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Report on Smart City Mission-India

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1. Introduction

What is a Smart City?

There is no universally accepted definition of a Smart City, the conceptualization varies from city-to-city and country-to-country, depending on the level of development, willingness to change and reform, resources and aspirations of the residents.

Some definitional boundaries are required to guide cities in the Mission. In the imagination of any city dweller in India, the picture of a smart city contains a wish list of infrastructure and services that describes his or her level of aspiration. To provide for the aspirations and needs of the citizens, urban planners ideally aim at developing the entire urban eco-system, which is represented by the four pillars of comprehensive development-institutional, physical, social and economic infrastructure.

Need for Smart Cities in India

India is a country with a total population of 1.35 billion as on 20th May, 2018 based on the latest United Nations estimates. Of this 70% of total population lives in villages and 30% lives in cities. Mumbai, Chennai, Delhi, Kolkata, Hyderabad, Bangalore, Pune, and Ahmedabad are among the designated metro cities in India.

As apparent, India is less than 30 per cent urban and the quality of life in its cities is chronically low. However, with 2/3rds of GDP already generated in India's cities and with rural to urban migration patterns accelerating, the country faces a critical challenge: managing this rapid urbanization in a way that enhances the livability of India's urban spaces. A large number of population living in the cities, the country is in dire need to enhance the quality of living of its citizens in both urban and rural spaces.

India struggles with a number of significant barriers that continue to hamper the development of urban infrastructure: complex leadership structures, land valuation challenges, capability gaps, and funding shortfalls are all part of the urban challenge that is effectively holding India back from a new round of dramatic economic growth. India also needs to address the current problems of developing good infrastructure, solid waste disposal, flood management, storm water and sewerage system etc. resulting in urban decay, traffic gridlock and thereby a deteriorating quality of life for many of its citizens. The wave of urbanization that is sweeping across India represents one of the country's greatest opportunities as well as one of its most serious challenges.

Most cities in Europe and America were established in the 19th century when there was easy availability of land, gas and water. India is a late starter and is far more crowded and complex. Therefore, India requires a far more efficient and sustainable solution for servicing urban areas and can reap the benefits by using technology to learn from best practices from other parts of the world. Thus India, too, is on the road to building smart cities—world-class, self-sustainable

habitats with minimal pollution levels, maximum recycling, optimized energy supplies and efficient public transportation.

Establishment of Smart Cities Mission

Under the leadership of Prime Minister Narendra Modi, the government of India launched its flagship program, **'Smart Cities'** on 25th June 2015. As part of the program, the government has decided to develop 100 Smart Cities by 2024. It aims to address challenges associated with India's rapid growth and massive urbanization in coming years.

Smart Cities Mission envisions developing an area within 100 cities in the country as model areas based on an area development plan, which is expected to have a rub-off effect on other parts of the city, and nearby cities and towns.

Cities will be selected based on the Smart Cities challenge, where cities will competed in a countrywide competition to obtain the benefits from this mission. In June 2018, selection of 100 smart cities has been completed under the Smart Cities Mission.

The Union Ministry of Urban Development (MoUD) is tasked with the responsibility to implement the smart city mission in collaboration with the respective cities. To select the smart cities, the MoUD announced the Smart City Challenge programme, a multi stage competition designed to inspire and support municipal officials for developing smart city proposals to improve residents' lives. All states used a standardized criteria to pick their cities for the competition. Each city formulated its own unique vision, mission and plan for a "smart city." Their concepts reflected the city's local context, resources, and priorities of citizens.

According to the Ministry of Urban Development, the Smart City Mission marks a paradigm shift towards urban development in the country since it is based on 'bottom up' approach with the involvement of citizens in formulation of city vision and smart city plans and the urban local bodies and state governments piloting the mission with little say from the Ministry of Urban Development.

It is a five-year program, where all of the Indian states and Union territories are participating, except West Bengal, by nominating at least one city for the Smart Cities challenge. Financial aid will be given by the central and state governments between 2017-2022 to the cities, and the mission will start showing results from 2022 on-wards.

2. Smart City Mission

Vision:

With increasing urban population and rapid expansion of areas, operators are looking at smarter ways to manage complexities, increase efficiencies and improve quality of life.

This has created need for cities that monitor and integrate infrastructure to better optimize resources while maximizing services to its citizens.

