



sensorise
connect & serve



REMOTE MANAGEMENT

Artificial Intelligence IoT

Authentication Inter-Operate

Lifecycle Management

Mobility
Smart Cities
Analytics

eUICC

Network Identity

MIS@

OneM2M

Presentation Title

Imperatives for the Smart Sustainable Cities

Presentation to

Virtual Conference – 100 SmartCities

Presentation by

Sharad Arora, Founder and MD,
Sensorise Smart Solutions

Date

27Aug2020



- "Over time the IoT is going to be very much like the fabled elephant – that it will be much, much bigger than any of us can imagine it being today."
- Tyson Tuttle, CEO of Silicon Labs, 2014
- Smart Cities Imperatives
- Resources for the SSC Administrators
- Imperatives for SSC practitioners
- Innovations to support Smart Cities





Sensorise Company Profile

Role Model Machine to Machine Service Provider



Who We Are

- A Role model M2M Service Provider
- Strong team with several decade of experience in Telecom, Analytics, Products and Services
- HQ in Noida with PAN India reach
- A strong and focused 50+ people team, management style tailored based on Xerox Quality Systems and Tata Leadership Practices, very Swedish in the approach

Achievements

- First company to introduce embedded SIM (QoSim®) and its Life Cycle Management in Indian market. Filed a Patent in Indian, USA and Sweden Patent Offices
- More than 100 OEMs use the QoSim® and SenseLCM® over 600,000 QoSim M2M Cards deployed
- Development & deployment of Customer Feedback Device with Portal, Dashboard, Analytics & field support for Swachh Bharat Mission in Delhi NCR, Haryana and Kerala
- US Patent on “Method and System to control expense and usage of subscriptions in a mobile device”

Differentiators

- In house R&D team with capabilities in telecoms, security, messaging, over-the-air management, portals, analytics and machine learning models
- End-to-End Service Provider; takes complete responsibility hardware, embedded Software, Portals, Analytics and Field deployment and support
- Regularly participate and contribute to Standards and Policies for India
- Ensure the Products and Services always “Standards aware”

Role in Standards and Policy



Author

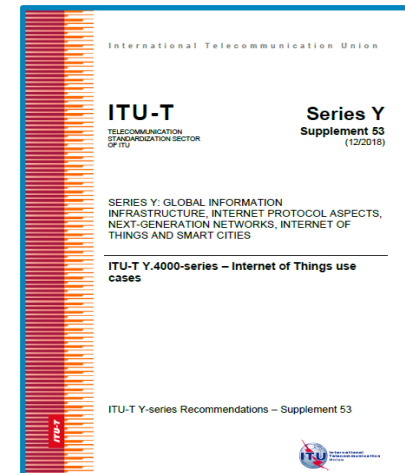
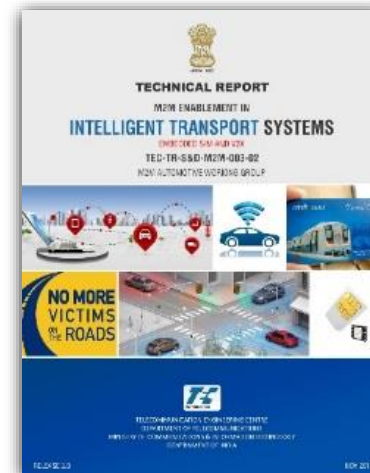
- Co-Author, Technical Report on Intelligent Transport Systems, Vehicle to Vehicle Communications and Embedded SIMs (Nov, 2015)
- Co-Author, ITU Y-Series Supplement 53, Digital Identity and eKYC for Automotive Industry (Published, Dec 2018)
- Lead Author of the M2M Security Workgroup, Recommendations for M2M Security (Released, Jan 2019)
- Co-Author, ITU Proposal on Open Bootstrap Framework (Mar, 2019)

Editorial Group

- Communication Technologies in M2M / IoT (TEC, May 2015)
- M2M Gateway & Architecture (TEC, May 2015)
- M2M Enablement in Safety & Surveillance System (TEC, Nov 2015)
- ICT deployment and strategies for Smart Cities (TEC, Jul 2016)

Contributor

- TRAI Consultation on 'Spectrum, Roaming and QoS related requirements in Machine-to-Machine (M2M) Communications
- Member of the MTCTE Committee on Certification
- Member of the Telematics Working Group of Niti Aayog
- Member, Telecom Standards Development Society of India (TSDSI)
- Member of National Working Group 20, aiding the ITU SG20
- Member of National Working Group 13, aiding the ITU SG13
- Member of National Working Group 17, aiding the ITU SG17
- Rapporteur, SmartCities Standards Advisory Committee
- Member, 5G Application Layer Standards Committee
- Indian languages Standardisation initiative, TSDSI
- BIS LITD 28, IoT RA





