Standardization of Internet of Things (IoT) & Smart City

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BIS - National Standards Body, India

Promote Harmonious development of the activities of Standardization, Marking and Quality Certification of goods and attending to connected matters in the Country.
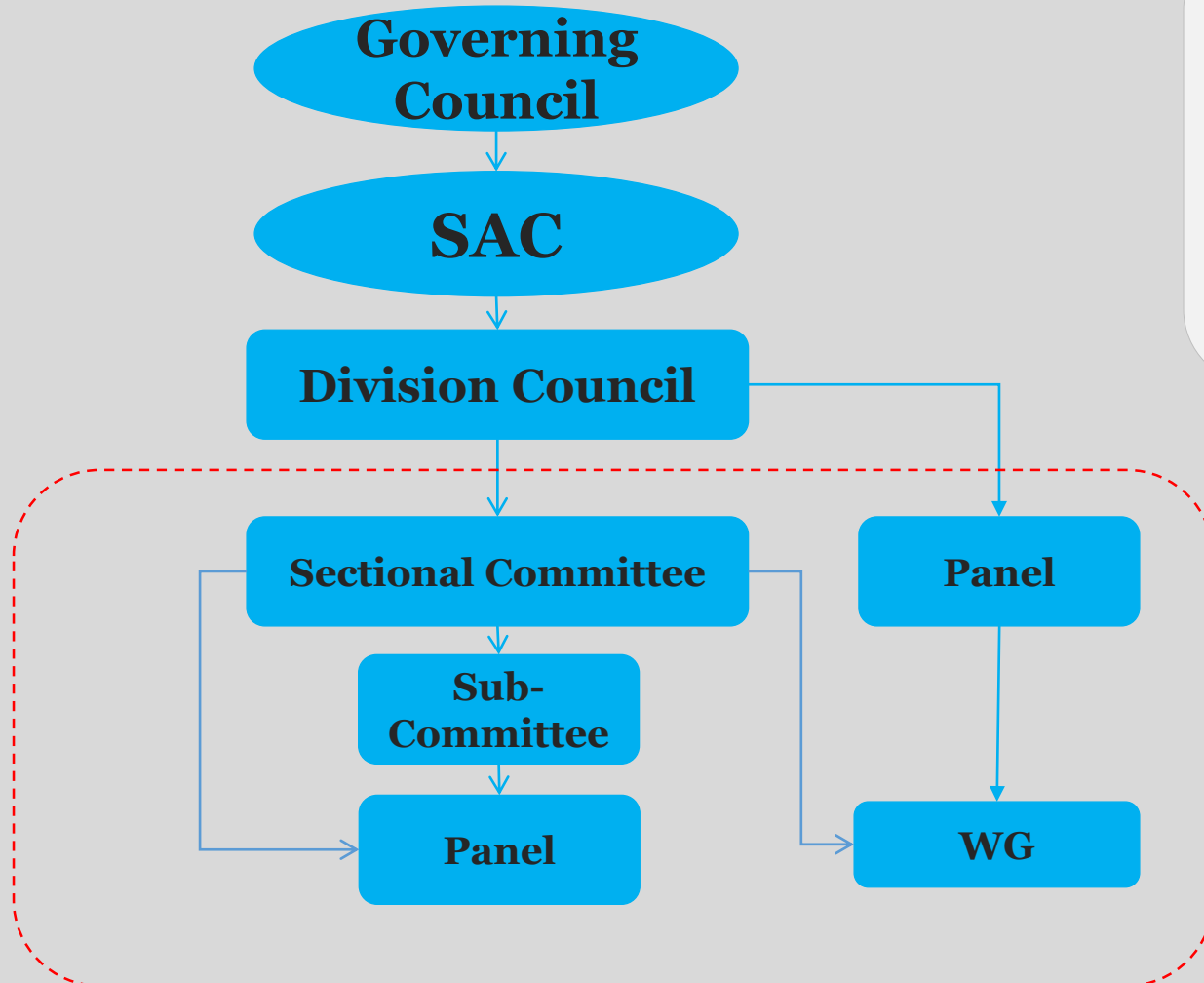
मानक: पथप्रदर्शक:

