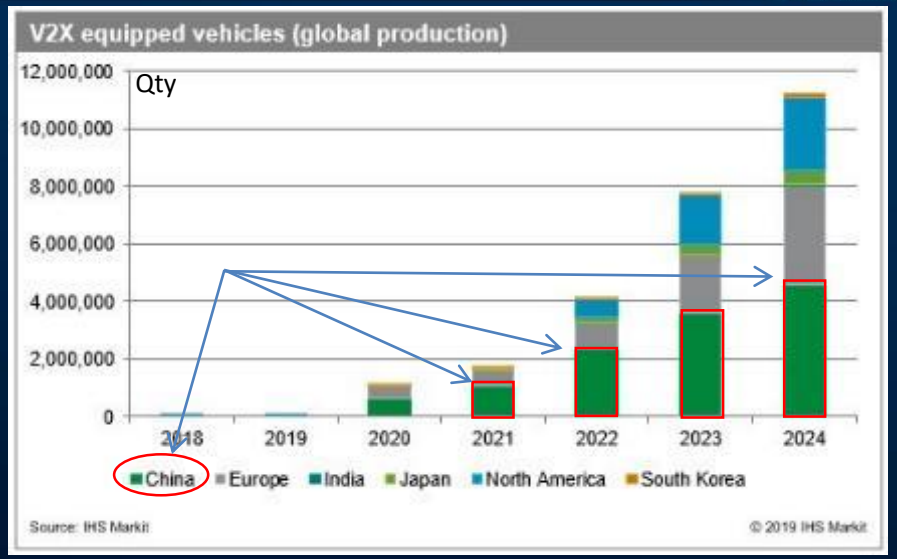
Better Autonomous Driving Experience

- V2X is also helping pave the way for fully autonomous driving through its unique non line-of-sight (NLoS) sensing capability
  - which allows vehicles to detect potential hazards, traffic, and road conditions
  - From longer distances and sooner than other in-vehicle sensors such as cameras, radar, and LiDAR (Light Detection and Ranging)

V2X Market Forecast



Courtesy of: Grand View Research



Courtesy of: HIS Markit

- Global spending on V2X :
  - Expected to grow at a CAGR of > 170% between 2019 and 2022
  - More than 11.2 million light vehicles equipped with some form of V2X system will be produced globally and compound annual growth rate (CAGR) of 277.5% in 2024