Imperatives for Smart Cities

Agenda for the digital society

Smart Sustainable Cities Liveability Index – UN U4SSC



Economy Dimension

Environment Dimension

Society & Culture

Dimension	Sub-Dimension	Category	KPI	Type	Type
Economy	ICT	ICT Infrastructure	Household Internet Access	Core	SMART
			Fixed Broadband Subscriptions	Core	SMART
			Wireless Broadband Subscriptions	Core	SMART
			Wireless Broadband Coverage	Core	SMART
			Availability of WiFi in Public Areas	Advanced	SMART
		Water and Sanitation	Smart Water Meters	Core	SMART
			Water Supply ICT Monitoring	Advanced	SMART
		Drainage	Drainage / Storm Water System ICT Monitoring	Advanced	SMART
		Electricity Supply	Smart Electricity Meters	Core	SMART
			Electricity Supply ICT Monitoring	Advanced	SMART
	Transport	Demand Response Penetration	Advanced	SMART	
		Dynamic Public Transport Information	Core	SMART	
	Public Sector	Traffic Monitoring	Core	SMART	
		Intersection Control	Advanced	SMART	
		Open data	Advanced	SMART	
	Productivity	Innovation	e-Government	Advanced	SMART
			Public Sector e-procurement	Advanced	SMART
			R&D Expenditure	Core	STRUCTURAL
		Employment	Patents	Core	STRUCTURAL
			Small and Medium-Sized Enterprises	Advanced	STRUCTURAL
			Unemployment Rate	Core	STRUCTURAL
			Youth Unemployment Rate	Core	STRUCTURAL
	Tourism Sector Employment	Advanced	STRUCTURAL		
ICT Sector Employment	Advanced	STRUCTURAL			

Dimension	Sub-Dimension	Category	KPI	Type	Type
Environment	Environment	Air quality	Air pollution	Core	SUSTAINABLE
			GHG Emissions	Core	SUSTAINABLE
		Water and Sanitation	Drinking Water Quality	Core	SUSTAINABLE
			Water Consumption	Core	SUSTAINABLE
			Freshwater Consumption	Core	SUSTAINABLE
			Wastewater Treatment	Core	SUSTAINABLE
		Waste	Solid Waste Treatment	Core	SUSTAINABLE
			Environmental Quality	EMF Exposure	Core
		Public Space and Nature	Noise Exposure	Advanced	SUSTAINABLE
			Green Areas	Core	SUSTAINABLE
	Green Area Accessibility		Advanced	SUSTAINABLE	
	Protected Natural Areas		Advanced	SUSTAINABLE	
	Recreational Facilities		Advanced	SUSTAINABLE	
	Energy	Energy	Renewable Energy Consumption	Core	SUSTAINABLE
			Electricity Consumption	Core	SUSTAINABLE
			Residential Thermal Energy Consumption	Core	SUSTAINABLE
			Public Building Energy Consumption	Core	SUSTAINABLE

Dimension	Sub-Dimension	Category	KPI	Type	Type
Society and Culture	Education, Health and Culture	Education	Student ICT Access	Core	SMART
			School Enrollment	Core	STRUCTURAL
			Higher Education Degrees	Core	STRUCTURAL
			Adult Literacy	Core	STRUCTURAL
		Health	Electronic Health Records	Advanced	SMART
			Life Expectancy	Core	STRUCTURAL
			Maternal Mortality Rate	Core	STRUCTURAL
			Physicians	Core	STRUCTURAL
			In-Patient Hospital Beds	Advanced	STRUCTURAL
			Health Insurance / Public Health Coverage	Advanced	STRUCTURAL
	Culture	Cultural Expenditure	Core	STRUCTURAL	
		Cultural Infrastructure	Advanced	STRUCTURAL	
		Safety, Housing and Social Inclusion	Housing	Informal Settlements	Core
	Social inclusion	Housing Expenditure	Advanced	STRUCTURAL	
		Gender Income Equity	Core	STRUCTURAL	
		Gini Coefficient	Core	STRUCTURAL	
		Poverty	Core	STRUCTURAL	
		Voter Participation	Core	STRUCTURAL	
		Child Care Availability	Advanced	STRUCTURAL	
		Safety	Natural Disaster Related Deaths	Core	SUSTAINABLE

- Three Dimensions, multiple Sub-Dimensions, Categories and KPIs
- ICT and Data services are amongst the highest priority sub-dimension

