

Electronic Architecture Design to realize SDV

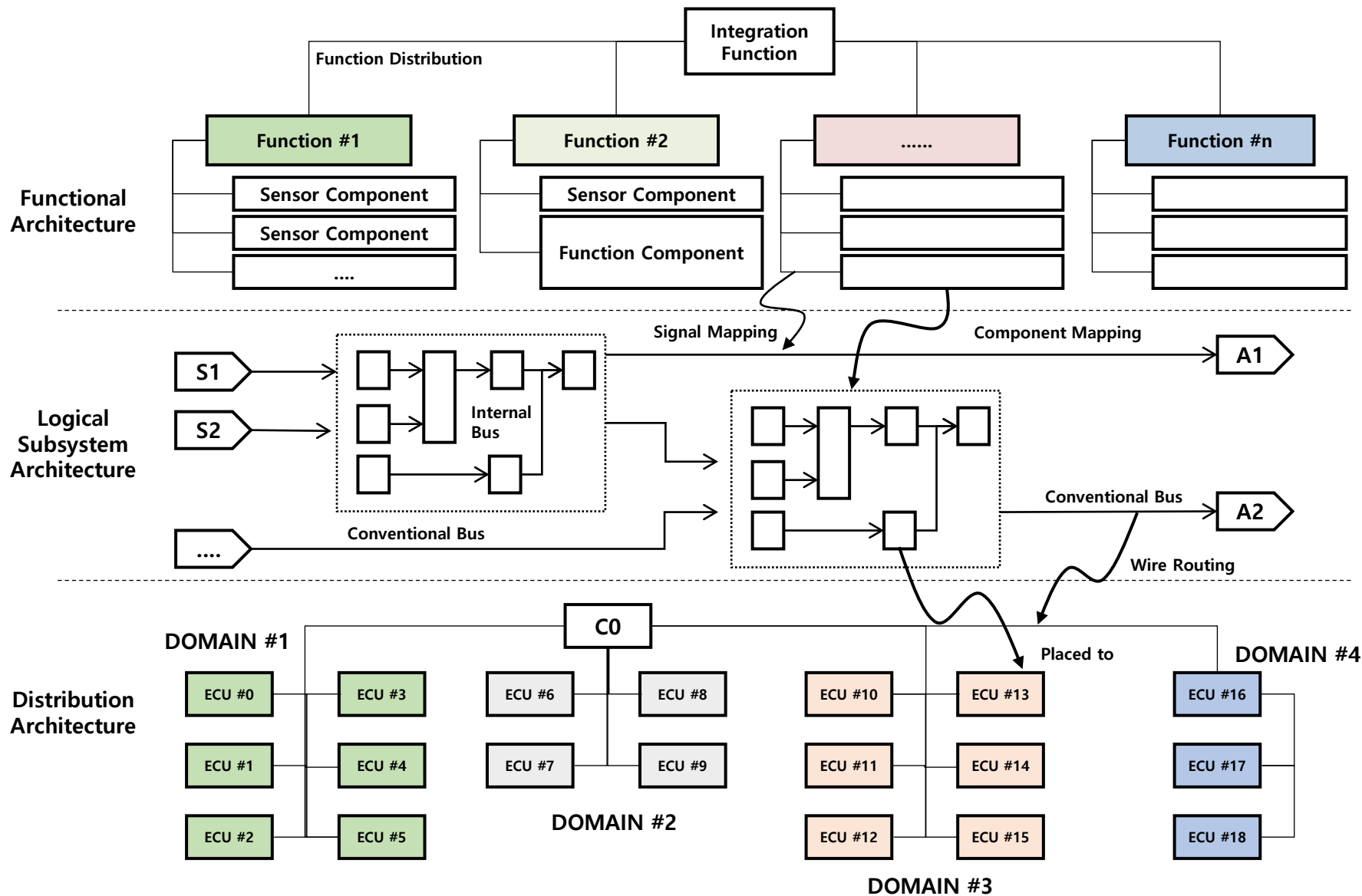


KATECH (Korea Automotive Technology Institute)

