COMMUNICATION VERTICAL OFFERINGS

HARMAN DTS

MARCH 2024

AT HARMAN, WE CONNECT PEOPLE TO BILLIONS OF DEVICES AND SYSTEMS

100% WHOLLY OWNED SUBSIDIARY OF SAMSUNG
RANKED #1 IN DIGITAL COCKPIT, CAR AUDIO,
PORTABLE AUDIO, PARTY BOXES

$11.1B
Revenue

32,000+
Professionals
worldwide

40+
Global
centers

6,000+
Patents

Automotive

Navigation, multimedia, connectivity, telematics,
safety & security solutions

**Audi | Mercedes Benz
| BMW**

Lifestyle Audio

Premium branded audio products for use at
home, in the car and on the go.

**Official Audio Partner |
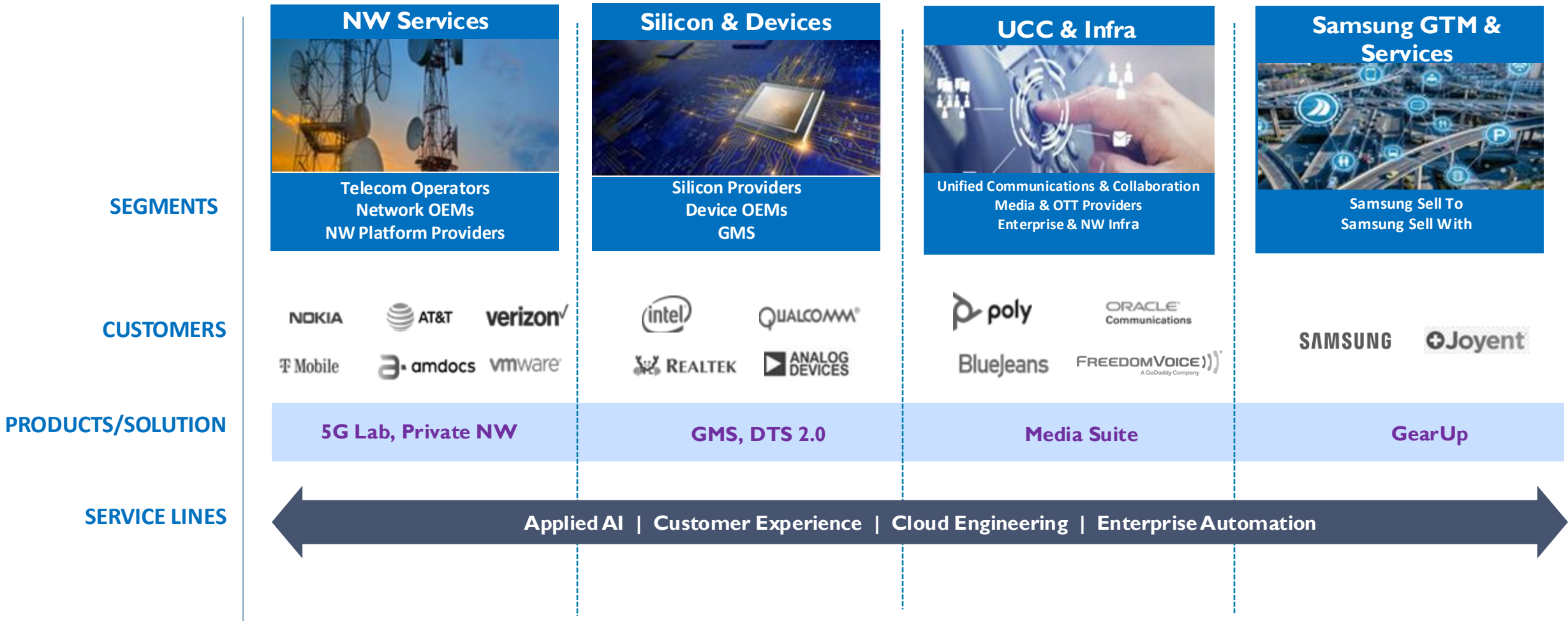Grammys & NBA**

Digital Transformation Solutions (DTS)

Creating and delivering technology-led
solutions that transform everyday experiences

**7 of Top 10
Software OEMs**

TELECOM PRACTICE OVERVIEW

Enabling efficiency in the Telecom Ecosystem & Network monetization by delivering Innovation & Smart Communications

	NW Services	Silicon & Devices	UCC & Infra	Samsung GTM & Services
SEGMENTS	Telecom Operators Network OEMs NW Platform Providers	Silicon Providers Device OEMs GMS	Unified Communications & Collaboration Media & OTT Providers Enterprise & NW Infra	Samsung Sell To Samsung Sell With
CUSTOMERS	NOKIA, AT&T, verizon, T·Mobile, amdocs, vmware	intel, QUALCOMM, REALTEK, ANALOG DEVICES	poly, ORACLE Communications, BlueJeans, FREEDOMVOICE (A GoDaddy Company)	SAMSUNG, Joyent
PRODUCTS/SOLUTION	5G Lab, Private NW	GMS, DTS 2.0	Media Suite	GearUp

SERVICE LINES

Applied AI | Customer Experience | Cloud Engineering | Enterprise Automation

TELCO DIGITAL SERVICES LANDSCAPE

	CUSTOMER EXPERIENCE (UX, XR, AR, VR)	DATA, ANALYTICS & APPLIED A AI OPS, Gen AI Search engine	AUTOMATION Intelligent Automation framework	CLOUD ITO & CYBERSECURITY Cloud Hub
SERVICE LINE OFFERINGS				

VERTICAL SOLUTIONS

	EXISTING	NEW

EXISTING	Smart Spaces Solution	Private Networks	5G Device Testing	Media Suite	GearUP
NEW	RISC-V	UVM	O-RAN Interoperability	Telco Cloud	Open Networking

DOMAIN OFFERINGS

verizon ESIM RSP PLATFORM	T Mobile 5G VPN UNIVERSAL CONNECTIVITY STACK	NOKIA CONNECTIVITY MANAGEMENT PLATFORM	ORACLE Communications MEDIA SERVER (CPAAS)	FREEDOMVOICE A GoDaddy Company IP TELEPHONY
vmware VIRTUALIZATIONS CNF/VNF TELCO CLOUD	verizon DEVICE MONITORING & ANALYTICS SOLUTION	T Mobile DIGITAL IT	poly VIDEO COLLABORATION PLATFORMS	BlueJeans by Verizon TEAMS GATEWAY
amdocs NW Apps	ORACLE Communications DIAMETER ROUTING SERVICE	LEBARA MVNO RETAIL PLATFORM	BlueJeans by Verizon ENTRUST SECURING A WORLD IN MOTION ITO/NOC/SOC	Pluribus NETWORKS CLOUD FABRIC INFRA
SAMSUNG RAN L1/L2 SUPPORT	intel MODEM TESTING	SAMSUNG PRE-SILICON VALIDATION	intel POST-SILICON VALIDATION	F-Secure MOBILE SECURITY

SEGMENTS

NETWORK SERVICES	SILICON & DEVICES	UCC & INFRA

HARMAN & SAMSUNG SYNERGY

Sprint

poly

SAMSUNG

intel

ORACLE COMMUNICATIONS

SUCCESS STORIES

| T·Mobile | verizon√ | Jio | AT&T | BT | Lebara | mobily موبايلي | amdocs | ORACLE COMMUNICATIONS |

Virtualizations CNF/VNF Telco Cloud	5G Lab As A Service	5G Private Networks	MEC	SON (Wifi/LTE)	Subsidy Lock Solution	Connectivity Management Platform	Network Performance Management
Cloud Native Networking and Security							MVNO Retail Platform
24x7 Product support/NOC/SOC							Device Management (OMADM/LWM2M)
NFV							ESIM Platform (SMDP/LPA)
SDN							Network Monitoring Tools/Kit
Telecom Analytics	Smart City	Smart Femto	Set top Box/RDK	LTE Drone/Platform	V2X Platform/ V2X AI	AR/VR Devices & Applications	Voice AI Conversational Platform
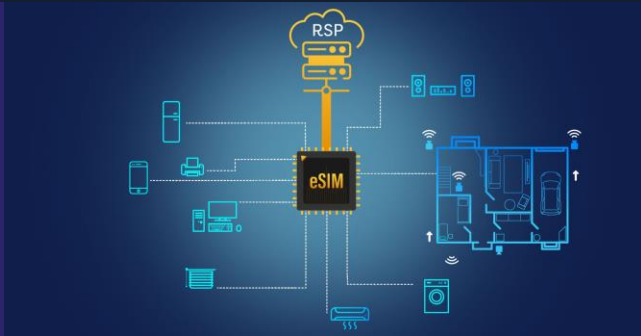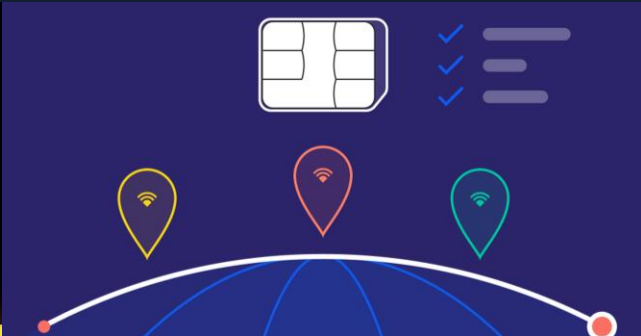
CES INNOVATION AWARDS 2019 HONOREE

TREBL with Sprint magicbox

● **5G ENABLERS**   ● **OPERATIONS & BUSINESS SUPPORT**   ● **NEXT GEN PRODUCTS AND PLATFORMS**   ● **VIRTUALIZATION AND CLOUD TECHNOLOGIES**

5G OFFERINGS

LAB-AS-A-SERVICE

- 5G/LTE Device Certification
- Live Private 5G Network
- AT&T AVL Partnership

AT&T   SAMSUNG

Anritsu   KEYSIGHT TECHNOLOGIES
envision:ensure

PRODUCTS & SOLUTIONS

- Smart X Solutions (IoT, Video AI)
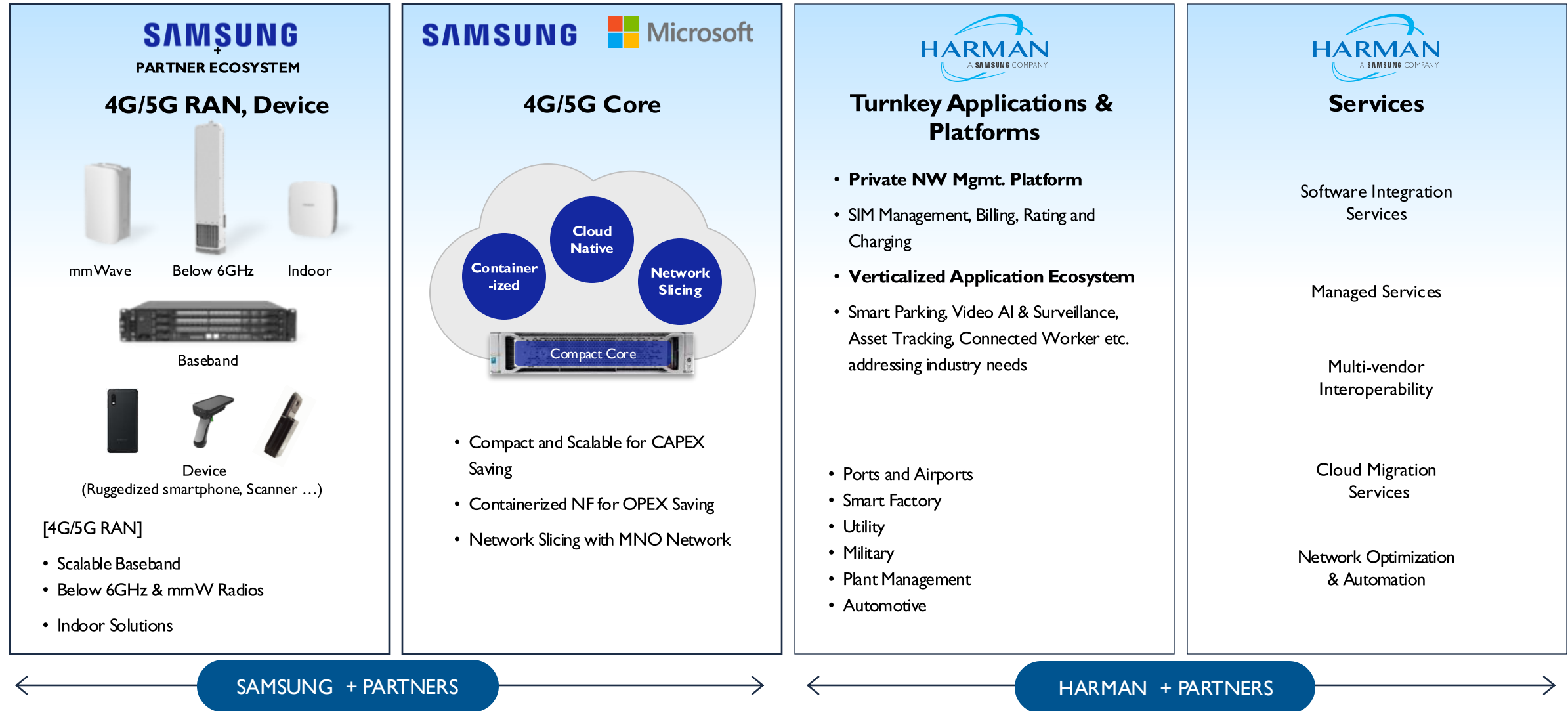- B2B Connectivity Management
- Remote Sim Provisioning Platform (RSP)

