TMA Telecom

With 29 years of experience in telecom software development, TMA delivers end-to-end services and comprehensive solutions that accelerate customers' time to market.

29 Years of experience in Telecom Software & Solution Services

2000+ Engineers

R&D Centers for leading companies

Telecom & Network Software Services

- Telecom software development
- Telecom systems integration & validation
- Telecom network transformation
- Network integration & EMS development
- Cloud & DevOps operation
- 5G core network and applications development
- Security engineering
- AI implementation for Telecom / Network

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Telecom/Network Areas of Expertise

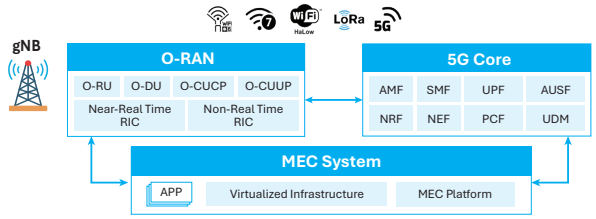
Access Devices

- 5G: Smartphones • IoT Devices • Vehicles
- WiFi: Laptops • Enterprise Devices
- LoRaWAN: Smart Meters • Sensors • Trackers
- Smartphone
- Laptop
- Smart Utility Meters
- IoT Devices
- Sensor
- 5G-Connected Vehicles
- Enterprise Devices
- Tracker

AI Applications

- Call Fraud Detection
- Auto Development (Telecom Labs)
- AI Agents
- Monitoring Analytics
- AI-powered Automation Framework

Wireless Network

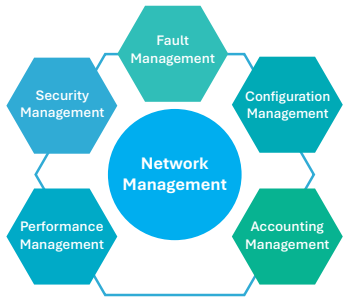


Cloud Data Center

Data & Analytics

- Network & Subscriber Analytics
- Real-time Monitoring
- KPI Dashboard

Network Management System

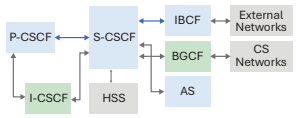


Core Networks

- **Network Orchestration** — Service & Resource Orchestration
- **SDN Controller** — Software-Defined Networking
- **IP / MPLS / Segment Routing** — Core Router; Service Edge Router
- **NFV Infrastructure (NFVI)** — Virtualized Network Functions
- **Optical Transport Network** — DWDM; ROADM; Optical Fiber

SIP Trunk
SIP/RTP

IMS Network



Communication Platform as a Service (CPaaS)

- Advanced Routing
- AI-Powered Support
- System Integrations
- Help & Self-service Desks

CPaaS

- Templates
- API
- Analytics & Call Center Metrics
- Phone & Messaging

Enterprise Solutions

- Voice
- SMS
- Chat
- Contact Center
- AI Agents
- Routing
- Support

Communication: API; Webhooks

Engagement: API; Webhooks; CRM & Apps

Devices & Channels: Phone; Mobile; Desktop

Use Cases

- Business Phone
- Cloud PBX
- Collaboration
- Remote Work

Carrier Solutions

SIP Server	Media Server	Provisioning System	Billing	Management System
Gateway Controller	Media GWs	Call Agent	SIP Trunking	SS7 GWs

- Enterprise Network
- IMS
- Mobile Network
- PSTN
- SS7 Network

Telecom & Network Domains

500
Enterprise Communications

- Unified Communication Systems (UC)
- Communication Platform as a Service (CPaaS)
- Contact Center (CC)
- SIP PBX
- IP Clients

200
Wireless Network

- 4G LTE EPC: PGW, SGW, MME
- 5G: Core, O-RAN, MEC, Applications
- Wi-Fi: Wi-Fi6, Wi-Fi7, Wi-Fi HaLow

600
Carrier Communications

- NGN Softswitch
- SIP Application Server
- Signaling Gateway
- Media Gateway
- Policy & Routing Server
- OAMP & Analytics
- Session Border Controller
- Interconnect Trunking
- IMS: CSCF, BGCF, MGCF, HSS, SLF

700
Networking

- Optical Networking Platform
- IP/MPLS Routing Switch
- Carrier Edge Router
- Network Orchestrator
- OSS/BSS
- EMS/NMS
- Network Automation Platform
- Network AI Chatbot
- LAN Core/Access Switch, Data Center Switch