Bigdata · SW platform R&D division

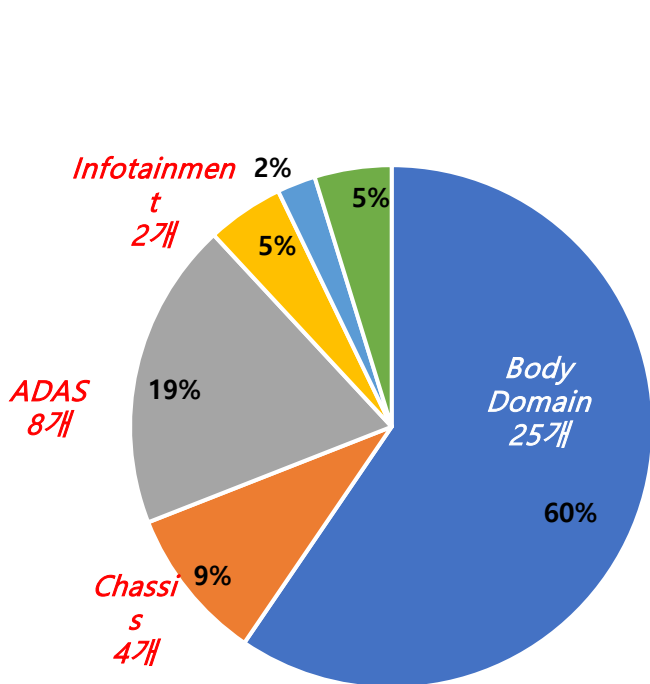
Park Jeehun (parkjh@katech.re.kr)