DFW   syngenta   Trilogy NextGen

Neu Community   Telefónica   verizon

5G

ENGINEERING SERVICES

- Device Engineering
- Platform Development
- Wireless Modem Validation
- 5G/LTE Device and Network Monitoring Solution

T Mobile   verizon   intel

NOKIA   SAMSUNG

PARTNER ECOSYSTEM

- 5G Device Certification
- Video AI, Sensors, Cameras
- 5G Core, Small Cell
- ODM Partnership

SAMSUNG   AT&T

Microsoft   SERCOM

PRIVATE NETWORK AS A SERVICE (PNAAS)

Harman private networks solution enables verticalized use cases, private NW management and interop & integration lab capabilities

SAMSUNG + PARTNER ECOSYSTEM

4G/5G RAN, Device

mmWave   Below 6GHz   Indoor

Baseband

Device
(Ruggedized smartphone, Scanner …)

[4G/5G RAN]

- Scalable Baseband
- Below 6GHz & mmW Radios
- Indoor Solutions

SAMSUNG / Microsoft

4G/5G Core

Cloud Native

Container-ized

Network Slicing

Compact Core

- Compact and Scalable for CAPEX Saving
- Containerized NF for OPEX Saving
- Network Slicing with MNO Network

HARMAN

Turnkey Applications & Platforms

- **Private NW Mgmt. Platform**
- SIM Management, Billing, Rating and Charging
- **Verticalized Application Ecosystem**
- Smart Parking, Video AI & Surveillance, Asset Tracking, Connected Worker etc. addressing industry needs

- Ports and Airports
- Smart Factory
- Utility
- Military
- Plant Management
- Automotive

HARMAN

Services

Software Integration Services

Managed Services

Multi-vendor Interoperability

Cloud Migration Services

Network Optimization & Automation

SAMSUNG + PARTNERS

HARMAN + PARTNERS

5G DEVICE CERTIFICATION PARTNER : FOR AT&T 10776 (ADAPT) NETWORK

TEST AS A SERVICE: FOR DESIGN TO FIELD VERIFICATION

HARMAN Device Certification Labs provides a **State-of-the-art LTE & 5G** Network Emulation**,** which enables AT&T Device Certifications across different development and acceptance stages of chipset to Launch of Devices in US Market on AT&T Network

DEVICE CERTIFICATION

- OPERATOR ACCEPTANCE
- MODEM FUNCTIONAL
- PROTOCOL - CONFORMANCE
- PRODUCT STABILITY/STRESS
- PERFORMANCE & BENCHMARKING

FIELD TESTING

- COMPATIBILITY
- FIELD TRIALS
- USABILITY
- APPLICATION
- USER ACCEPTANCE

CAPTIVE TESTING

KEYSIGHT TECHNOLOGIES

Anritsu envision : ensure

R&S

SPIRENT Communications

| DEVICE CHIPSET | MOBILE DEVICES | CPEs |

1000+ AND GROWING TEST CASE REPOSITORY ACROSS VARIOUS ASPECTS OF 4G/ 5G DEVICE TESTING

USE CASES BASED DEVICE TESTING

Automotive 5G Testing – V2X

Private Networks Smart "X"

Healthcare – Wearables, VR Headsets

LIVE PRIVATE 5G NETWORK LAB

HARMAN Solution

Live private network lab is targeted to provide a multi-vendor environment for live network connectivity, applications, devices and sensors for end-to-end integration, validation and testing of use-cases and verticalized solutions. The lab is equipped with shielded chamber to accommodate any FR1 and FR2 frequency spectrum requirements
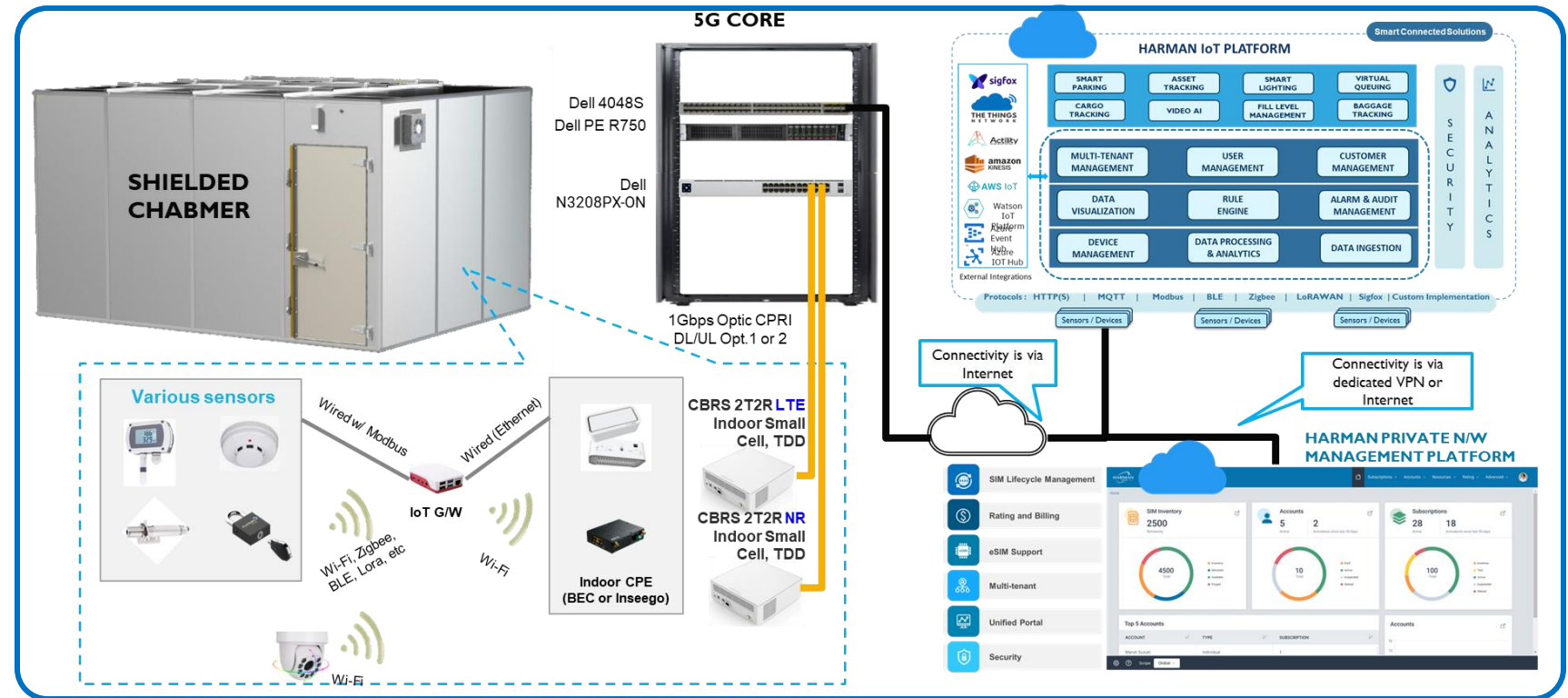
HIGHLIGHTS

- **Private Network Lab As a Service -** An E2E Live Private Network Lab Solution provider enabled by solutions from HARMAN and Partners
- **5G Private Network Interoperability Lab** - to fasten time to Market Rapid lab access to maximize product and solution quality
- **Testing with IoT Devices, Gateways and Cameras -** for multiple device types including (M2M and IoT devices) before deployment
- **Smart X Solutions -** Private Network Capability backed Smart X Solutions across Industries

HARMAN PRIVATE NETWORK MANAGEMENT PLATFORM

One stop solution for Private Network providers and enterprises to manage all aspects of connectivity

SIM Lifecycle Management

5G Ready

eSIM Support

Multi-tenant

Unified Portal

Security
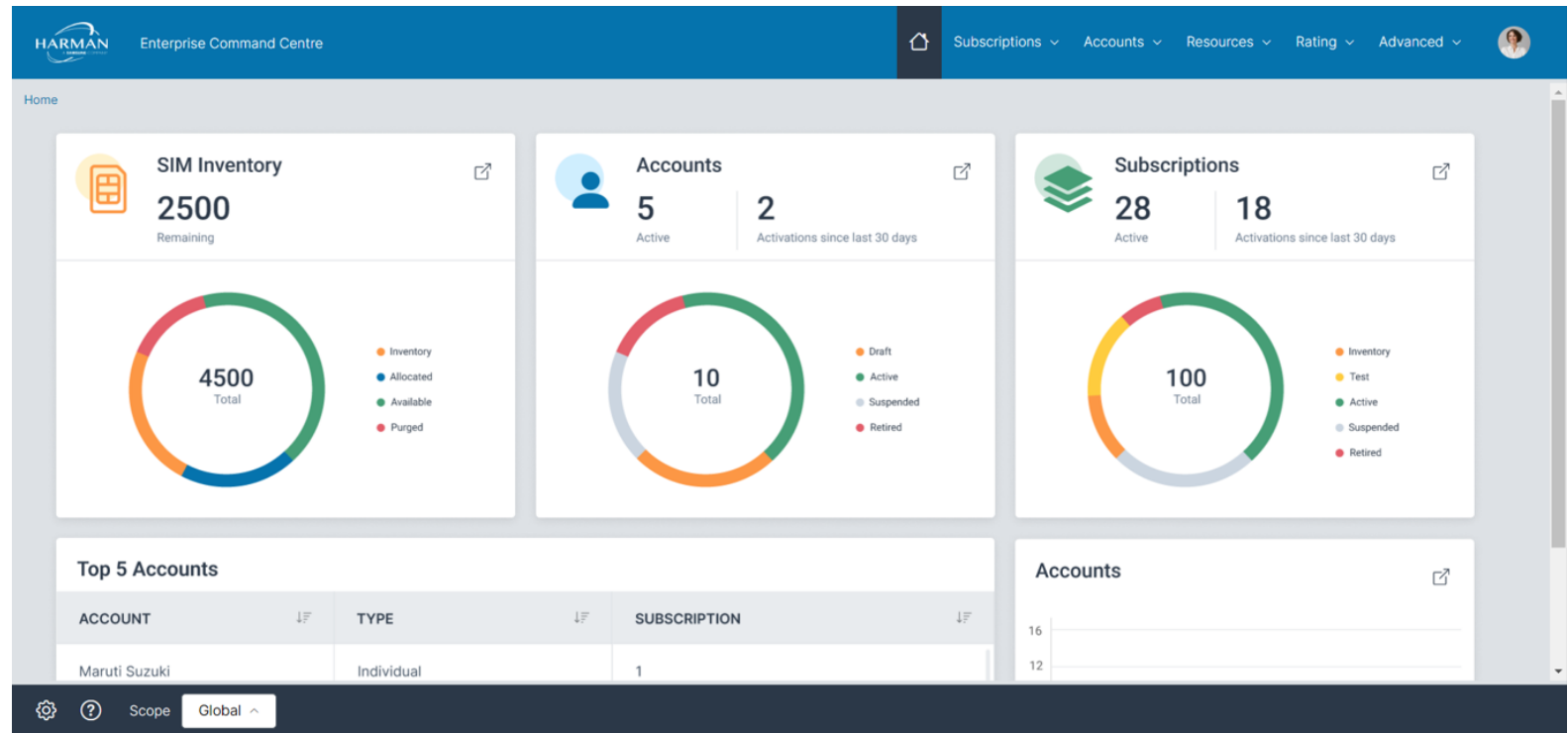
Unified Interface in single pane of glass

Get fast and secure batch activation

Collect data to gain actionable insights

5G VPN SOLUTION FOR US TIER_12 OPERATOR

A solution for securing IOT Device communication when connected to 5G Network using untrusted non-3GPP access without exposing internal details of the underlying network.