Telecom & Network Technologies

Platforms



Linux
RHEL, CentOS



Virtualization
KVM, VMWare, Docker, OpenStack



Cloud
Open Stack, K8s, AWS, Azure, GCP

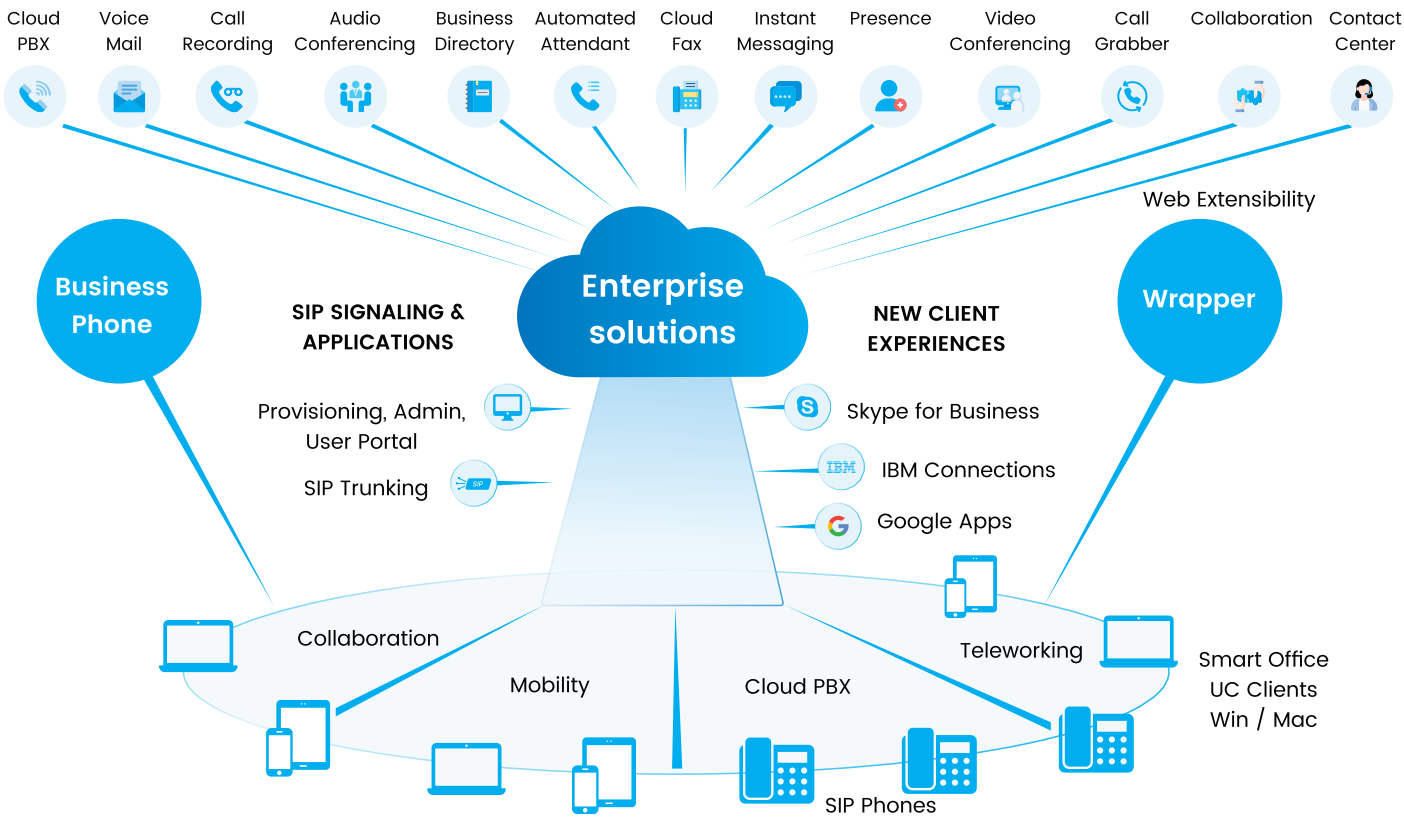
Key Technologies

- **Legacy:** TDM, SS7, ISDN, Sigtran
- **Signaling:** MGCP, H.248, H.323, SIP, Diameter, SDP, M3UA
- **Media transport:** RTP, SRTP, RTCP, MRFC/MRFP, TDP, UDP
- **Codecs:** Audio (G.711, G.729, G.722, AMR), Video (H.263, H.264, H.265, VP8/9, AV1), Transcoding
- **Security:** IPSec, NAT, QoS, TLS, IPS, SBC, IAM, SSO
- **Transport & Network:** Ethernet, IPv4, IPv6, DSCP, LAN, WAN, SD-WAN, SDN, SDH, SONET, DWDM
- **Billing:** Billing mediation, CDR, OCS (online), OFCS (offline), CCS(converged)
- **Routing:** STP, ENUM, LCR, IP/MPLS, OSPF, BGP, ROADM
- **Telephony:** SIP, SIP over WebSocket, SIP trunking, IMS, VoLTE, VoNR, WebRTC, Messaging (IM, Presence), Contact Center (ACD,CTI, IVR)
- **Devices & Endpoint:** softphone, analog/digital phone, IP phone, headset
- **Monitoring:** Prometheus, Grafana, Wireshark, SNMP, ELK, Network Analytics

Tools & Frameworks

- **Programming languages:** C/C++, Java, Go, Python, Perl, JavaScript, TypeScript
- **Databases:** MySQL, PostgreSQL, MongoDB, MariaDB, RDBMS
- **Automation:** TMA AI Automation Framework, Robot Framework, Selenium, Playwright, CI/CD, IaC
- **Supported tools:** security test tools, SDLC AI-assisted tools, AI agents, Analytics tools