BIS – Core activities

- Standards Formulation

- Conformity Assessment

  - Product certification

  - Self declaration of conformity

  - Hallmarking

  - System Certification

- Testing

- Training

Standards Formulation

National Standards development process follows the principles of good standardization and is in compliance with the WTO-TBT Code of Good Practice.
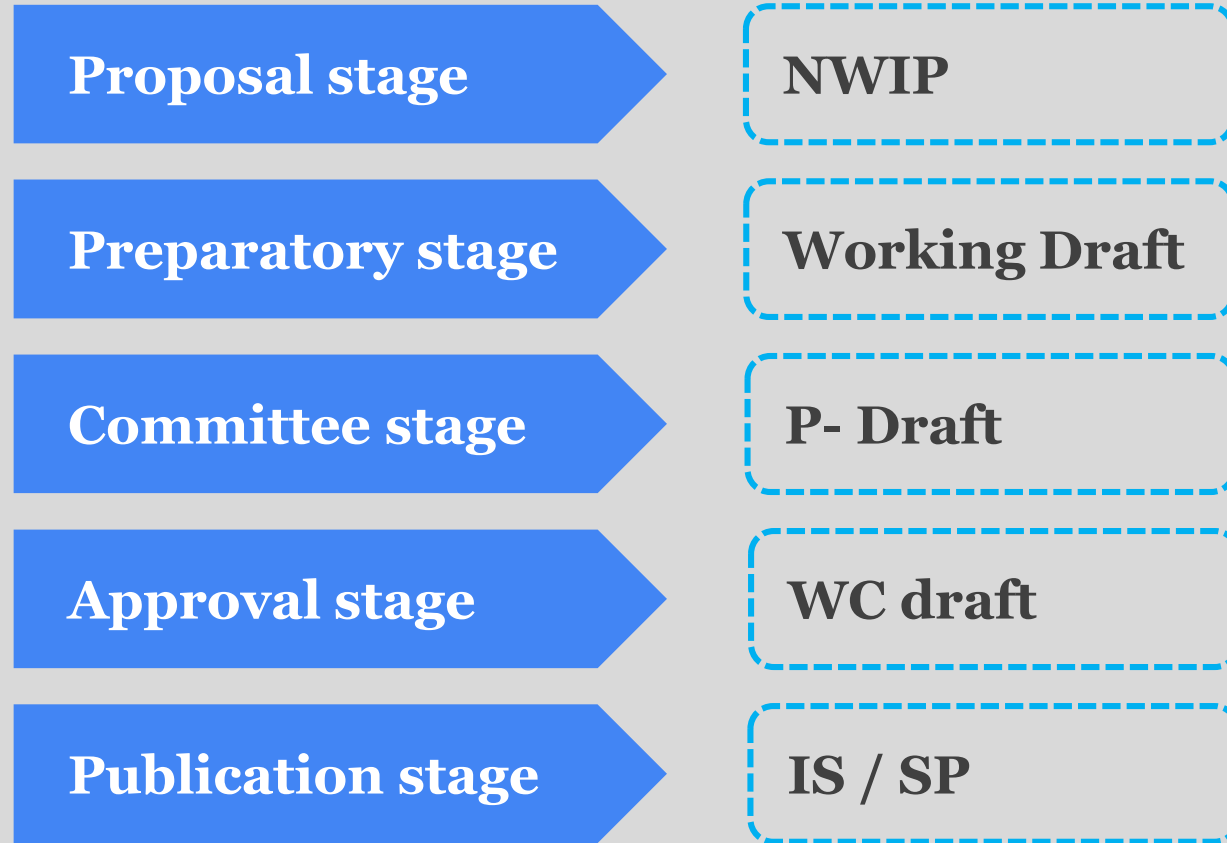
Governing Council

SAC

Division Council

Sectional Committee

Panel

Sub-Committee

WG

Panel

मानकः पथप्रदर्शकः

National Standards are formulated based on the principle of Consensus by the Division Councils and the Sectional Committees under it

Stakeholders

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

Standard development process

Proposal stage	**NWIP**
Preparatory stage	**Working Draft**
Committee stage	**P- Draft**
Approval stage	**WC draft**
Publication stage	**IS / SP**

मानक: पथप्रदर्शक:

BIS Portfolio

14

Division Councils

337

Sectional Committees

19,849

Standards

International Standardization

Standards Developing Organizations

| ISO | IEC | JTC 1 |

Membership

94%

83%

100%

654

166

22
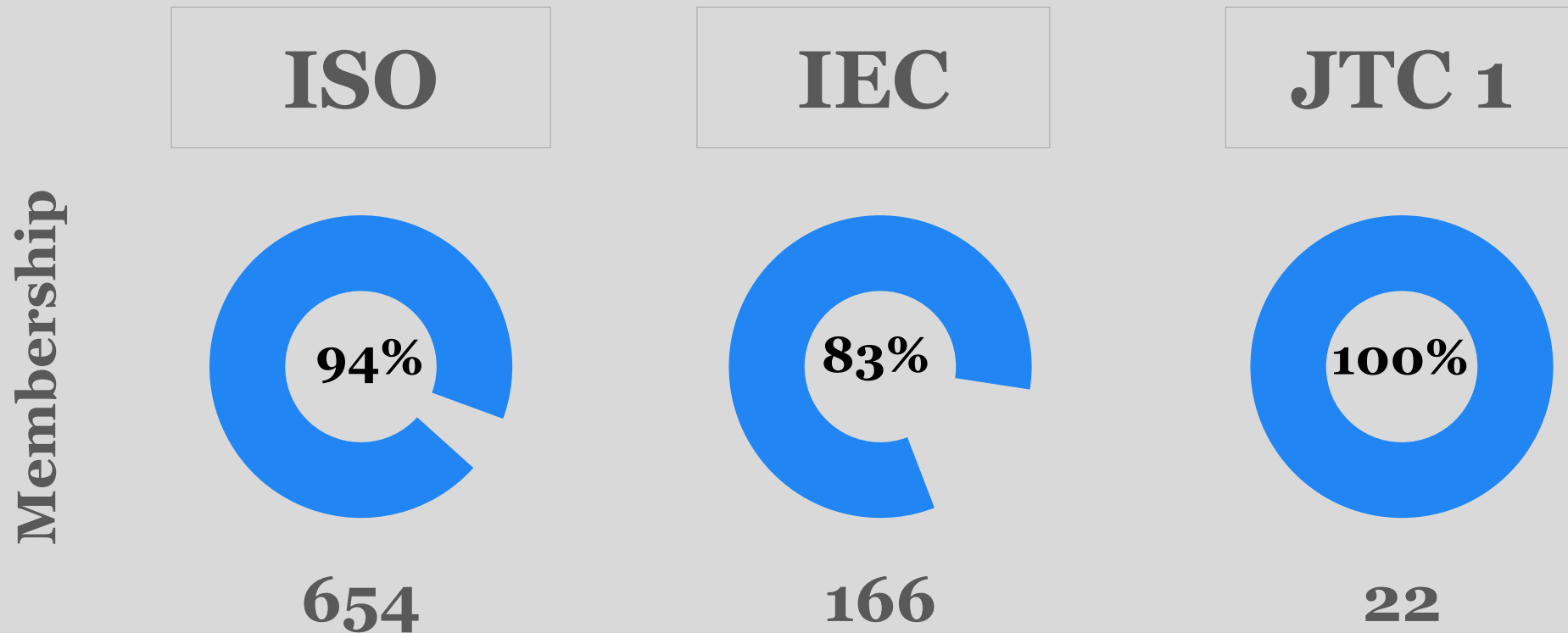
Electronics and Information Technology

Standards

1626

28 Sectional Committees

67% **Harmonized with ISO/IEC**

33% **Indigenous**

मानक: पथप्रदर्शक:

Participation in International Standardization

- Creates National Mirror Committees

- Review draft International Standards

- Nominate Experts on working groups of ISO/IEC Committees

- Propose new projects

- Take leaderships

- Provide Secretariat

- Host Meetings

Secretariat in ISO and IEC

Committee	Title
ISO/IEC JTC 1/SC 7	Software and systems engineering
ISO/TC 113	Hydrometry
ISO/TC 113/SC 1	Velocity area methods
ISO/TC 113/SC 6	Sediment transport
ISO/TC 120	Leather
ISO/TC 120/SC 1	Raw hides and skins, including pickled pelts
ISO/TC 120/SC 2	Tanned leather
ISO/TC 120/SC 3	Leather products
ISO/TC 146/SC 1	Stationary source emissions
ISO/TC 34/SC 7	Spices, culinary herbs and condiments
IEC SyC LVDC	Low Voltage DC