SCOPE

- Detailed Requirements definition according to 3GPP Specification 23.502 Rel 17.
- Design and architecture, defining internal data structure and APIs interface between modules.
- Implementation of all platform modules

APPROACH

Harman leaned on its wide experience in IoT & Wireless/5G domain, its robust product design and engineering with a 360-degree system design, development and integration capabilities to provide a multi-tier solution to the customer

OUTCOME

- Strong security aligned with operations requirements.
- Streamlined deployment for business outcomes.
- Scalable and aligned to evolving ecosystem.

Untrusted Wi-Fi — Mobile Core Network

IOT — Wi-Fi AP — IPsec Tunnel — IPSec Termination Gateway — Secure Tunnel — Packet Gateway — INTERNET
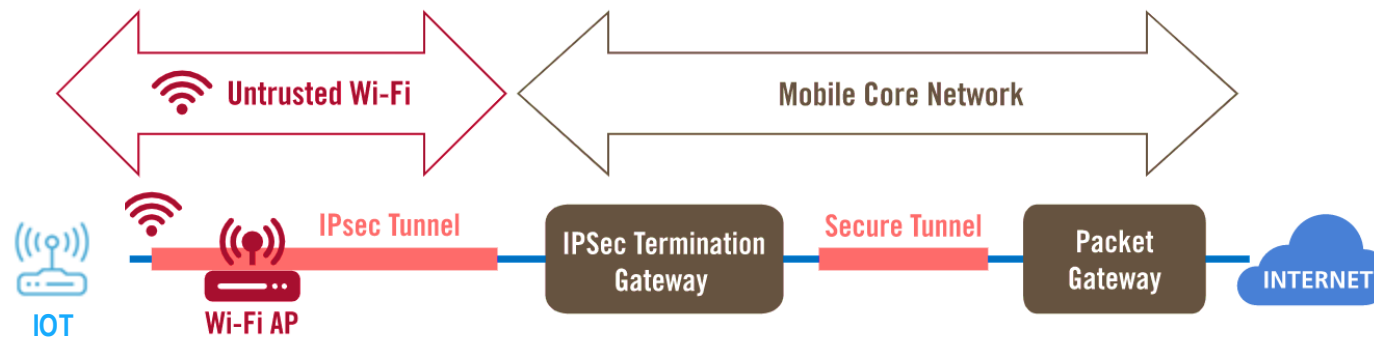
NETWORK MAINTENANCE AND ANALYTICS

NETWORK IT CAPABILITIES

TECHNOLOGY FOOTPRINT

amazon web services™
Microsoft Azure
React
Angular
NETFLIX | OSS + Spring
GWT
Apache Spark™
kafka
elasticsearch + logstash + kibana
hadoop
python™
cassandra
mongoDB
druid
ORACLE
MariaDB
HyperSQL
HSQLDB - 100% Java Database
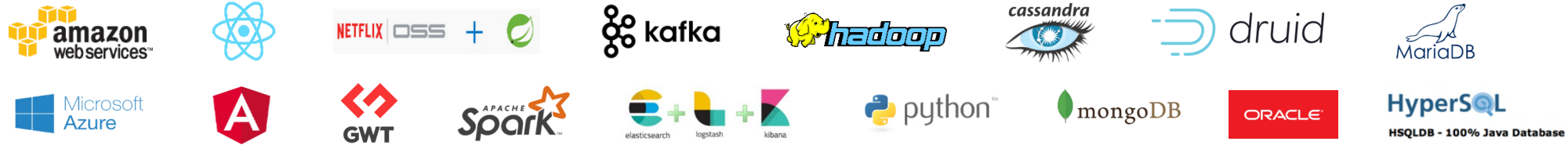
NETWORK INTERFACES

SNMP SSH TR-067 MQTT CORBA
TR-069 CLI TL-1 https XML CMIP
ftp sftp text csv Netconf Netflow
RPC Syslog MTOSI Custom plugin

TRUSTED PARTNER FOR YOUR DIGITAL JOURNEY

TOOLS AND SOLUTIONS

DOMAIN CONSULTING

ADVANCED TECHNOLOGIES

PROFESSIONAL SERVICES

OPEN-SOURCE TECHNOLOGIES AND FRAMEWORKS	BUSINESS ANALYSIS, ARCHITECTURE & DESIGN	BIG DATA, AI AND DL FOR INSIGHTFUL ANALYTICS	APPLICATION SUPPORT MANAGED SERVICES

500+ Engineers | Domain consultants, Senior Solution architects, Open-source Technologies experts, COTS customization, OSS transformation technologists, UI / UX experts, Product Development

KEY CUSTOMERS SERVED

BT
Jio
SAMSUNG ELECTRONICS
mobily موبايلي
verizon✓
ENTRUST

COTS EXPERTISE

ORACLE SIEBEL
DATADOG
bmcsoftware Remedy ITSM
DELL EMC SMARTS
PRTG Network Monitor
IBM Tivoli software
splunk>
checkmk
puppet labs®
Nagios®

NETWORK IT SOLUTIONS

ENHANCEMENT

Experience and Performance

OPTIMIZATION

Time and Cost

MINIMIZE COST OF FAILURE

IMPROVED NETWORK PERFORMANCE

- NETWORK OPTIMIZATION TOOL
- NETWORK PERFORMANCE MANAGEMENT
- CAPACITY PLANNING

- REAL TIME NETWORK MONITORING
- NETWORK SURVEILLANCE
- CONFIGURATION MANAGEMENT

REDUCED TOTAL COST OF OWNERSHIP

- FAULT MANAGEMENT
- EXECUTIVE DASHBOARDING
- INVENTORY MANAGEMENT
- WORKFLOW MANAGEMENT
- NETWORK PROVISIONING AND BILLING

ENHANCED CUSTOMER SATISFACTION

REDUCED TIME TO MARKET

- NETWORK FAULT PREDICTION
- CHURN MANAGEMENT
- TRAFFIC ANALYSIS

- SYSTEMS TRANSFORMATION
- SOLUTION CONSULTING
- ONAP EVALUATION

SOLUTIONS

NETWORK OPERATIONS
Predictive Network Maintenance (PNM)
Reduce false positives
Reduce Mean Time to Repair (MTTR)
Network Optimization

CUSTOMER EXPERIENCE
Customer satisfaction
Network performance
Service availability
Real-time Customer Experience

NETWORK CAPACITY PLANNING
Node Split Forecasting
Network Transport Planning
Switch and Router / Microcell Planning
Network Capacity and Optimization

INTELLIGENT SERVICE ASSURANCE
Quality of Service (QoS)
SLAs Performance Management
Reducing Network Service interruptions
Proactive Network performance issue response
First call ticket closures

IWAN MONITORING
Near real time traffic view of WAN network
Based on Grafana, TSDB and open source-based collection framework
Support for Cisco NetFlow v5/v9/NBAR/NBAR2
Dashboard and reporting at interface level
incoming, outgoing, utilization traffic views

NETWORK PERFORMANCE MONITORING
Custom created opensource based framework monitoring 40K network devices and processing 4 billion collections per day
Advanced analytics with actionable insight
Comprehensive alerting - Burst Threshold, Dynamic Baseline Threshold, Sudden Sharp KPI Drop, Composite Thresholds
Customizable dashboard views, Geographical maps, RAG, Topology maps, Heat maps

CAPACITY MANAGEMENT AUTOMATION
Network & Service Capacity management of complete network using Performance & Configuration data.
Proactive network capacity uplift.
Configurable thresholds, rules and ranges

TELECOM ANALYTICS OFFERINGS

DEVICES
Network Fault Prediction
Outlier/Anomaly Detection
Real-time Asset Monitoring
Demand Forecasting
Warranty Attribution Models
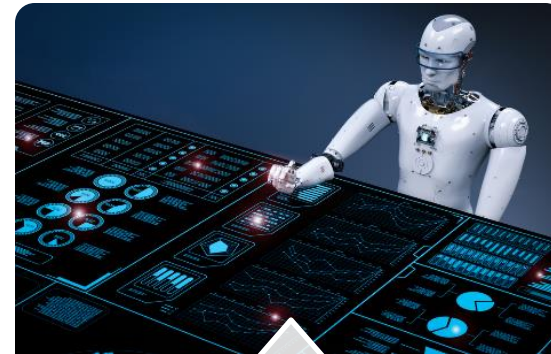
COGNITIVE AUTOMATION
Document Classification
Image Processing
Object Recognition/Classification
Field Service Issue Classification
Advanced Driver Assistance

CONSUMER
Personalized Promotions/Advertising
Personalized Search
Next Best Offer Recommendation
Media Mix Optimization
Propensity Models
(Uplift/Churn/Fraud)

VIRTUAL ASSISTANTS
Self-Learning Virtual Assistant (ITSM Automation)
Digital Concierge
BOT Commerce

TOOLS

SAS | python | R | amazon web services | Hortonworks | HIVE | INFORMATICA | ORACLE EXADATA | Power BI | VERTICA | Google

Microsoft CNTK | Keras | cloudera | MAPR | Flume | | IBM DB2 | talend | PostgreSQL | birst | elastic

TensorFlow | mxnet | kafka | snowflake | Amazon Redshift | | Microsoft | MicroStrategy | NETEZZA | tableau | IBM BigInsights

OpenCV | PyTorch | Azure Data Lake | | Google BigQuery | Apache Spark | DataStage | QlikView | TIBCO Spotfire | COGNOS |

NETWORK MONITORING AND DIAGNOSTICS SERVICES

NETWORK PERFORMANCE MONITORING SOLUTION

BT wanted to evaluate & customize a COTS products utilized by Monitoring and Reporting Platform to save on heavy License fees and improve accuracy.

- Delivered next generation solution from ideation up until realizing business benefits
- Delivered solution with best-in-class software architecture, using Open-Source toolsets
- Support for data analytics solution
- Nextgen UI options like HeatMap, GeoMap, Pie charts, Tabular views, Graphs etc.
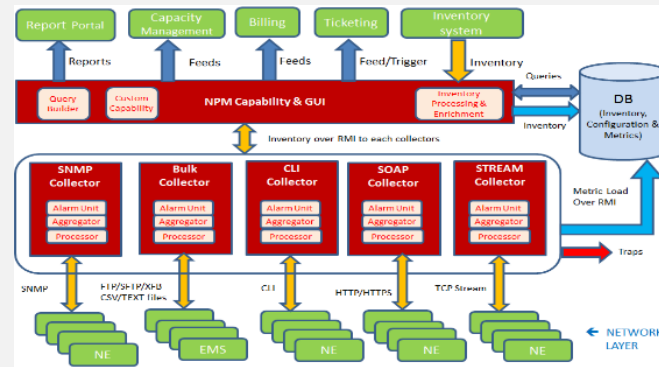
KNOWLEDGE BASED DIAGNOSTICS

BT wanted a tool for its customers to reduce the turnaround time for identifying a problem on a network with better efficiency.