Enterprise Communication System



Products/Solutions

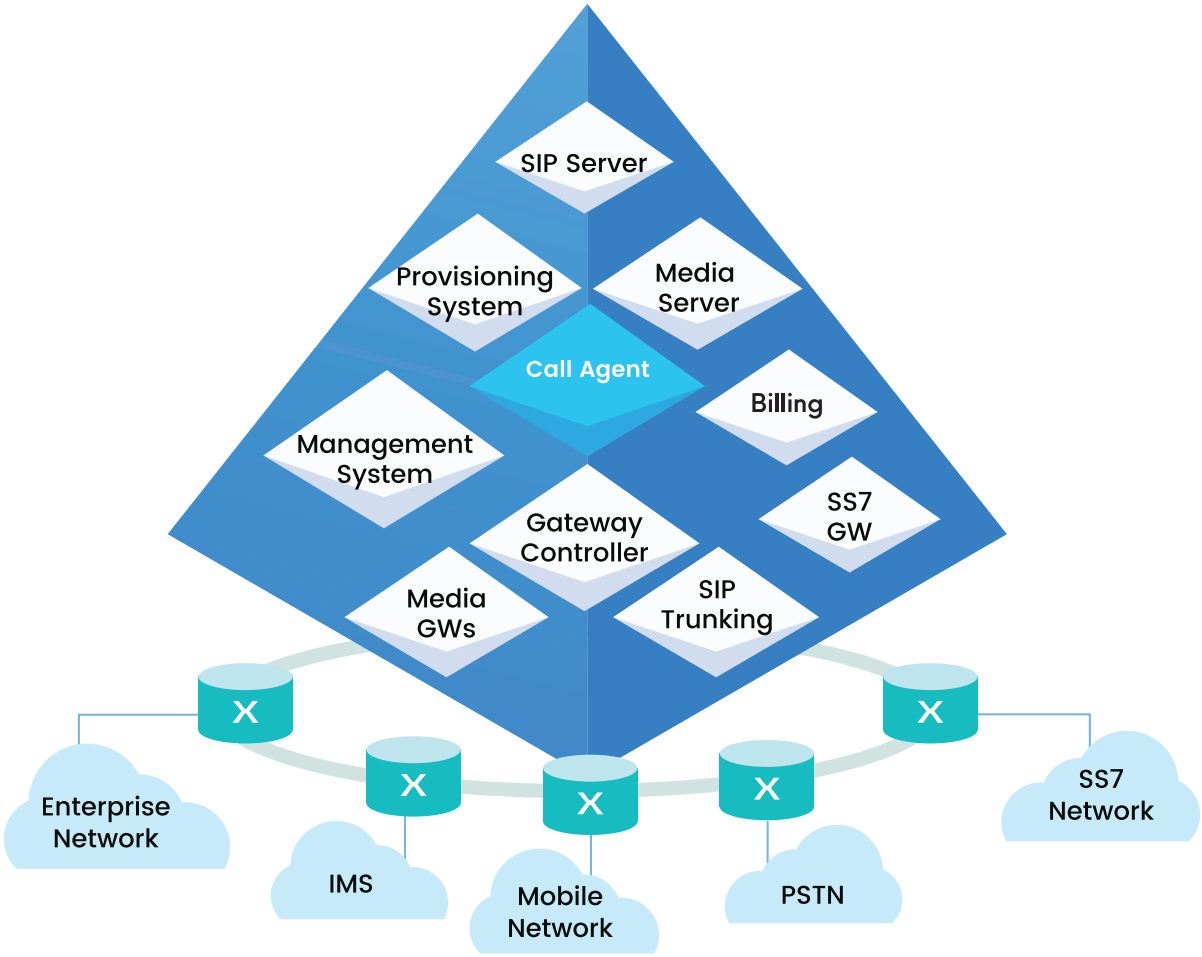
- Unified Communication
- Contact Center (CC)
- CPaaS (Communications Platform as a Service)
- IP/Cloud PBX
- WebRTC
- Collaboration services
- OTT services
- Enterprise Clients, Smart Office

TMA Software Services

- UC and CC applications development/test
- CPaaS Voice/Messaging API/SDK development
- Integration test, Solution test, Security test, DevOps
- Clients validation
- Voice Chatbot integration

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Carrier Communication System



Products/Solutions

- Call Agent/Billing
- Gateway Controller
- Media Gateway
- Signaling Gateway
- Provisioning & EMS
- SIP Application Server
- Home Access Network
- PSTN/SS7 Access
- SBC/IMS – Mobile network
- Enterprise Business System

TMA Software Services

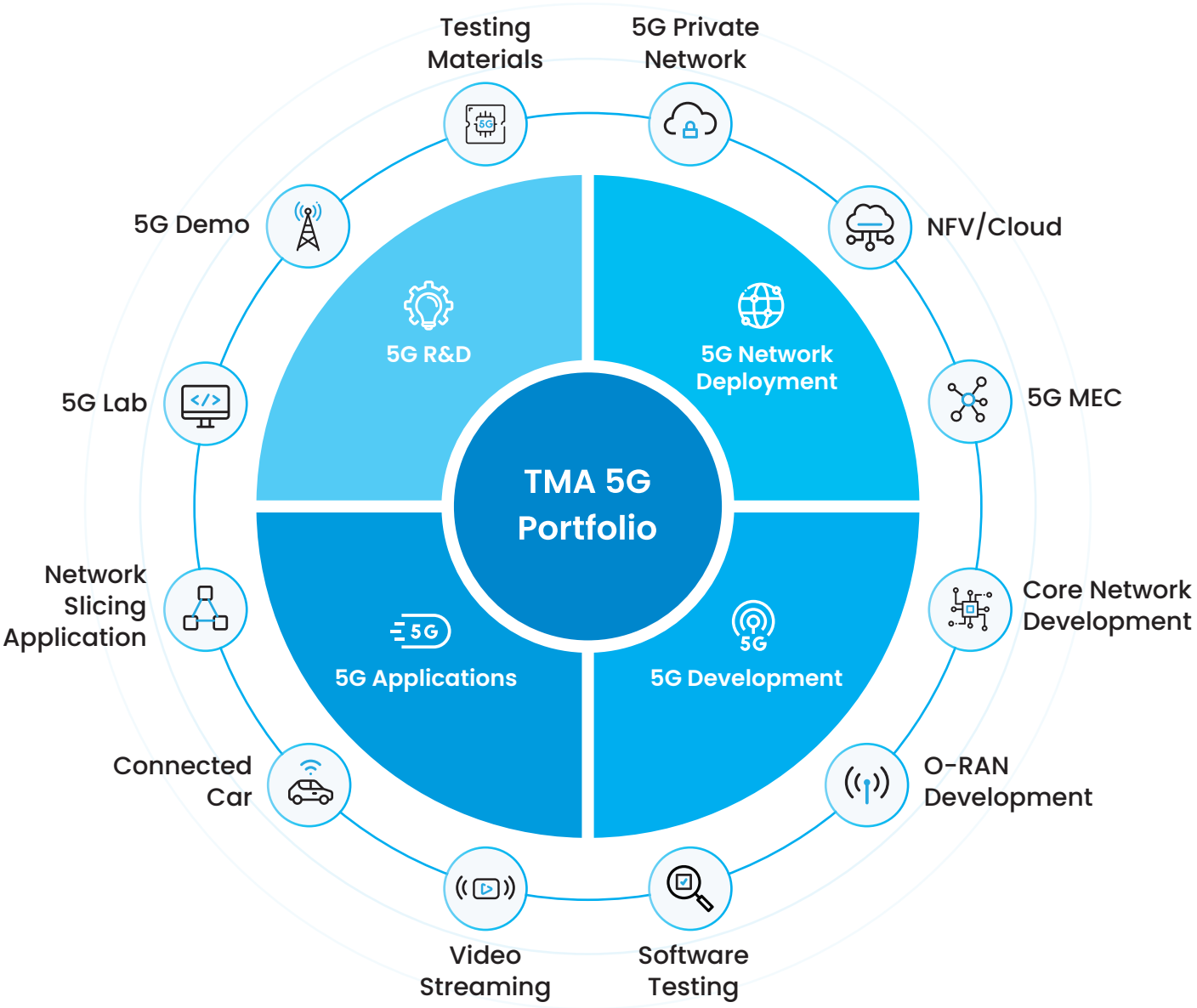
- Product features development & patching
- Carrier solutions integration
- Full software verification for products and solutions
- DevOps services
- Security & Pentest

