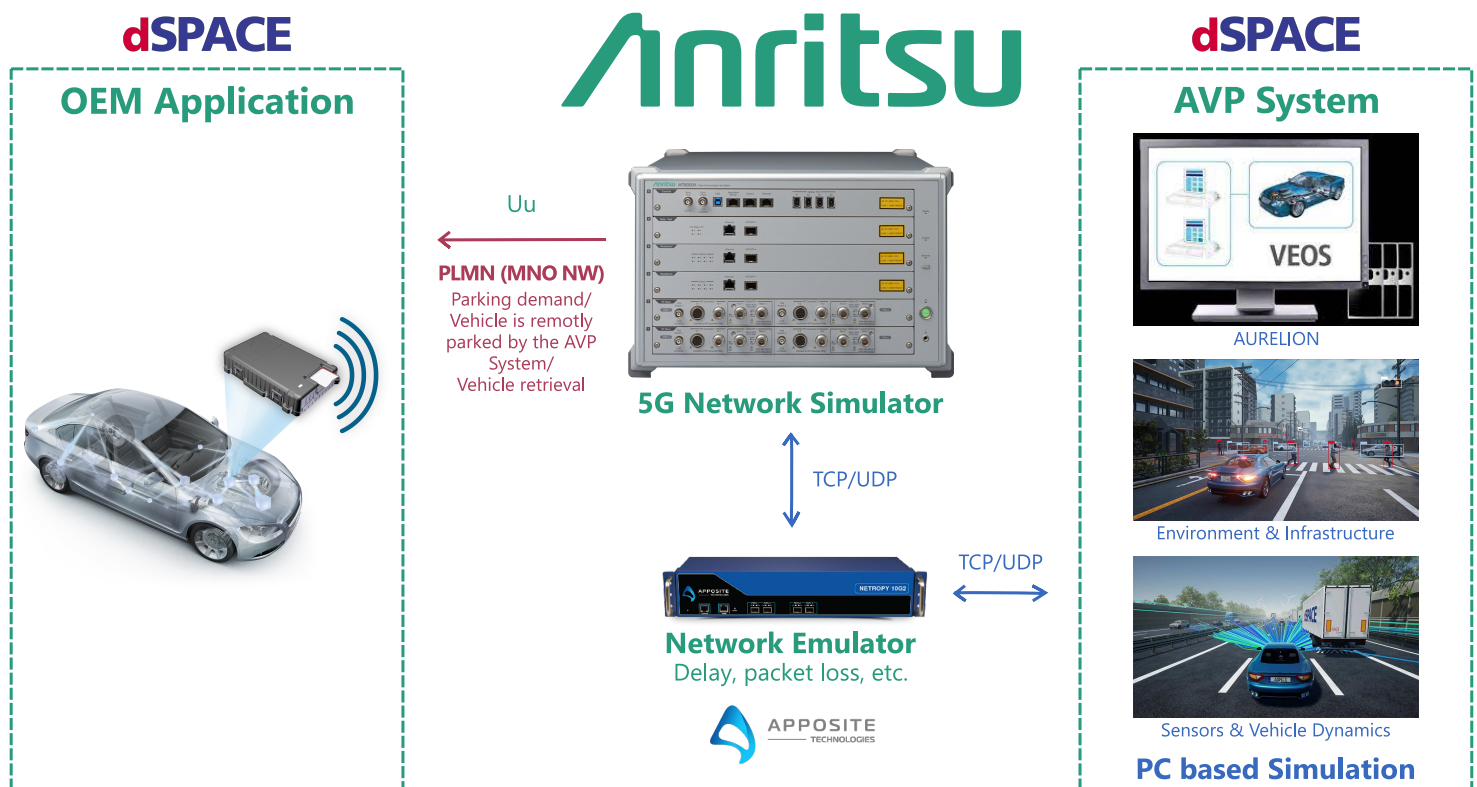# Anritsu
Advancing beyond
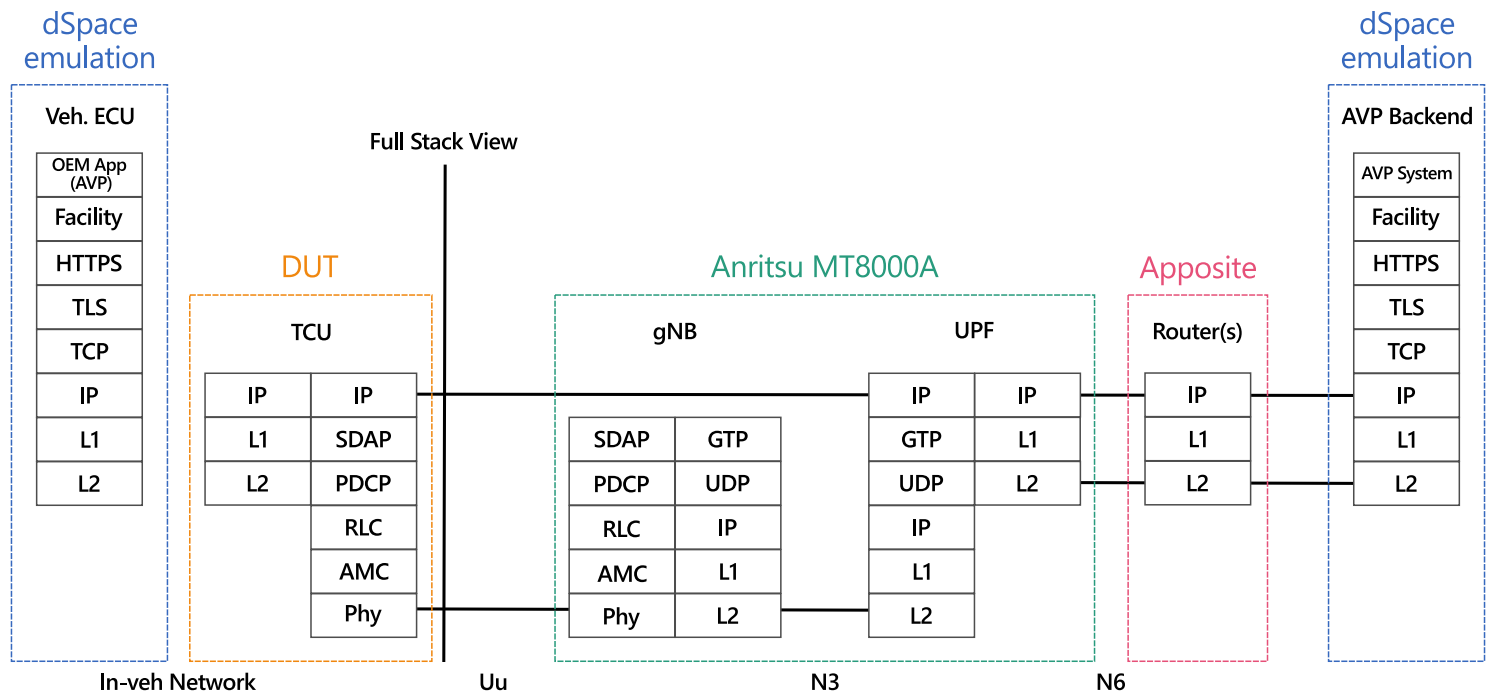
5G Enabled Automated Valet Parking