- Complete solution and architecture design
- Development, testing and deployment of a solution
- Extensive Integration with peripheral systems such as fault, alarm and ticket management systems
- Accurate fault localization using advanced algorithms for fault detection
- Improved accuracy touching 95%
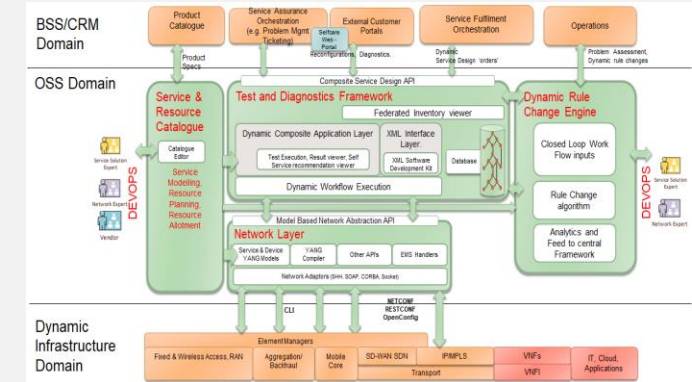
NETWORK MONITORING TOOL

Samsung was struggling with the Configuration management and Reporting capability in the midst of massive scale 4G rollout with 600k+ eNodeBs catering to 270m+ subscriber

- Developed a unified solution for Configuration management providing configurable reporting option
- Predefined data views and User defined Configurable views
- Extensive API Integrate-able with externally hosted BI system
- Compliant with Standard interfaces for NBI using MTOSI, OSS/J
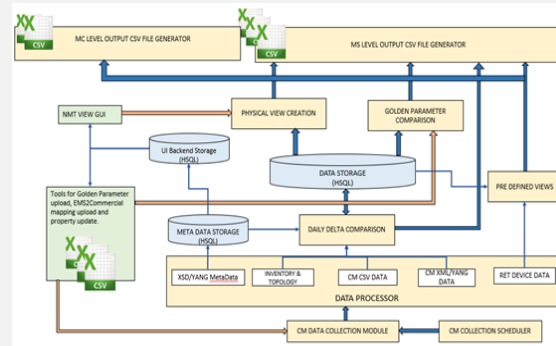
NETWORK MONITORING TOOL

VMware vRNI (vRealize Network Insight) is a network monitoring tool of on-prem & SaaS based model, which optimizes network performance to achieve best service deployment effect.

- Implementation of deep packet inspection feature (NetScout Integration).
- Modified flow processor, proxy and message store to process DPI records & pass it to the platform.
- Contributed to discovery & device modelling. Added capabilities for new device support in vRNI, IPv6 support across the entire product.
- Platform upgradation - PhotonOS & Ubuntu20
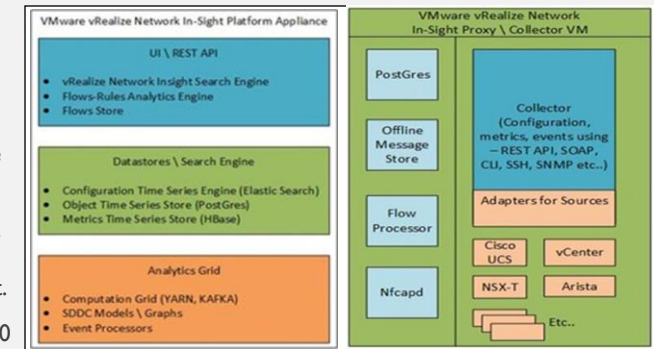
MANAGED SERVICES AND NETWORK OPERATIONS

NETWORK SERVICES	DATACENTER MANAGED SERVICES	AI-OPS	CROSS FUNTIONAL SERVICES	NOC/SOC MONITORING SERVICES
SECURITY SERVICES	DIGITAL WORKPLACE SERVICES	UNIFIED COMMUNICATION SERVICES	EUC & COLLABORATION	SERVICE DECK SOLUTION

HARMAN IP ENABLERS   CLOUDHUB | AI OPS FRAMEWORK | DEFENSIGHT | CASTANET

HARMAN A SAMSUNG COMPANY	**BlueJeans** by Verizon	**SAMSUNG**	**poly**	**hp**
GLOBAL ITO SUPPORT MANAGED INHOUSE.	PARTNERED TO BUILD CLOUD VIDEO INTEROP FOR TEAMS & E2E NOC OPS	TRANSFORMED MES & MIS APPLICATIONS TO ESG-COMPLIANT, NEX-GEN PLATFORM	INFRA MONITORING AND SUPPORT FOR POLY REALCONNECT VIDEO SERVICE
DODGE DATA & ANALYTICS	**ENTRUST**	**ORACLE** Communications	**IRi** Growth delivered.
CLOUD MIGRATION AND OPERATIONS SUPPORT	SECURITY BASED IOT PRODUCT – MONITORING	NOC OPERATION SERVICES FOR ORACLE MULTIPLE SAAS APPLICATIONS (VOIP, MEDIA)	GLOBAL MANAGED SERVICES FOR HYBRID CLOUD DATA CENTER

SERVICE OFFERINGS AND SOLUTIONS

NETWORK PLATFORM

- Connectivity Management Platform
- SIM Management platform
- ESIM (SMDP/LPA) Acceptance Platform
- MVNO Retail Platform
- Network Monitoring & performance Benchmarking Platform
- LTE Drone / Platform

SMART SOLUTIONS

- Smart Femto
- Connected Fleet Management / OBD Dongle
- Public Safety
- Smart Kiosk
- Smart City
- Gearup-up – Worker Safety

DEVICE ENGINEERING

- IT Asset Management
- Device Management (OMADM/LWM2M)
- 5G Test Lab
- Set top Box/RDK Development
- Device Design – Wearables, AR/VR Glasses, NB-IOT Devices
- Pre/Post Silicon Validation

CLOUD AND VIRTUALIZATION

- Storage
- Virtualization framework
- Networking, SDN
- Cloud Application Engineering
- Cloud Migration and Managed Services
- VMware CAAS

NETWORK AND INFRA SOLUTIONS

- 5G Testing and Trials
- SON (Wi-Fi/LTE)
- Network Operations Center
- Datacenter Services
- Cyber Security Services

BSS/OSS AND APPLICATION DEV

- OSS/BSS Transformation
- Open-Source Management – CentOS, OpenJDK
- Digital Apps care / Retail
- Mobility Applications – iOS and Android
- Network Performance Monitoring

CISCO   ARBOR NETWORKS   vmware   ERICSSON   verizon   HUAWEI   PROXY Networks   AT&T   BT   Pluribus NETWORKS

Sprint   T··Mobile·   SAMSUNG   Infoblox   ENTRUST   mobily   amdocs   LEBARA   Comcast   NOKIA

PARNERSHIPS AND ALLIANCES

Strategic Partnerships

AT&T
AVL Partner for 5G/LTE Device Certification

SAMSUNG
Private Network As a Service

Google
Scale out Partner for GMS and Android TV Certification

Adobe
Adobe Primetime Ad Insertion Platform

SAFR from realnetworks
Video Analytics/AI Slutions

aws

Azure

ORACLE CLOUD

Microsoft

Frameworks and Tools

ORACLE

SAS

Qlik Q Qlik Sense

Informatica

MicroStrategy Best in Business Intelligence

CLOUDERA

SAP HANA

ptc

Qualcomm

tableau SOFTWARE

docker

RSA

ANALOG DEVICES

vmware

AUTOMATION ANYWHERE

Microsoft — Microsoft Gold Partner (since 2000), Azure Circle Partner & among the Top 3 Global SI (for 3 years in a row), We have helped more than 100 customers move & also 1 of the 4 Microsoft Technology Center (MTC) services partners globally.

Google — We have 15 years old partnership with google. We are the scaling partner for Android, delivered over 1000+ Android projects. We have deep automotive software development experience. We are a scale-out partner for GMS validation & certification.

aws — We have 360-degree platinum partnership with AWS and also achieved Reseller partner status which is a rare. We have significant strength of certified AWS professionals. As a strategic partner we have developed cloud platforms for our customers.

amazon alexa — 360-degree relationship with Alexa Voice Service (AVS). HARMAN is a member of Amazon's Voice Interoperability Initiative, be proactive work with customers for Alexa integration.

sas — HARMAN partnered with SAS & developing about 120 custom projects every month, spanning across descriptive analysis, customer analytics, market driver analysis, marketing effectiveness

mit media lab — We are in partnership with MIT Media Lab focused on interdisciplinary research areas.

CO-ENGINEERING TECHNOLOGY LED SOLUTIONS

HELPING CUSTOMERS WITH TECHNOLOGY LED SOLUTIONS TO BUILD AND TRANSFORM PRODUCTS FOR ENHANCED EXPERIENCES

Smart Femto Solution from Concept to Launch

HW and SW Development of QLED based In-Flight Entertainment System

Optimize personal's performance and safety
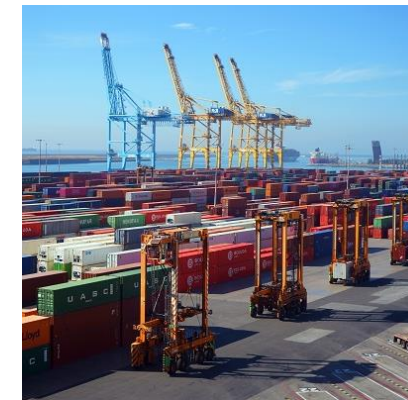
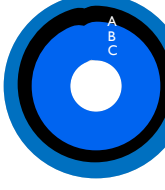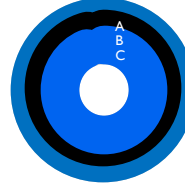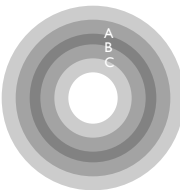Worker and Staff Safety Solution at Port de Barcelona

SAMSUNG QLED DISPLAY

Samsung GearUP

C-V2X

SILICON END TO END CAPABILITIES

Architecture **Idea to Spec**	Design & Verification **Functional Check**	Physical Implement **RTL to Gate**	Physical Design **Gates to Netlist**	FAB	IC Packaging	Validation **Functional check**	Product Launch
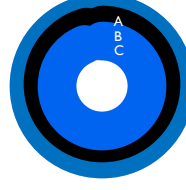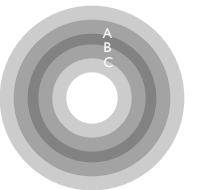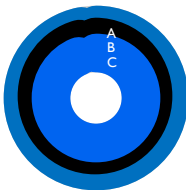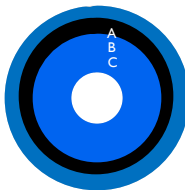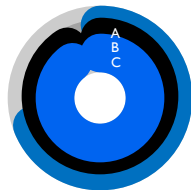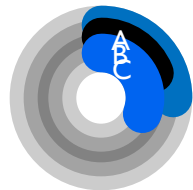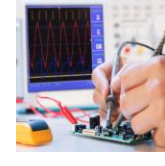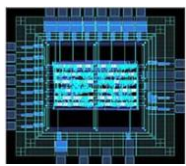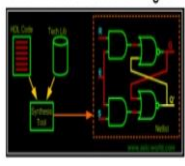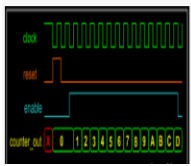
| A: Architectural Explorations B: HW & SW Partitioning C: HLD | A: RTL Design B: Design Verifications C: Emulations | A: STA B: DFT C: Formal | A: Place & Route (P&R) B: PV C: Analog Layout | | | A: Firmware B: Application C: UI | A: Pre-Si Validation B: Post-Si Validation C: Protocol Compliance | A: Acceptance test for mass production B: Yield check/improvements |

intel

SAMSUNG
intel

SAMSUNG
synopsys

SAMSUNG
synopsys

intel
synopsys
WD
QUALCOMM

intel

intel
synopsys
WD
QUALCOMM

ACRONYMS

RTL	Register Transistor Logic
STA	Static Timing Analysis
DFT	Design for Test
PV	Physical Verification
ATE	Automatic Test Equipment

UNIFIED COMMMUNICATIONS & COLLABORATION CAPABILITIES

INFRASTRUCTURE
Multipoint Control Unit (MCU), Conference Management, Content Management and Recording/Streaming Solutions, Gateways, Device Management

ENDPOINTS/CLIENTS
Windows, Android and iOS/Mac endpoints, Room HW Endpoints, Video Client SDK, Desk Phones

STANDARD AND PROPRIETARY SOLUTIONS
H.323, SIP and API based Solutions, WebRTC, Skype for Business, Microsoft Teams, Cisco TIP

NETWORK OPERATIONS AND GLOBAL SUPPORT
Monitoring, Troubleshooting and Maintenance of Cloud Video Service Infrastructure, DevOps, Professional Services, Tier-1/2/3 Support

poly	BlueJeans by Verizon	HARMAN MEDIA SUITE
R&D Engineering and Support Ownership of Video Collaboration Server (MCU), SVC based Next-Gen High Capacity MCU, WebRTC Translator, Video Client SDK	Developed World's 1st Microsoft Teams Gateway and Network Operation Centre for Bluejeans Cloud Infrastructure	Video Meeting Recording, Transcoding and Streaming Solution. IP Owned by HARMAN
nextiva BUSINESS CLOUD COMMUNICATION	DOLBY	Gigaset
Development of Device Management and Analytics Solution for Voice Devices (Poly, Cisco, Vtech etc.)	Development of Standard SIP Video Capabilities in Room Endpoint. Interoperability Lab Setup and Testing with 3rd Party Solutions such as Zoom, Webex, Avaya, Poly etc.	Development of SIP based Android Desk Phone. Ownership of End-to-End development starting from HW validation till Product Testing and Certification

