



ONEM2M STAKEHOLDERS DAY

24 FEB 2023

**Standards initiatives in developing
(IoT)/M2M**

BUREAU OF INDIAN STANDARDS

**Priyanshu Sharma, Member Secretary (LITD 27 'Internet of Things
and Related Technologies' technical committee)**

Bureau of Indian Standards (BIS)

“National Standards Body of India”

Driven by THE BUREAU OF INDIAN STANDARDS ACT, 2016





BIS represents India at ISO and IEC
**Participation in the International
standardization work**

BIS participation in ISO, IEC

- ISO/IEC TC/SCs - 'Participating' member: **53**
- ISO/IEC TC/SCs - 'Observer' member: **17**
- BIS, as a participating member nominate experts on the working Groups of the ISO/IEC technical committees to participate in international standardization activities.
- These experts are the members of BIS technical committees
- On an average 70 plenary meetings are being attended by India

BIS – Core activities

- **Standards Formulation**
- Conformity Assessment
 - Product certification
 - Self declaration of conformity
 - Hallmarking
 - System Certification
- Testing
- Training



BIS Standards Development at a Glance



Electronics & IT Division Council

Scope: Standardization in the field of Electronics and Information Technology (IT) including Information & Communication Technologies (ICT)

Sectional Committees:

- 34

Sub Committees:

- 3

Panels/Working Groups:

- 100+

Standards Published:

- 1750+

Experts:

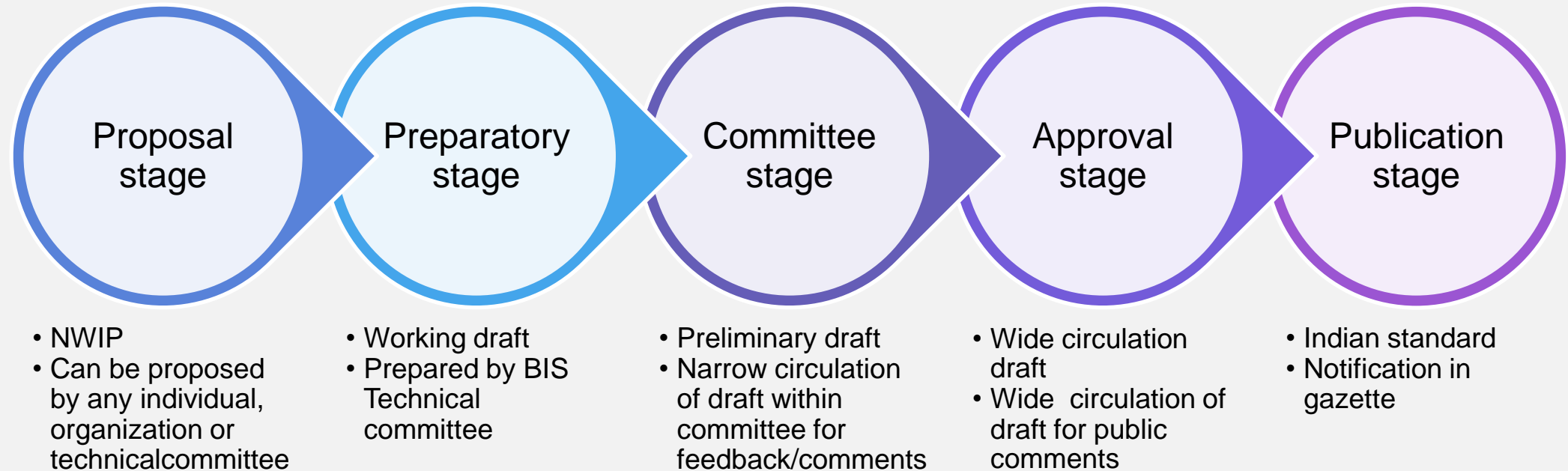
- 1800+

Stakeholders

- Government
- Regulators
- Industry
- Laboratories
- Research & Developments
- Consumers
- Academia



How standards are published?



Standards National Action Plan (SNAP) 2022-27 Areas identified in ICT Sector

- Artificial Intelligence
 - **Internet of Things**
 - Blockchain and DLT
 - Big Data
 - Geographic Information System
 - Metaverse
 - **Smart cities ICT**
 - Data privacy
 - Cyber security
- Mobile security guidelines
 - Data maturity assessment and data governance
 - Trustworthiness
 - Digitally delivered services
 - Natural Language Processing
 - RFID/ Geo-tagging