Anritsu solution for Automated Valet Parking

This solution features Anritsu **MT8000A Radio Communication Test Station** and **dSPACE VEOS** (a PC-based simulation platform), with **dSPACE AURELION** sensor-realistic simulation provides 5G Digital Twin testing environment for Automotive V2X Use Cases.

This is a demonstration of **Automated Valet Parking** (AVP) Type 2, which is one of the actively discussed use cases of V2X. By using communication technology such as 5G, the parking request will be received by the AVP service. The vehicle will then be dropped off by the driver and automatically driven by the AVP system to its intended parking spot. Upon request of the owner, the vehicle is automatically retrieved.

dSPACE

OEM Application

Anritsu

dSPACE

AVP System

Uu

PLMN (MNO NW)
Parking demand/
Vehicle is remotly
parked by the AVP
System/
Vehicle retrieval

5G Network Simulator

VEOS

AURELION

TCP/UDP

Environment & Infrastructure

Network Emulator

TCP/UDP

Network Emulator
Delay, packet loss, etc.

APPOSITE
TECHNOLOGIES

Sensors & Vehicle Dynamics

PC based Simulation

Protocol Configuration

dSpace emulation

Veh. ECU

OEM App (AVP)
Facility
HTTPS
TLS
TCP

Full Stack View

DUT

Anritsu MT8000A

Apposite

dSpace emulation

AVP Backend

AVP System
Facility
HTTPS
TLS
TCP

TCU

gNB

UPF

Router(s)

IP	L1	L2

IP	IP
L1	SDAP
L2	PDCP
	RLC
	AMC
	Phy

SDAP	GTP
PDCP	UDP
RLC	IP
AMC	L1
Phy	L2

IP	IP
GTP	L1
UDP	L2
IP	
L1	
L2	

IP
L1
L2

IP
L1
L2

In-veh Network   **Uu**   **N3**   **N6**

Operation Sequence

AVP service discovery and reservation

Vehicle parking

(optional) Vehicle re-parking

AVP payment & Vehicle retrieval

Parking demand	AVP dropp-off	Ignition off	*(optional)* AVP re-start for parking	*(optional)* Ignition off	AVP re-start for pick-up	AVP return
User searches andd books AVP service	Vehicle control is handed over to AVP, OEM AS is involved	(Parking start)	(Parking stop)	(Parking start)	(Parking stop)	Vehicle control is handed back to owner

Normal driving	Normal driving	AVP operation	Vehicle parked	AVP operation	Vehicle parked	AVP operation	Normal driving
		Vehicle is driven by the AVP System for parking or other services	Ignition-off, vehicle is in sleep mode	Vehicle is driven by the AVP System for parking or other services	Ignition-off, vehicle is in sleep mode	Vehicle is driven by the AVP System for parking or other services	

Legends: | Events | | Vehicle state | Operation sequences shown in the demonstration