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C-V2X Futures and Challenges

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Content

Outline

What is C-V2X

Topics and challenges

Take SPaT as an example

Take SRM and EVA as examples

What should not be virtualized

What is C-V2X

2 communication modes

4 applications

Uu interface
(5G network)

PC5 interface
(short range)

C-V2X

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graph LR; C-V2X --> Uu[Uu interface (5G network)]; C-V2X --> PC5[PC5 interface (short range)]; C-V2X --> V2V[V2V Vehicle-to-Vehicle]; C-V2X --> V2I[V2I Vehicle-to-Infrastructure]; C-V2X --> V2P[V2P Vehicle-to-Pedestrian]; C-V2X --> V2N[V2N Vehicle-to-Network];
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V2V Vehicle-to-Vehicle

V2I Vehicle-to-Infrastructure

V2P Vehicle-to-Pedestrian

V2N Vehicle-to-Network

* 5G Automotive Association standards

C-V2X today and future

20 years later...

- OBU is standard equipment on every vehicle
- Complete RSU coverage
- Comprehensive human-vehicle-road-cloud operations
- Far beyond 5G network

Today

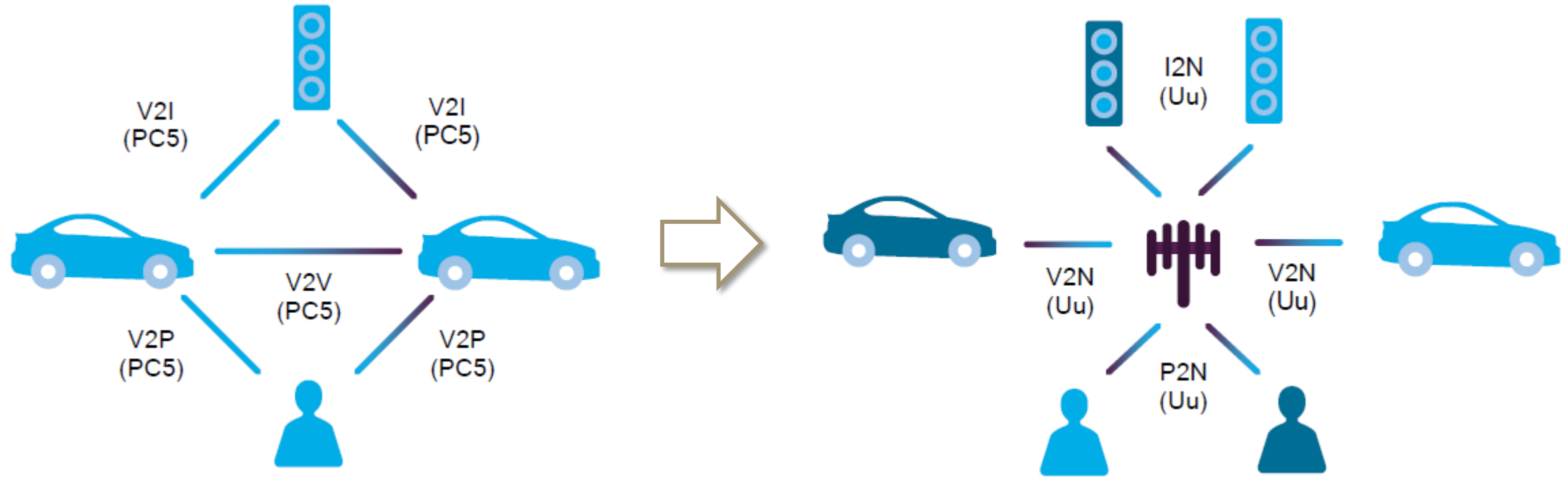
- Very few on-board units (OBUs)
- Very few road side units (RSUs)
- Partial C-V2X POC operations
- 5G network

Topics and challenges

- Hybrid driverless and driver
- Mixing with and without OBU
- Transfer with and without RSU

