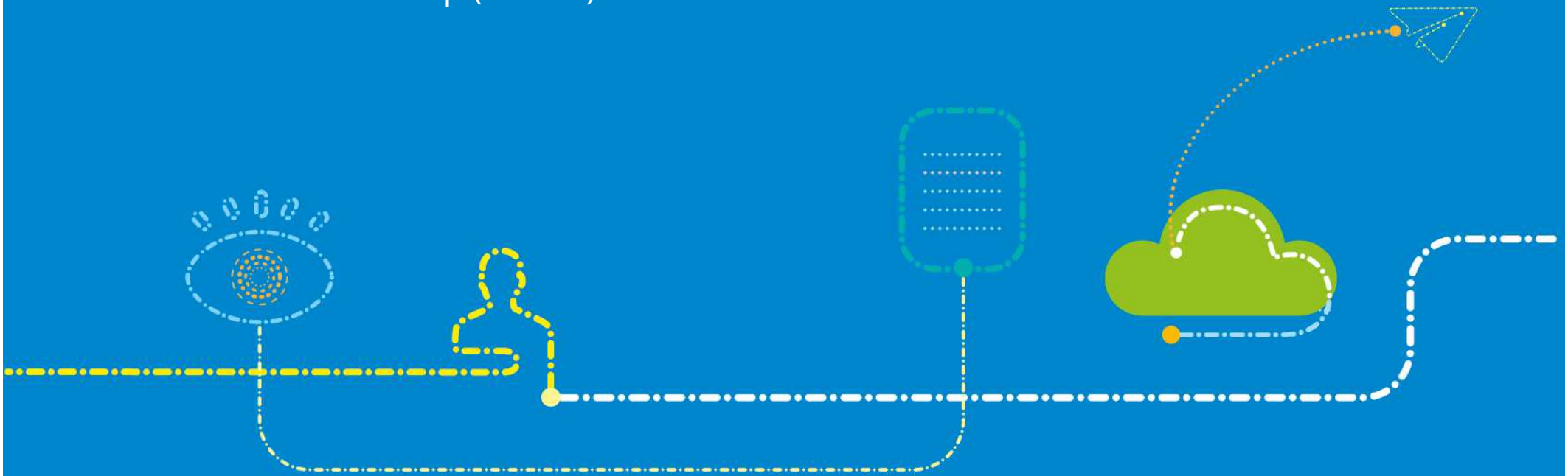
ZTE

Tomorrow never waits

V2X for 5G

Patrick Svedman

2nd 5G Verticals Workshop (5G PPP) 2015-11-09



ZTE Background in Automotive/V2X

- ZTE Company info:
  - ~70,000 staff, 18 R&D Centers,
  - Terminals, Wireless, Fixed access, Core network, Cloud&IT, Services, etc.
- V2X contributions in 3GPP, CCSA, C-ITS, TIAA, IMT-2020 Promotion group
- Example automotive product: ZTE Smart City
- Research project (pending): Autonomous driving using 5G technologies

中国移动 China Mobile　Baidu 百度　CAICT 中国信息通信研究院　BUPT

- Connected cars/telematics research projects with Chinese car vendors

BAG　GAC　China Auto

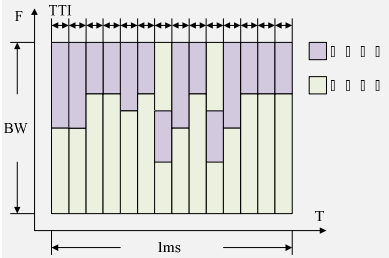
- Many V2X-related university research cooperation projects

Tsinghua　Beijing Jiaotong　Southeast　Xidian　UESTC　Harbin

5G Key Technologies for V2X

- **V2X for 5G well covered by the 5G-PPP Automotive white paper**
- V2X is more than connected cars: trains, flying vehicles (drones), ships, …
- 5G Key technologies for V2X:

Frame structure

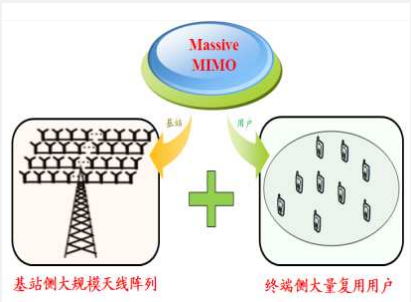


- **Goal**
  - low latency
  - high mobility
- **Solution**
  - frame structure design : legacy and brand new
  - pilot structure and sequences

V2V protocol

- **Goal**
  - low latency, high reliability, high mobility
  - communication in coverage or out of coverage
- **Solution**
  - V2V PHY design
  - V2V higher layer design

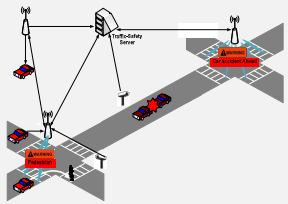
5G V2X



Goal
- high throughput
- massive devices, high capacity

Solution
- SRS optimization
- CSI optimization

Massive MIMO



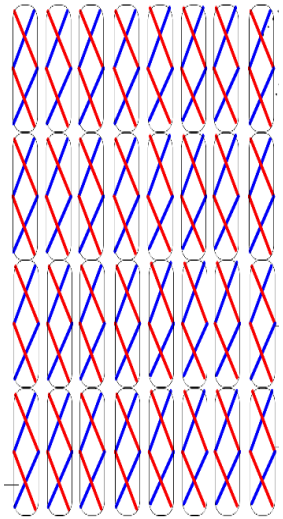
- **Goal**
  - low latency, massive devices
  - high mobility, agile architecture
- **Solution**
  - agile and configurable core network
  - local eNB forward
  - many type of RSU design
  - keep service continuity in seamless handover

Network architecture

Massive MIMO for V2X

- For high data-rate in vehicles (e.g. high-rate sensors, remote processing, ...)
- For extended coverage (e.g. rural V2I, high-frequency V2V, ...)
- Challenge: CSI, beam alignment, etc, at high speed

Example V2X Project Contribution: Massive MIMO Hardware



64 RF Ports
(128 elements)

TD-LTE BTS (Antenna+RU+BBU)

ZTE Paper® demoed in MWC 15

- Band: 2.6 GHz
- Bandwidth: 20MHz
- TX Power: 40W/Carrier
- Weight: 40Kg
- Size (mm): 900*500*120