Task 3.4: Modular and Interoperable IoT system design

AVL-AT (L), TEVVA, IRIZAR, TEC, DATIK; M10-M18

Overview of innovative measures

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Task Description and Objectives

Task 3.4 Design of interoperable IoT concept and Interfaces for connected electric truck fleet (AVL-AT(L), TEVVA, IRIZAR, TEC, DATIK; M10-M18)
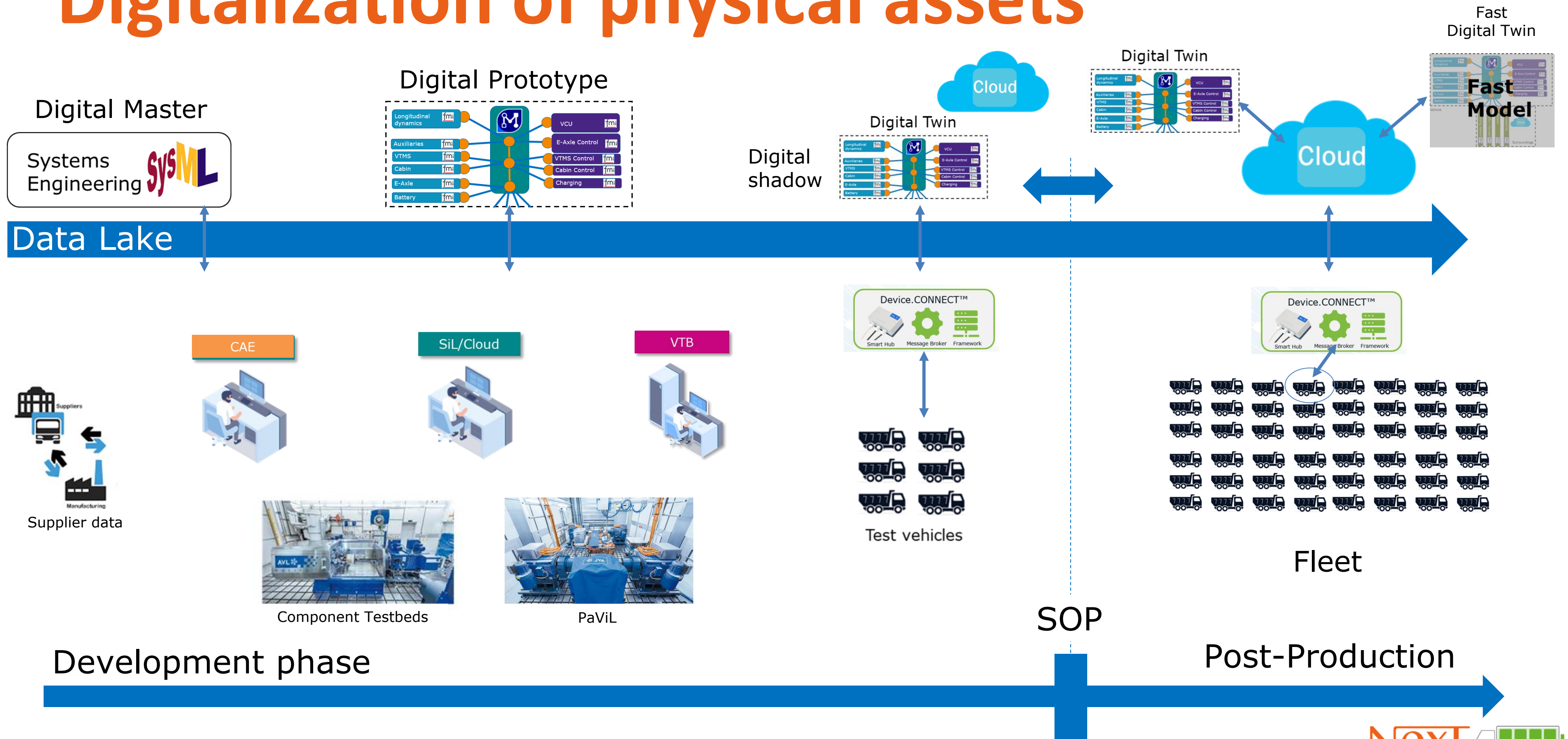
Objectives
- Connects almost anywhere in the world
- High security communications (safety, IP & data protection)
- Flexible, fast bi-directional communications
- Ease of implementation / integration
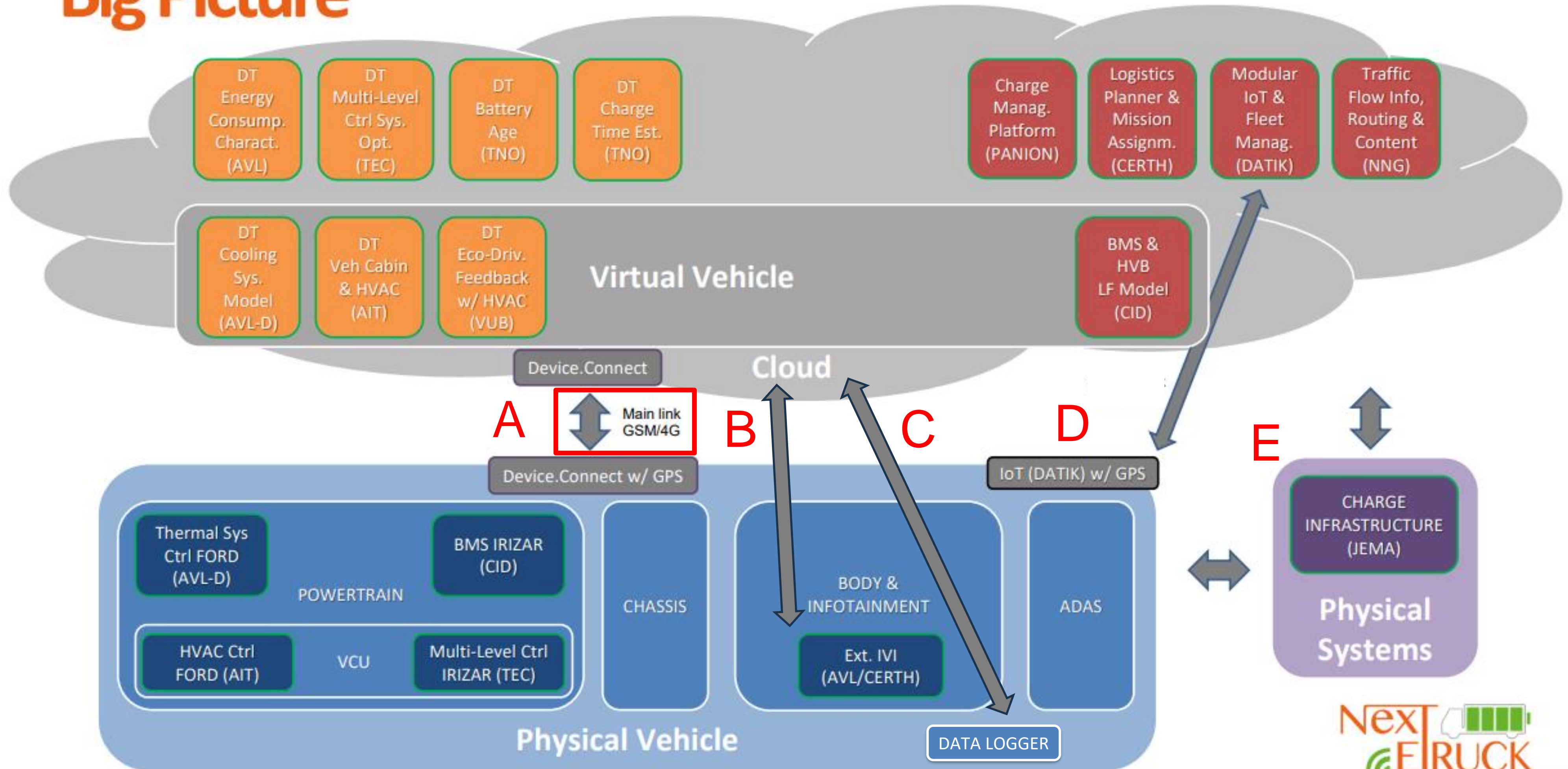- Cost effective