TMA 5G Software Services

7+ Years of experience in 5G technologies

5G R&D Center

200 Engineers



TMA Wifi Solutions

6+ Years of Experience in Wi-Fi Technologies

100+ Engineers

10+ Wi-Fi Solutions for Industry 4.0

Wi-Fi Technologies for Industry 4.0

Wi Fi 7™

Wi Fi 6™

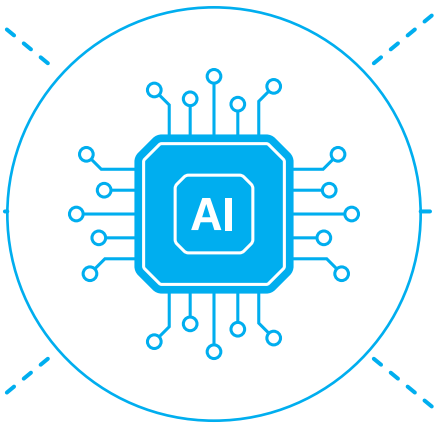
Wi Fi™ Wi-Fi HaLow

- Access Control with Smart Wi-Fi Camera
- Smart Wireless Handover for Mobility
- Smart Environment Monitoring with Wi-Fi HaLow
- Seamless Connectivity for Smart Wi-Fi Hotspot
- Real-Time Localization for Smart Building
- Security and Safety with Wi-Fi Wearable Camera

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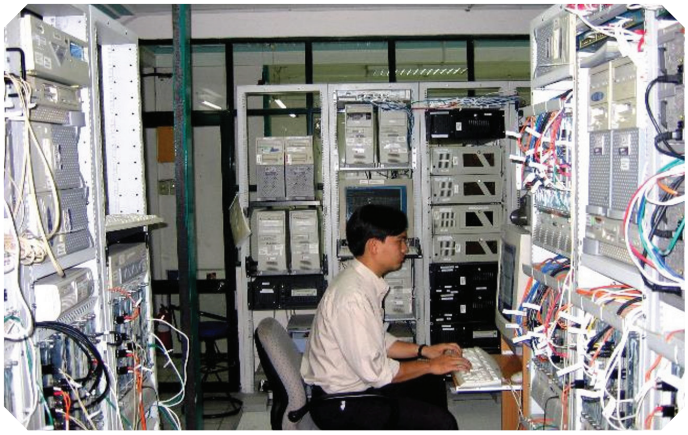
AI Implementation for Telecom/Network

- Fraud Call Detection & Voice Authentication
- Telecom systems monitoring and network analytics
- AI Agents for automated deployment of Telecom labs
- AI-Powered Test Automation framework
- AI Virtual Assistant for Safety Communication System
- AI Chatbot for Telecom knowledge



Sample Telecom Labs







Sample Telecom Labs







Case Study

Enterprise Desk Phones Certification Testing



Customer Needs

- Acceptance, Regression and Certification testing for:
- Standard desktop phones, USB phones, Conference phones, Video phones, Analog gateways, Desk phone accessories, Pagers & intercom and VoIP system
- UC Features: Legacy and advanced phone features, headset call control.

TMA Values and Achievements

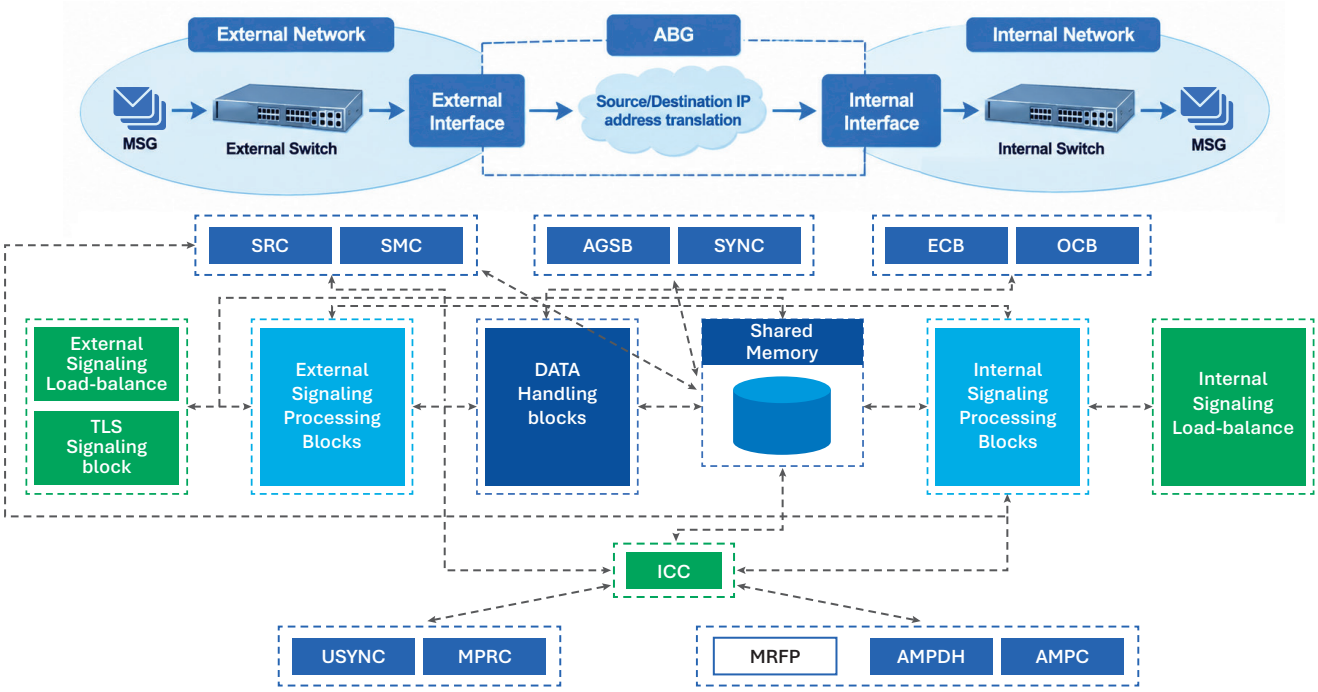
- Certified various types of desk phones types and desk phone accessories of multiple vendors (Cisco, Avaya, Yealink, Poly, Grandstream...) with multiple SIP PBX systems
- Integration testing between multiple vendors
- Testing in both on-premise and cloud-based environments