Objective:

The objective of smart city initiative is to promote **sustainable and inclusive cities** that provide **core infrastructure** and give a **decent quality** of life to its citizens, a **clean and sustainable environment** and application of '**Smart' Solutions.**

Some of the core infrastructure elements in a Smart City would include:

I. 24x7 availability of high quality utility services like water and power.
II. A robust transport system that emphasizes on public transport
III. Provide opportunities for jobs and livelihoods for its inhabitants.
IV. Proper facilities for entertainment and the safety and security of the people. State-of-the-art health and education facilities are also a must.
V. Minimize waste by increasing energy efficiency and reducing water conservation and proper recycling of waste materials

Strategy:

The strategic components of Area-based development in the Smart Cities Mission are **city improvement (retrofitting), city renewal (redevelopment) and city extension (Greenfield development) plus a Pan-city initiative** in which Smart Solutions are applied covering larger parts of the city. Below are given the descriptions of the three models of Area-based Smart City Development:

I. **City improvement (Retrofitting)** will introduce planning in an existing built-up area to achieve Smart City objectives, along with other objectives, to make the existing area more efficient and liveable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the retrofitted Smart City. This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.

II. **City renewal (Redevelopment)** will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the Saifee Burhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.

III. **City extension (Greenfield development)** will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, planned financing and plan implementation tools (e.g. land pooling/ land reconstitution) with provision for affordable housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example is the GIFT City in Gujarat (. Unlike retrofitting and redevelopment, Greenfield developments could be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).

IV. **Pan-city development** envisages application of selected Smart Solutions to the existing city-wide infrastructure. Application of Smart Solutions will involve the use of technology, information and data to make infrastructure and services better. For example, applying Smart Solutions in the transport sector (intelligent traffic management system) and reducing average commute time or cost to citizens will have positive effects on productivity and quality of life of citizens. Another example can be waste water recycling and smart metering which can make a substantial contribution to better water management in the city

For more information please click here

- **http://smartcities.gov.in/content/innerpage/strategy.php**

2.1. Smart City Selection Process

The Mission was introduced in the form of a competition, called the Smart City challenge. There were two stages in the selection process mentioned below:

2.2.1. Stage 1 of the competition: Shortlisting of cities by States

The first stage of the competition is intra-state; cities in the state shall compete on the conditions precedents and the scoring criteria laid out. The state/union territory shortlists the potential smart cities based on conditions precedents, scoring criteria and in accordance to the total number allocated to it. The cities with the highest scores will be shortlisted and recommended to participate in Stage 2 of the challenge. The state/union territory will recommend the names of cities that have successfully been selected in this round to the MoUD, who shall thereafter announce the list of selected 100 smart cities.

2.2.2. Stage 2 of the competition: The Challenge round for selection

In the second stage, each of the potential 100 smart cities shall prepare their proposals for participating in the city challenge. The Smart City Proposal (SCP) for each city should outline the preferred model for Area Based Development (ABD) as well as pan-city development with smart solutions, the proposed financing and revenue model to attract private participation, etc. These proposals shall be evaluated by a committee comprising national and international experts, organisations and institutions. After the evaluation, a list of winning cities is

announced. The remaining cities rework and improve their SCPs in order to be considered in the next round of challenge.

Detailed process of selection of smart cities is available here

- **http://smartcities.gov.in/upload/uploadfiles/files/Process%20of%20Selection%20(1).pdf**

2.2.3. List of cities nominated by states for the smart city challenge

The total numbers of 100 smart cities have been distributed among the States and UTs on the basis of equitable criteria. The formula gives equal weightage (50:50) to urban population of the State/UT and the number of statutory towns in the State/UT. Based on this formula, each State/UT will, therefore, have a certain number of potential smart cities, with each State/UT having at least one. This distribution is given below. The number of potential Smart Cities from each State/UT will be capped at the indicated number. The distribution of smart cities will be reviewed after two years of the implementation of the Mission. Based on an assessment of the performance of States/ULBs in the Challenge, some re-allocation of the remaining potential smart cities among States may be required to be done by ministry (MoUD).