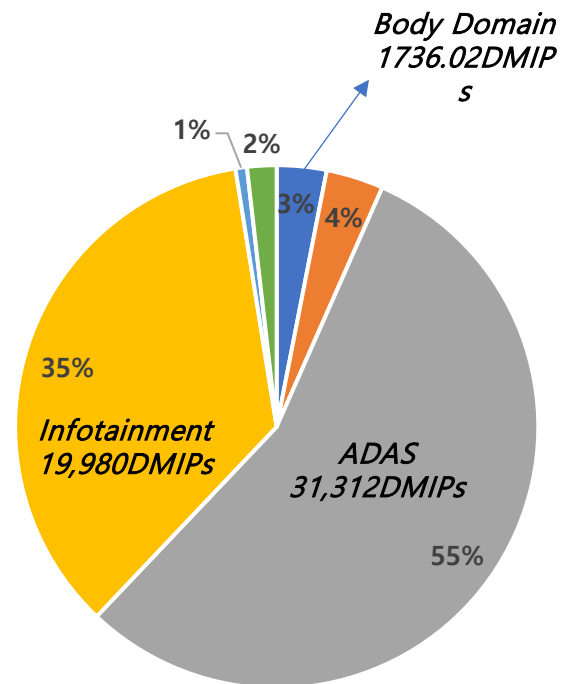


Bench-
marking

ECU Function Distribution

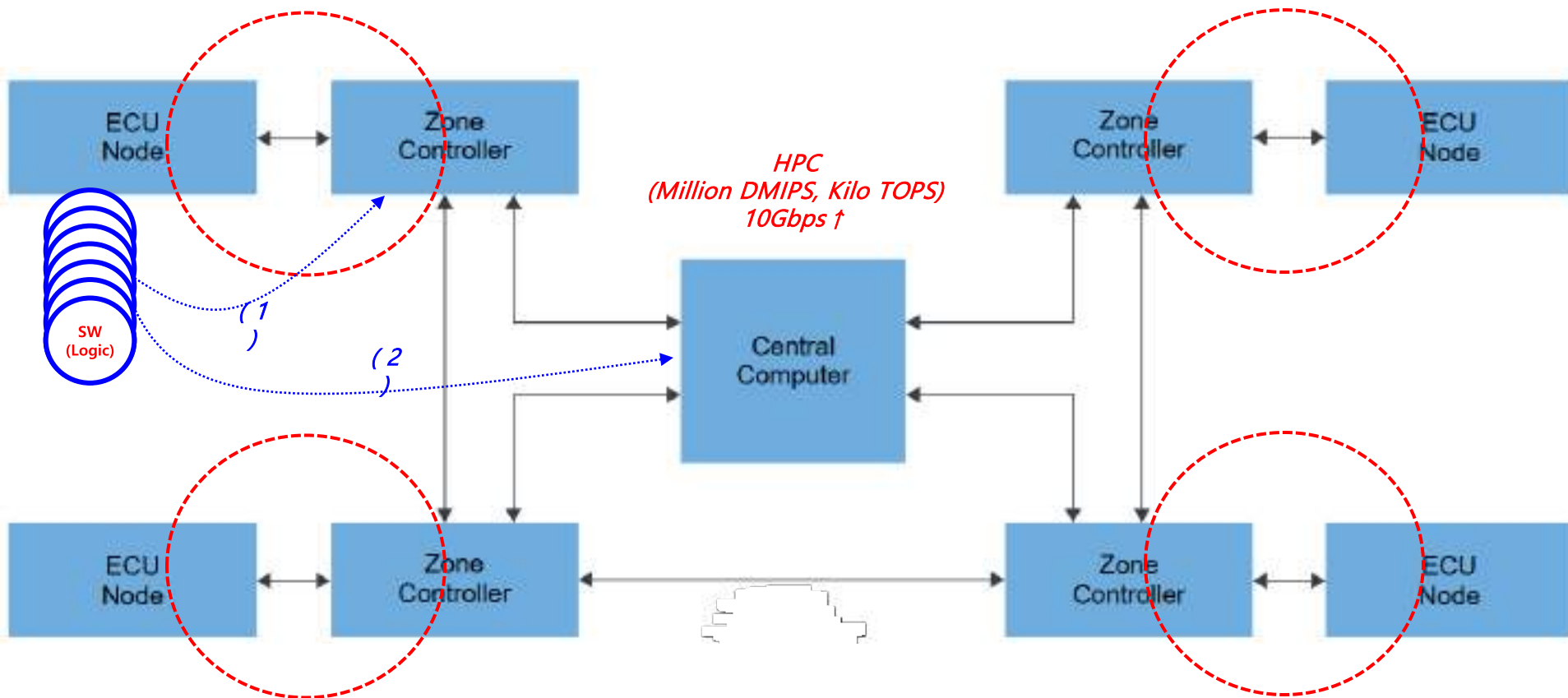


- Body Domain ■ Chassis Domain ■ ADAS
- Infotainment ■ PowerTrain ■ Battery



- Body Domain ■ Chassis Domain ■ ADAS