Digitalization of physical assets

Big Picture

AVL Device.CONNECT

Initially designed for in-house use on

- Remote connection to test vehicles and
- Allow maintenance and "live diagnostics" of equipment installed at customers

Now expanding to a full IoT platform for

- Whole connected facilities (Lab Management)
- Mixed reality maintenance & support
- Fleet management
  - Including preventative maintenance
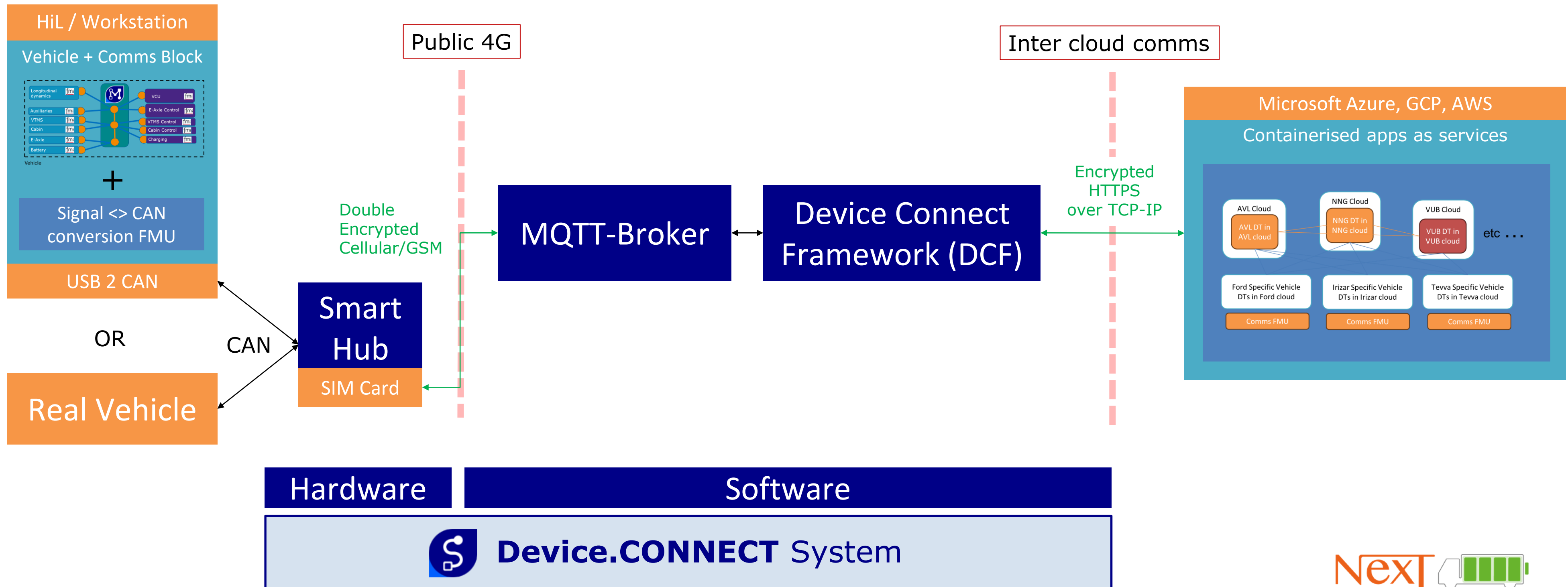- True digital twin support (not just digital shadow)

Secure Data Transfer with the Cloud

Real or Simulated Vehicle

AVL Cloud

Cloud Environments

HiL / Workstation

Vehicle + Comms Block

+

Signal <> CAN conversion FMU

USB 2 CAN

OR

CAN

Real Vehicle

Smart Hub

SIM Card

Public 4G

Double Encrypted Cellular/GSM

MQTT-Broker

Device Connect Framework (DCF)

Inter cloud comms

Encrypted HTTPS over TCP-IP

Microsoft Azure, GCP, AWS

Containerised apps as services

AVL Cloud — AVL DT in AVL cloud

NNG Cloud — NNG DT in NNG cloud

VUB Cloud — VUB DT in VUB cloud

etc . . .

Ford Specific Vehicle DTs in Ford cloud

Irizar Specific Vehicle DTs in Irizar cloud

Tevva Specific Vehicle DTs in Tevva cloud

Comms FMU

Comms FMU

Comms FMU

Hardware

Software

Device.CONNECT System

Innovation Areas 1

Connects almost anywhere in the world

- Vehicles, infrastructure, locations and suppliers are increasingly globally distributed
- 4G ubiquitous, fast enough for most applications

High security communications (safety, IP & data protection)

- Secure boot, full disk encryption, ultra high (EAL6+) key store, hardened
- Patented non-routable connectivity approach
- Dual encryption over GSM network

Ease of implementation / integration

- Plug and play

Cost effective

- Only required interfaces
- Modular approach (support for more on request)
- Flexible production line in place

