Presentation to:
ITU COE on IOT Technologies & Applications
Subject:
A perspective on standardization and developments in Intelligent Transport Solutions (ITS)
Presentation By:
Sharad Arora, Founder & MD, Sensorise Digital
Mr PK Seshadri, National Account Manager, BSNL
Date:
29 Oct 2018
Presentation Theme

Theme

• A perspective on standardisation and developments in Intelligent Transport Solutions (ITS)

Agenda

• Standardisation: Challenges for ITS
• Indian ITS: Developments in Standards and Ecosystem
• Heroes of the Indian ITS
• AIS 140 / BIS 16833 Example
• Identity, Authentication and Security for M2M Devices and IoT Applications
About Us | Active role in Standardisation

Author
• Lead Author of the M2M Security Workgroup, Recommendations for M2M Security (Due for Release in Sep 2018)

Editorial Group
• Technical Report on Communication Technologies in M2M / IoT (TEC, May 2015)
• M2M Gateway & Architecture (TEC, May 2015)
• M2M Enablement in Safety & Surveillance System (TEC, Nov 2015, Released by Secretary, Telecoms)
• ICT deployment and strategies for Smart Cities (TEC, Jul 2016)

Contributor
• Key contributor to TRAI Consultation on ‘Spectrum, Roaming and QoS related requirements in Machine-to-Machine (M2M) Communications
• Member of the Telecom Engineering Centre MTCTE Committee on Certification
• Member of the Telematics Working Group of Niti Aayog in India overseeing the AIS 140 Standard and its Implementation
• Invited Speaker / Participant at several Telecom Standards Development Society of India (TSDSI) meetings
• 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
Beyond Standards, Implementing the mandate

- AIS 140
- Secure Connectivity and Machine KYC provider for the Tracking and Traceability of Mining Trucks in the State of Odisha
- Design, manufacturing, deployment and managed Services for the Customer Feedback Device and Portal for the Ministry of Urban Development (Delhi, Kerala, Haryana)
- Secure IMSI locked SIM and Subscription
- Conceptualisation of a Child Helpline IoT Device and Backend Call Centre infrastructure for identification and assistance of destitute children
- Sensorise has set up the IoT Experience Centre for Indian Public Sector Manufacturing giant, ITI Ltd

- Swachh Bharat Mission
- Delhi Transport Department
- Childline India
- IoT Experience Centres
Imagine the cataclysmic disaster if the example of electrical plugs was to follow for ITS
The ITS Standardisation threat is real!
ITS Standardisation from the Telecom Prism

- Global Harmonisation of Standards
- Coordination across ETSI, IEEE, SAE, ISO, IETF
- Involvement of 3GPP, CCC, C2C-CC, 5GAA

Courtesy: Presentation by Adrian Scrase, CTO, ETSI, 3rd Indo European Conference on Standards and Emerging Technology
The Basic Set of ITS Applications are grouped as below:
- Road Safety
- Traffic Efficiency
- Cooperative Local Services
- Global Internet Services

ITS Safety Services will use the band 5875-5905 MHz to realise the V2X and I2X communication.

Telco stakeholders are working on a solution for the use of 5.9 Ghz band for LTE-V2X communication (PC5).
ITS – Applications: Day 1 List

1. Emergency electronic brake light
2. Emergency vehicle approaching
3. Slow or stationary vehicle(s)
4. Traffic jam ahead warning
5. Hazardous location notification
6. Road works warning
7. Weather conditions
8. In-vehicle signage
9. In-vehicle speed limits
10. Probe vehicle data
11. Shockwave damping
12. GLOSA / TTG
13. Signal violation/Intersection safety
14. Traffic signal priority request by designated vehicles
15. Off street parking information
16. On street parking information and management
17. Park & Ride information
18. Information on AFV fuelling & charging stations
19. Traffic information and smart routing
20. Zone access control for urban areas
21. Loading zone management
22. Vulnerable road user protection
23. Cooperative collision risk warning
24. Motorcycle approaching indication
25. Wrong way driving

Courtesy: Presentation by Antonino Pirrotta, AP Crono, 3rd Indo European Conference on Standards and Emerging Technology
C-ITS Vision

- In Vehicle Information
- Intersection Safety
- Other Events

- In EU, Starting 2019
- One New Vehicle = One Connected C-ITS OBU
- 16 Mn new cars / year

Driver’s perspective today

Driver’s perspective tomorrow

Courtesy: Presentation by Antonino Pirrotta, AP Crono, 3rd Indo European Conference on Standards and Emerging Technology
Critical State and Ecosystem Interventions

Management of the Data Deluge
Secure and Reliable Management of Public Data becomes essential
Resilient and Remote manageable Connectivity
Standardisation and Certification of IoT Devices
Skill development and capacity building
Data Sovereignty and Customer Ownership in the context of Internationally Produced Devices used in Indonesia
Enable Local Manufacturing, with access to international markets with reciprocal agreements for connectivity
Global collaboration for IoT / M2M Enablement

OneM2M: The Standard of Standards
oneM2M enablement for IoT

Legacy Solutions are Technology Verticals (Zigbee, DLMS for smart meters, etc.)