BIS Technical Committee under LITD related to Internet of Things (IoT)/M2M

Committee	Title	Corresponding ISO/IEC Technical Committee
LITD 27	Internet of Things (IoT) and related technologies	ISO/IEC JTC 1/SC 41 “Internet of Things & Digital Twin”
LITD 28	Smart Infrastructure	IEC SyC Smart Cities (Electrotechnical aspects) ISO/IEC JTC 1/WG 11 Smart Cities (ICT aspects)

- LITD-27 - Indian National Mirror Committee (NMC) of ISO/IEC JTC 1/SC 41, with India being a P-member in ISO/IEC JTC 1/SC 41 represented by BIS.
- Only members of LITD 27 & its associated WGs/Panels can participate in the meetings of SC 41

Structure of LITD 27

- **Scope:** To develop standards in the field of Internet of Things, Digital Twin and related technologies including sensor networks.
- 35+ members in the current composition.
- Currently, there are 6 Working Groups/Panels under LITD 27:
 - 1) LITD 27/ WG 3 IoT Architecture
 - 2) LITD 27/ WG 4 IoT Interoperability
 - 3) LITD 27/ WG 5 IoT Applications
 - 4) LITD 27/ WG 6 Digital Twin
 - 5) LITD 27/ WG 7 Maritime, underwater IoT and Digital Twin applications
 - 6) LITD 27/Panel 1 IoT for Stress Management, Good health & Well-being

Standardization in the field of Internet of Things (IoT)

- Standards developed by BIS

Standards *published* by BIS as Indian standards:

- 1) IS/ISO/IEC/TR 22417 : 2017 “Information Technology — Internet of Things (IOT) — IOT Use Cases”
- 2) IS 18004 (Part 1) : 2021 “IoT System Part 1 Reference Architecture”

Standards currently *under development* by BIS as Indian standards:

- 1) 18 drafts on IS/ISO/IEC 30118 “Information technology — Open Connectivity Foundation (OCF) Specifications” – Completed WC stage

ISO/IEC JTC 1/SC 41 “Internet of Things & Digital Twin”

- **Scope:** Standardization in the area of Internet of Things and Digital Twin, including their related technologies.
- Various Working Groups, Advisory Groups & Ad hoc groups under JTC 1/SC 41.
- Experts from LITD-27 actively participate and contribute in the these WGs.
- Indian delegation regularly attends the Plenary meetings of ISO/IEC JTC 1/SC 41.

Standards development work in ISO/IEC

- Standards published: 41
- Ongoing projects: 27
- Indian experts are actively participating in many of these ongoing projects.
- We nominate experts in ongoing projects of JTC 1/SC 41 based on their interest and expertise.

Projects in JTC 1/SC 41 proposed by India

- **ISO/IEC 30177 Internet of Things- Underwater Network Management system interworking**

Presently at Committee draft (CD) stage in WG 7 of JTC 1/SC 41. It will be adopted as an Indian standard too once it is published as an international standard.

This document specifies the detail description on interworking components in underwater network management system (U-NMS). It provides the intra-working of U-NMS components, interworking between U-NMS's terrestrial domain components and U-NMS's surface domain components, interworking between U-NMS's surface domain components and U-NMS's underwater domain components, and interworking in U-NMS's underwater domain components.

- **IoT for Stress Management, Good health & Well-being**

Proposed by India during 12th plenary meeting of JTC 1/SC 41 held during 28 Nov-02 Dec 2023 in Berlin, Germany, the proposal garnered a lot of appreciation & support from other National bodies and SC 41 approved the project for NP submission from India.

Structure of LITD 28

- **Scope:** Standardization in the field of Smart Cities (Electro-technical and ICT aspects).
- National Mirror Committee to IEC SyC Smart Cities (Electrotechnical aspects) & ISO/IEC JTC 1/WG 11 Smart Cities (ICT aspects).
- Currently, there are 8 Panels under LITD 27:
 - 1) LITD 28/P1 - Last mile Communication Protocols
 - 2) LITD 28/P6 - ICT Reference Architecture
 - 3) LITD 28/P7 - Data Layer Architecture
 - 4) LITD 28/P8 - Urban e-Governance Platform
 - 5) LITD 28/P9 - IoT Systems Reference Architecture
 - 6) LITD 28/P10 - GIS Framework
 - 7) LITD 28/P12 - Data exchange
 - 8) LITD 28/P13 - Urban Domain standards