Technologies

- TLS/TCP/IP, IPv4, IPv6, DB, SIP, SRTP/SRTCP, SSH...
- VMware, OpenSIP, Docker, ESXi, KVM, CSDK, etc...
- 100Gb network, VLAN, NAT
- Test Management Tool: JIRA, DevOps, Asana
- Automation and Traffic tools: Selenium, Robot framework, SIPp and TARTS

Case Study

Session Border Controller (SBC)



Customer Needs

- Access Border Gateway (SBC): Access ABG (A-ABG), Inter-connect ABG (I-ABG)
- Product functions: Subscriber Management, Call control, NAT Traversal, Network Topology Hiding, Routing Control, Flood Handling, Traffic filtering, Media Relay, Enhanced signaling and media encryption (TLS, SRTP), Transcoding, DTMF conversion

TMA Values and Achievements

- Develop core components of both A-ABG & I-ABG: Signaling proxy, Media proxy, and Transcoding Gateway
- Develop ABG TLS module for secured signaling control
- Develop ABG MPRC module for secured media control
- Develop AMPC (MRFC) module to provide media transcoding and telephony event conversion for ABG
- Develop telephony call services
- Perform product testing (both manual & automation)

Technologies

- Languages: C/C++, Python
- Protocols: TCP/IP, SIP, SSL/TLS, SRTP
- Multi-thread, shared memory, new codecs (Lyra, EVS), Netfilter hook techniques
- Platforms: Linux

Case Study

LTE IMS System

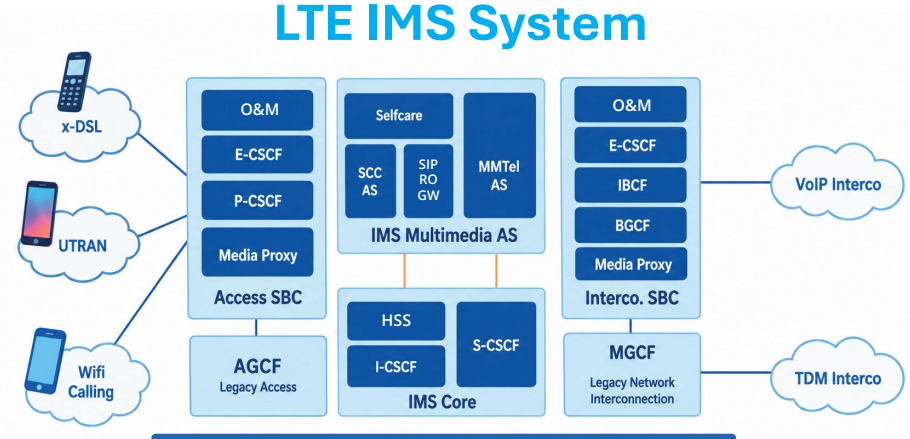
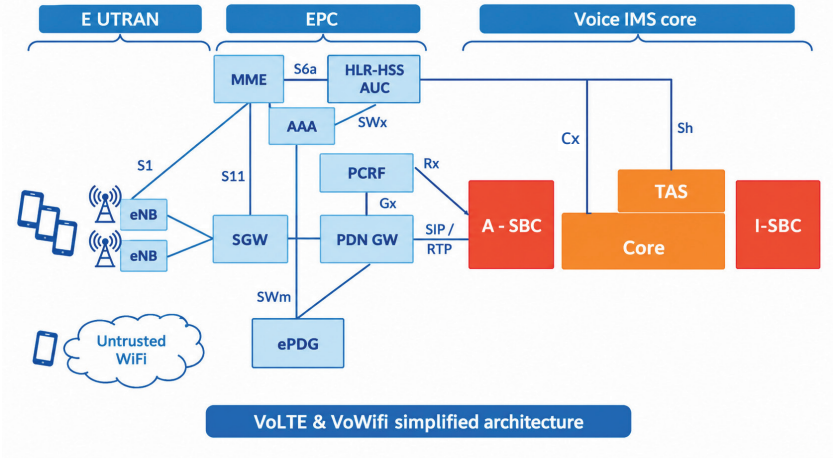


Figure 2: The IMS separates the control, services, and media layers



VoLTE & VoWifi simplified architecture

Customer Needs

- LTE Mobile Communication System with multimedia services: Voice, Video, Data, Messaging, multi-media services, Fixed Mobile Convergence
- Solution components: LTE Core, IMS, TAS, Access SBC, Inter-connect SBC, AGCF, MGCF