- Infotainment ■ PowerTrain ■ Battery

Realization Zonal Architecture



ECU | Body System



DAU



DSM



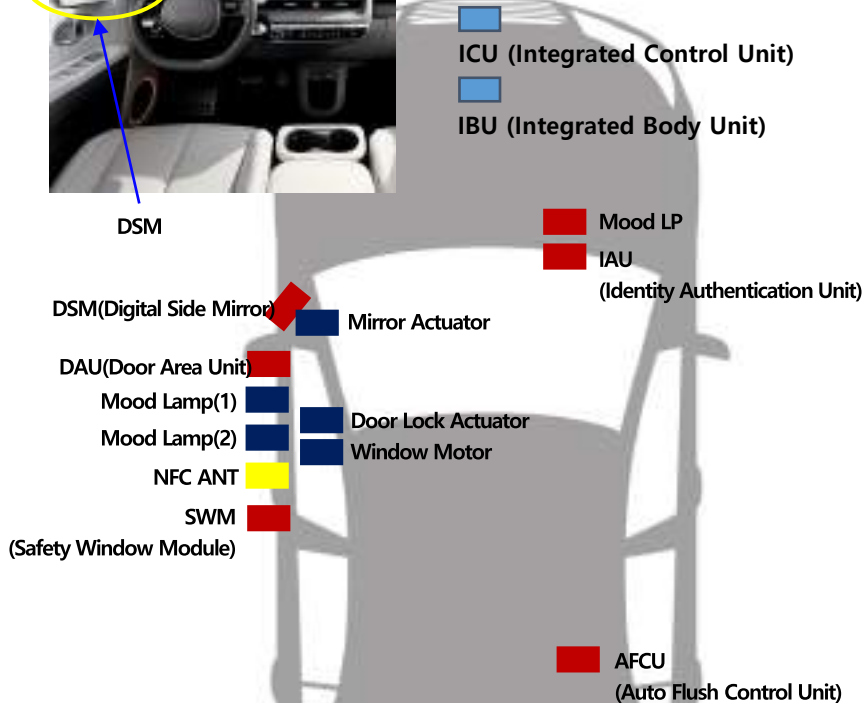
Mood_LP



DD_SP / DD_AR



NFC ANT



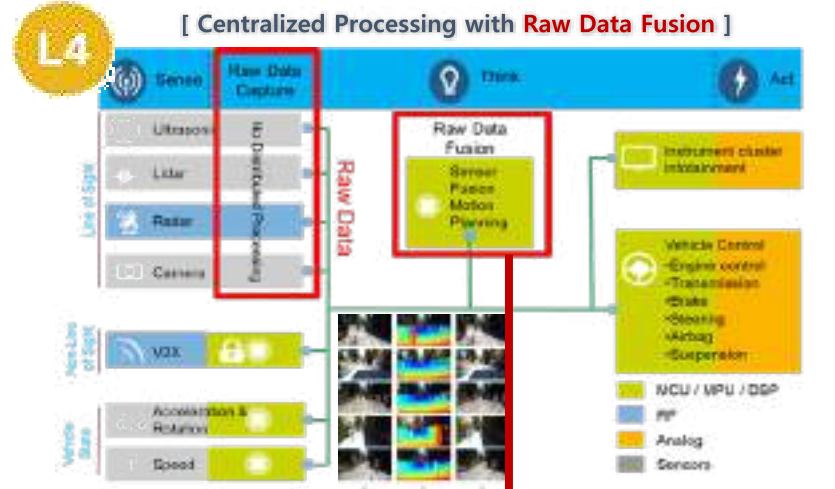
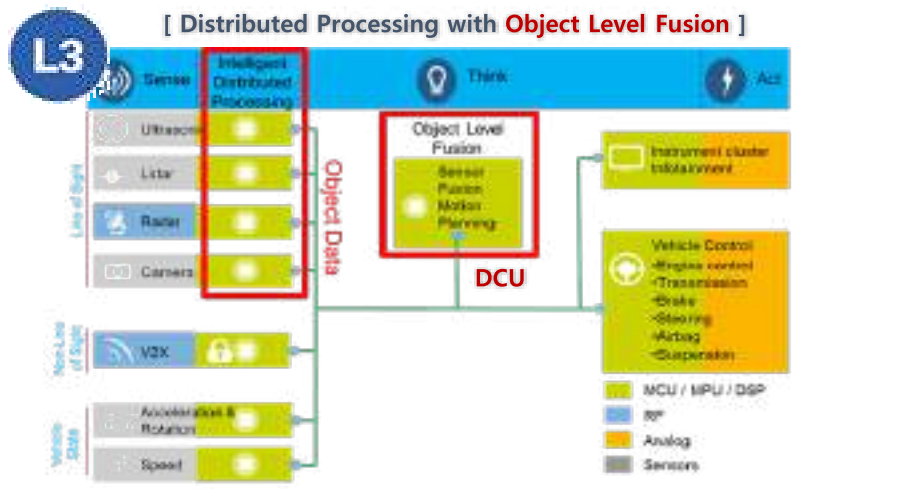
IAU