BIS – Emerging Digital technologies

- Internet of Things

- Big Data

- Artificial Intelligence

- Blockchain

- Smart Cities

- Smart Manufacturing

- 3D Printing

- Wearable Devices

- 5G

Content

- What do we mean by IoT?
- IoT Applications
- **IoT Standardization**

ISO/IEC Definition

..an infrastructure of interconnected entities, people, systems and information resources together with intelligent services to allow them to process information of the physical and the virtual world and react [ISO/IEC 20924 : 2018]
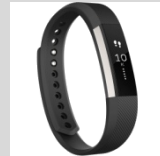
What is IoT

- Is a network of physical objects (Devices) that are embedded with electronics, sensors, software and network

- allows objects to be sensed and controlled remotely across existing network infrastructure
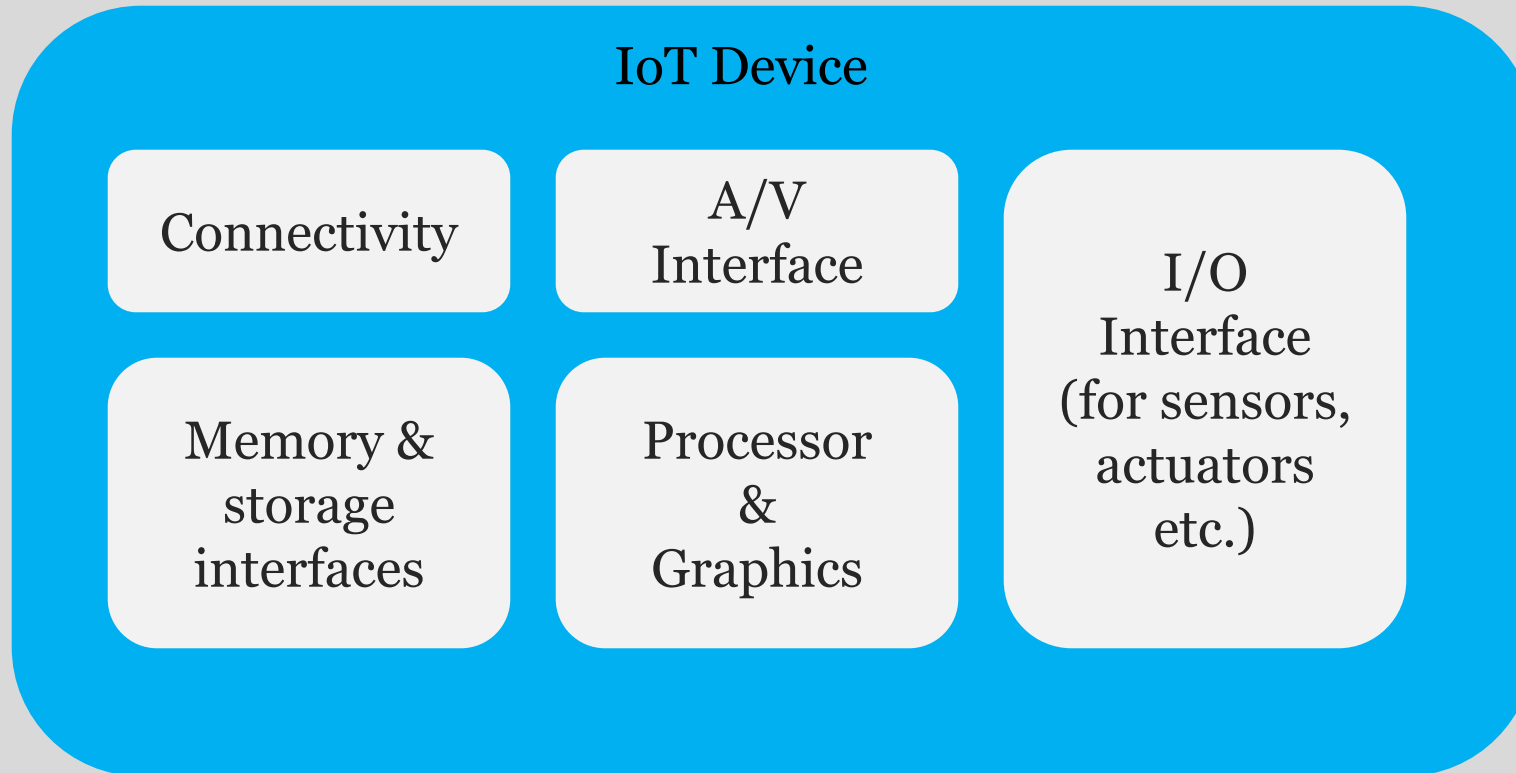
Things
in
IoT

