

5G Center



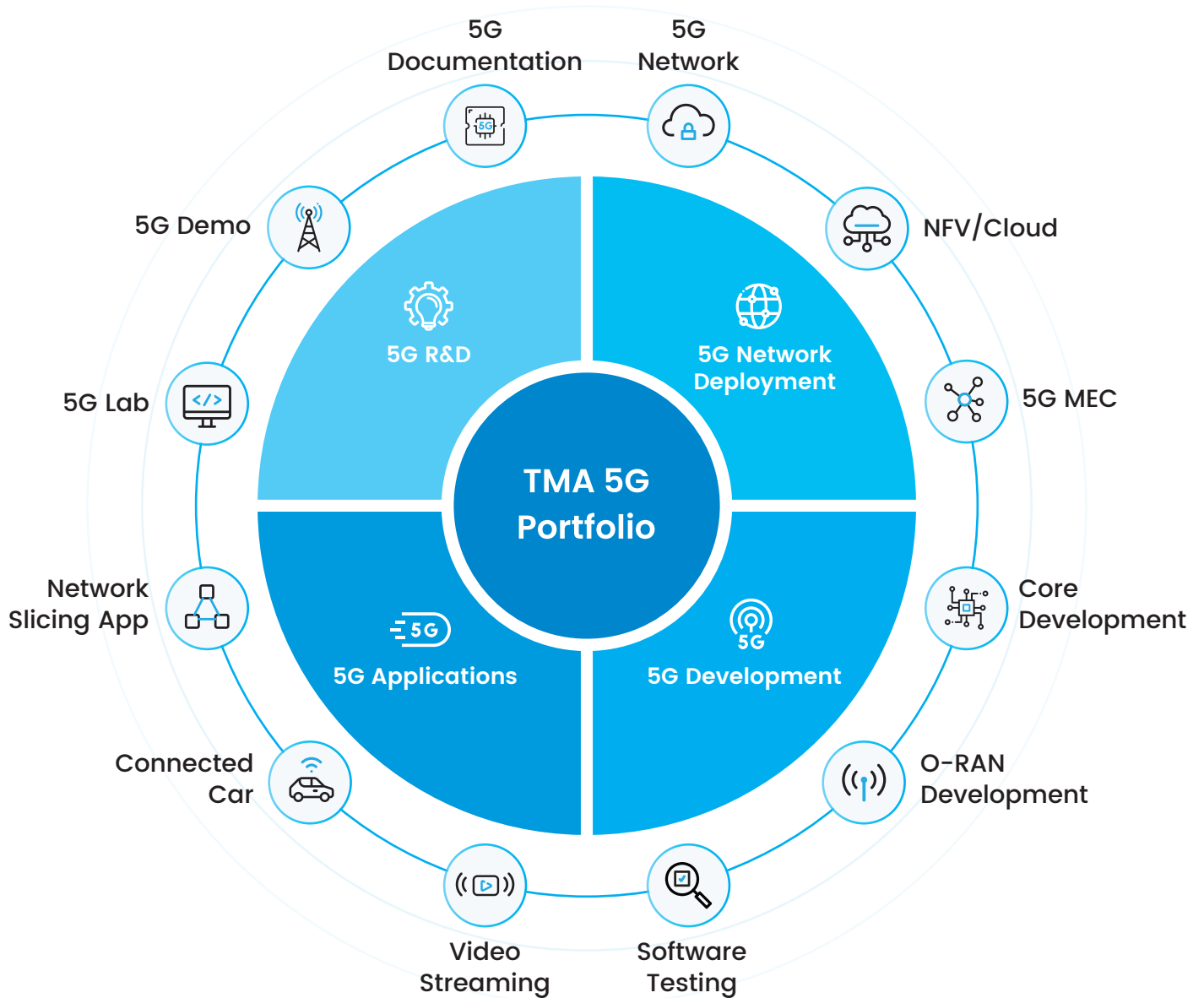
27 Years of experience
in Telecom



2000 Engineers working
on Telecom projects for
global leading companies



5G Private Lab with
integrated MEC solution





Technologies

eMBB, uRLLC,
mMTC

O-RAN (Open RAN)

Network Slicing

Edge Computing

VNF, NFV, K8S
Cloud

DevOps: Jenkins, CI/CD

Programming:
C/C++, Java,
Python, Go

SDN, Networking

Automation:
Robot Framework,
Python

Protocols:

HTTP/2, TLS, TCP, UDP, SCTP, IP, GTP, NG-AP, NAS,
PFCEP, RRC, PDCP, SDAP, RLC, FIAP, E1AP, E2AP, XnAP.



www.tmasolutions.com



+84 28 3997 8000



sales@tmasolutions.com



5G Services



Platform
Development



5G Applications
Development



O-RAN
Development



5G MEC
Deployment



5G Core
Development



NFV/Cloud
Deployment



UE Simulation
Development



VNF
Orchestration



5G
Software Testing



Software
Deployment for
5G Private Network



Private Cloud
Deployment



PoC
Implementation



www.tmasolutions.com



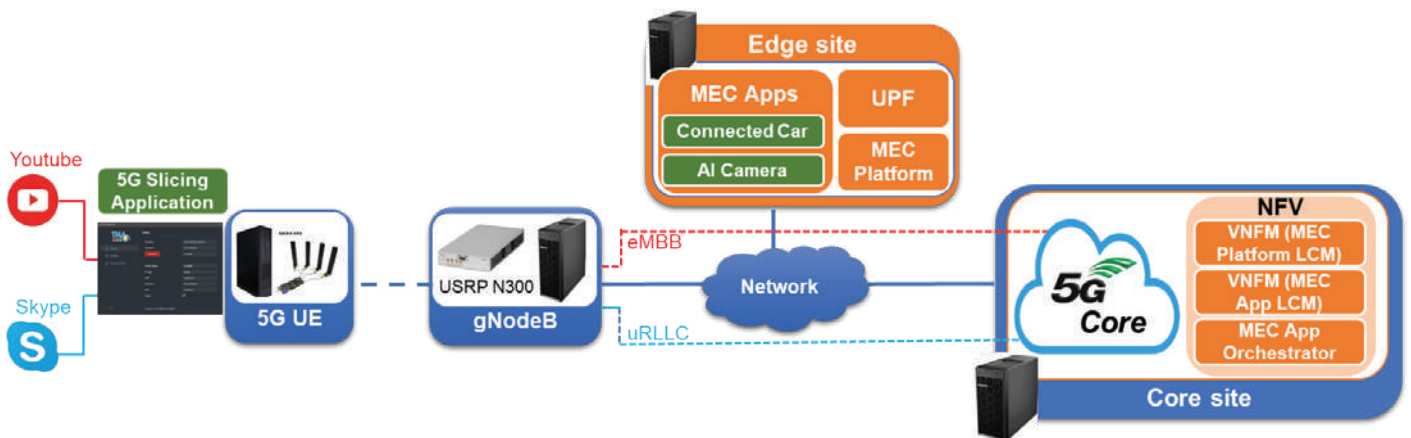
+84 28 3997 8000



sales@tmasolutions.com



5G R&D Lab



5G LAB COMPONENTS

Hardware

- PC i7 (X86 HW)
- USRP B210/N300
- Adlinktech MECS-6110

Software

- gNB: OAI gNB
- 5GC: Open5GS

Bandwidth (UL/DL)

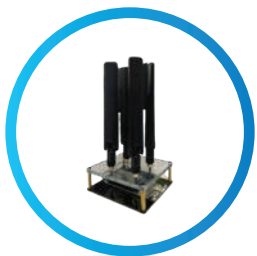
- 100 MHz
- 30Mbps–330Mbps

UE

- Quectel: RM500Q-GL
- XR-90

5G NR SA TDD Configuration

- Frequency band: n78
- SCS: 30kHz
- Uplink-Configurations: 64QAM max
- Downlink-Configurations: 256QAM max



UE



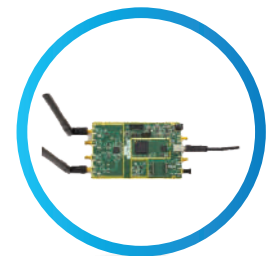
USRP N300



Adlinktech
MECS-6110



PC



USRP B210





5G R&D Lab

5G LAB CONFIGURATION

5G UE/Modem

Simulated RAN/gNodeB
(use USRP B210, USRP N300 for RU)



5G Core

5G MEC
(MEP, MECM, MEAO)