Smart Sustainable Cities Liveability Index - MoHUA



Pillar of Comprehensive Development	Category Index	Average value for each pillar	Weight Adjustment	City Liveability Index
Institutional (25% weight)	Governance Index (A)	A	$T=A*0.25$	City Liveability Index = $T+U+V+W$
Social (25% weight)	Identity and Culture Index (B)	$R=\frac{B+C+D+E}{4}$	$U=R*0.25$	
	Education Index (C)			
	Health Index (D)			
	Safety and Security Index (E)			
Economic (5% weight)	Economic Index (F)	F	$V=F*0.05$	
Physical (45% weight)	Housing and Inclusiveness Index (G)	$S=\frac{G+H+J+K+L+M+N+P+Q}{9}$	$W=S*0.45$	
	Open Space Index (H)			
	Mixed Use and Compactness Index (J)			
	Energy Index (K)			
	Mobility Index (L)			
	Water Index (M)			
	Waste Water Index (N)			
	Solid Waste Index (P)			
Pollution Index (Q)				

PILLAR OF COMPREHENSIVE DEVELOPMENT	CATEGORY	INDICATOR	TYPE
INSTITUTIONAL	1. Governance	1.1 Percentage of citizen services available online	Core
		1.2 Percentage of services integrated through Command Centre	Supporting
		1.3 Percentage of citizens using online services	Core
		1.4 Average delay in grievance redressal	Core
		1.5 Tax collected as percentage of tax billed	Core
		1.6 Extent of cost recovery (O&M) in water supply services	Core
		1.7 Capital spending as percentage of total expenditure	Core
		1.8 Percentage of population covered under Ward Committees/ Area Sabhas	Core

Four Pillars of Liveability Index – Institutional, Social, Economic, Physical
The Category of Governance is critical

- Online Citizen Services, Services integrated through Command Centres are amongst the highest priority
- Smart Cities will generate zetabytes of city and citizen related data



Resources for Smart Cities Administrators

Knowledge & specifications for sustainable solutions

Resources for the SSC Administrator



- Sustainable Smart Cities Reports, Recommendations and KPIs published by ITU
- Sustainable Smart Cities Reports, Recommendations and KPIs published by “United 4 Smart Sustainable Cities” by the United Nations
- Standards and Reports from ISO / IEC
- TSDSI has transposed the oneM2M Standards for IoT and Smart Cities
- BIS LITD 28 Sectional Committee for Smart Cities
- Telecom Engineering Centre Reports on various aspects of communication technologies, IoT and Smart Cities



SSC = Sustainable Smart Cities

Some relevant ITU Standards on Smart Cities



Standards to Support Horizontal Areas

Sno	ITU Recommendation for Horizontal Areas	ITU Number
1	Requirements for the interoperability of smart city platforms	Y. 4200
2	High-level requirements and reference framework of smart city platforms	Y. 4201
3	Requirements and reference architecture of the M2M service layer	Y. 4413

Standards to Vertical Industry domains

Sno	Industry Verticals	ITU Standard	Indian Standards	BIS
1	Power/ Energy	Y. 4251	IS 16444	
2	Automotive/ Transport	Y. 4119	AIS 140	IS 16833
3	Smart Parking	Y.4456		
4	Transportation Safety Services	Y. 4457		
5	Water Management: Requirements for water quality	Y.4107		
6	Health: Service and capability requirements for e-health	Y.4110		
7	Capability framework for e-health monitoring	Y.4408		
8	Wearables: Requirements and capabilities of the Internet of Things	Y.4117		

Some relevant oneM2M Standards for Smart Cities practitioners



S. No.	Title	ITU No.
1	oneM2M – Functional architecture	Y 4500.1
2	oneM2M – Requirements	Y 4500.2
3	oneM2M – Service layer core protocol specification	Y 4500.4
4	oneM2M - management enablement (OMA)	Y 4500.5
5	oneM2M - management enablement (BBF)	Y 4500.6
6	oneM2M – CoAP protocol binding	Y 4500.8
7	oneM2M – HTTP protocol binding	Y 4500.9
8	oneM2M – MQTT protocol binding	Y 4500.10
9	oneM2M – Common terminology	Y 4500.11
10	oneM2M - base ontology	Y 4500.12
11	oneM2M – Interoperability testing	Y 4500.13
12	oneM2M – LwM2M interworking	Y 4500.14
13	oneM2M – Testing framework	Y 4500.15
14	oneM2M – Web Socket protocol binding	Y 4500.20
15	oneM2M – Field device configuration	Y 4500.22
16	oneM2M – Home appliances information model and mapping	Y 4500.23
17	oneM2M – MAF and MEF Interface Specification	Y 4500.32