☞ Long-term revolution from **0** to **1**

Mobile network can help



Source: Maxime Flament, C-V2X today and next steps, 5GAA

Topics and challenges

Selective deployment of C-V2X physical appliances

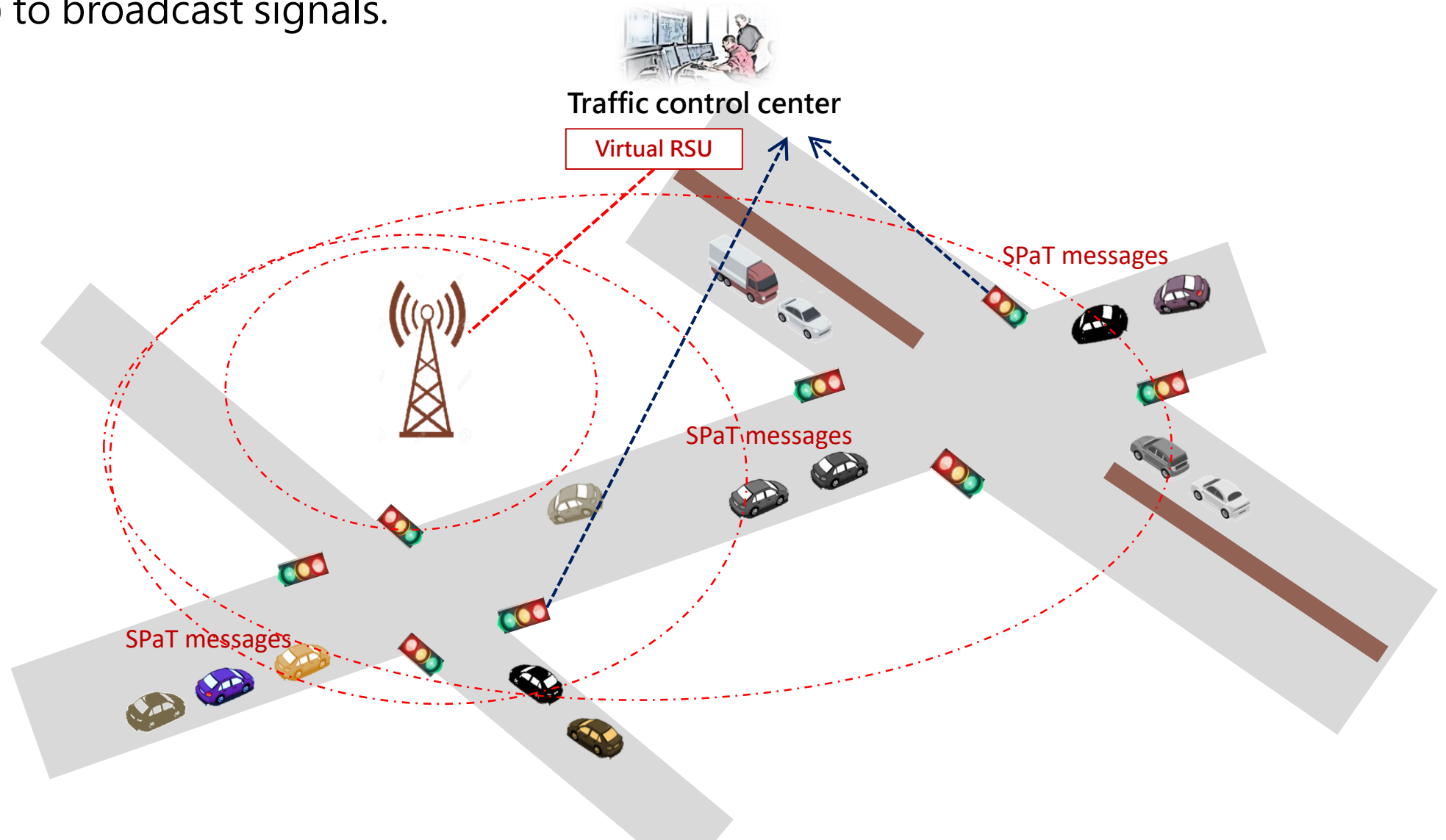
- use V2N to replace V2I
- use Uu to replace PC2
- use cell phones to replace OBU