SUPPORT FUNCTIONS

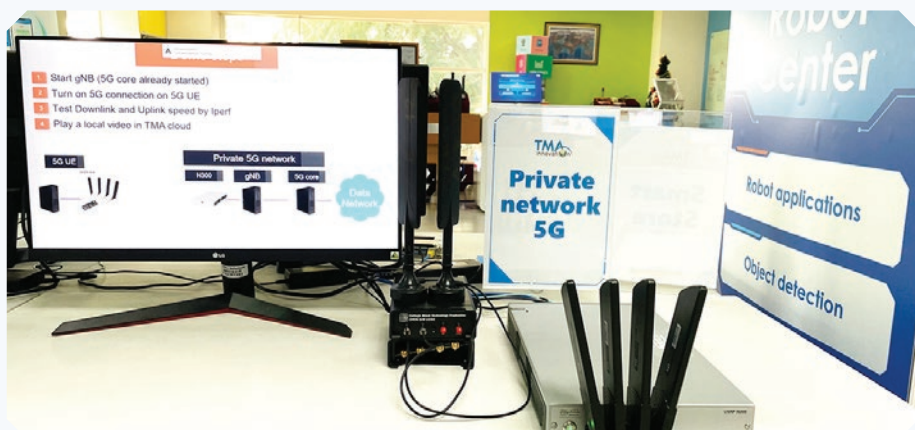
Full operation of 5G core:
AMF, SMF, UPF, AUSF, N3IWF,
NSSF, NRF, UDM, PCF

RAN functions with
simulated gNodeB

5G Components &
System Orchestration

Support both 5G SA
(Standalone) and 5G NSA

Support edge computing
with MEC platform



www.tmasolutions.com



+84 28 3997 8000



sales@tmasolutions.com



5G Case Studies

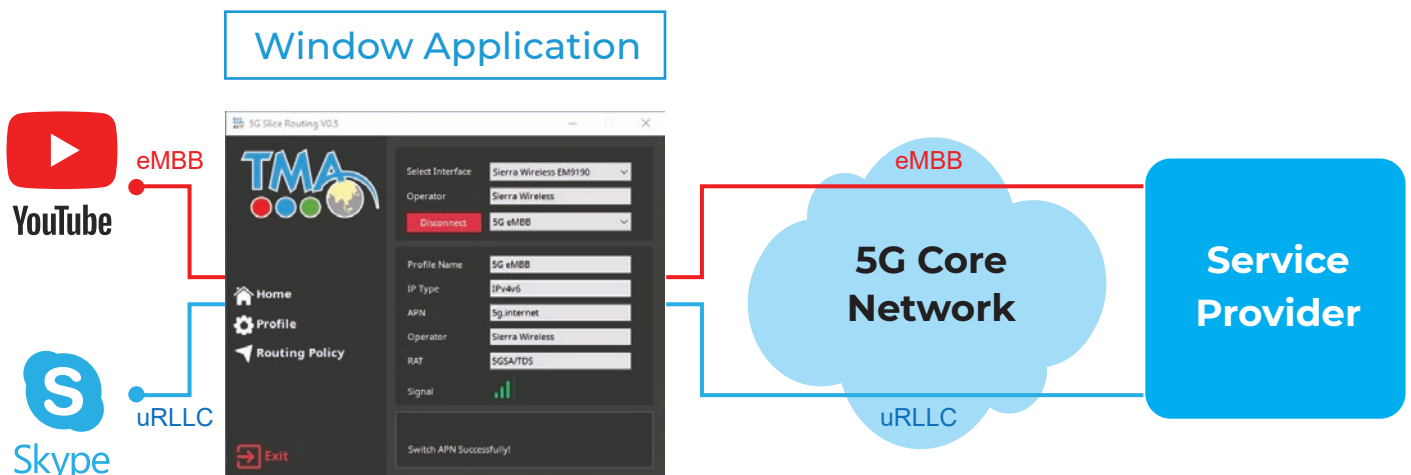
5G NETWORK SLICING WINDOW APPLICATION

Window Application's functions

- Start multiple PDU sessions to different 5G network slices
- Automatically route app traffic to appropriate 5G network slices

Window Application's key features

- Manage Interface, Profile
- Manage Routing Policy for specific application
- Display network connection characteristics
- Automatically switch network slice based on APN and Routing Policy