Imperatives for Smart Cities practitioners

Readying the Indian Smart Cities for the future data society

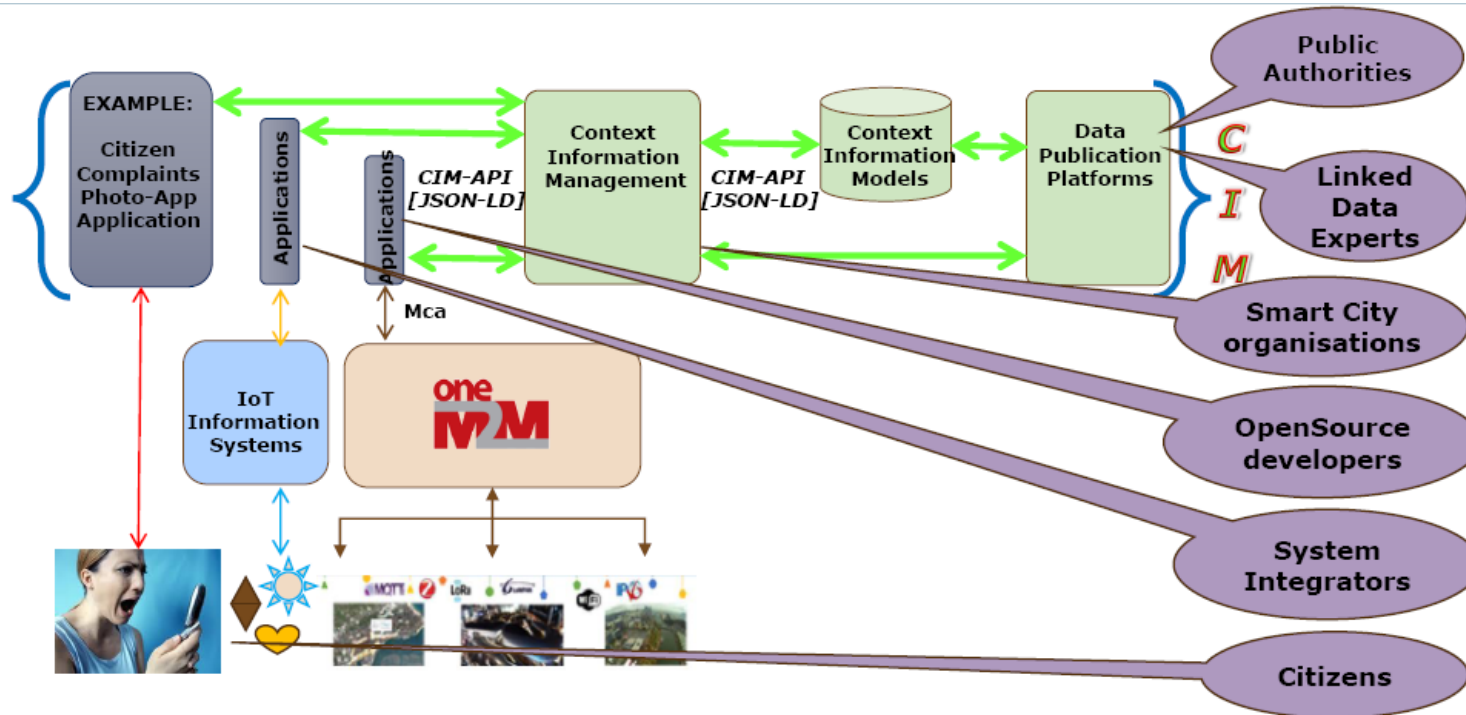
Summary of ICT Imperatives for Smart Cities



Identity, Safety, Security	Availability, QoS, Manageability	Smart Cities Platform, Data Sharing & Inter-operability
Standardised	Remote Manageable	Data Sharing
Know the IoT / ICT Assets, its custodian, it's standardization and that it is safe	Ensure that the ICT / IoT Assets are reachable and manageable all the time	Data is shared between and to entities that are authorized to access the data
Inability to tell between genuine and rogue, lack of Standardization	Absence of assurance of connectivity and QoS	Absence of Data Sharing & Data Management Policies

Smart City Platforms, Standardisation & Inter-operability, Data source Identification and Data Sharing, Data Privacy

Critical imperative of Smart Cities Platforms and Smart Cities Data Management



A committee of experts set up by the Government under the Chairmanship of Mr Sushil Kumar, DDG, IoT, TEC has recommended that oneM2M Standards for IoT and Smart Cities are notified as national standards