Disparate Machines and Applications

Horizontal framework, APIs, Objects as Resource Access Control Policy

OneM2M Common Framework

IoT Ontologies (formal description of concepts and relationships, e.g. W3C Semantic Sensor Network) as well as big data frameworks

IoT Ready Ecosystem
Standards and Policies | Indian Example

- National M2M Roadmap
- Technical Reports by Telecom Engineering Centre
- M2M Service Provider Registration Guidelines (Draft)
- TRAI Guidelines for M2M
- Telecom Act Amendment for Device Certification
- TEC Essential Requirements for Mandate for Certification of all connected devices by 1Oct2018
- DoT M2M / e-SIM Mandate
- AIS 140 Standard for enablement of all Public Transport Vehicles with Devices for Tracking & Alarms
- National Trust Centre Mandate by Telecom Commission

Coming Soon
- Privacy Policy
- Data Management Policy

- Apr 2015
- May-Nov 2015
- Jul 2016
- Sep 2017
- Sep 2017
- Apr 2017
- May 2018
- July 2018
- Aug 2018
Local Standards harmonised to Global Standards

Device Certification

Security | All Devices
AIS 140 | Vehicular

Regulation

National Registration

Policies, Gazettes and Mandates

Sector Regulations and Rules

IT
Energy / Smart Grid
Transport
Health

Department of Telecom
Urban Development Ministry
Road Transport Ministry
Electronics and IT Ministry

Aadhaar | People Identity
National Trust Centre | Devices and Applications

TRAI: Telecom Regulatory Authority of India
TSDSI: Telecom Standards Development Society of India
IT: Information Technology

Indian IoT Ecosystem Concept

Slide No 21
Intelligent Transport Systems

Initiatives in India
ITS – INDIAN Perspective

Our Challenges are Different!
Smart City Solutions | ITS is a key area

- E-Governance and Citizen Services
  1. Public Information, Grievance Redressal
  2. Electronic Service Delivery
  3. Citizen Engagement
  4. Citizens - City’s Eyes and Ears
  5. Video Crime Monitoring

- Energy Management
  6. Smart Meters & Management
  7. Renewable Sources of Energy
  8. Energy Efficient & Green Buildings

- Waste Management
  9. Waste to Energy & Fuel
  10. Waste to Compost
  11. Waste Water to be Treated
  12. Recycling and Reduction of C&D Waste

- Water Management
  13. Smart Meters & Management
  15. Water Quality Monitoring

- Urban Mobility
  16. Smart Parking
  17. Intelligent Traffic Management
  18. Integrated Multi-Modal Transport

- Other
  19. Tele-Medicine & Tele Education
  20. Incubation/Trade Facilitation Centers
  21. Skill Development Centers
The Road Safety Agenda

<table>
<thead>
<tr>
<th>Road traffic deaths</th>
<th>Vulnerable road users</th>
<th>Legislation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.25 million</strong></td>
<td><strong>Almost 50%</strong></td>
<td><strong>17 countries</strong></td>
</tr>
<tr>
<td>people die each year on the world's roads</td>
<td>of the people who die each year on the world's roads - pedestrians, cyclists, and motorcyclists</td>
<td>have amended their laws to bring them into line with best practice on one or more key risk factors for road traffic injuries between over the past 3 years</td>
</tr>
<tr>
<td>Number of Road Traffic Deaths</td>
<td>Distribution of Traffic Deaths by Road User</td>
<td>Existence of child restraint legislation</td>
</tr>
</tbody>
</table>

90% of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have approximately 54% of the world's vehicles. India and China contribute > 0.5 Mn deaths per annum over the global total of ~1.25 Mn
National Digital Communications Policy

- Released on 1 May 2018
- Open for Public Comment

Inviting Public comments on Draft National Digital Communications Policy – 2018

The objective of a national policy on digital communications is to prepare the country and its citizens for the future. Achieving these goals would require that the key stakeholders – namely the Centre, the States, local governments and agencies, Telecom Service Providers, Internet Service Providers, handset and equipment manufacturers, the academic community, the innovators and start-ups come together to forge a coalition to deliver this national policy and its missions.
“5G technology has the potential for ushering a major societal transformation in India by enabling a rapid expansion of the role of information technology across manufacturing, educational, healthcare, agricultural, financial and social sectors. India must embrace this opportunity by deploying 5G networks early, efficiently, and pervasively, as well as emerge as a significant innovator and technology supplier at the global level. Emphasis should be placed on 5G touching the lives of rural and weaker economic segments so as to make it a truly inclusive technology”
5G India Mission