5G Case Studies

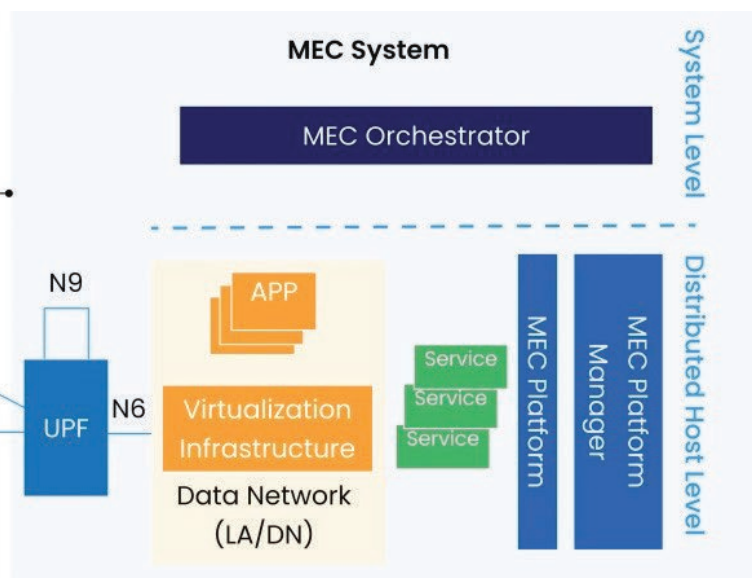
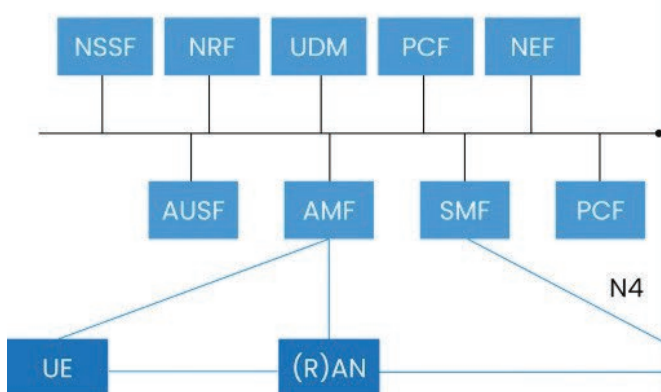
POC – 5G MEC SYSTEM

PoC Product

- Provide an application deployment platform close to the end users (edge site). This MEC platform helps to deploy real-time, compute and resource-intensive applications like video caching, augmented reality, virtual reality, and Internet of Things at the edge
- Help decrease congestion & latency at 5G Core site

PoC Description

- Follow ETSI standard
- 5G Core Network (gNdb, Core), 5G Apps
- MEC system includes:
 - MEC Platform (MEP)
 - MEC Manager (MECM)
 - MEC App Orchestrator (MEAO)
- Technologies: Edge Computing, Traffic steering, DNN, LADN