Table 1: Number of cities allocated to States based on urban population and number of statutory towns:

S. No.	Name of State/UT	No. of cities	Name of Cities Shortlisted
1.	A & N Islands	1	Port Blair
2.	Andhra Pradesh	3	Vishakhapatnam, Tirupati, Kakinada
3.	Arunachal Pradesh	1	Pasighat
4.	Assam	1	Guwahati
5.	Bihar	3	Muzaffarpur, Bhagalpur, Biharsharif
6.	Chandigarh	1	Chandigarh
7.	Chhattisgarh	2	Raipur, Bilaspur
8.	Daman & Diu	1	Diu
9.	Dadra & Nagar Haveli	1	Silvassa
10.	Delhi	1	New Delhi

11.	Goa	1	Panaji
12.	Gujarat	6	Gandhinagar, Ahmedabad, Surat, Vadodra, Rajkot, Dahod.
13.	Haryana	2	Karnal, Faridabad
14.	Himachal Pradesh	1	Dharamshala
15.	Jammu & Kashmir	1	Srinagar, Jammu
16.	Jharkhand	1	Ranchi
17.	Karnataka	6	Mangaluru, Belagavi, Shivamogga, Hubbali-Dharwad, Tumakuru, Davanagere
18.	Kerala	1	Kochi
19.	Lakshadweep	1	Kavaratti
20.	Madhya Pradesh	7	Bhopal, Indore, Gwalior, Jabalpur, Satna, Ujjain, Sagar
21.	Maharashtra	10	Greater Mumbai, Thane, Kalyan-Dombivali, Pimpri-Chinchwad, Nashik, Amravati, Solapur, Nagpur, Pune, Aurangabad
22.	Manipur	1	Imphal
23.	Meghalaya	1	Shillong
24.	Mizoram	1	Aizawl
25.	Nagaland	1	Kohima
26.	Odisha	2	Bhubaneshwar, Rourkela
27.	Puducherry	1	Oulgaret
28.	Punjab	3	Ludhiana, Jalandhar, Amritsar
29.	Rajasthan	4	Jaipur, Udaipur, Ajmer, Kota

30.	Sikkim	1	Namchi
31.	Tamil Nadu	12	Coimbatore, Chennai, Madurai, Triuchirapalli, Vellore, Salem, Erode, Tiruppur, Dindigul, Thanjavur, Tirunelveli, Thoothukudi
32.	Telangana	2	Warangal, Karimnagar
33.	Tripura	1	Agartala
34.	Uttar Pradesh	13	Meerut, Muradabad, Aligarh, Saharanpur, Bareilly, Jhasi, Kanpur, Allahabad, Varanasi, Luchnow, Gaziabad, Agra, Rampur
35.	Uttarakhand	1	Dehradun
36.	West Bengal	4	New Town Kolkata, Bidhannagar, Durgapur, Haldia
	Grand Total	**100**	

2.2. Implementation of Smart Cities- execution process

The implementation of the Mission at the City level will be done by a **Special Purpose Vehicle (SPV)** created for the purpose. The SPV will plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the Smart City development projects. The SPV would be a limited company incorporated under the Companies Act, 2013, at the city level and would be formulated through equity contributions from the state and Central governments. The private sector or financial institutions can be considered for an equity stake in the SPV; however, the shareholding pattern of 50:50 of the state/union territory and the ULB has to be maintained and they together should have a majority shareholding and control of the SPV. The SPV would be headed by a full-time CEO and would be appointed with the approval of the MoUD. The board of directors shall be constituted by representatives of the Central Government, state government, ULB, independent directors as well as the CEO and functional directors. The Divisional Commissioner/ Collector/Municipal Commissioner/Chief Executive of the Urban Development Authority shall be the Chairperson of the SPV.

The SPV may appoint Project Management Consultants (PMC) for designing, developing, managing and implementing area-based projects. SPVs may take assistance from any of the empanelled consulting firms in the list prepared by MoUD and the handholding agencies. For procurement of goods and services, transparent and fair procedures as prescribed under the

State/ULB financial rules may be followed. Model frameworks as developed by MoUD may also be used for Smart City projects.

For more information please click here
- http://164.100.161.224/content/innerpage/spvs.php

2.3. Mission Monitoring

I. **National level:** National level monitoring will be of two type:
   1. Apex committee
   2. National mission directorate

Apex Committee:

An Apex Committee (AC), headed by the Secretary, MoUD and comprising representatives of other related Ministries and organisations will approve the Proposals for Smart Cities Mission, monitor their progress and release funds. This Committee will meet periodically, as considered necessary. The AC will consist of the following indicative members:

- Secretary, Housing and Poverty Alleviation - Member
- Secretary (Expenditure) – Member
- Joint Secretary, Finance, MoUD - Member
- Director, National Institute of Urban Affairs (NIUA) - Member
- Chief Planner, Town and Country Planning - Member
- Select Principal Secretaries of States - Member
- Select CEOs of SPVs - Member
- Mission Director - Member Secretary

The Representatives of stakeholders like UN Habitat, World Bank, The Energy and Resources Institute (TERI), Centre for Development of Advanced Computing (C-DAC), Centre for Smart Cities (CSC), Bangalore or other bilateral and multilateral agencies and urban planning experts may be invited with the approval of Chair.