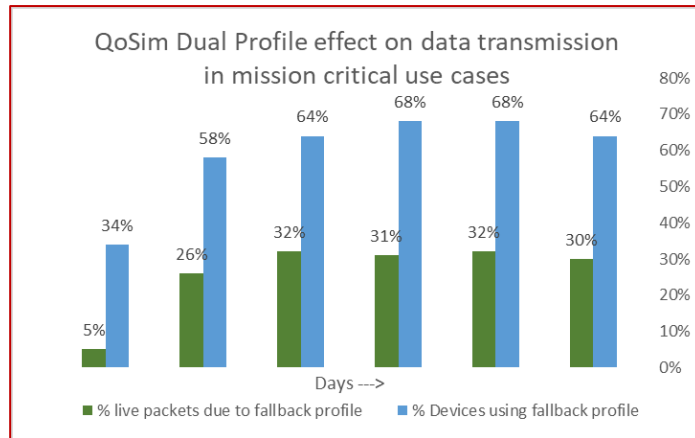
Sensorise enablement for Smart Cities

Role Model Machine to Machine Service Provider

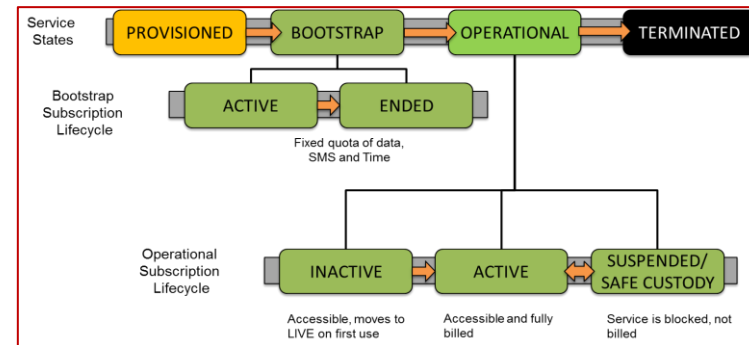
QoSIm & SenseLCM – mission critical M2M Connectivity



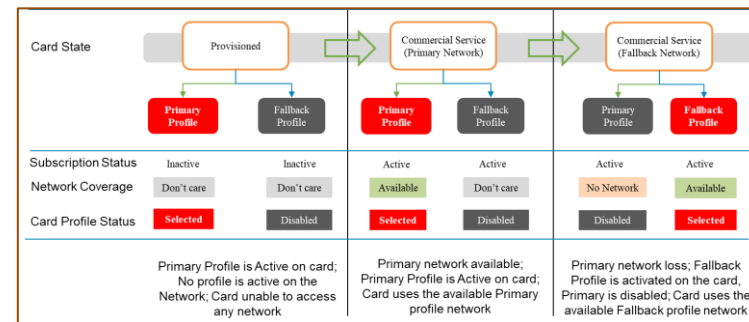
- Multi-network QoS for mission critical use cases,
- Frugal remote manageable M2M connectivity, choice of Domestic and International Networks
- Single Dashboard and Self Care platform, supporting multiple MNO subscriptions



Mission Critical quality of service with dual network profile



Connectivity Lifecycle management through multiple device lifecycle stages

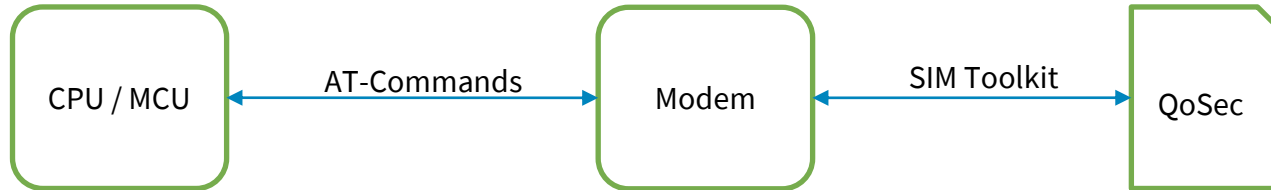


Flexible, frugal, secure and remote manageable M2M Connectivity for all Smart Cities Use cases

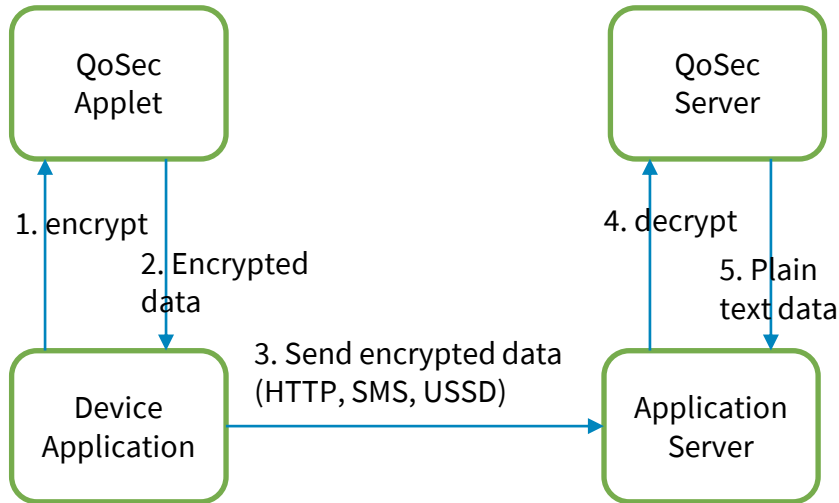
Frugal end to end security for any Smart Cities use case