Generic configurations

	RS 232	USB Device	USB Host	CAN
Ethernet	GY3291	GY3292	GY3522	GY3523
WLAN	GY3292	GY3294	-	GY3524
LTE	GY3524	GY3509	-	GY3526

Innovation Areas 2

Flexible, fast bi-directional communications framework

- <1s round trip time secure comms (semi-realtime)
- Full Software and Hardware implementation
  - AVL or Local Cloud deployment
- Multi-cloud endpoint
  - Security and protocol support
  - Latency investigation
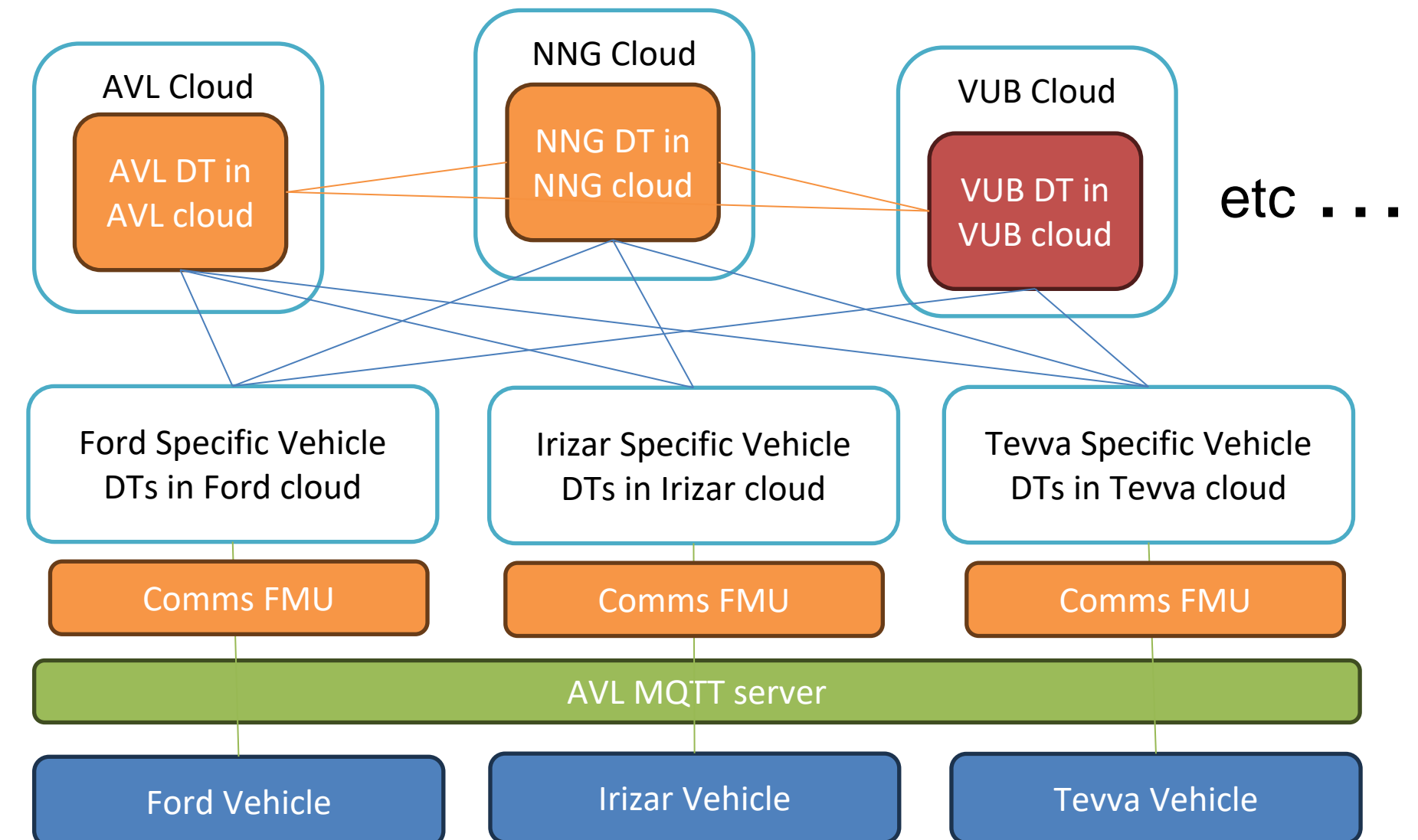
Possible final solution with multiple cloud environments

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