“5G technology has the potential for ushering a major societal transformation in India by enabling a rapid expansion of the role of information technology across manufacturing, educational, healthcare, agricultural, financial and social sectors. India must embrace this opportunity by deploying 5G networks early, efficiently, and pervasively, as well as emerge as a significant innovator and technology supplier at the global level. Emphasis should be placed on 5G touching the lives of rural and weaker economic segments so as to make it a truly inclusive technology.”
ITS Standardisation / Projects activity

• National M2M Roadmap, 2015
• TEC Technical Report on ITS released May 2016
• TEC Technical Report on V2X and Embedded SIM released Nov 2015
• Standard for Tracking of Public Transport Vehicles Notified vide G.S.R. 1095(E) dated 28 Nov 2016; Implementation deadline of 1 Apr 2018 subsequently revised to 1 Apr 2019
• DoT Connected Device Certification related rules released 5 Sep 2017
• TRAI Guidelines on M2M released 6 Sep 2017, address e-SIM and E-Call Pilot
• DoT M2M SIM Instructions released 16 May 2018
• TSDSI is transcribing OneM2M Standards for adoption in India
• Niti Aayog ITS Working Group is preparing policy recommendations for transformational impact

• IS 16490 : 2016-LED Destination Board System for Buses
• AIS 140: Vehicle Location Tracking Device with Emergency Button
• IS 16833 : 2018 -ANNEX B: Electronic Fare meter with Integrated ATD and an integrated emergency system
• IS 16833 : 2018 -ANNEX C/D: CCTV system with an integrated emergency system

Ongoing Projects

• Consultations for readying the norms for back-end Emergency Response Centres for Alarms initiated from AIS-140 Connected Vehicles
• AIS-140 related State-wide Project implementation activities initiated in Kerala
• AIS-140 related Auto-Rickshaw Enablement Project implementation activities initiated in Andhra Pradesh
• Automotive OEMs of Public Transport Vehicles readying for the AIS-140 Implementation in new vehicles
• BSNL Smart Cities
• ITI Smart City Initiatives
• C-DoT initiatives for Standardisation and Common Service Layer
What is AIS-140?

- Mandate to provide a uniform capability Vehicle Location Tracking (VLT) Unit in every Public Transport Vehicle for PUBLIC SAFETY
- Certification of VLTs by ICAT/ARAI
- Position-Velocity-Time data from every vehicle every 10s while moving
- Device Health / Security Monitoring data
- High QoS, Secure, Embedded, Multi-network Connectivity with SMS Fall-back
- Alerts
  - Emergency
  - Tamper
  - Parameter Changes
  - Ignition Off
  - Rash Driving
  - Battery Disconnection / Low battery
- Integration with Back End Command and Control Centres for Emergency Response
Sensorise AIS-140 Solution Rendition

Application Layer

- Diagnostics, Remote Management
- Route Management, Metering, Alarms
- Device / Driver Verify Fraud Management / Analytics
- C&CC, E-Call, APIs (NERS, RTA)

Common Service Layer

- Cloud Platform
  - Device, Driver, Vehicle Registration
  - Vehicle Positioning
  - Server & Storage

Network

Secure, Redundant, Remotely Managed Connectivity

End Points

- QR Code
- Automotive Grade IoT Device
  - Processor
  - SOM
  - RFID
- Automotive Grade E-SIM
  - GPRS Modules
  - SIM2, GPRS Modules
- Mobile App

ITU CoE Proram on IoT, ALTTC, 29th Oct 2018
<table>
<thead>
<tr>
<th>Safety &amp; Security</th>
<th>Availability and QoS</th>
<th>Scalability and Inter-operability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identity &amp; Auth</strong></td>
<td><strong>Redundancy</strong></td>
<td><strong>Continuity</strong></td>
</tr>
<tr>
<td>Know the Connected Device, the Machine, The Custodian and that it is safe</td>
<td>Ensure that the Connected Object is reachable and manageable all the time</td>
<td>Ensure that the Users have a reliable service that is assured for business continuity</td>
</tr>
<tr>
<td>Inability to tell between genuine and rogue</td>
<td>Absence of assurance of QoS</td>
<td>Coverage, Technology &amp; SP Gaps</td>
</tr>
</tbody>
</table>
Participation in ITU

Contributions towards the ITS Ecosystem
Digital ID and eSIM for Vehicles

- Independent and Tamper Identity for each vehicle
- Embedded, Remote Manageable Connectivity
- Carrier class intervention with sustainable, inter-operable solutions
Solutions for Multi-Stakeholder Telematics Play

Embedded SIM solutions for the Automotive OEM Disruption: Free Device to the Car OEM

- Bootstrap subscription
- Lifecycle management
- Collect App agnostic data
- Cloud Storage
- Reports, Analytics, API
- Diagnostics to Automotive OEM

Goodwill or Monetise?