Virtual RSU/OBU for Non latency-sensitive applications

Physical RSU/OBU for time-critical applications

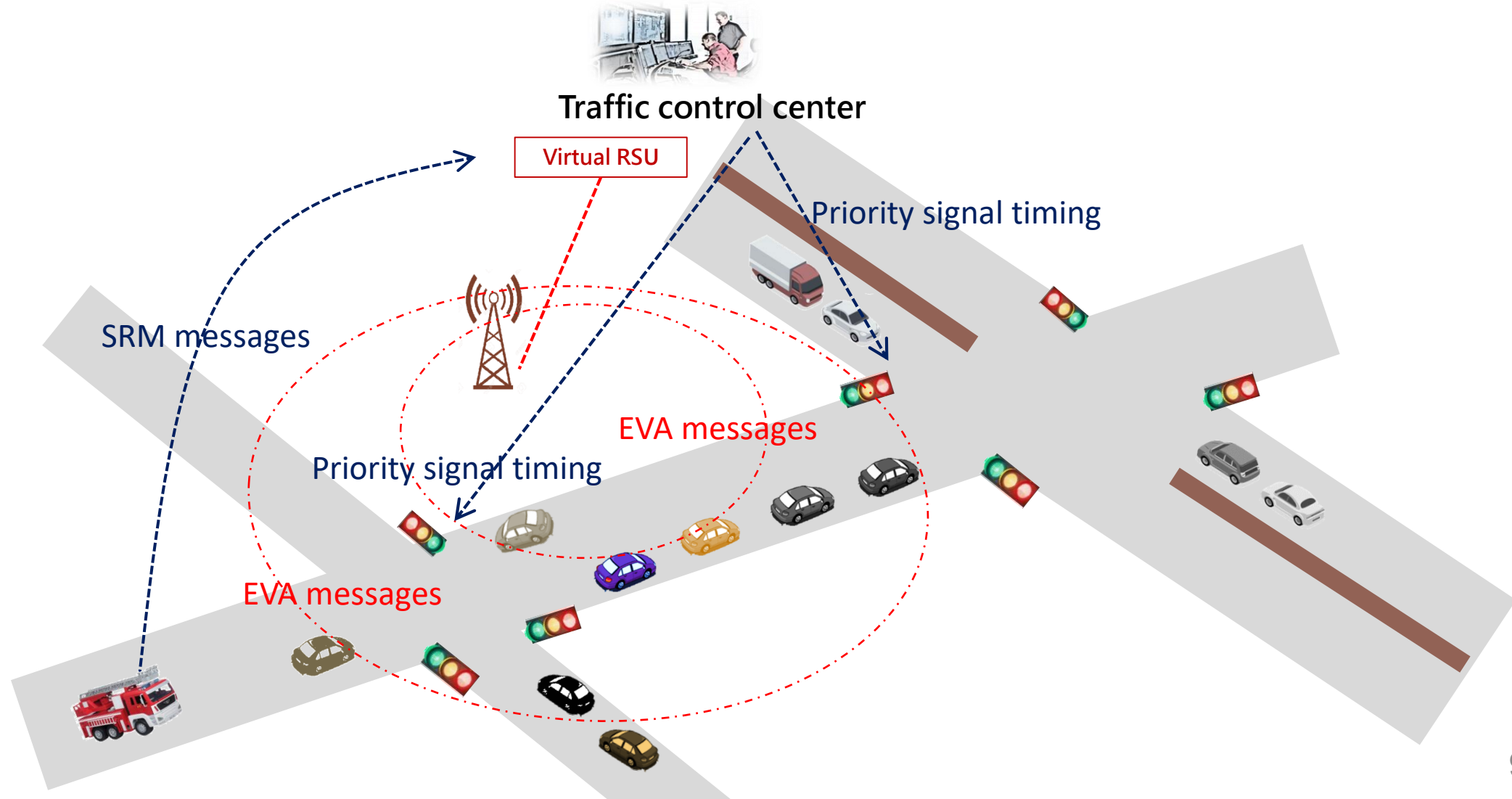
Take SPaT as an example

Signal Phase and Timing (SPaT): One base station can replace dozens of physical roadside units (RSUs) to broadcast signals.



Take SRM and EVA as examples

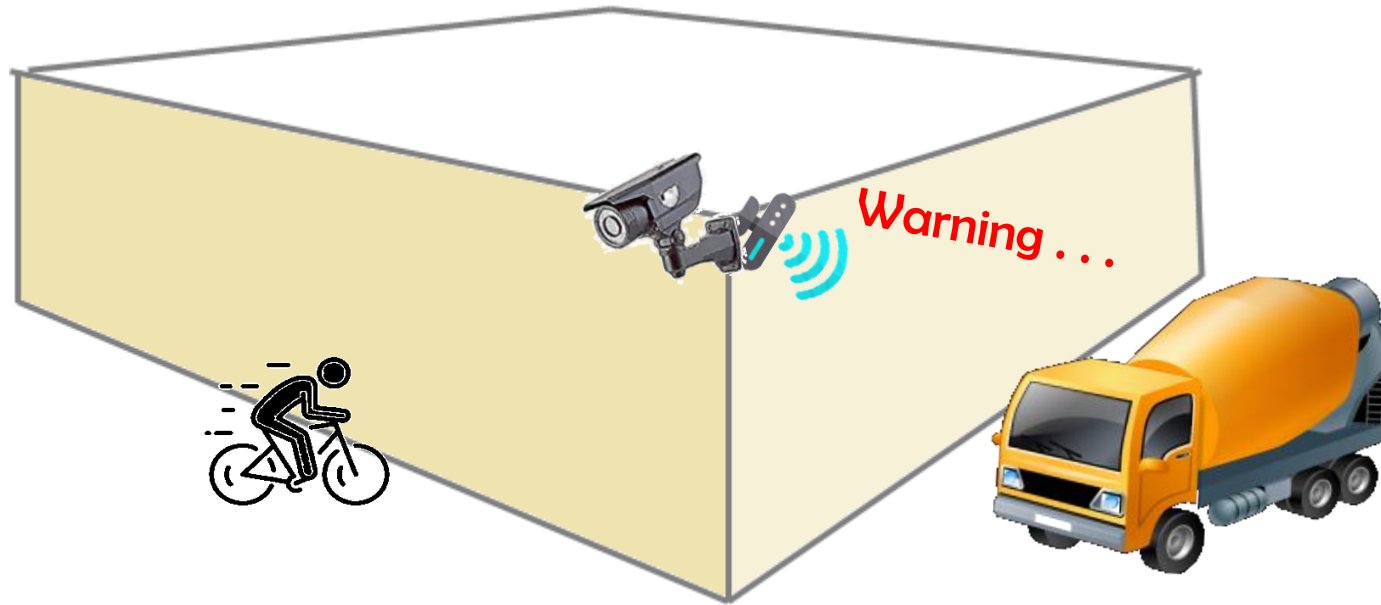
Signal Request Message (SRM), Emergency Vehicle Alert (EVA): The traffic control center can use the base station to evacuate surrounding vehicles in advance.



What should not be virtualized ?

Time-critical applications still need to deploy roadside units (RSUs) to deliver warning messages quickly.

Something like **Vulnerable Road Users (VRUs) Protection**.



Thank You!