End to End IoT Security Solution that converts the operator SIM into a Secure Element



Empowers any GPRS Modem based Device with tamper resistant security using the frugal QoSec



QoSec Security Workflow

- Secure Element within QoSim
- Easy access using SIM AT Commands
- Sensorise Implementation Guide
- Sensorise Certification Service
- Independent of connectivity /communication channel

Affordable, carrier class, end to end security for low cost M2M devices enabling Smart Cities Use cases

SenseIT – Sense Intelligent Things



- Frugal remote manageable M2M connectivity, multi-network QoS for mission critical use cases
- Multi access, multi- use case IoT standards enabled sensor data acquisition device
- Smart application for data collection, protocol interpolation and data transmission
- End to end Device and Data Security using frugal components
- Connecting CFD Devices, SCADA sub stations, Distribution Automation to Command Centres



Solution Architecture

- Single platform agnostic of Telco & SIM
- Connectivity Management Platform
- Subscription Management Platform
- Real time diagnostics for Network availability
- Secure and Captive Messaging Gateway
- Messaging Gateway with multi-Telco integration
- Authenticated Device Management using Secure SMS
- DoT KYC Compliance

Advantage of Solution

- ULBs / Discoms become Telco independent for connectivity and connectivity management
- End to End Security compliant to hon TRAI recommendations
- Secure Device Management

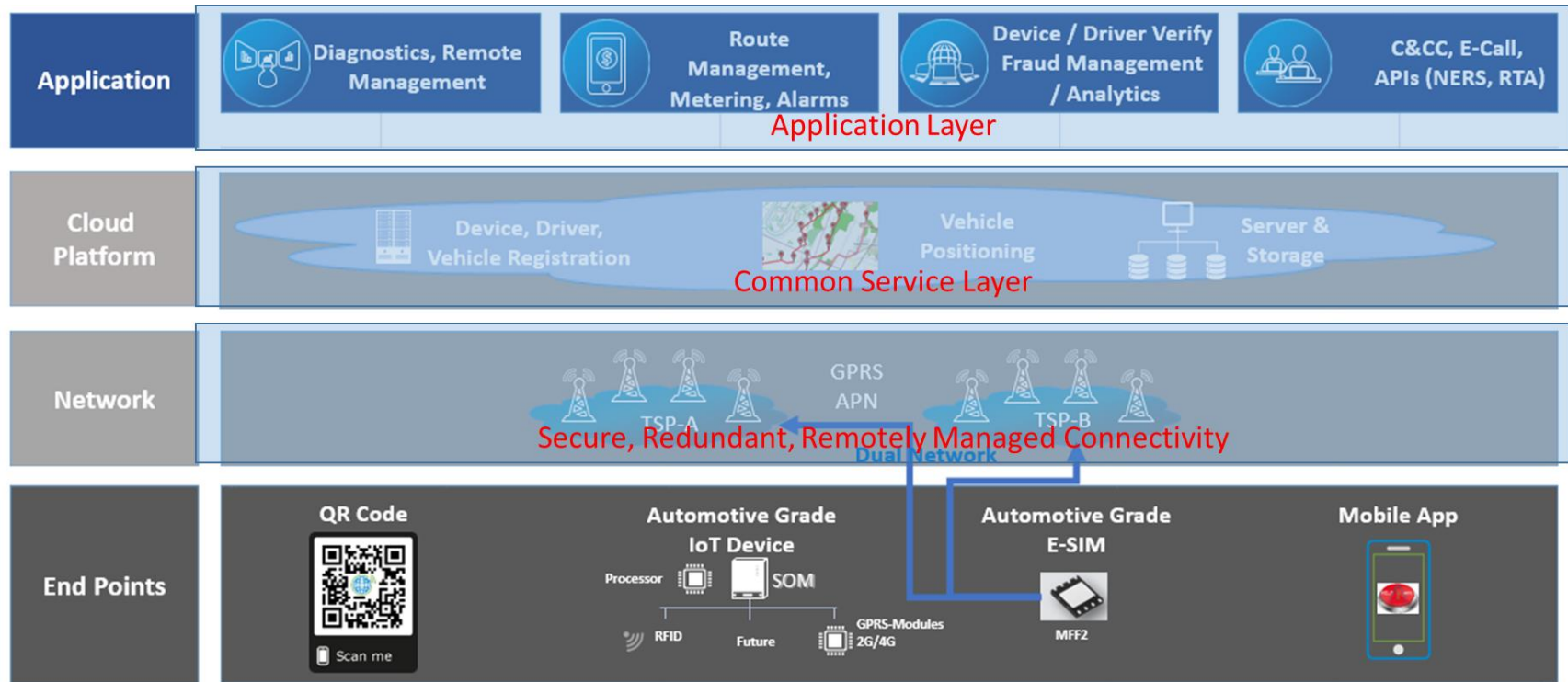
Committed Connectivity

- Best choice of network – at factory and in the after-market
- Best QoS choice – single or multi profile
- End to End security along with connectivity



Frugal, IoT based, standards compliant device, connectivity, protocol translation, data capture capabilities for digitalisation of field assets for enabling Smart Cities Use cases

SenseTraq – Secure tracking of Public Service Vehicles



A national scale open standards based public service vehicle tracking solution, secured with the tamper resistant globally uniquely identity infrastructure for tracking of public service field assets for Smart Cities



Thank You!