मानक: पथप्रदर्शक:

Things in IoT

- Surveillance cameras
- Industrial machines
- Printers
- Retail payment systems
- Energy systems
- Wearable electronics
- Home appliances
- Smart phones / computers

IoT Device

IoT Device

Connectivity	A/V Interface	
Memory & storage interfaces	Processor & Graphics	I/O Interface (for sensors, actuators etc.)

मानक: पथप्रदर्शक:

Things in IoT

Things

- Physical devices

- Appliances

- Vehicles

- Machines

- …

Characteristics

- Unique identity

- Connected to internet

- Communication and exchange of data

- embedded with electronics, software, sensors, actuators,

IoT Standardization at International
&
National level

- International Level – ISO/IEC JTC 1/SC 41 is the international Subcommittee under ISO/IEC Joint Technical Committee on Information Technology

- National Level – Electronics & IT Division Council has 28 Sectional Committees ; LITD 27 Sectional Committee

मानक: पथप्रदर्शक:

What is ISO/IEC JTC 1 SC 41

Title – Internet of things and related technologies

Structure –

1 Advisory Group ISO/IEC JTC 1 SC 41/AG 6

3 Working Groups

7 Ad Hoc Groups / Study groups

Scope of ISO/IEC JTC 1/SC 41

Standardization in the area of Internet of Things and related technologies

- Serve as the focus and proponent for JTC 1's standardization programme on the Internet of Things and related technologies, including Sensor Networks and Wearables technologies

- Provide guidance to JTC 1, IEC, ISO and other entities developing Internet of Things related applications.

Working groups

Study groups

WG 3 IoT Architecture

WG 4 IoT Interoperability

WG 5 IoT Applications

AHG 7 Wearables

AHG 14 Business Plan

AHG 15 Communication & Outreach

AHG 16 RA & Vocab harmoniation

AHG 17 Societal & human factors in IoT based services

AHG 18 Integration of IoT and blockchain

AHG 19 Realizing Context Specific Soln / System Architecture based on IoT RA

मानक: पथप्रदर्शक:

Continued……

ISO/IEC JTC 1 SC 41/WG 3 IoT Architecture

Standardization in the area of IoT vocabulary, architecture and frameworks

ISO/IEC JTC 1 SC 41/WG 4 IoT Interoperability

Standardization in the area of IoT interoperability, connectivity, conformance and testing

ISO/IEC JTC 1 SC 41/WG 5 IoT Applications

Standardization in the area of IoT applications, uses cases, IoT platforms, middleware, tools and implementation guidance

Projects & Publications

Project	Title
ISO/IEC 20924	IoT - Definitions and vocabulary
ISO/IEC 30141	IoT Reference Architecture
ISO/IEC 29182	IoT Sensor Network Reference Architecture (SNRA)
ISO/IEC 21823-1	IoT - Interoperability for Internet of Things Systems - Part 1: Framework
ISO/IEC 21823-2	IoT - Interoperability for Internet of Things Systems - Part 2: Network connectivity
ISO/IEC 21823-3	IoT - Interoperability for Internet of Things Systems - Part 3: Semantic interoperability
ISO/IEC TR 22417	IoT use cases
ISO/IEC 30140	Underwater acoustic sensor network (UWASN)

NMC – LITD 27 Sectional Committee

Title: Internet of Things and related technologies

Scope: Standardization in the field of Internet of Things and related technologies including sensor networks, wearables devices and technologies

Liaison: JTC 1/SC 41 and IEC TC 124

Stakeholders : Industry, Academia, Govt. Bodies, Testing labs, Individuals, Policy makers and Regulators

मानक: पथप्रदर्शक:

Composition

- All India Radio
- Amity University
- ASM Enterprise Solution
- Capgemini
- CDAC
- C-DoT
- CGI
- CSI
- Cognizant Tech Solutions
- Delhi University
- Fan Fire Solutions LLP