Standardization in the field of Smart Cities

- Standards published by LITD 28 committee of BIS:
 - 1) IS 18000:2020 Unified Digital Infrastructure - ICT Reference Architecture UDI-ICTRA
 - 2) IS 18002-1:2021 Unified Digital Infrastructure Data Layer Part 1 Reference Architecture
 - 3) IS 18003 (Part 1) Unified Data Exchange Part 1: Architecture
 - 4) IS 18003-2:2021 Unified Data Exchange Part 2 API specifications
 - 5) IS 18004-1:2021 IoT System Part 1 Reference Architecture
 - 6) IS 18006-1:2021 Municipal Governance - Part 1 Reference Architecture
 - 7) IS 18006-3-1:2021 Municipal Governance Part 3 Property Tax Section 1 Taxonomy
 - 8) IS 18008-1:2021 Smart Cities- GIS Part 1 Reference Architecture
 - 9) IS 18010 (Part 1):2020 Unified Digital Infrastructure - Unified Last Mile Communication Protocols Stack - Part 1 Reference Architecture (UDI – ULMCPS - RA)
 - 10) IS 18010 (Part 5/Sec 1):2020 Unified Digital Infrastructure - Unified Last Mile Communication Protocols Stack - Part 5 Network Access Layer (IEEE 802.15.4) - Section 1 Specification

Standardization in the field of Smart Cities

- Standards published by LITD 28 committee of BIS:
 - 11) IS 18010 (Part 4/Sec 1):2022 Unified Digital Infrastructure Unified Last Mile Communication Protocols Stack – Part 4 Network Access Interface Layer - Section 1 Specification
 - 12) IS 802.15.4:2021 Low-Rate Wireless Networks
 - 13) IS 802.15.9 : 2020/ IEEE Std 802.15.9-2016 Recommended Practice for Transport of Key Management Protocol (KMP) Datagrams
 - 14) IS/ISO/IEC/IEEE 8802-11 : 2018 Local and metropolitan area networks Specific requirements Part 11: Wireless LAN Medium Access Control MAC and Physical Layer PHY Specifications
 - 15) IS/ISO/IEC/IEEE 8802-1X : 2013 Local and Metropolitan Area Networks Part 1X: Port-based Network Access Control

IS 18004 (Part 1) IoT System Reference Architecture

- This Indian Standard describes the IoT Reference Architecture, that comprises IoT Concept Model, IoT Reference Models (Domain based and Entity based models), and IoT Deployment Views.
- IoT Concept Model and Reference models elaborate the interactions between various entities, both digital and non-digital.
- Assistance Drawn from:
 - ISO/IEC 30141 : 2018 IoT Reference Architecture
 - ITU-T Y.3056 Framework for bootstrapping of devices and applications for open access to trusted services in distributed ecosystems
 - TEC 30001 : 2020 oneM2M Functional Architecture

Ongoing standardization work in “Working Group 3 IoT Foundational Standards”



- ISO/IEC 20924 ED3 “Internet of Things (IoT) and Digital Twin – Vocabulary”
- ISO/IEC 30141 ED2 “Internet of Things (IoT) - Reference architecture”
- ISO/IEC 30149 ED1 “Internet of Things (IoT) - Trustworthiness Principles”
- ISO/IEC TS 30168 ED1 “Internet of Things (IoT) - Generic Trust Anchor Application Programming Interface for Industrial IoT Devices”

Ongoing standardization work in “Working Group 4 IoT Interoperability”



- PNW JTC1-SC41-320 “Internet of Things (IoT) - Device Discovery Method For Interoperability”
- PNW JTC1-SC41-321 “Internet of Things (IoT) - Collaborative Framework and Interface between Mobile Communication Network and Time-Sensitive Networking”
- PNW JTC1-SC41-322 “Internet of Things (IoT) - Technical requirements for IoT device access and management”
- ISO/IEC 30161-2 “Internet of Things (IoT) – Data exchange platform for IoT services – Part 2: Transport interoperability between nodal points” – **Indian expert is contributing**
- ISO/IEC 30178 “Internet of Things (IoT) - Data format, value and coding” – **Indian expert is contributing**
- ISO/IEC 30181 ED1 Internet of Things (IoT) – Functional architecture for resource ID interoperability – **Indian expert is contributing**

Ongoing standardization work in “Working Group 5 IoT Applications”



- ISO/IEC 30180 “Internet of Things (IoT) - Functional requirements to determine the status of self-quarantine through Internet of Things data interfaces” – **Indian experts are contributing**
- ISO/IEC 30184 “Internet of Things (IoT) – Autonomous IoT object identification in connected home – Requirements and framework” – **Indian expert is contributing**
- ISO/IEC 30187 “Internet of Things (IoT) - Evaluation indicator for IoT systems” – **Indian expert is contributing**

Ongoing standardization work in “Working Group 6 Digital Twin”



- PNW JTC1-SC41-333 “Digital Twin - Reference architecture”
- ISO/IEC TR 30172 “Digital Twin - Use cases”
- ISO/IEC 30173 “Digital Twin - Concepts and terminology”
- ISO/IEC 30186 “Digital twin – Maturity model and guidance for a maturity assessment”