Technologies

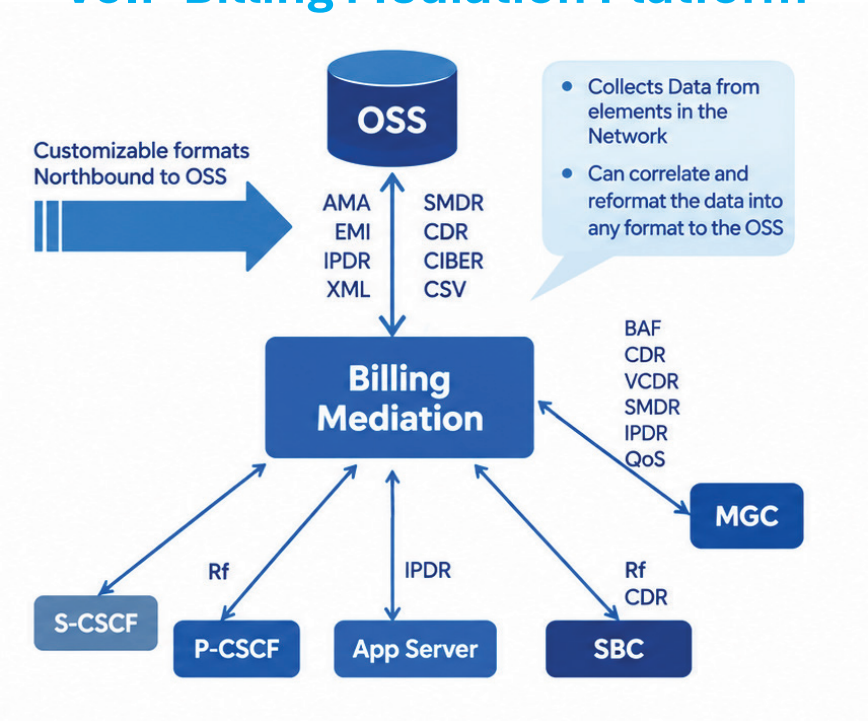
- Languages: C/C++, React, Python
- Protocols: TCP/IP, SIP, Diameter
- Platforms: Linux, Windows
- Test automation: In-house framework

TMA Values and Achievements

- Develop IMS Core's modules and solution features: S-CSCF, I-CSCF, P-CSCF, HSS, BGCF, IBCF
- Develop AS (as IMS TAS) module to provide IP Multimedia Services
- Develop SCCAS (Service Centralization and Continuity Application Server) which supports UE handover from LTE to 2G/3G network
- Develop Access SBC & I-SBC (inter-connect), including Signaling proxy, Media proxy (RTP forwarder) and Transcoding Gateway
- Develop telephony call services
- Perform solution testing (both manual & automation)

Case Study

VoIP Billing Mediation Platform



Customer Needs

- Billing mediation solution for telecom systems
- Convert telecom data types for billing purposes
- Real-time collection of billing records from network elements
- Aggregate multiple events into session-based billing records
- Support standard and proprietary billing formats
- Customize and distribute CDRs to multiple billing systems
- Scalable for networks handling millions of daily events

TMA Values and Achievements

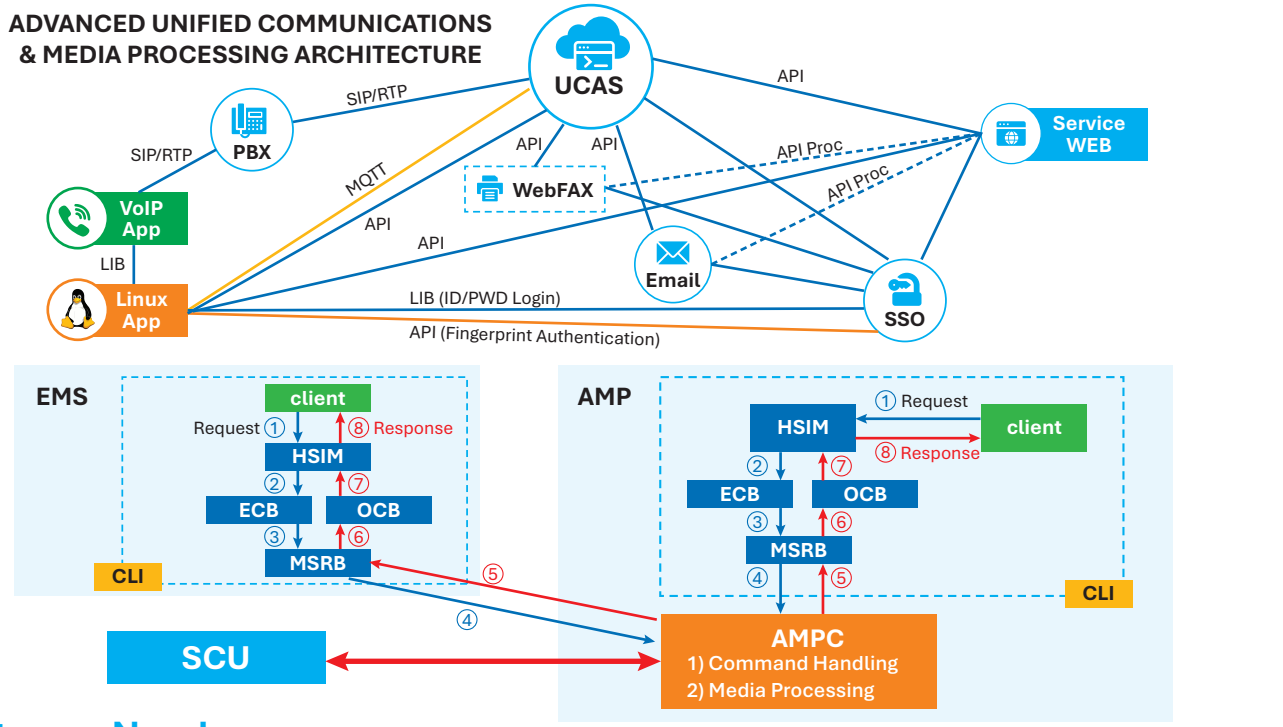
- Developed and maintained a VoIP billing mediation platform
- Provided end-to-end services: development, testing, maintenance, production support
- Enabled real-time billing data processing with flexible formatting
- Reduced downstream billing system workload via aggregation & correlation
- Delivered reliable and scalable solutions for large telecom deployments

Technologies

- VoIP Billing Mediation
- Real-time Data Processing
- Data Aggregation & Correlation
- Scalable Telecom Billing Architecture

Case Study

Secure Communication System



Customer Needs

- A secured communication system includes: VoIP Call Server, Advanced Media
- Platform, Element Management Server, Call Dispatcher, Management and
- Communication applications on Linux GooRoom, Android and iOS
- Mission-Critical Push-To-Talk (MCPTT) functionality is designed for secure national communications, enabling users to broadcast emergency audio/video commands, make secured calls, set up situation hotlines, and send faxes and emails.