5G Application

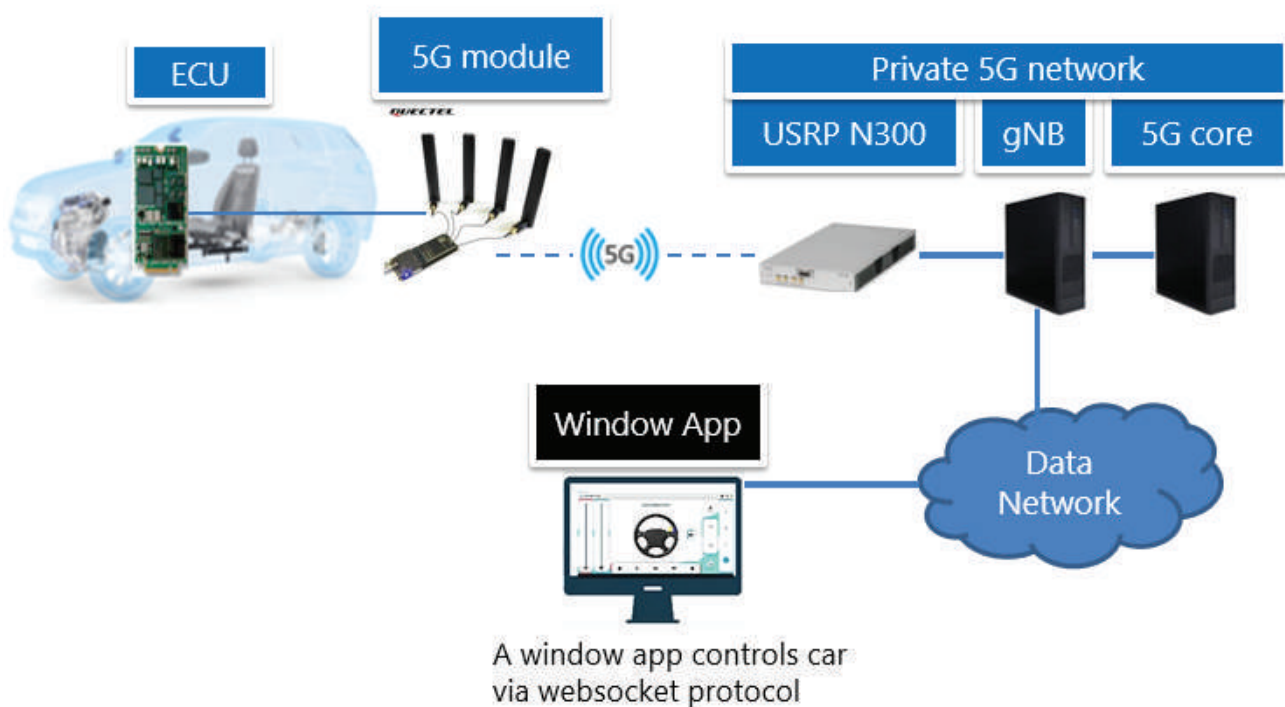
CONNECTED CAR UNDER 5G PRIVATE NETWORK

Application Functions

- Connected Car (by Remote Control) - Car is connected to 5G network and can be controlled remotely by mobile app or window app:
 - Control accelerator/brake to increase/decrease speed
 - Control Steering wheel
 - Turn on/off lights, trumpets
 - Turn on driver assistance features like Cruise Control
 - Video streaming

Technologies

- Computer vision and AI image recognition
- C/C++, Python, OpenCV
- ECU programming
- Protocol: CAN, TCP/IP, USB, Ethernet
- Wireless: 5G, Wifi





5G Application

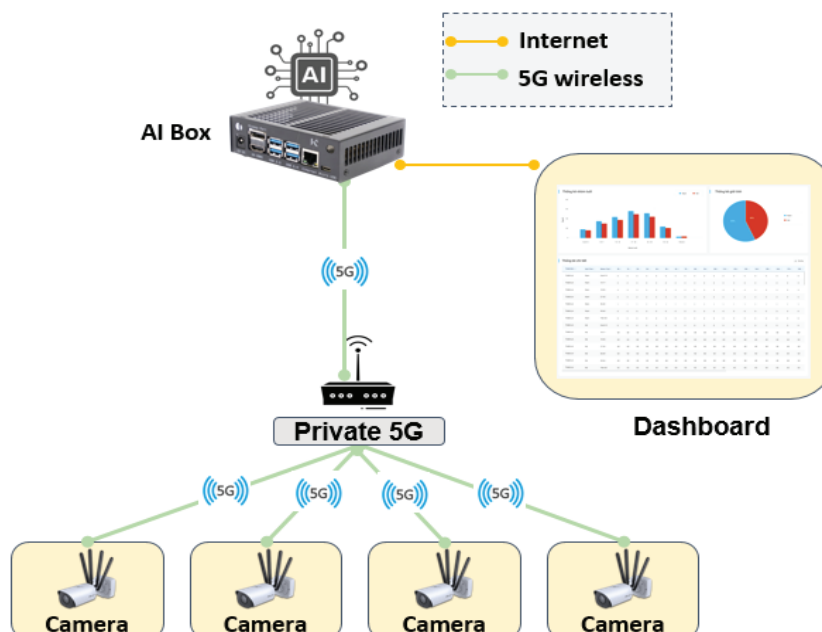
AI CAMERA UNDER 5G PRIVATE NETWORK

Application Functions

- Object Detection: people, vehicle, specific objects
- Face Recognition; Age/Gender Detection
- Extract and store information from video/stream
- Behavior analysis
- Active observation & incident warning
- License Plate Recognition
- Text/Digit Detection and Recognition (OCR)
- Edge processing and Centralized processing
- Network connection with private 5G network

Technologies

- Computer Vision
- Image Processing
- Deep Learning
- Object Tracking, Multiple Camera Processing
- Python, OpenCV, Tensorflow, Pytorch, Caffee, TensorRT, OpenVINO, Onnx
- Restful API, MQTT





Contacts

Vietnam: +84 28 3995 1060

+84 28 3995 1059

Australia: +61 411 276 342

Email: sales@tmasolutions.com

North America: +1 844 224 4188

Europe: +33 7 44 77 49 24

Japan: +81 50 5490 9867

Website: www.tmasolutions.com