For More information

www.sensorise.net

Contact:

sales@Sensorise.net

Management Team



Sharad Arora, MD

25 +Years of experience including R&D for an Office Automation major, Managing IT and Telecommunications Services, running the Asia Pacific Business of a VAS & Security Solutions MNC, leading incubation of Data Services & Mobile Entertainment, M-Commerce, Location Services, Mobile Security & Apps and IoT Solutions. Worked at Modi Xerox, Escotel, SmartTrust, Tata Teleservices



Rajeev Arora, CTO

32+ Years of experience of development in Business Intelligence / Data Mining, Sales Force Automation, VLSI CAD and embedded software. Set up and execution of India operations for global software delivery and support models. Founding member of Apex Decisions. Worked at Wipro, Texas Instruments, BaaN



Abhishek Batra, CFO

20+ Years with consulting firm with variety of clients and experience in assurance, audit and tax advisory for all types of business entities. Managed Outsourced Finance & Accounts Function Management and Tax Compliance Team.



Jonas Haggard, CSO

20+ years of professional experience in Telecommunications. Skilled in Mobile Technology, VAS, Mobile devices, Product Management, NFC, OTA, Smart Card, Wireless, Security. Worked in companies like Teracom, Smart Trust, G&D



Vijaya Kamath, CIO

23+ years of experience of Telco Systems in the OSS / BSS space, Mobile Applications and Solution Architectures. Worked at TCS and Vodafone and freelanced with large enterprises and SI companies to develop digital solutions.



Ajay Nandy, VP Supply Chain, Country Head Indonesia

20+ years in Sourcing, Procurement, Imports and Logistics, Contract & Project management in multiple domains viz Automobile MNC, Telecom MNC, Infrastructure, Highway and Roadways. Worked at Force Motors Ltd, Hero Moto Corp Ltd, JP Associates, Soma Isolux Corsan







Prasun Nigam, VP Sales

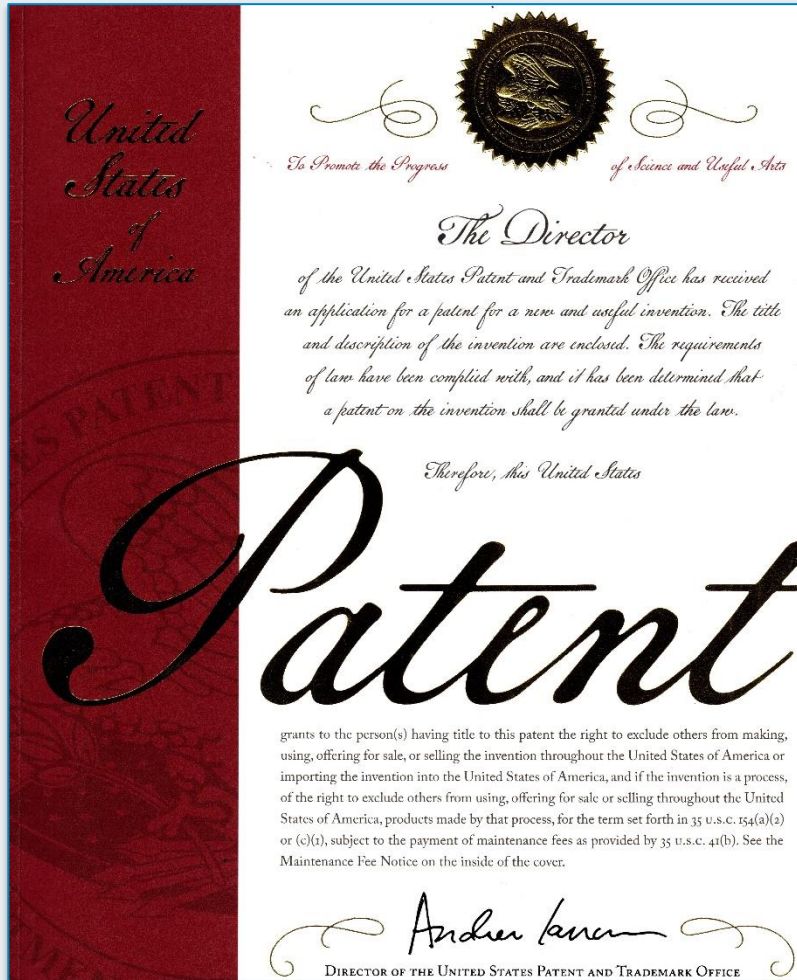
Post Graduate in Sales & Marketing Management, having 35+ years of experience in Sales, Marketing and Operations with large and Multinational Conglomerate in wide spectrum of Rural, Automobile and Telecom & IT industry. Last 23+ years experience in Telecom, IT & M2M/IoT industry