SYSTEMS, STORAGE AND CLOUD CAPABILITIES

STORAGE	VIRTUALIZATION AND CLOUD	SYSTEMS MANAGEMENT	NETWORKING
• Storage Arrays – NAS/SAN, File-system, Object Storage • Flash/SSD storage • All Flash Arrays • Storage Management • Data Protection, Backup, Recovery, DR, Replication, Archiving, • Container eco-system integration for Docker, Kubernetes	• Hypervisors – VMware, HyperV • Private/Public/Hybrid Cloud Platforms and Cloud Management Platforms • SDDC (Software Defined Data Center) – SDS (Software Defined Storage), SDN (Software Defined Networking) • Cloud (public, enterprise/private) based file synchronization/collaboration platforms • Application Streaming	• System Monitoring and Management • ITSM, Asset Management, Configuration Management, Desktop Management, RBA • Remote Management • Identity & Access Management • Vulnerability Management	• Expertise in all phases of for networking solutions • Development and QA for DDI based solution • SDN Development and QA • Device and fabric management Provisioning • Network diagnostics and integrated performance analytics

- **6 of Top 10 clientele as customers**
- **700+ engineers with domain exp.**
- **2500+ man years of engineering expertise**
- **Technology Partnership: VMware, BMC, Microsoft, SNIA**

Solution Accelerators and IP
- Reference architectures (1)VMware integration (2) SOA service platform
- QA accelerator : Log analyzer, Storage QA automation framework, Test Stat collection tool, VASA and VAAI Certification Kits, "VMware Ready" test harness
- Domain training : Storage boot camp, VMWare boot camp (vSphere, vCenter)

MEDIA AND ENTERTAINMENT CAPABILITIES

MEDIA PROCESSING

- Media Transcoding – AVC/HEVC
- Video Format Conversion
- Pre-processing and Post-production
- Closed Captioning
- Text and Graphics Overlays
- Media Security – AES, SRTP/SRTCP
- Quality of Service – Bandwidth Management, Latency, Jitter

CONTENT MNANAGEMENT AND DELIVERY

- Content Tagging and Searching
- Content Metadata and EPG
- Digital Rights Management (DRM)
- Omni channel distribution
- CDN for large scale distribution
- Integration with external CDNs – Wowza, Akamai, Edgecast etc

STREAMING

- Live Streaming
- Video-on-Demand (VOD)
- Streaming Protocols – HLS, RTSP, RTMP
- Online and Offline Transcoding
- Recording and Playback

AI, ML & ANALYTICS

- Content Personalization
- Customer Sentiment Analysis
- Customer Acquisition and Retention
- Audience engagement insights
- Promotional & Product Strategies
- Social Media analytics
- Campaign Effectiveness

INFRASTRUCTURE & CLOUD

- Infra Support and Maintenance
- Multi Channel Management
- Digital Rights Management
- Content Optimisations
- Audit Management
- Dev-Ops/Cloud-Ops

SAMSUNG — SMART TV, SMASUNG ADS

MediaKind everyone. everywhere. — NEXT GEN ANALYTICS AND RECOMMENDATION ENGINE

COMCAST — RDK DEVELOPMENT AND INTEGRATION

youview — STB INTEGRATION

SiriusXM — SUSBSCRIBER BEHAVIOR ANAYSIS

SYMPHONY Advanced Media — OPTIMIZE MARKETING ROI FOR MEDIA RESEARCH AND MEASUREMENT

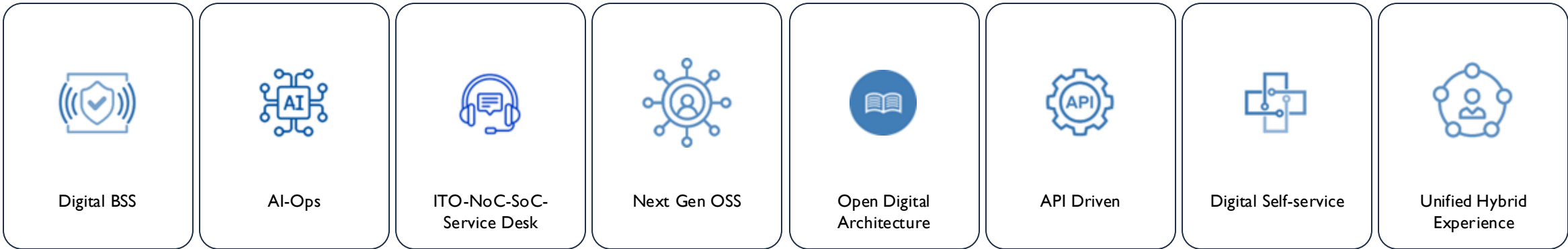**VUBIQUITY** — CONTENT AS A SERVICE SOLUTION

CONVIVA — ANALYTICS LIBRARY FOR VIDEO PLAYERS

Vuclip — REAL-TIME RECOMMENDATION ENGINE

TELCO DIGITAL TRANSFORMATION

HARMAN
A SAMSUNG COMPANY

PHYGITAL EXPERIENCE	DIGITAL PLATFORM DEVELOPMENT	CUSTOM APP DEVELOPMENT	INTEGRATED CYBER SECURITY	NEW PRODUCT INTRODUCTION

Digital BSS	AI-Ops	ITO-NoC-SoC-Service Desk	Next Gen OSS	Open Digital Architecture	API Driven	Digital Self-service	Unified Hybrid Experience

VALUE DELIVERED

Opex Optimization | Customer Experience | Omnichannel Support | Zero Touch Automation | AI powered insights from B/OSS | Data Monetization

NOKIA	Worldwide IoT Network Grid (WING) Connectivity Management platform	SAMSUNG	4G RAN Configuration management tool	amdocs	Data Transformation and Application Migration	Sprint	Omnichannel Experience & Digital Self care
LEBARA	B2B E-commerce platform	BT	Open source-based system transformation for Network Performance and Telecom Analytics	verizon	Verizon – PACT Migration of FCM in AWS	mobily	Product Migration & Customization of Ericson EOC ,ECM & ESM.

SDN - SDWAN -TELCO CLOUD PRACTICE

SDN/NFV

OPERATIONALIZE SOFTWARE DEFINED NETWORK

Service Enablement

Network Intelligence

Service Validation

Multi-controller interaction

Service Monitoring

Application Analytics

Network Management

Legacy & Open-flow interface

SD-WAN

SDN/NFV ENABLED SDWAN SOLUTIONS

WAN Network assessment

SD-WAN implementation

Solution Design & Strategy definition

Network operations & maintenance

Enterprise SD-WAN

Cloud Performance

VoIP & UC Performance

Pluribus NETWORKS vmware® Infoblox velocloud vmware® VMware Tanzu

IOT FOR COMMUNICATIONS

HARMAN IOT to transform Business Processes and create New business Models
Predictive Maintenance - Better Asset Utilization & Higher Productivity paired with Remote monitoring and XAAS (Everything as a service)

HARMAN USE CASES

SMART PRODUCTION
- Smart factories
- Mining
- Airports
- Logistics
- Energy

SMART URBAN
- Construction
- Urban 'Hot spots'
- Stadiums
- Smart automotive

SMART RURAL
Fixed Wireless Access
Agriculture

SMART PUBLIC SERVICES
- Healthcare
- Municipalities
- Education
- Tourism

SYSTEM INTEGRATION & STRATEGY CONSULTING.,

CAPABILITIES

SENSOR SOLUTIONS
- Wearables Development
- Custom Sensor Development
- Secure Devise Boot & Whitelisting
- Performance Benchmarking

GATEWAY SOLUTIONS
- IoT GW Development
- IoT Test Harness
- Local Monitoring & Diagnostics
- Vertical Application Development

CLOUD SOLUTIONS
- MDM/FOTA Solution
- Application Storefront
- Cloud Service Bus Adaptations
- Performance Optimization

CONNECTIVITY
- Low Power Radio Development
- Security Enhancements
- Interoperability Testing

USER EXPERIENCE
- Immersive UI/UX
- Multi Format Porting
- Data Visualizations
- Next Gen Voice Controlled UI/UX

ANALYTICS
- Big Data Analytics
- Machine learning & Data Science
- Business Analytics
- Data Management

WHY HARMAN

Shortening Time to Market
Shorten your time from concept to delivery using are dedicated industry practices, turnkey delivery models and rich talents

Cross Platform
Harman experience and Samsung advantage in multiple industry verticals and leading platforms to rapidly exploit new market opportunities

Global Delivery Footprint
Centers around the world

Solution accelerators
A Global pool of Partnerships and Solution accelerators in the centers of excellences that gives insights and access to trends & innovation.

TOP LINE BENEFITS

Walk along with OEMs CSPs and Third-party service providers to
- Swiftly detect and resolve issues
- Optimize service reliability
- Launch new services and applications
- Enhanced customer experience via a scalable digital ecosystem

Use IOT gateways & Platforms
- To innovate and ensure that smart programs viz Smart City & V2X peek with operational efficiency Hyper personalization to achieve user experience.
- Streamline software updates to logistics in unison.
- Sustainable shop of reusable components, services, and APIs to modular & scalable platforms
- Intelligent integration with backend systems

CLOUD INFRASTRUCTURE SERVICES

1000+ CERTIFIED PROFESSIONALS ON AWS , AZURE & GOOGLE CLOUD

HARMAN
A SAMSUNG COMPANY

HYPERSCALER PARTNERSHIPS

aws | Microsoft | Google

CLOUD PLATFORM EXPERTISE
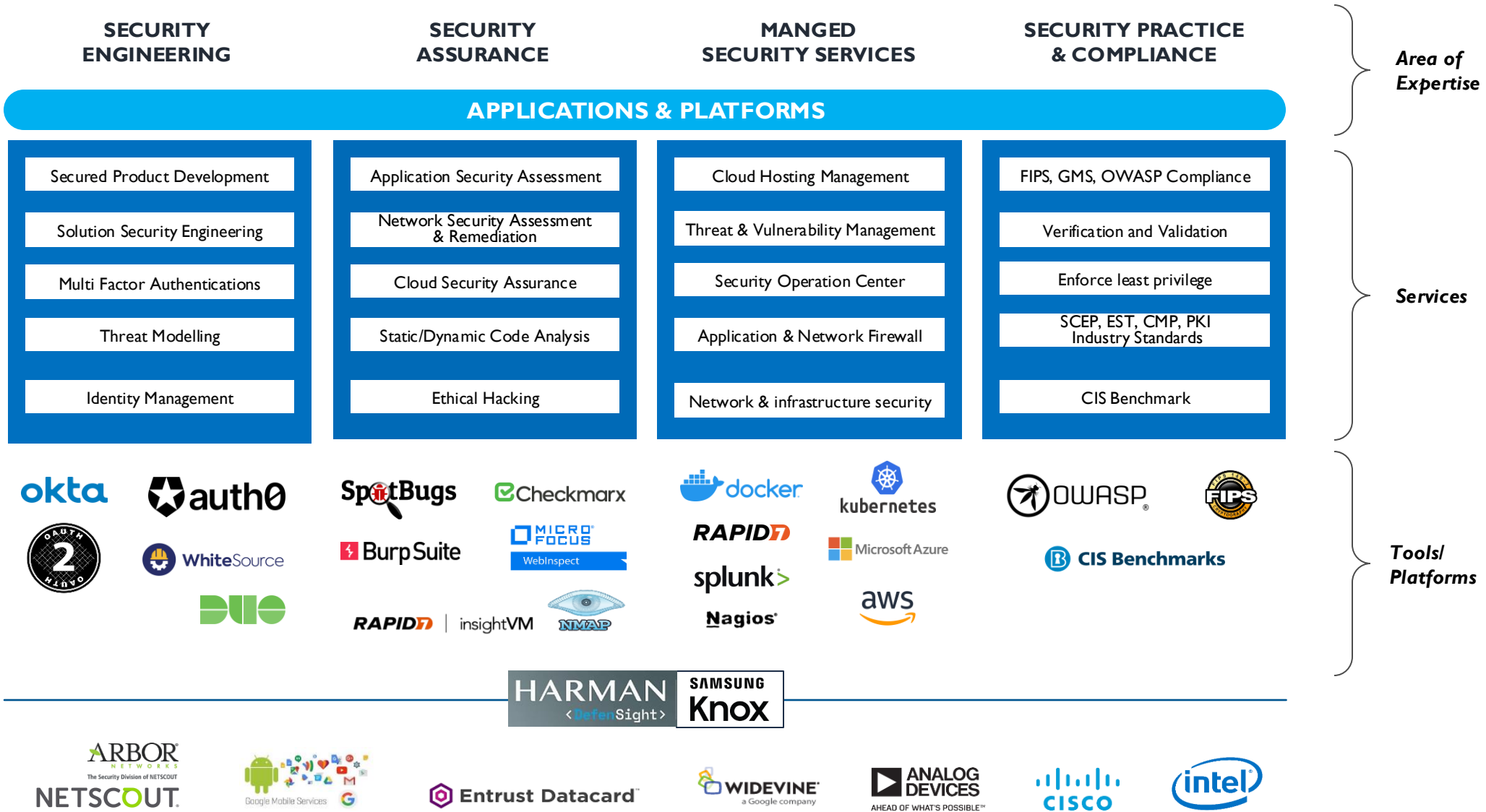
amazon web services | Microsoft Azure | vmware