- IBM India Ltd
- IETE
- IIT, Hyderabad
- IIIT, Bangalore
- Jadavpur University
- KPMG
- MeitY
- MITS
- Narnix Technolabs Pvt Ltd
- Nasscom

- National Institute of Electronics & IT
- Sakshi Automation
- Samsung India
- Schneider Elcetric
- STQC
- TEC
- TUV Rheinland
- VIT
- Wearable Technologies A G

Smart home

- Smart lighting

- Smart appliances

- Intrusion detection

- Smoke gas detectors

Environment

Weather monitoring

Air pollution monitoring

Noise pollution monitoring

Forest fire detection

Transportation

- Route generation and scheduling

- Fleet tracking – detect deviations from planned routes

- Shipment monitoring

- Remote vehicle diagnostics

Health care

Remote patient monitoring

Telehealth

Assisted living

Hospital asset management

Improved drug management

Hand hygiene compliance

Chronic disease management

Behavior modification

मानक: पथप्रदर्शक:

Agriculture

Our participation at ISO/IEC

- 1st meeting of JTC 1/SC 41 was attended by BIS & Industry during May 2017 at Seoul, Korea

- **2nd Plenary & WGs meeting of JTC 1/SC 41 was hosted in New Delhi, India and around 30 Indian delegates participated in the meeting**

- 3rd meeting of JTC 1/SC 41 was attended by BIS and industry during May 2018 at Berlin, Germany

- **4th Plenary Yokohama, Japan 26-30 Nov 2018**

- TC 124 Plenary on Wearables at Busan, S Korea during 22-24 Oct 2018

मानक: पथप्रदर्शक:

2ⁿᵈ Plenary, New Delhi, November 13 - 17, 2017

- 101 participants:
  - 11 P members, Austria, Canada, China, Germany, India, Japan, Korea, Russia, Sweden, UK, USA.
  - 2 O members, Luxembourg, Norway.
  - 3 External Liaisons, IIC, OGC, AIM.

Smart City Standardization journey - BIS

Apr 2015
Smart infrastructure
Panel (LITDC/P 2)

Nov 2017
Pre-standardization
sturdy report
published

Jan 2018
1st Meeting LITD 28

Nov 2015
1st meeting
LITDC/P 2

Dec 2017
Smart infrastructure
sectional committee,
LITD 28

मानक: पथप्रदर्शक:

NMC - LITD 28 Sectional Committee

Scope

- Standardization in the field of Smart Cities (Electro-technical and ICT aspects) and related domains including Smart manufacturing, Active assisted living.

Liaison

- IEC SyC Smart cities (Electrotechnical aspects)

- JTC 1/WG 11 Smart cities (ICT aspects)

- IEC SyC Smart Manufacturing

- IEC SyC Active Assisted Living

- IEC SEG 8 - Communication Technologies & Architecture

- IEC SEG 9 - Smart Home/Office Building Systems

मानक: पथप्रदर्शक:

Composition

- Accenture
- Arcus Media Pvt Ltd
- B&R Industrial Automation
- Bharti Airtel LTD.
- Bharti - Infratel
- Bosch Rexroth
- CDAC
- C-DoT
- Centre for Health Informatics
- CII
- Unlimit

- Criterion Networks Labs
- Cyan Technology India Pvt Ltd
- Data Science Foundation
- MeiTY
- DIMTS Ltd
- E U Standards
- Ericsson India Pvt Limited
- Ernet India
- ESRI
- FICCI
- MoUHA

Composition continued……

- G3ict
- IBM India Ltd,Gurgaon
- IEEE India
- IEEMA
- In Personal Capacity
- India Electronics & Semiconductor
- India Smart Grid Forum
- Intel India Technology Pvt. Ltd.
- Itron
- KPMG

- Landis+Gyr
- Larson and Turbo
- Microsoft Corporation (India) Pvt
- Microsoft Corporation (India) Pvt. Ltd
- Narnix Technolabs Pvt Ltd
- National Institute of Urban Affairs
- National Smart Grid Mission
- NXP Semiconductors India Pvt. Ltd.
- Personal Capacity
- PricewaterhouseCoopers Pvt Ltd