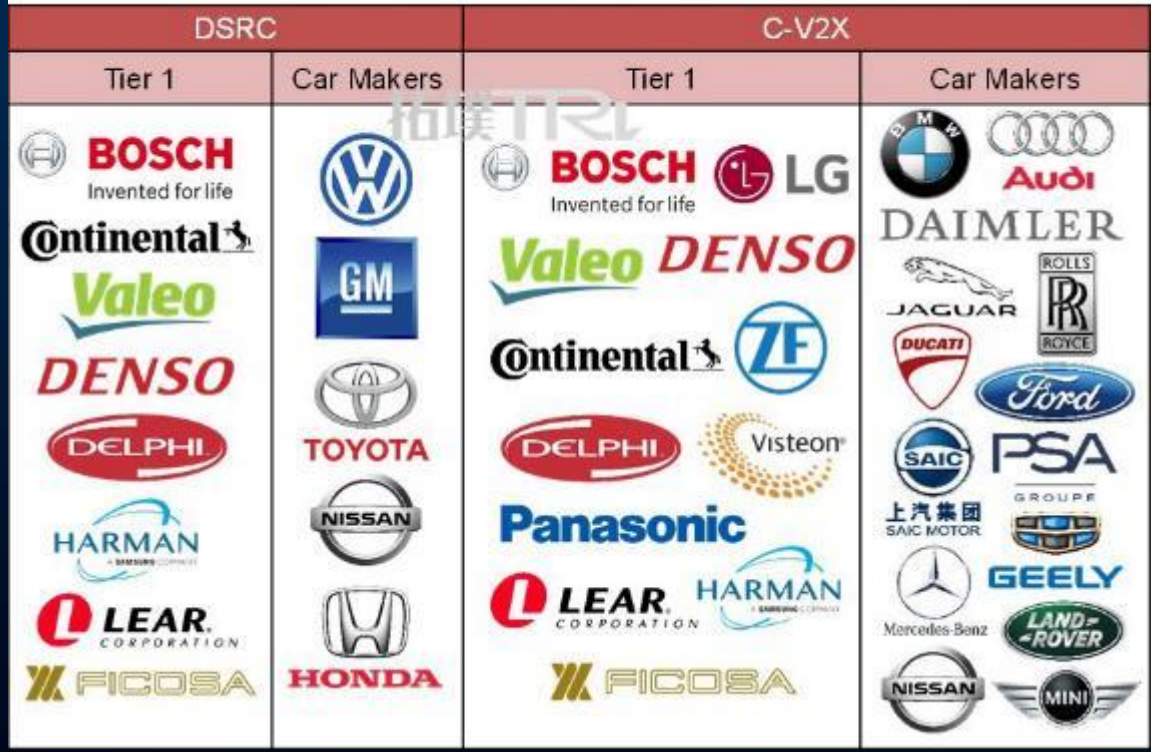
Major Technologies

- Dedicated Short Range Communication (DSRC)
  - Key technology: IEEE 802.11p-2010
    - IEEE 802.11bd/NGV (Next-Generation V2X)
  - USA WAVE/DSRC standard
    - Integrated IEEE 802.11p & IEEE 1609
  - Europe: European Telecom Standard Institute (ETSI)
    - ITS-G5 regulation version based on IEEE 802.11p protocol
    - Announced 《the Delegated Act on C-ITS》in 2019/March, lean toward DSRC(IEEE 802.11p)

- Cellular Connectivity (C-V2X)
  - Key technology: 5G/3GPP Release 14/15/16
  - China aggressively promote it
    - 629,000 light vehicles produced in the region equipped with C-V2X technology in 2020
  - USA: Industry supports of the 5G Automotive Association's waiver request seeking permission to deploy Cellular Vehicle-to-Everything (C-V2X) technology in a portion of the 5.9 GHz band