TRUSTED PARTNER ON YOUR JOURNEY TO THE CLOUD

CLOUD READINESS ASSESSMENT	INFRASTRUCTURE ON CLOUD	APPLICATIONS ON CLOUD	PLATFORM ON CLOUD	INTEGRATION & ORCHESTRATION	CLOUD DEVOPS	CLOUDCARE - MANAGED SERVICES
Cloud Strategy and Business Case Assessment of applications, infra, processes, and architecture	DR, backup, and BCP workloads Migrate VM, collaboration, dev/ test environments, data, and directory	Leverage SaaS platforms like Office, SharePoint, and CRM for business productivity and business process automation	Consolidation, migration, rewrite of existing applications, and new applications development and deployment on cloud	Integration and orchestration across applications and platforms on cloud	Continuous Delivery of applications and infrastructure made faster Optimization for cloud resident application and infrastructure	Managing applications and infrastructure as a managed service remotely SLA-driven, web-based execution and delivery
CLOUD STRATEGY WORKSHOP	FORMATIONS + WORKLOADS		ARCHITECTURE	IP	CLOUD CARE	

HARMAN
A SAMSUNG COMPANY | Symphony HEALTH SOLUTIONS | poly | REMA 1000 | DODGE DATA & ANALYTICS | J.D. POWER | Datasite® | ENTRUST |

SECURE SDLC PRACTICE

SECURITY ENGINEERING	SECURITY ASSURANCE	MANGED SECURITY SERVICES	SECURITY PRACTICE & COMPLIANCE	Area of Expertise

APPLICATIONS & PLATFORMS

SECURITY ENGINEERING	SECURITY ASSURANCE	MANGED SECURITY SERVICES	SECURITY PRACTICE & COMPLIANCE	
Secured Product Development	Application Security Assessment	Cloud Hosting Management	FIPS, GMS, OWASP Compliance	**Services**
Solution Security Engineering	Network Security Assessment & Remediation	Threat & Vulnerability Management	Verification and Validation	
Multi Factor Authentications	Cloud Security Assurance	Security Operation Center	Enforce least privilege	
Threat Modelling	Static/Dynamic Code Analysis	Application & Network Firewall	SCEP, EST, CMP, PKI Industry Standards	
Identity Management	Ethical Hacking	Network & infrastructure security	CIS Benchmark	

Tools/ Platforms

AI/ML OFFERINGS

HARMAN
A SAMSUNG COMPANY

DS/ML

Predictive Sciences

Targeted Campaign Management, ML Based Recommendations, Assortment Optimization, Churn Model, MMX, Propensity Models, Anomaly Detection, Fraud/Risk Models, CLTV, Log Analytics, Predictive Maintenance

ML/DL

Cognitive Analytics and NLP

Chatbots, Text/Topic Mining, Intent identification, Opinion Mining & Sentiment Analysis, Named Entity Extraction, Speech Analysis, Voice Recognition

DL

Computer Vision

Object Detection in Real time, Object Localization & Classification, Image Synthesis, Video Analytics

QUANTUM COMPUTE ENHANCED

15+ Years AI/ML experience

GENERATIVE AI FOR ENTERPRISES OpenAI

- DEEP LEARNING FRAMEWORK
- DISTRIBUTED TRAINING ON GPUS
- ONNX AND DMLC BEST PRACTICES
- MODEL OPERATIONALIZATION AND DS FACTORY
- AI ACCELERATION & MODELS FOR TRANSFER LEARNING

AI / ML SOLUTIONS ACROSS ENTERPRISES

RETAIL/CPG	INFOMEDIARY	TRAVEL / LEISURE	INDUSTRIAL	ISV	COMMUNICATIONS		MEDIA	HEALTHCARE
Unilever	nielsen	Travelopia	Ford	SUMMIT	Panasonic	verizon	SiriusXM	Barnabas Health
THE HOME DEPOT	DODGE	Camelot	TRAFIGURA	Microsoft	BT	ERICSSON	MediaKind	U.S. RENAL CARE

EXTENDED TECHNOLOGY ACCESS FROM SAMSUNG

SAMSUNG'S SUITE OF NETWORK SOLUTIONS - RAN, CORE AND NETWORK ANALYTICS
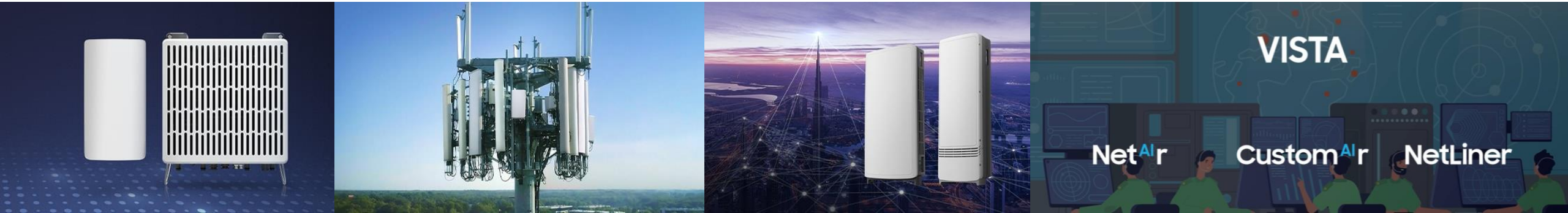
SAMSUNG'S CONNECTED MOBILITY-WEARABLES-DISPLAYS - EXPONENTIAL APPLICATIONS

NEXSHOP DIGITAL SIGNAGE	SAMSUNG SMART WEARABLES	NEXLEDGER	SAMSUNG SECURITY	SAMSUNG PAY

SAMSUNG–HARMAN INTEGRATION SYNERGY

EXPANDED RESOURCES TO ACCELERATE GROWTH & SUCCESS
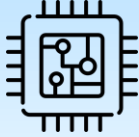
NETWORK CORE & INDUSTRY LEADING TECHNOLOGIES IN CONNECTED MOBILITY SEMICONDUCTORS & DISPLAYS

DYNAMIC GOVERNANCE STRUCTURE TO ENSURE FOCUS & SPEED TO GTM

Cloud Technologies	Silicon	Managed IP	Mobile and App Dev	ITO	5G
Joyent Private Cloud	SAMSUNG SYSTEM LSI	SAMSUNG Gear UP	Samsung Research		5G
Bixby	Post Silicon Verification	SAMSUNG ELECTRONICS	SAMSUNG RESEARCH AMERICA		
SAMSUNG Account	Physical Implementation & Physical Design		SAMSUNG SDS	Metal machining automation system	5G Test for Operator Deployment
DevOps	RTL Design	Wearable for worker safety and productivity	Nexshop	Gobal tooling management system	Private 5G Solutions
India, Korea	**Korea**	**India**	**India, US**	**India, Korea**	**US, India**

Team strength of ~370 HC

HARMAN FOR SAMSUNG NETWORKS

5G DEVICE TESTING AND CERTIFICATION

AT&T Operator Acceptance and Certification for Samsung Galaxy Mobile Devices including Fold, S22, S23, A54 devices

Functional Testing
Protocol Compliance
Performance and Benchmarking
Field Testing
Captive Testing

PRIVATE NETWORK AS A SERVICE

Samsung and Harman partnered to bring complete portfolio of Private Network as a Service (PNaaS) for enterprises, venues, ports, airports etc.

HARMAN provides verticalized **Smart Spaces Solutions** and **Private Network Management Platform** for Samsung PNaaS.

RAN TESTING AND TIER-1 and TIER-2 SUPPORT

Harman Technical Consultants are associated with Samsung Engineering Services and Technical Solutions Team in RAN QA Samsung Lab, Operators Lab

HARMAN provides Tier-1 and Tier-2 support for
Validate and Modify Mops
UE log Analysis
Validation of the Build Installation
KPI Validation of the Build
Provision/Commission LTE & 5G RAN equipment

5G DEVICE CERTIFICATION PARTNER : FOR AT&T 10776 (ADAPT) NETWORK

TEST AS A SERVICE: FOR DESIGN TO FIELD VERIFICATION

HARMAN Device Certification Labs provides a **State-of-the-art LTE & 5G** Network Emulation**,** which enables AT&T Device Certifications across different development and acceptance stages of chipset to Launch of Devices in US Market on AT&T Network

DEVICE CERTIFICATION

- OPERATOR ACCEPTANCE
- MODEM FUNCTIONAL
- PROTOCOL - CONFORMANCE
- PRODUCT STABILITY/STRESS
- PERFORMANCE & BENCHMARKING

FIELD TESTING

- COMPATIBILITY
- FIELD TRIALS
- USABILITY
- APPLICATION
- USER ACCEPTANCE

CAPTIVE TESTING

KEYSIGHT TECHNOLOGIES

Anritsu envision : ensure

R&S

SPIRENT Communications

DEVICE CHIPSET | MOBILE DEVICES | CPEs

1000+ AND GROWING TEST CASE REPOSITORY ACROSS VARIOUS ASPECTS OF 4G/ 5G DEVICE TESTING

USE CASES BASED DEVICE TESTING

| **Automotive 5G Testing – V2X** | **Private Networks Smart "X"** | **Healthcare – Wearables, VR Headsets** |

SMART SPACES

SMART PARKING

*Real Time
Parking management*

SMART LIGHTING

*Automated Lighting,
Sustainable Energy Savings*
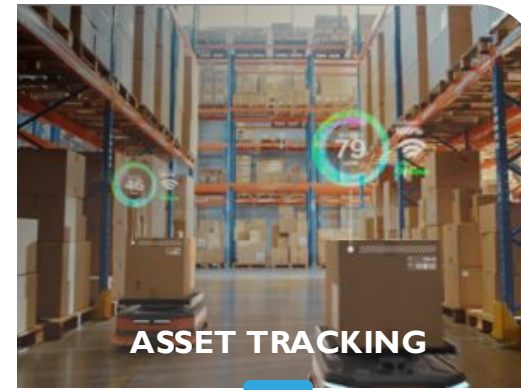
ASSET TRACKING

*Real Time Assets Information,
Availability & Utilization*

WASTE MANAGEMENT

*Efficient Waste Management,
Reducing Carbon footprint*

FLEET TRACKING

*Traceable and Actionable
Logistics insights*

VIDEO AI

*Host of solutions for Warehouses,
Transportation and more*

ENVIRONMENTAL

*Real Time Environmental
Monitoring*

INFRA MONITORING

*Smart Connectivity, Management
& Control of Critical Infrastructure*

DFW | Neu Community | Telefónica | syngenta | verizon | Honeywell

SUCCESS STORIES

AT&T

HARMAN achieved **5G Device certification partner** status for AT&T 10776 (adapt) network across different development and acceptance stages of chipset to launch of devices in US Market on AT&T Network

01

SAMSUNG

HARMAN is a smart X solutions and connectivity management solution development partner for Samsung **PNaaS (Private 5G Network as a Service)** initiative

02

T Mobile

HARMAN is developing a **5G VPN solution** with T-Mobile innovation team for securing IOT Device communication through 5G Non 3GPP access without exposing internal details of the underlying network.

03

NOKIA

Development of **Nokia WING Digital Hub (WDH) solution** – Single Pane of Glass for connectivity management of Nokia WING solution enabling global seamless connectivity across 5G/LTE network technologies and geographical boundaries of IoT

verizon

Development of **cell monitoring and RF performance monitoring** solution which provides near real time or real time analysis of more than 700 5G/LTE network KPIs. It is designed to support 3000 concurrent users.