Ongoing standardization work in “Working Group 7 Maritime, underwater IoT and Digital Twin applications”

- ISO/IEC 30177 “Internet of Things (IoT) - Underwater network management system (U-NMS) interworking” – **Indian led project**
- ISO/IEC 30183 “Internet of Things (IoT) – Addressing interoperability between heterogeneous underwater acoustic sensor networks (UWASNs) based on underwater delay and disruption tolerant network (U-DTN)” – **Indian expert is co-editor in this project**
- ISO/IEC 30185 “Internet of Things (IoT) – Addressing interoperability between IPv6-based network and UWASN” – **Indian expert is contributing**

Preliminary Work Items in ISO/IEC JTC 1/SC 41

- PWI JTC1-SC41-6 “Guidance for IoT and Digital Twin use cases”
- PWI JTC1-SC41-8 “Internet of Things (IoT) - Behavioral and policy interoperability”
- PWI TR JTC1-SC41-9 “Internet of Things (IoT) – IoT-based cultural heritage management – Part 1: Framework”
- PWI TR JTC1-SC41-10 “Internet of Things (IoT) – IoT-based cultural heritage management – Part 2: Use cases”
- PWI TR JTC1-SC41-11 “Digital Twin - Correspondence measure of DTw twinning”
- PWI TR JTC1-SC41-12 “Internet of Things (IoT) – Environmental and ecological effects, risks, and considerations of underwater acoustic signaling”
- PWI TR JTC1-SC41-13 “Internet of Things (IoT) – IoT Applications for Long-distance Oil and Gas Pipeline”

International standards related to IoT/M2M published by ISO/IEC JTC 1/SC 41



- 1) ISO/IEC 19637:2016 Sensor network testing framework
- 2) ISO/IEC 20005:2013 Sensor networks - Services and interfaces supporting collaborative information processing in intelligent sensor networks
- 3) ISO/IEC 20924:2021 IoT Vocabulary
- 4) ISO/IEC 21823 series: Interoperability for IoT systems (4 parts - Framework, Transport, Semantic and Syntactic interoperability)
- 5) ISO/IEC TR 22417:2017 IoT use cases
- 6) ISO/IEC TR 22560:2017 Sensor network - Guidelines for design in the aeronautics industry: Active air-flow control
- 7) ISO/IEC 29182 series (7 parts) Sensor networks: SNRA
- 8) ISO/IEC 30101:2014 Sensor network and its interfaces for smart grid system
- 9) ISO/IEC 30128:2014 Generic Sensor Network Application Interface



International standards related to IoT/M2M published by ISO/IEC JTC 1/SC 41

- 10) ISO/IEC 30140 UWASN (4 parts - Overview and requirements, RA, Entities and interfaces & Interoperability)
- 11) ISO/IEC 30141:2018 IoT Reference architecture
- 12) ISO/IEC 30142 series: UWASN - Network management system
- 13) ISO/IEC 30143:2020 Internet of Things (IoT) - UWASN - Application profiles
- 14) ISO/IEC 30144:2020 IoT - Wireless sensor network system supporting electrical power substation
- 15) ISO/IEC 30147:2021 Integration of IoT trustworthiness activities in ISO/IEC/IEEE 15288 system engineering processes
- 16) ISO/IEC TR 30148:2019 IoT - Application of sensor network for wireless gas meters
- 17) ISO/IEC 30161-1:2020 Data exchange platform for IoT services - Part 1: General requirements and architecture
- 18) ISO/IEC 30162:2022 Compatibility requirements and model for devices within Industrial IoT systems

International standards related to IoT/M2M published by ISO/IEC JTC 1/SC 41

- 19) ISO/IEC 30163:2021 System requirements of IoT and sensor network technology-based integrated platform for chattel asset monitoring
- 20) ISO/IEC TR 30164:2020 Edge computing
- 21) ISO/IEC 30165:2021 Real-time IoT framework
- 22) ISO/IEC TR 30166:2020 Industrial IoT
- 23) ISO/IEC TR 30167:2021 Underwater communication technologies for IoT
- 24) ISO/IEC 30169:2022 IoT applications for electronic label system (ELS)
- 25) ISO/IEC 30171-1:2022 Base-station based underwater wireless acoustic network (B-UWAN) - Part 1: Overview and requirements
- 26) ISO/IEC TR 30174:2021 Socialized IoT system resembling human social interaction dynamics
- 27) ISO/IEC TR 30176:2021 Integration of IoT and DLT/blockchain: Use cases
- 28) ISO/IEC 30179:2023 Overview and general requirements of IoT system for ecological environment monitoring

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Thank you