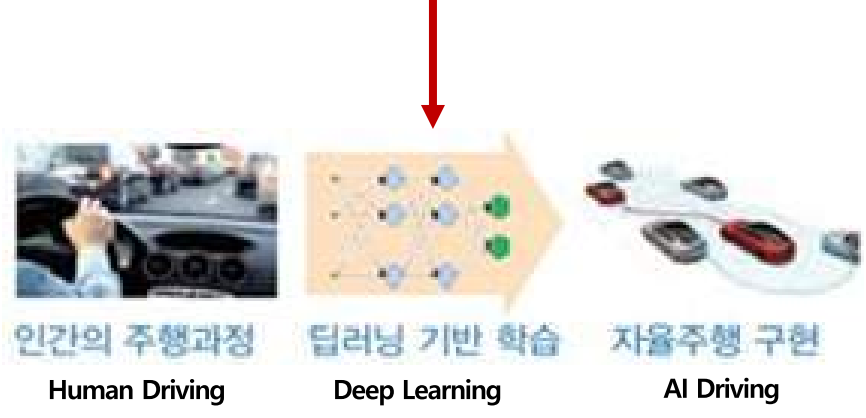
SWM



AFCU



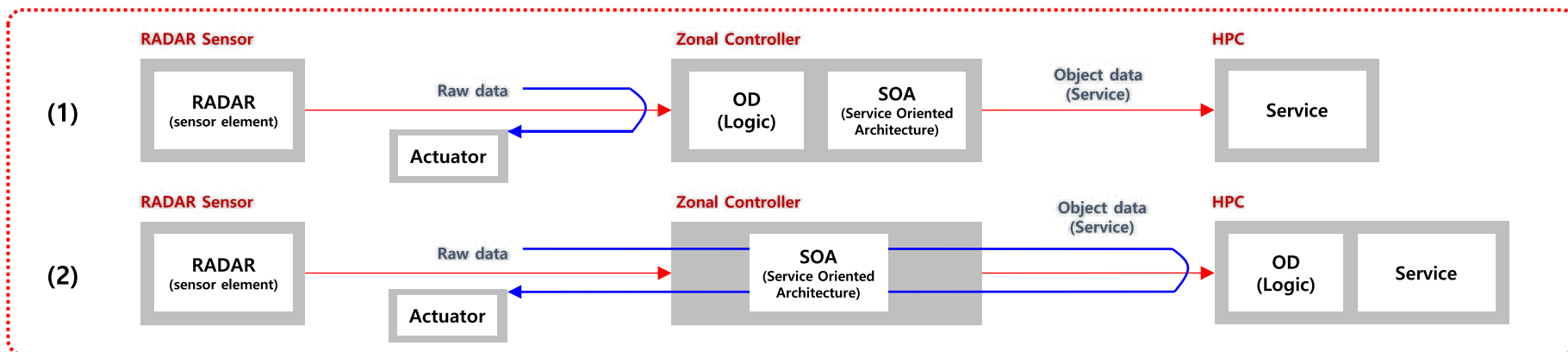
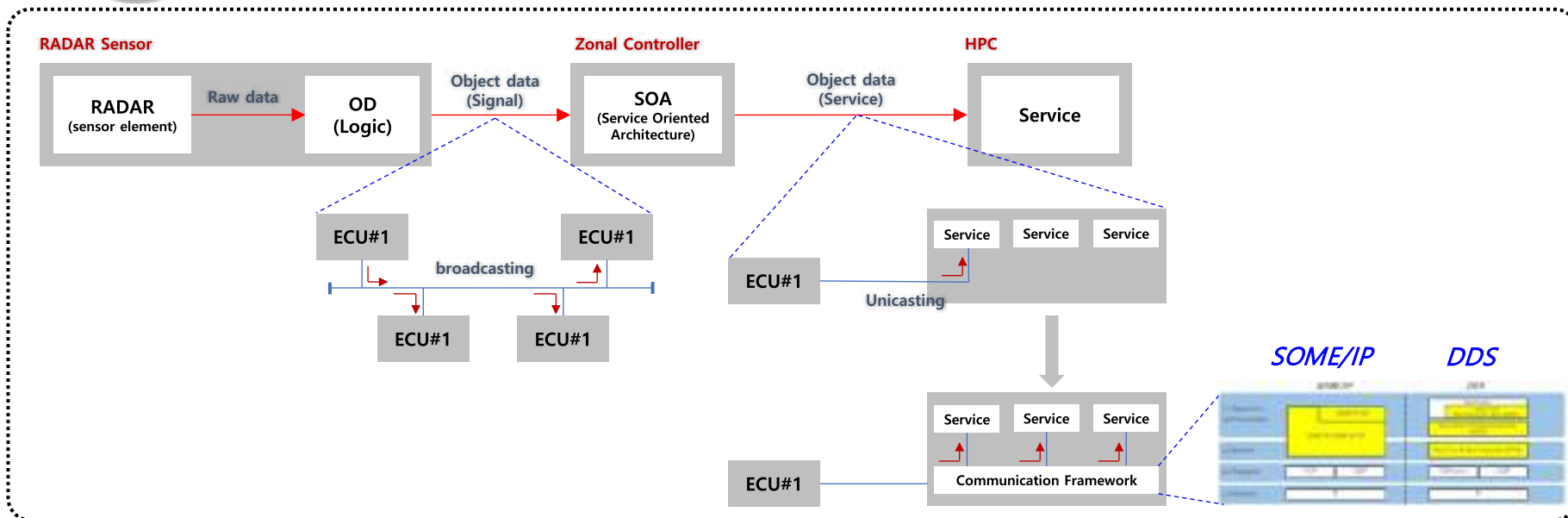
레벨 1	레벨 2	레벨 3	레벨 4	레벨 5
센서 개형 1 #	센서 개형 2 #	센서 개형 3 #	센서 개형 4 #	센서 개형 5 #
초음파 센서 4	초음파 센서 8	초음파 센서 8	초음파 센서 8	초음파 센서 8~10
장거리 레이더 1	장거리 레이더 1	장거리 레이더 2	장거리 레이더 2	장거리 레이더 2
단거리 레이더 2	단거리 레이더 2~4	단거리 레이더 4	단거리 레이더 4	단거리 레이더 4
카메라/ 단거리 전용 레이더 1	카메라 2~4	카메라(좌우) 2	카메라 [스테레오/3초점] 2/3	카메라(좌우) 2/3
총합 ~6~8	총합 ~12	카메라(좌우) 4	카메라(좌우) 4	카메라(좌우) 4
		카메라(스테레오) 1	카메라(스테레오) 1	카메라(좌우) 2
		ubolo 1	ubolo 1	ubolo 1/2
		레이더 1	레이더 2/4	레이더 4
		주축위치 1	주축위치 1	주축위치 1
		총합 ~24~26	총합 ~24~28	총합 ~26~32
속변 프로세싱 세부보장 지원	주위 환경 관찰	의식 공유	운전자 표적 검출	운전자 없음



[Average sensor count in respective autonomous driving levels (출처: Frost&Sullivan)]

Methodology

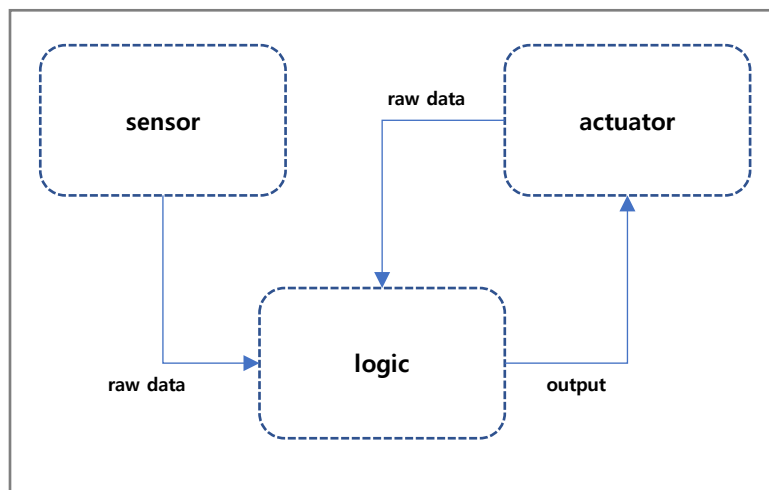
SW migration based on real-time requirements