05

intel

5G/LTE modem chipset integration and validation and backoffice co-ordination and system level analysis of all Platform issues from Pre-certification, Certification and Field Test

06

SUCCESS STORIES

Sprint

CES Innovation Award winning Smart Femto solution for Sprint Magic Box built leveraging Harman-Kardon speakers and far-field array technologies along with Samsung ARTIK or IoT connectivity

07

DFW

HARMAN **Cargo Tracking Solution** for DFW airport in partnership with Samsung (RAN) and Microsoft (Private 5G Core) for private 5G network connectivity

08

Neu Community

Real estate developer building **smart communities** selected a host of Harman smart city solutions such as waste management, smart lighting, water monitoring, inventory management

09

Port de Barcelona

Solution for **Collision avoidance** from Gantry cranes and shuttles for Port staff safety using HARMAN MECWAVE platform in collaboration with Telefonica

Syngenta

By partnering with HARMAN, Syngenta's new **Farm to Command Center solution** improved operational efficiency, reduced downtime and enhanced asset utilization.

11

Trilogy NextGen

Broadcasting network building a **Smart Solutions experience center** selected Harman to deploy smart lighting, smart parking, smart agriculture monitoring, environmental monitoring solutions in its experience center

12

HARMAN CO-DEVELOPED MULTIPLE PRODUCTS & SERVICES OF VMWARE

2007 .... **R&D Services & Synergies across Business Units of Vmware** .... **2021...**

| Hyperconverged Infrastructure | Cloud Management | Cloud service Provider | Network Services | End User Computing | Infrastructure Services |

Design & Development |Automation | Testing as a Service | Data Protection & Support | Ecosystem | Analytics and AI | Cloud Enablement and Integration | UX Design

SECURE SDLC PRACTICE SUCCESS

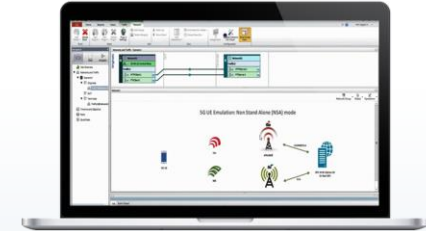|	5-YEAR COLLABORATION	PRODUCT R&D IT & INFRA MGMT & TRANSITION MANAGED SERVICES	6+ ACTIVE PROJECTS 50+ TEAM SIZE	LOCATIONS INDIA | CANADA | US	DOMAIN & TECHNOLOGY EXPERTISE

PRODUCT R&D

ioTrust

- PKI– Secure Connected EcoSystem for IoT Value Chain / Supply chain from Dev to Final product
- iOT Identity Issuance
- iOT Identity Management
- Product Ideation, Product Management
- End to End Product Development Ownership
- GTM Partnership

Managed PKI

- Cloud Hosted (AWS)
  Licensing & Workflow Orchestration
  - End to End Product Development Ownership

Certificate Hub & CA G/W

- Management Console for Organizational Certificates & CAs.
- On-Prem & Cloud Hosted (AWS)
- Enrollment G/W: REST API Suite for Certificate Management Product Mgmt. & Development
- Extended team to Entrust Engineering Team.

On-Prem Certificate Services FW

- Deployment & Functionality Automation
- Kubernetes based Orchestration to deploy Entrust Products on-premise.
- Extended Team

ioT Toolkit

- Lightweight SDK for certificate Operations
- Enrollment Protocol Support
- Collaborative Development

Legacy PKI Products

- Certificate Management for Legacy/Desktop Products
- Enhancements, Maintenance & Support

HARMAN FOR SAMSUNG NETWORKS

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UE log Analysis
Validation of the Build Installation
KPI Validation of the Build
Provision/Commission LTE & 5G RAN equipment

PRODUCTS LAUNCHED AT CES 2023

IOT IN A BOX

HARMAN IoT in a Box is equipped to draw your machine landscape within minutes. Connect to the universal IoT gateway that supports all standard industrial protocols.

DEFENSIGHT

A cybersecurity asset management platform built to offer end-to-end secure strategies against potential IT/OT data breaches.

5G SOLUTIONS

Test and validate your products and networks, faster than ever, with end-to-end testing at the HARMAN 5G Test Lab in an automated, independent, and real 5G environment.

INTELLIGENT HEALTHCARE PLATFORM

A platform that helps healthcare and life sciences organizations provide personalized customer-centric services.

CLOUDHUB

Securely manage your critical enterprise data and end-points with an integrated IoT device management platform.

THANKYOU

CASE STUDIES

TELECOM APPLICATION DEV & SUPPORT

CLIENT IS A TIER 1 TELECOM SERVICE PROVIDER FROM SAUDI ARABIA OFFERING VARIOUS PRODUCTS AND SERVICES OVER WIRELESS AND WIRELINE NETWORK.

20+
Team Members and Growing

3+
Years Engagement

MOBILY OBJECTIVES

- IT Applications enhancements
- IT Applications upgrades, Transformation
- Product Migration
- Application support and maintenance

HCS OFFERING

- IT Application enhancements and customization to support Network upgrades and rollouts
- Team of SMEs, Architects and E2E designers across various OSS/BSS products

HCS DELIVERABLES

- Customization and Management of Siebel CRM
- Product migration and customization of Ericsson EOC, ECM, ESM and Charging system
- Solution Design and Consulting
- System Design, Development and Testing
- UAT, RFS support, Product Rollout support
- Campaign Design and Management

DESIGN, DEVELOPMENT AND SUPPORT FOR OSS/BSS APPLICATION STACK CONSISTS OF MORE THAN 35 APPLICATIONS

COTS EXPERTISE
SME's across platforms

ORACLE SIEBEL   ERICSSON   IBM unica   IBM MQ

End-to-End | Solution Design and Development | COTS Customization & Transformation | Upgrades & Support

BSS APPLICATION DESIGN, DEVELOPMENT, SUPPORT

amdocs

HARMAN'S ENGAGEMENT SUPPORTS **AMDOCS ENSEMBLE** PRODUCT DEVELOPMENT, CUSTOMIZATION AND DEPLOYMENT FOR CUSTOMER CARE, BILLING AND RATING PLATFORM

86+
Team Members and Growing

2.5+
Years Engagement ongoing

AMDOCS OBJECTIVES

- Application enhancements and customization
- Cloud Migration
- Data Migration
- Domain Consulting

HCS OFFERING

- Application enhancement and customization with expertise in technologies like Java, Springboot, Microservices, C, Unix, .net, Angular, React etc.
- Team of Azure cloud SMEs expert in cloud migration projects
- Team of Business Analyst and Scrum Masters managing various Business enhancements and Project deliveries

HCS DELIVERABLES

- Customization and Feature enhancement of Amdocs BSS platform
- Application migration from AWS/GCP cloud to Azure cloud
- Project delivery management
- System Design, Development and Testing
- Business analysis, Requirement gathering and Solution design

DESIGN, DEVELOPMENT AND SUPPORT FOR BSS APPLICATION STACK CONSISTS OF Customer Care, Billing and Order Management applications
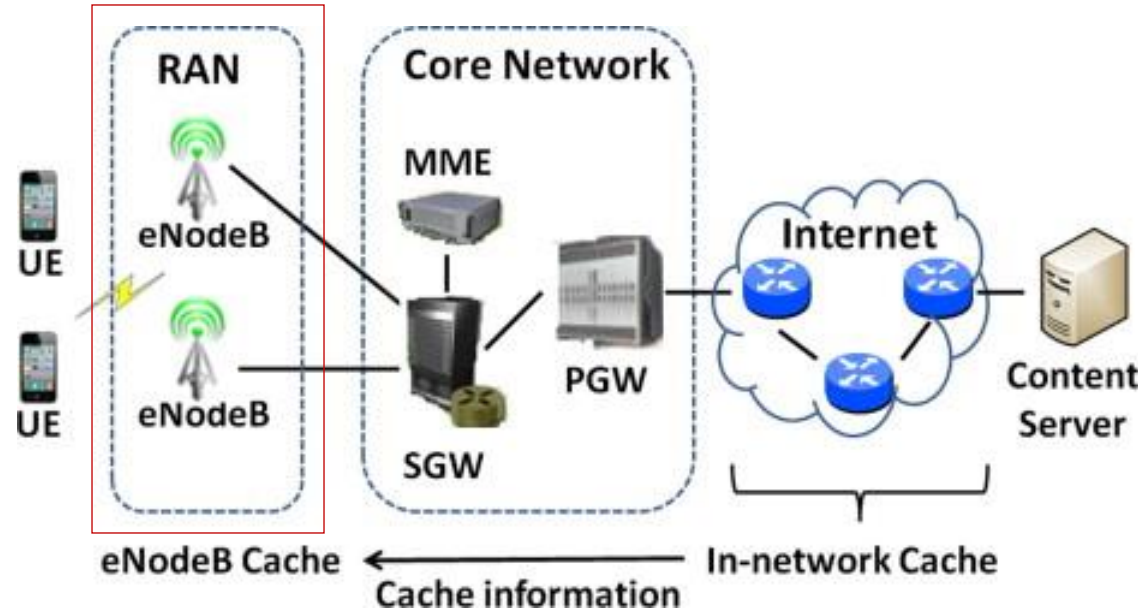
TECHNOLOGY EXPERTISE

Amdocs Customer Care, Billing and Order Management Platform, Azure Certified Cloud Architects

End-to-End | Solution Design and Development | COTS Customization & Transformation | Upgrades & Support

ENODE-B CONFIGURATION MANAGEMENT SOLUTION

HARMAN TENETS TO SYNERGIZE

- ▸ CENTRALIZED CONFIGURATION MANAGEMENT, MONITORING AND REPORTING OF eNodeB GOLDEN PARAMETERS

- ▸ PRE-DEFINED DATA VIEWS AND USER DEFINED CONFIGURABLE VIEWS

- ▸ TOOL FOR GOLDEN PARAMETER AND OTHER MAPPING DATA EXTERNAL UPLOAD

- ▸ HIGHLY CUSTOMIZABLE SOLUTIONS BASED ON OPEN-SOURCE TECHNOLOGIES

- ▸ RICH GRAPHICAL USER INTERFACE FOR MANAGING USER DEFINED VIEWS WITH CREATE, EDIT AND DELETE FUNCTIONALITY

Golden Parameters

|							
PcchConfLogic	HandoverOptionInfoFunc	EnbSchedulerDSCPData	SonUpmFunc	PrachConfLogic	DphyULPwrCtrlFunc	CellSelectInfoLogic	CellAccessInfoLogic	MceMbmsTimerInfo
PdcpInfoFunc	QciInactivityTimerInfo	DSCPMapTraffic	TrchBSRFunc	RachConfLogic	PdschConfIdle	CellReselectInfoLogic	EutraPeriodicInfo	MceConnectionParam
LogicalCHInfoFunc	PlmnSignalingInactivity	DscpMapSignaling	QciValueInfoFunc	RachConfIdle	PhichConfIdle	EutraA3CriteriaInfoQCI	BLERCtrl	MceMbmsDelayInfo
DRXInfoFunc	TimerInfoPhy	SysDSCPData	LocalTimeInfo	PucchConfIdle	DphySRFunc	EutraFaPriorInfoFunc	MacUlSchedulerFunc	SmartDSCPData
RohcInfoFunc	EnbMbmsTimerInfo	SonSrsFunc	EnbMbmsSvcConf	PuschConfLogic	TimeAlignCommonInfoLogic	SonFuncCellControl	FpHoControlInfo	
SonFuncEnbControl	EnbInfoPhy	NoRtpTimerInfo	ExternalEutranCellFDDLogic	PuschConfIdle	TrchInfoFunc	PositioningConf	TrafficManageFuncCellControl	
ExternalEnbConf	IdleModeLbConf	DphyRLFFunc	QosCacParam	SoundingRsUlConfLogic	UeTimerConstInfoLogic	ClockCtrl	MacVoIPFunc	
SonAnrFunc	CsiInfo	RlcInfoFunc	SibSchedulingInfoLogic	SoundingRsUlConfIdle	MeasurementInfoFunc	CellSchrConf	MbmsSchedulingInfo	
NbrDelCauseInfo	DphyCQIReportingFunc	SrbRlcInfoFunc	BcchConfLogic	DphyULsoundingRsFunc	QuantityConfigEutra	DphySPSFunc	MbmsQciInfo	
..........................SonMroFunc	EnbCacInfoFunc	TimeAlignCommonInfoIdle	MacControlChFunc	UlPowerControlParamLogic	EutraA3CriteriaInfo	CellCacInfoFunc	McchRelatedBcchConfInfo	