TMA Values and Achievements

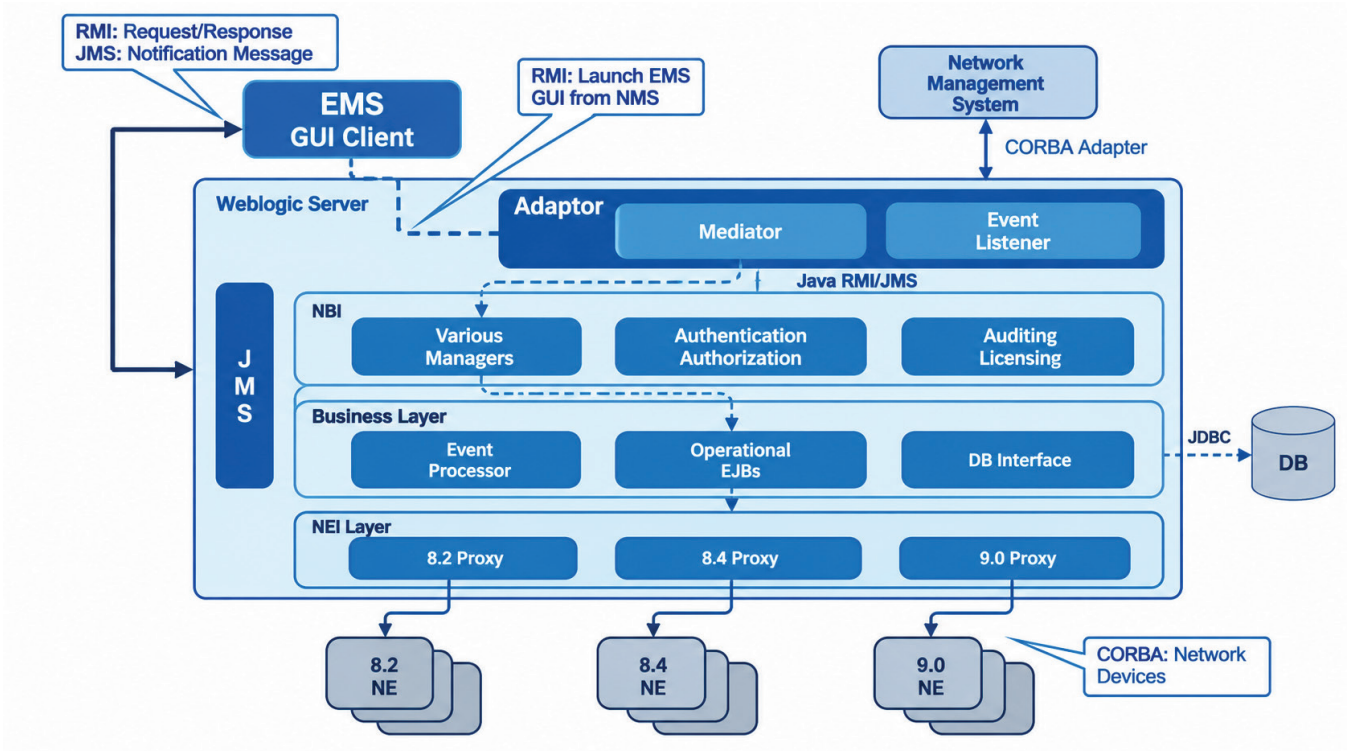
- Develop VoIP Call servers (including SCU – Signal Controller Unit)
- Architect & develop AMP platform, including AMPC (like MRFC)
- Develop Element Management Server
- Develop embedded module and Linux applications on specific hardware for desk phone client
- Develop mobile and web applications
- Develop application's backend servers: API, fax, web storage
- Perform full system test for solution

Technologies

- Signaling and media protocols, multi-process, multi-thread, HA, LB, pipelines, queues, shared mem, synchronization mechanisms
- Programming: C/C++, QT/QML, Python, Java/Swing, Flutter
- Platform: Linux on IA, Gooroom Linux, Android, iOS, LTE terminal

Case Study

Optical Network EMS



Customer Needs

- An EMS system for optical transport devices with key functions of provisioning, managing and monitoring optical network elements