The AC will provide overall guidance and play an advisory role to the Mission and its key responsibilities are given below:

- Review the list of Cities sent by the State Governments after Stage 1.
- Review the proposals evaluated by panel of experts after Stage 2.
- Approve the release of funds based on progress in implementation.
- Recommend mid-course correction in the implementation tools as and when required.
- Undertake quarterly review of activities of the scheme including budget, implementation and co-ordination with other missions/ schemes and activities of various ministries.

National mission directorate:

There will be a National Mission Director, not below the rank of Joint Secretary to Government of India and who will be the overall in-charge of all activities related to the Mission. A Mission Directorate will take support from subject matter experts and other staff as considered necessary. The key responsibilities of the Mission Directorate are given below:

1. Develop strategic blueprint and detailed implementation roadmap of the Smart Cities Mission, including the detailed design of the City Challenge.
2. Coordinate across Centre, States, ULBs and external stakeholders in order to ensure that external agencies are efficiently used for preparation of Smart City Proposal (SCP), Detailed Project Reports (DPRs), sharing of best practices, developing Smart Solution, etc.
3. Oversee Capacity building and assisting in handholding of SPVs, State and Urban Local Bodies (ULBs). This includes developing and retaining a best practice repository (Model RFP documents, Draft DPRs, Financial models, land monetization ideas, best practices in SPV formation, use of financial instruments and risk mitigation techniques) and mechanism for knowledge sharing across States and ULBs (through publications, workshops, seminars).

II. **State level: Monitoring**

There shall be a State Level High Powered Steering Committee (HPSC) chaired by the Chief Secretary, which would steer the Mission Programme in its entirety. The HPSC will have representatives of State Government departments. The Mayor and Municipal Commissioner of the ULB relating to the Smart City would be represented in the HPSC. There would also be a State Mission Director who will be an officer not below the rank of Secretary to the State Government, nominated by the State Government. The State Mission Director will function as the Member-Secretary of the State HPSC. The indicative composition of HPSC is given below:

- Principal Secretary, Finance
- Principal Secretary, Planning
- Principal Secretary/Director, Town & Country Planning Department, State/UT Governments.
- Representative of MoUD.
- Select CEOs of SPVs in the State.
- Select Mayors and Municipal Commissioners /Chief Executive of the ULBs, and Heads of the concerned State Line Departments.
- Secretary/Engineer-in-Chief or equivalent, Public Health Engineering Department.
- Principal Secretary, Urban Development – Member Secretary

The key responsibilities of the HPSC are given below:

- Provide guidance to the Mission and provide State level platform for exchange of ideas pertaining to development of Smart Cities.
- Oversee the process of first stage intra-State competition on the basis of Stage 1 criteria.
- Review the SCPs and send to the MoUD for participation in the Challenge.

III. City level: Monitoring

A Smart City Advisory Forum will be established at the city level for all 100 Smart Cities to advise and enable collaboration among various stakeholders and will include the District Collector, MP, MLA, Mayor, CEO of SPV, local youths, technical experts, and at least one member from the area who is a:

- President / secretary representing registered Residents Welfare Association,
- Member of registered Tax Payers Association / Rate Payers Association,
- President / Secretary of slum level federation, and
- Members of a Non-Governmental Organization (NGO) or Mahila Mandali / Chamber of Commerce / Youth Associations.

The CEO of the SPV will be the convener of the Smart City Advisory Forum.

2.4. Financing of Smart Cities

The Smart Cities Mission (SCM) is a centrally-sponsored scheme, where state governments and urban local bodies (ULBs) will have to contribute funds for implementation of projects specified in the Smart City Proposal, on a matching basis with the funds provided by the central government. The entire budget for the Mission over five years is estimated to be Rs 480 billion (6 billion euro). The Government of India allocated around Rs 2 lakh crore (25 billion euro) to develop 100 cities under the Smart Cities Mission.