NCS

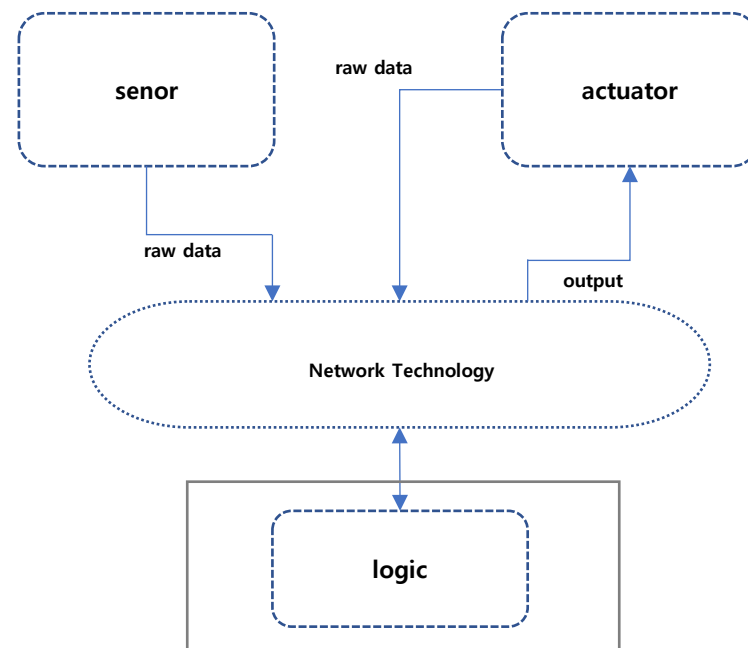
Data processing for SW migration

- To migrate software for HPCs in vehicles, the raw data needs to be transferred firstly.
 - (AS-IS) Sensors and actuators are directly connected to software(logic)
 - (TO-BE) Sensors and actuators are connected to software(logic) through a network technology



ECU

[Traditional vehicle ECU system]