Composition continued……

- Procubed Technology Solutions Pvt Ltd
- Qualcomm India Pvt. Ltd.
- Reliance Energy
- Reliance Infrastructure
- Reliance jio
- Samsung India Electronics Pvt. Ltd
- SB Energy
- Secure Meters Limited
- Siemens Ltd
- ST Microelectronic

- Tata Consultancy Sevices
- Tata Power Delhi Distribution LTD.
- Telecommunication Engineering Centre
- TEXAS Instruments(India) Pvt
- TSDSI
- TUV Rheinland (India) Pvt Ltd
- Twinstar Display technologies
- UL India Pvt Ltd
- Xylem Water Solutions India Pvt. Ltd.
- The open group
- LDRA

LITD 28 Structure

WG 1 Smart cities

WG 2 Active Assisted Living

WG 3 Smart Manufacturing

P 1 LMCP

P 2 Common Service Layer

P 3 ICT Architecture

P 4 Data Semantics

SG 1 Use Cases

SG 2 Implementations Challenges

SG 3 Standardization Inventory & Mapping

SG 3 RF Spectrum allocation

SG 3 **5G Imperatives**

Guiding Principles

- Interoperability

- Integrity

- Safety

- Security and privacy

- Resilience

- Simplicity

- Low cost of operation

- Short time to market

- Performance

Smart cities

- Smart parking – by detecting empty parking slots
- Smart lighting – lighting according to ambient conditions
- Waste collection – routing according to the availability of waste
- Surveillance – through internet connected video surveillance cameras
- Smart roads – provide traffic information and driving conditions

Areas identified for standardization

- Unified & secure Last Mile Communication Protocols for Smart Infrastructure

- Common Service Layer for Smart Infrastructure

- ICT Reference Architecture for Unified & Secure Smart Infrastructure

- Data Semantics Framework for Smart Infrastructure

- Common Gateways for Smart Infrastructure

मानक: पथप्रदर्शक:

Areas identified for Standardization

- Use Cases for ICT & Electrotechnology in Smart Cities

- Implementation Challenges in ICT & Electrotechnology related deployments in Smart Cities

- Standards Inventory and Mapping

- RF Spectrum allocation & de-licensing implications

- 5G imperatives for Smart Infrastructure

- Unified & Secure Common Citizens' Payment Systems Framework"

मानक: पथप्रदर्शक:

IEC SyC Smart Cities

Scope:

To foster the development of standards in the field of electro-technology to help with the integration, interoperability and effectiveness of city systems.

- by promoting the collaboration and systems thinking between IEC/TCs, the SyC and other SDOs in relation to city system standards;

- by undertaking systems analysis to understand the needs for standards and assess new work item proposals (NWIPs) related to city systems;

- by developing systems standards where needed and

- by providing recommendations to existing SyCs, TCs/SCs and other SDOs.

मानक: पथप्रदर्शक:

IEC SyC Smart Cities - Structure
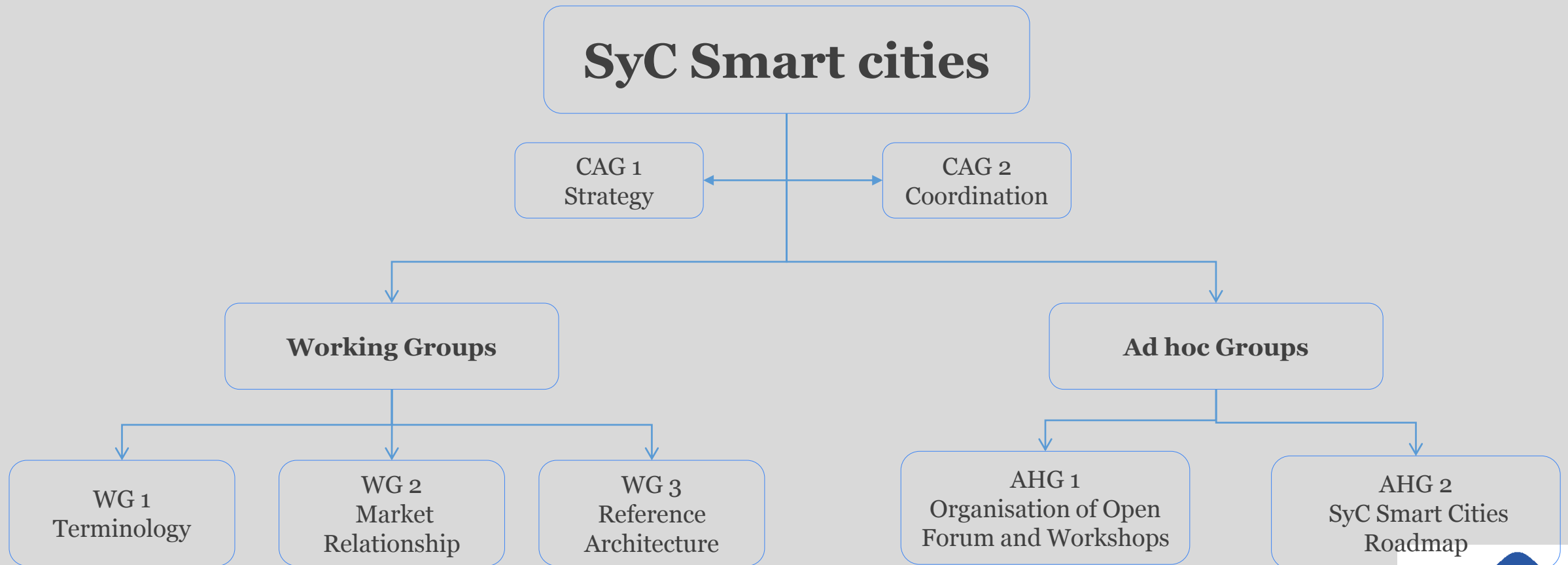
Projects

IEC 63152 ED1	Smart Cities - City Service Continuity against disasters - the role of the electrical supply
IEC TS 63188 ED1	Smart Cities Reference Architecture Methodology (SCRAM) - SRD
IEC 63205 ED1	Smart Cities Reference Architecture (SCRA)
NP	Smart City System - Methodology for concepts and taxonomies building (SRD)
NP	Smart City Standards Inventory and Mapping

मानक: पथप्रदर्शक:

Meetings

Meeting	Date	Place
1st Plenary	15 Jul 2016	Singapore
2nd Plenary	17 Feb 2017	Tokyo, Japan
Working groups	28 Jun – 1 Jul 2018	Shanghai
3rd Plenary	29 Jan – 2 Feb 2018	Dortmund, Germany
Working groups	8 – 13 Jul 2018	Washington, USA
4th Plenary	10 – 14 Dec 2018	Varanasi, India

मानक: पथप्रदर्शक:

Varanasi meeting – Schedule

Day	Forenoon		Afternoon	Evening
Sunday 9 Dec 2018	CAG Meeting	Lunch	CAG Meeting	
Monday 10 Dec 2018	International conference on Smart city standardization		International conference on Smart city standardization	
Tuesday 11 Dec 2018	CAG Meeting		CAG Meeting	
Wednesday 12 Dec 2018	WG Meeting		WG Meeting	Welcome Dinner
Thursday 13 Dec 2018	WG Meeting		WG Meeting	
Friday 14 Dec 2018	IEC SyC Smart Cities Plenary		IEC SyC Smart Cities Plenary	

Purpose of the Conference

- Priority area of the Govt of India

- Bringing all stakeholders together to discuss the pain points and way forward

- Improving participation in Smart City Standardization

- Creating awareness

Smart City Conference - Highlights

- Chief Guest - Hon'ble Prime Minister, India

- Participants – Around 200

- Focusing on Smart City Standardization

Speakers

Inaugural session

Smart cities & Standards interplay

Stakeholder concerns in Smart city implementations

Smart city Standardization initiatives

Concluding session

मानक: पथप्रदर्शक:

Curtain Raisers

30 Oct 2018	ICT Perspective	Bangalore
15 Nov 2018	Smart Solutions − Energy Management	Bhopal
22 Nov 2018	Intelligent Transport Systems	Pune
3 Dec 2018	Physical Infrastructure	Agarthala

Challenges......for Standardization.....

- Security

- Privacy

- Interoperability

- Lack of participation

- Feedback on Documents open for vote at ISO/IEC

Participation and Contribution needed....

- Industry

- Academia

- Testing & Laboratories

- Individual experts

- Consumer Organization

- Policy makers

- Regulatory bodies

Thank you !!!