V2X Supply Chain

Source: 拓璞 TRi



Source: 拓璞 TRi

Taiwan’s Move in ICT/Semiconductor Industries

Personal Computer

Smartphone

Smart EV

MIH

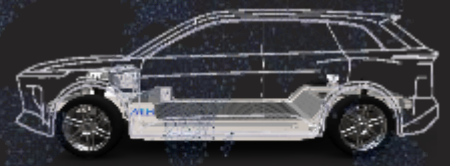
EV Open Platform
Foxconn Initiative

MIH

Partner Funnel

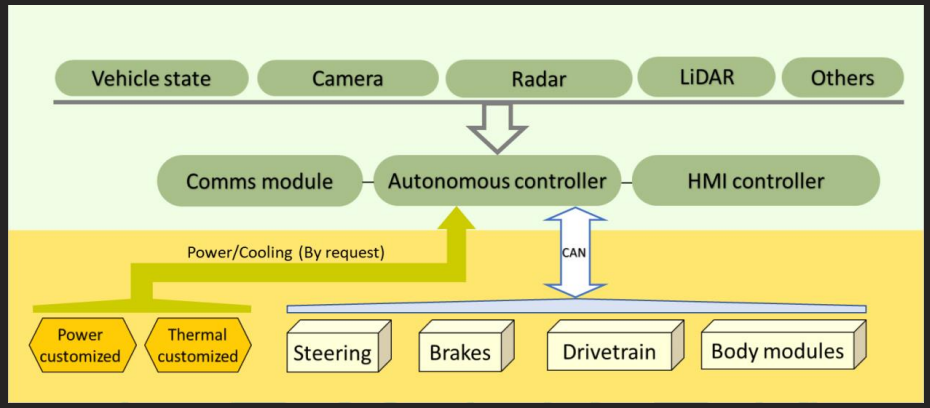
Alliance of partners

Key solutions & modularity

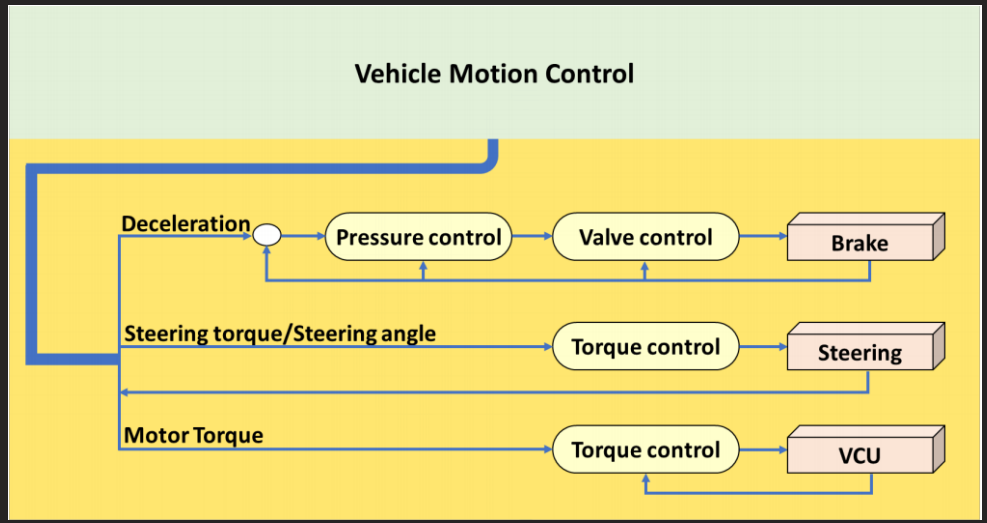


Go to market!

Open Platform Accelerating Innovation of EV



Autonomous Driving System



Potential Customers

Mobility Service Providers & Car Brands

MIH Alliance Partners

Automotive industry suppliers

Software developers & Cloud connectivity providers

ICT component suppliers

Electrification

Function Safety Requirements

- **ISO26262 or ASIL for current products are not necessary now in V2X**
  - Most of market available SoCs are **not** dedicated for V2X (for mobile phone or networking)
  - However, in the future
    - RSU (Road Side Unit)
      - ASIL-B: may be required
    - OBU (On-board Unit)
      - ASIL-B: minimum
      - ASIL-C/D: required for Unman-drive purpose
- **For EV, not limited in V2X, but also for Motion Control and ADAS**
  - ASIL-B is required

What Andes Can Provide for EV & V2X?

- **Non ASIL requirement:**
  - EV requirement
    - ADAS and Vehicle Motion Control requirement can be satisfied by V5 cores
      - V5 27/45-series can be dual issue, multi-core unit like ADAS and/or Motion Control Unit
  - V2X CPU requirement
    - Major SoCs CPU requirement can be satisfied
      - V5 45-series can be multi-function unit like OBU
      - V5 25/27-series can be good for cost-down devices like RSU
  - Security requirement:
    - Possible partners solution, AndeSentry platform: Secure-iC, Silex Insight, Hex-Five, IAR, etc.
- **ASIL requirement: ASIL-B certified CPU IP on the way**

Concluding Remarks

- EV, Smart EV will dominate market
- Smart EV requires V2X communication
- In Taiwan there are supply chains for Smart EV, V2X platforms
- MIH Open Platform is a good example
- Andes is MIH member, will provide solutions for CPU IP required in EV & V2X
- Yet there are more for you to dig out in Taiwan
- Computex provides you platform for digging out ideal suppliers

Thank You!