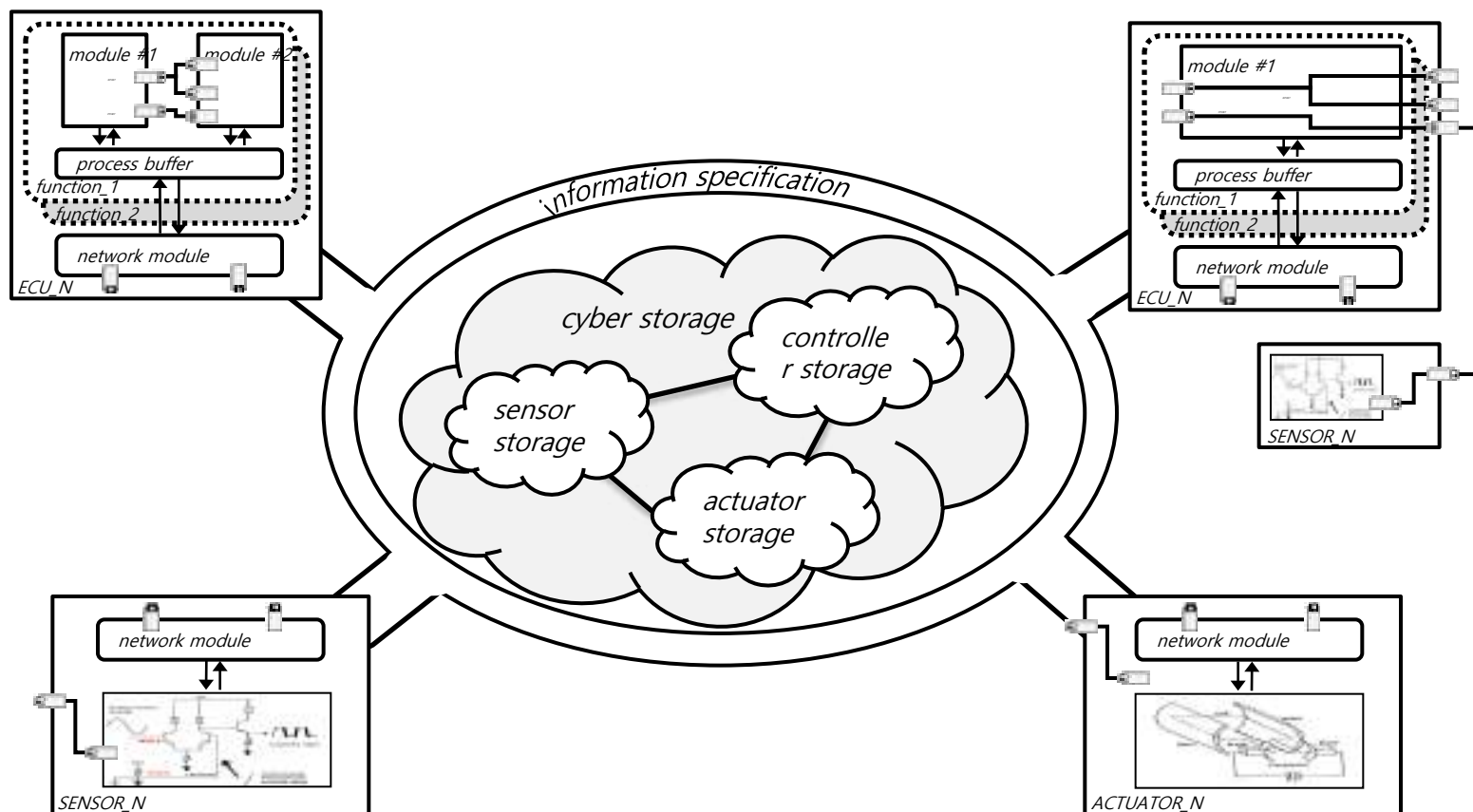
HPC

[HPC-based ECU system]