TMA Values and Achievements

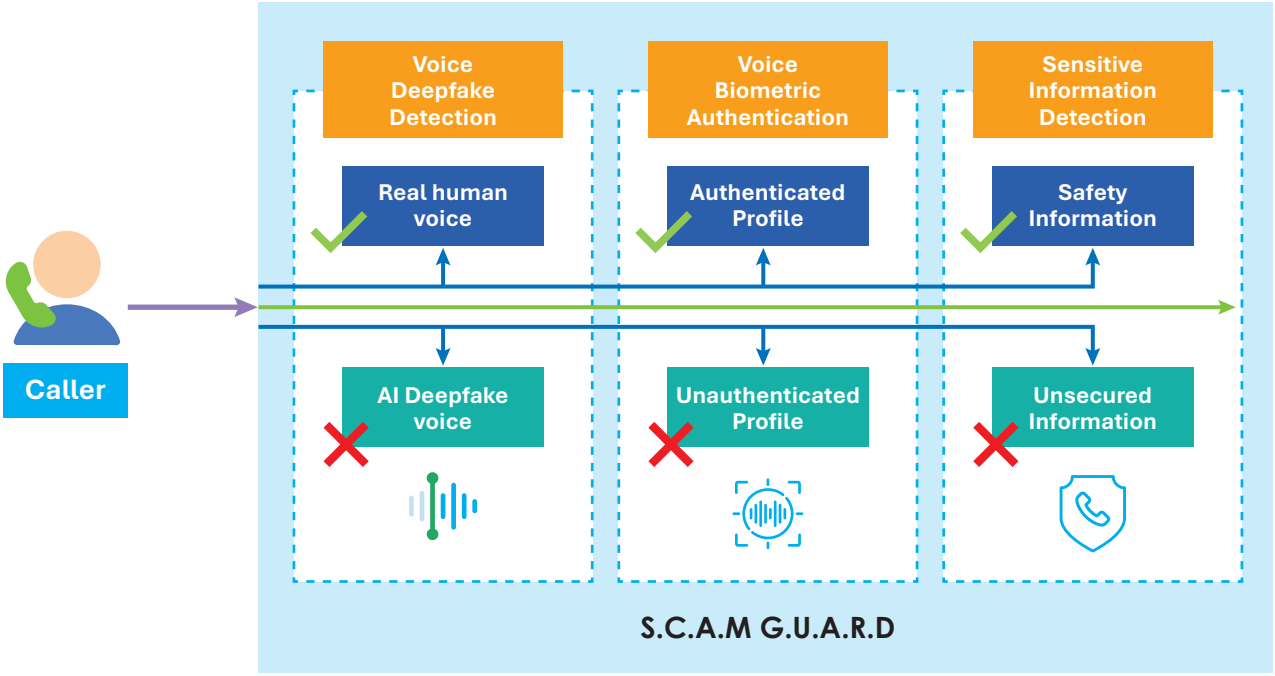
- Resolved all bugs reported by the V&V team
- Developed all new STMS features
- Collaborate with Customer Support teams in resolving customer issues
- Received positive feedback and recognition from Ribbon management team

Technologies

- Programming language: Java Core, Java EE (JMS, RMI, EJB, JPA, JTA)
- Framework/Library: Swing (Java GUI)
- RDBMS: Oracle
- Protocol: CORBA
- Platform: Linux & Solaris
- Optical Network Domain: Network Topology, Network Topology
- Network Devices/Components and Optical Standards.

Case Study

AI-based Fraud Call Detection Application



Customer Needs

Provide an AI-based application which can:

- Detect voice deepfakes
- Support voice authentication
- Detect sensitive information
- Prevent fraud calls
- Support real-time monitoring
- Easily to integrate into a PBX, call center

TMA Values and Achievements

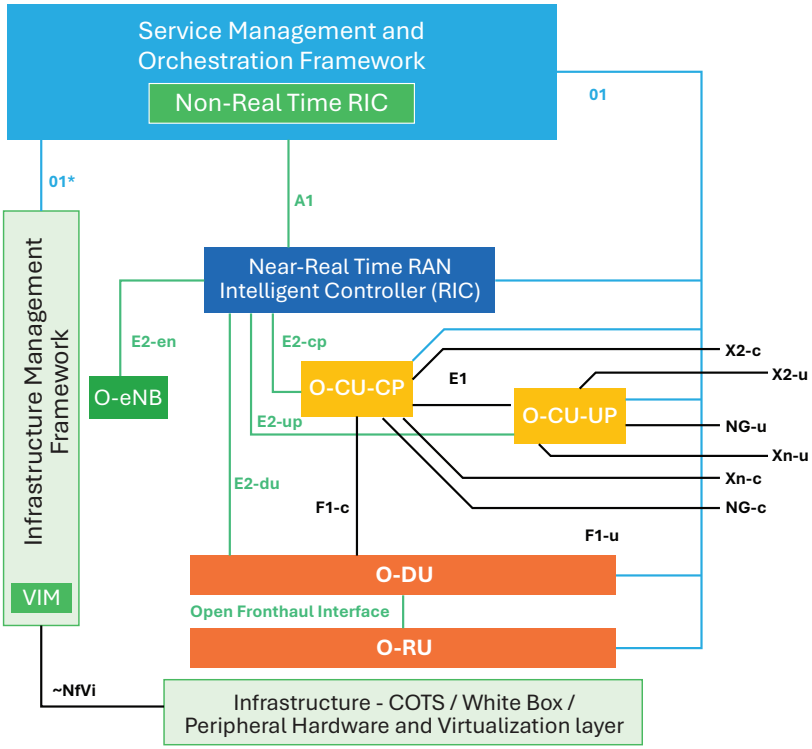
- Zero fraud calls to customer service call centers across various industries: banking, government, insurance, enterprise, telecom, e-commerce...
- Improve customer experience and offer significant value-added benefits to customers

Technologies

- Wav2Vec2 for Feature Extraction
- AASIST for AI model training for Voice Deepfake Detection
- MFCC for Feature extraction
- GMM (Gaussian Mixture Model) for AI model training to generate speaker model database

Case Study

5G O-RAN (Open Radio Access Network)



Customer Needs

- Develop new features, fixing bugs and testing for 5G O-RAN components: CU, OAM, Platform, UE Simulator
- Develop test plans, test cases, and test scripts
- Execute functional, system, regression, and performance tests
- Develop automation test framework
- Develop and enhance automation test scripts

TMA Values and Achievements

- An Open RAN (Open Radio Access Network) is a concept based on interoperability and standardization of RAN elements including a unified interconnection standard for white-box hardware and open source software elements from different vendors
- O-RAN includes the following modules: CU (Central Unit), DU (Distributed Unit), OAM, Platform

Technologies

- GCC, G++, GDB, Boost, CMake.
- Container, Kubernetes, Linux
- CI/CD, Robot Framework
- C/C++, Java, Python, Go, YAML
- Microservices, REST API, Database
- IPC: Socket, Shared Memory, Synchronization...

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