- Intellectuals and Professionals with 20 to 35 years of industry experience
- Deep insights of industry & technology
 - Telecoms
 - OTA Technology and Platforms
 - Embedded Systems
 - Security
 - Analytics
 - Standards, Regulations
- Extensive Domestic and International experience

Vision Mission values




-  Sensorise is an **M2M Service Provider** with a practice of supplying end to end solutions in Remote and Lifecycle Management of e-SIM and IoT Devices
-  Sensorise Solutions are **Secure and Device, Network technology independent**
-  Sensorise Solutions depend on multi-party collaboration, aligning to the Brand Tagline **Connect and Serve**
-  Sensorise provides solutions to the Government and the Private Companies, with a focus on **quality of service, remote management, machine learning, automation**
-  Sensorise regularly contributes to the policy and standards working group, fostering an open and constructive industry dialogue.
-  Sensorise's work in the area of providing high quality and frugal connectivity in the space of mobile connectivity has been submitted as an Indian **Patent** Application
-  Sensorise has setup a 100% subsidiary for Smart IIoT Solutions, **3S**, for Industrial IoT solutions requiring Devices, M2M Connectivity (GSM and LP-WAN), Cloud based Apps, Remote Management, Analytics with an end to end orchestration of Smart Applications



Method and System to control expenses and usage of subscriptions in a Mobile Device

US Patent No US 10264137 B2 dated 16 Apr 2019



US010264137B2

<p>(12) United States Patent Haggard et al.</p> <hr/> <p>(54) METHOD AND SYSTEM TO CONTROL EXPENSE AND USAGE OF SUBSCRIPTIONS IN A MOBILE DEVICE</p> <p>(71) Applicant: Sensorise Digital Services Pvt. Ltd., New Delhi (IN)</p> <p>(72) Inventors: Jonas Haggard, Bromma (SE); Sharad Arora, Nodia (IN)</p> <p>(73) Assignee: Sensorise Digital Services Pvt. Ltd., New Delhi (IN)</p> <p>(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.</p> <p>(21) Appl. No.: 15/648,671</p> <p>(22) Filed: Jul. 13, 2017</p> <p>(65) Prior Publication Data US 2018/0020100 A1 Jan. 18, 2018</p> <p>(30) Foreign Application Priority Data Jul. 14, 2016 (IN) 201611024141</p> <p>(51) Int. CL H04W 8/18 (2009.01) H04M 15/00 (2006.01) (Continued)</p> <p>(52) U.S. CL CPC H04M 15/39 (2013.01); H04B 1/3816 (2013.01); H04M 15/8016 (2013.01); (Continued)</p> <p>(58) Field of Classification Search CPC . H04W 48/18; H04W 52/0254; H04W 12/06; H04W 38/0268; H04W 38/0280;</p>	<p>(10) Patent No.: US 10,264,137 B2</p> <p>(45) Date of Patent: Apr. 16, 2019</p> <p>(56) References Cited U.S. PATENT DOCUMENTS 2004/0148237 A1 * 7/2004 Bitmann G06Q 30/02 705/35 2012/0196644 A1 * 8/2012 Scherzer H04W 48/18 455/524 (Continued)</p> <p><i>Primary Examiner</i> — Quan M Hua (74) <i>Attorney, Agent, or Firm</i> — Vedder Price. P.C.</p> <p>(57) ABSTRACT A system to control usage of a subscription in a mobile device comprising: a plurality of subscriptions of at least two or more mobile networks; a subscription profile associated with each subscription; a UICC(e)/USIM/SIM card capable of switching among different networks; an applet running on the said SIM card; a server which communicates with the said mobile device through a network interface; a server process which stores identity and network related data of each subscription profile; stores network territory and coverage map; stores history of network drops and subscription profile switch events; stores quota-price-validity-bandwidth attached to each subscription profile; connects to the networks providing the subscription profile periodically, to retrieve, calculate and store actual usage and outstanding quota and validity for SMS, data and minutes for each subscription profile; connects to the SIM applet to receive information from the applet about network loss and network coverage; determines and stores best network, preferred network, and available network periodically; and communicates and commands the SIM card applet to initiate selection of subscription based on available quota, validity and coverage.</p>
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