CPS

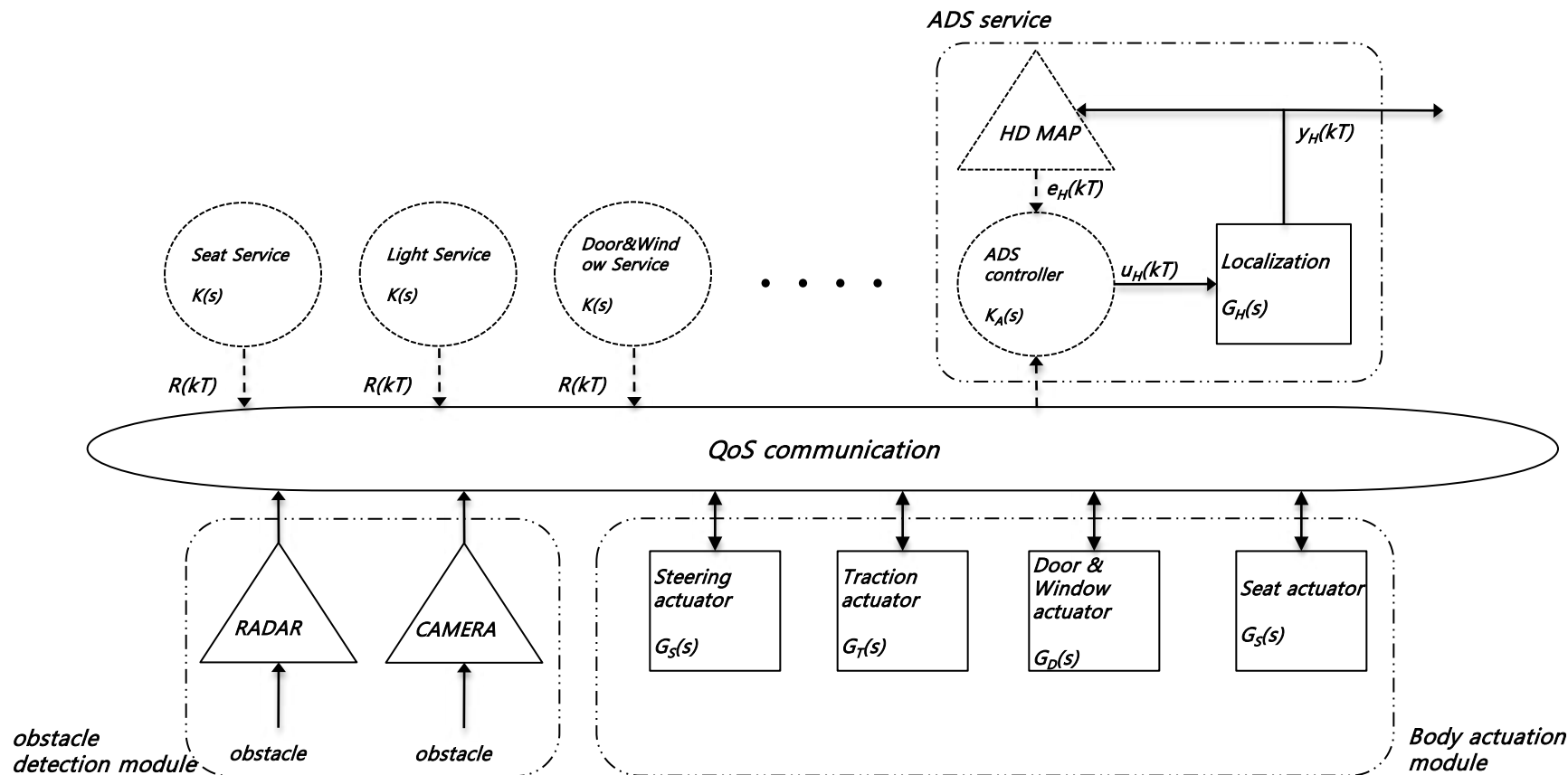
Cyber Physical System

- Definition of control loop and network information specification
- Design of virtual storage (eg, sensor storage, actuator storage, controller storage)



CPS

SDV based on Cyber Physical System (example)

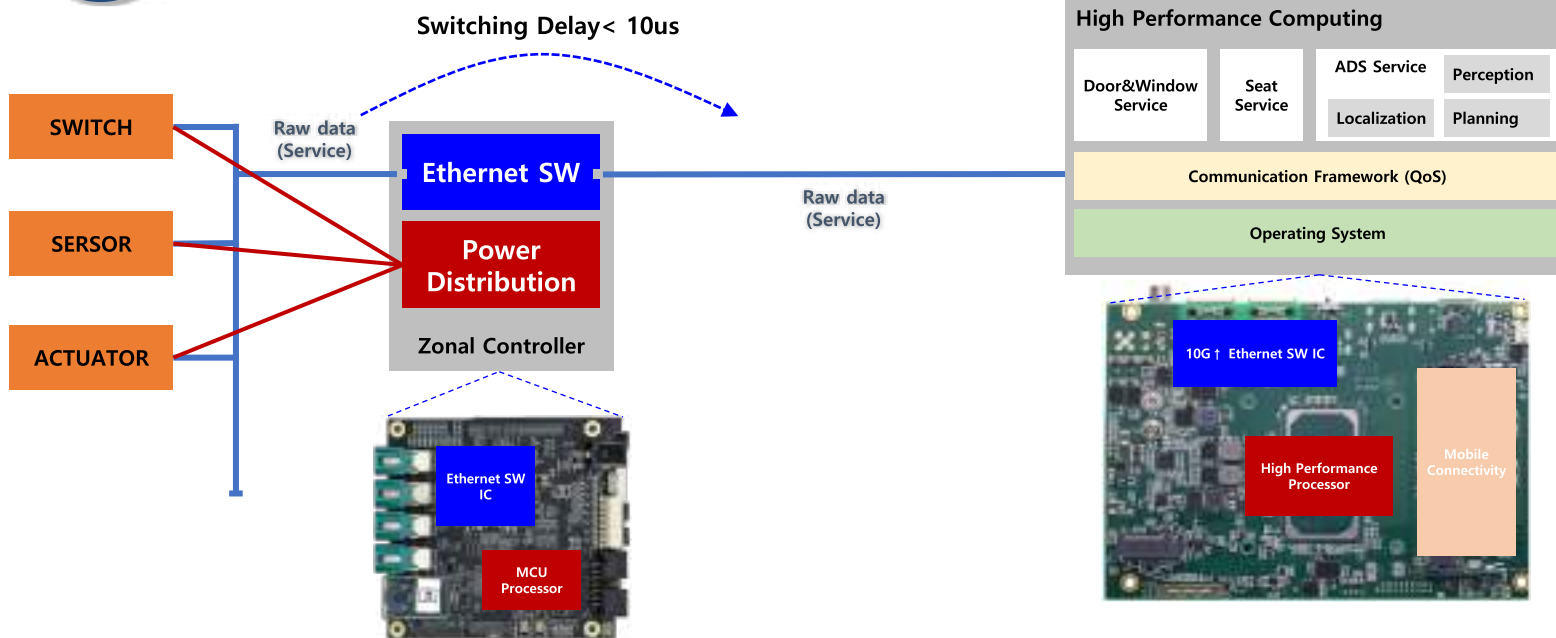


→ physical input/output — physical system

- - - cyber input/output - - - cyber system

CPS

SDV based on Cyber Physical System (example)



12/13 (EXAMPLE #1)



(EXAMPLE #2)

Conclusion

Vehicle brain – centralized architecture

- Zonal architecture is an temporary state to accommodate the constraints of the current vehicle architecture
- Considering software orchestration, network jitter, processing power, etc., the final form of SDV technically ends up being a centralized architecture with a vehicle brain
- Zonal controller has functions such as wiring harness reduction, power supply, etc.