Car user
- Free services (Track)
- Paid Services (Geo Lock)

App Community
- Data Access for App community

Embedded SIM solutions for the Automotive OEM Disruption: Free Device to the Car OEM

Mandatory Safety Tracking
- State / Government

Automotive OEM
- Diagnostics info

Pays

Fleet Owner
- Driver performance info
- Vehicle info

Insurance Agency
- Driver performance info
  (Pay as you go)

Pays
ITU SG 13 New Item Proposal for IoT/M2M Security

Current ETSI GBA Architecture

Proposed NIP for ITU SG13

- Current Standard
  - Based on historically trusted algorithms and protocols for authenticating UE
  - Proven Interoperable
  - Simplifies for application developers as they don't need to worry about key management

- Proposed to ITU via SG 13
  - Make the GBA TSP Agnostic so that the Service works when changing a Service Provider
  - Enable the GBA to act independent of the HLR/HSS
  - Enable the M2M Service Provider community in providing Security and Authentication from the M2M SIM
ITU SG 13 New Item Proposal for IoT/M2M Security

T13-SG13-C-0xxx
Study Group 13

Original: English

Question(s): Q16/13


Source: Telecom Engineering Centre, Department of Telecommunications, Ministry of Communications, Government of India

Title: Proposal on new work item- “Providing Trustful access to IoT Devices and Data with a ETSI GBA type Network Authentication Function and Secure Element Services”

Purpose: New Recommendation under Q16/13: Knowledge-centric trustworthy networking and services

Contact: Sh AS Verma, DDG, TEC, DoT
Anuj Jain
TEC, DOT, Govt of India

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ITU CoPram on IoT, ALTTC, 29th Oct 2018

Slide 37
BSNL/Sensorise Intervention

Solutions for real world problems
BSNL / Sensorise Intervention

- Telco and SIM agnostic Connectivity
  - Solderable IC form factor SIM for machines – extends the proven identity and security to machines
  - Industrial grade and tamper resistant
  - Factory fitment possible
  - Multi-Profile SIM - Automatic Network Switching
  - Remote Manageable

- Secure Common Service Layer for Device, Vehicle and Custodian Identity and Authentication

- Remote Management Capabilities
Secure SSO Solutions for IoT / ITS using the eSIM as a Secure Element

• QoSIm Secure
  • Proposition: Secure Platform-As-A-Service FOR Single Sign On using the eSIM, WITHOUT the need for expensive and hard to manage DIGITAL CERTIFICATES
  • Offered on a Pay-As-You-Go (PAYG) model

• SenseIT Secure
  • Proposition: Locate and Identify devices and people using a BLE beacon from the Sensorise VTS Device
  • Connect Commuter App with the VTS device using BLE for purposes of Safety, Driver identification, Raising Alarms and Route selection
  • Server Side Registration and Authentication of Devices and People
**Step 1 – Login**
User enters credentials as usual. No modification required.

**Step 2 – Enter PIN**
User gets a message to authenticate the login by entering his/her chosen PIN

**Step 3 – Verify**
Server verifies the OTP
1. Prevents Replay
2. Prevents Man in the Middle

Server verifies the Response  ➔ User authenticated!
QoSim Secure for IoT App User Single Sign On

• Less than 5 seconds from login attempt to user is prompted on the phone
• No additional keys to be managed
• No Certificates required
• 2-factor authentication using two separate channels
• PIN protection – Only local validation, PIN never leaves the device
• Multiple Language support
• More secure than OTP over SMS
  • Challenge is encrypted
  • Replay attacks prohibited
• Device Agnostic
  • Works on feature phones and smartphones
QoSim Secure for M2M Devices

• Addressed to M2M Devices which are without a display
• Simultaneously uses four identities
  • The Device Identity such as MAC or IMEI
  • The Card Identity such as IccID
  • The Machine Identity such as Vehicle Registration Number
• Much harder to break as a hacker has to gain control of three disparate systems
  • The Device Firmware
  • The SIM card
  • The Security Server
Summary and Thanks

• Sustainable IoT and Smart City development requires Standardisation and inter-operability

• A committed Quality of Service of the Connected Objects is critical to offering Security and Manageability

• A layered architecture for the management of Smart City Objects is critical to Safety, Security, Privacy
  • A redundant connectivity layer that makes the use case reliable
  • A layer to register and identify devices and their custodians
  • A layer to capture the Data from the Devices
  • Making Applications and Analytics independent of the Registration and Data Layer
Thank You

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