Harman Open-Source Technology Expertise ❯ kafka · Java · React · MariaDB

NETWORK PERFORMANCE & MONITORING SOLUTION

WHAT WE CAN MONITOR
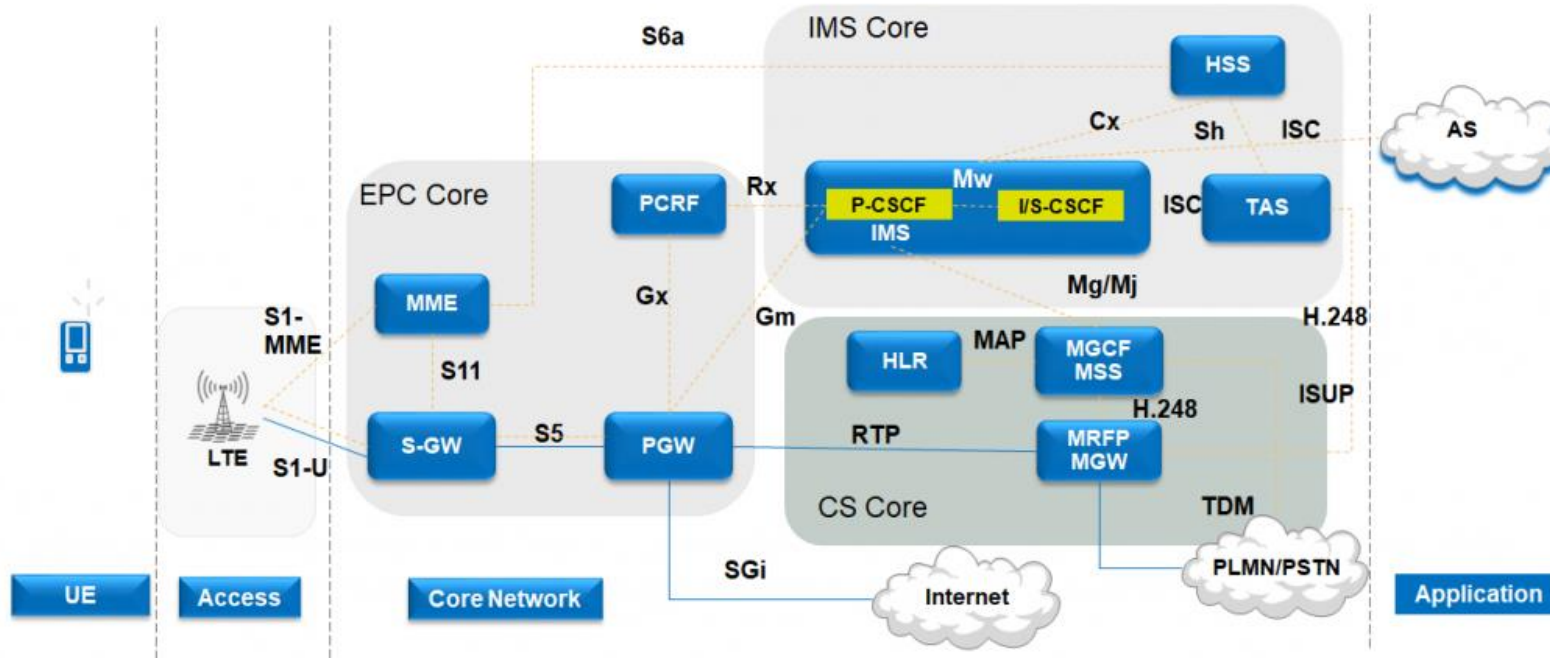
HARMAN TENETS TO SYNERGIZE

- PERFECTLY ALIGNED WITH OPEN CONVERGED WIRELESS SOFTWARE INITIATIVES

- VAST EXPERIENCE IN DEVELOPING MULTIPLE NETWORK CONFIGURATION AND PERFORMANCE MANAGEMENT SOLUTIONS CATERING TO MOBILE NETWORK, BROADBAND NETWORK, WAN NETWORK

- HIGHLY CUSTOMIZABLE SOLUTIONS BASED ON OPEN-SOURCE TECHNOLOGIES

- SOLUTION CAPABLE OF MONITORING HYBRID INTEROPERABLE ACCESS BACKHAUL AND CORE NETWORK.

- RICH GRAPHICAL USER INTERFACE FOR MULTIPLE NETWORK TOPOLOGY AND GEOGRAPHICAL VIEWS, INTUITIVE REPORTS AND USER SELF CUSTOMIZATION

KEY KPIs

RAN
1. Call Drop Rate
2. SRVCC Success Rate
3. Handover success rate

MME
1. Attach success rate
2. Paging success rate
3. Dedicated Bearer activation success rate

SGW PGW
1. IMS IP pool utilization
2. Create Bearer success rate

P-CSCF
1. Registration success ratio
2. Mute rate
3. MOS score
4. RTP packet loss
5. One-way calls

TAS
1. Call setup success rate
2. Call setup time
3. Average call duration

Harman Open-Source Technology Expertise > kafka · cassandra · druid · MariaDB · Spark · elasticsearch+logstash+kibana · Angular 6 New Compelling Features · Grafana

O-RAN INTEROP AND E2E TESTING ENABLER

HARMAN
A SAMSUNG COMPANY

HIGHLIGHTS

- Enable multi-vendor O-RAN Validation & E2E application validations

- 3GPP Rel 15 Compliant (Rel 16 coming soon)

- Supports both NSA and SA modes

- Supports LTE/5G/Untrusted Wifi Access

- Multi-Gbps throughput data plane support

- Highly Scalable solution

- Cloud Native - Deployable On-Prem/Hybrid/Public clouds

- End to End Eco-system to validate real Industrial use cases

Multi-Vendor O-RAN Validation Lab Setup
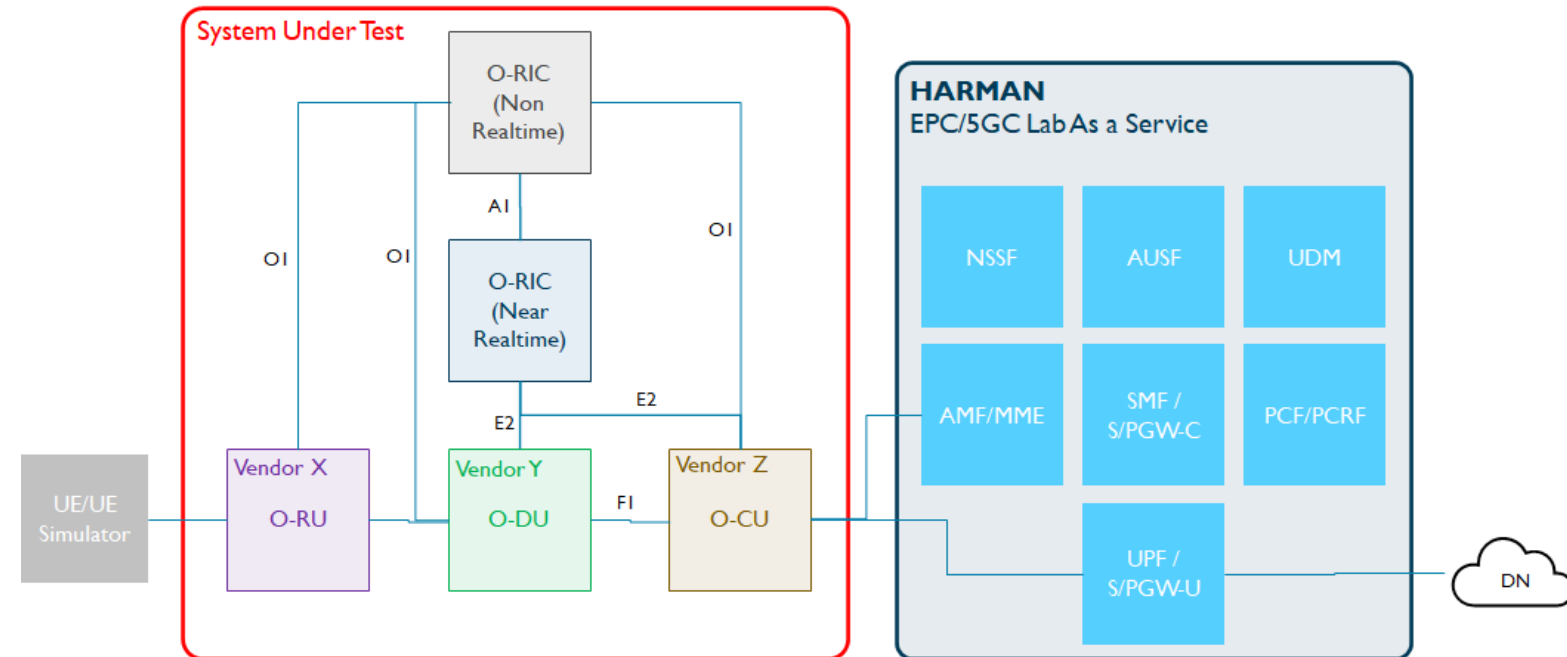
- Labs are current Located in Gurgaon, India

- Can be replicated across other regions as required (co-located to customer) – Can be discussed

REMOTE SIM PROVISIONING PLATFORM AND DEVICE MONITORING AND ANALYSIS

HARMAN
A SAMSUNG COMPANY

REMOTE SIM PROVISIONING PLATFORM

- Designed SMDP+ server architecture including DB's architecture, scalability, load balancing, dockering.
- Solution is fully compliant to specs: SGP22v2.2 to provision eUICC using mobile LPA agent and SGP02v3.1 for M2M eUICC provisioning.
- LPA agent modified to support SGP22v2.2.
- Design and development API for EUM(eUICC manufacturers) to upload profiles to SMDP+. Reference development of EUM Nokia.
- Reference development of MNO(mobile network operator) web Nokia
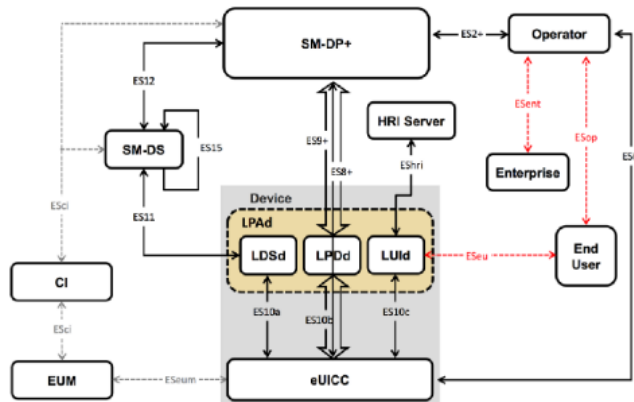
RSP ACCEPTANCE TEST PLATFORM

- Support of testing all entities involved in the eUICC remote provisioning system: eUICC, LPAd, SM-DP+, SM-DS, SM-SR
- Designed Test Driver server application which manages the entire testing process
- Designed Server Simulator and Device Simulator applications which plays specific roles and interacts with entities under test
- Solution is fully compliant to SGP23v1.2 spec for eUICC provisioning of consumer devices and SGP11v3.1 spec for M2M eUICC provisioning
- Support of performing platform and eUICC tests in auto mode
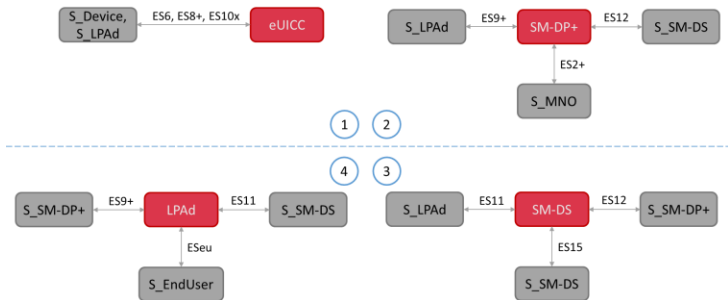
DEVICE MONITORING AND ANALYSIS TOOL

- Design and development of DMAT (Device Moniing and Analysis Tool) clustered server using Big data stack.
- Design and Development of trace application for WIndows, Android and iOS platforms
- Solution supports field engineers to analyze the network data and plan to tweak the cell site information to better serve its customers.
- Product getting ready for 5G Ready