According to the SCM Guidelines, in the first year, each 'smart city' will receive an initial corpus amount of Rs 200 crore (25 euro million). In every subsequent year, for the next three years, the government will provide Rs 100 crore (12.5 million euro) to each city. The central government will provide each potential 'smart city' with an advance amount of Rs 2 crore (0.25 million euro) for the preparation of the Smart City Proposal. This amount, along with Administrative and Office Expenses (A&OE) of the Ministry of Urban Development, will be deducted from the initial corpus amount. Each 'smart city' will thus receive Rs 194 crore (24.25 million euro) in the first year of its development. Subsequently after A&OE deductions, cities will receive Rs 98 crore (12.5 million euro) annually for next three years. By matching the government's contribution with an equal amount, states can ensure that each city has access to Rs 976 crore (122 million euro) to complete 'smart city' projects within four years.

States are expected to seek funds for projects outlined in the Smart City Proposal from multiple sources, including:

- States'/ULBs' own resources from collection of user fees, beneficiary charges and impact fees, land monetization, debt, loans etc.
- Additional resources transferred as a result of acceptance of the recommendations of the Fourteenth Finance Commission (FFC).
- Innovative finance mechanisms, such as municipal bonds with credit rating of ULBs, Pooled Finance Development Fund Scheme, and Tax Increment Financing (TIF).
- Leverage borrowing from financial institutions, including bilateral and multilateral institutions, both domestic and external sources.

- The National Investment and Infrastructure Fund (NIIF).
- Other Central Government schemes like Swachh Bharat Mission, AMRUT, National Heritage City Development and Augmentation Yojana (HRIDAY).
- Public-private partnerships (PPP) etc.

Each Smart City Proposal is required to include a 'Financial Plan' that provides extensive details of itemized costs, resource plans, revenue and payback mechanisms, plans for recovery of Operation and Maintenance costs, financial timelines, and plans for mitigating financial risk. The competence of this Financial Plan is an important criterion in judging the prospective of a potential 'smart city.

According to the SCM Guidelines, each 'smart city' is expected to receive an annual installment of funds subject to:

- Quarterly submission of a 'City Score Card' to MoUD;
- Satisfactory physical and financial progress shown in implementation of the Proposal, in the form of a Utilization Certificate and annual 'City Score Card';
- Achievement of milestones, as indicated in the timelines contained in the Smart City Proposal; and,
- Robustness of the functioning of the city's Special Purpose Vehicle (SPV), the entity constituted at the city level to implement the Mission's objectives.

Leading economies around the world have shown interest in India's smart city mission and are looking forward to participate in the development of smart cities. Major funding partners include Spain, the United States of America, Germany, Japan, France, Singapore and Sweden.

Short overview on the cities in the development of which these countries take part is given below:

- Spain has proposed to cooperate with India to develop Delhi into smart cities. The Barcelona Regional Agency of Spain has shown interest in exchanging technology with India.
- The US' United States Trade and Development Agency (USTDA) has decided to develop Visakhapatnam (Andhra Pradesh), Allahabad (UP) and Ajmer (Rajasthan) as smart cities.
- Germany has signed up with India to develop Bhubaneswar (Odisha), Kochi (Kerala) and Coimbatore (Tamil Nadu) as smart cities.
- Japan has decided to assist India with the development of Chennai, Ahmedabad and Varanasi as smart cities
- France has decided to support three Indian cities-Chandigarh, Lucknow and Puducherry and announced an investment of $1.5 billion (1.3 euro billion) in India.
- Singapore has shown its interest in helping India's smart city mission and offered to help develop Amravati, the new state capital of Andhra Pradesh as a smart city. The country is also looking at re-engineering and upgrading the transportation sector and retro-fitting the older Indian city.

- Sweden, Israel, the Netherlands, United Kingdom and Hong Kong have also shown interest in investing in India for developing smart cities.
- Recently fresh efforts have been infused as twenty cities across three Indian states of Punjab, Haryana and Rajasthan are likely to have a fast-track development under a new Indo-Canadian initiative to train smart city planners on capacity-building and governance, reform implementation, water supply, sewerage amongst others. The proposal aims at training at least 150 official urban planners and designers and build localized platforms and tools for efficient and predictable planning and execution of smart cities.

3. Current Status of Smart Cities Mission

3.1. Cities selected under the mission

In June 2018, Government of India has announced the names of 100 cities that will receive centre's funds under Smart City Mission. List of these cities mentioned below:

The total proposed investment in the final 100 cities would be around Rs.2.05 lakh crores (25.63 billion euro) .With a per city allocation of Rs. 100 crore (12.5 million euro) for each of the city for five years of the mission period, the central assistance to the mission is around Rs 50,000 crore (6.25 billion euro).

Table 2: Selected cities with proposed investments

Round of selection	Year of selection	Total Cost of Projects (₹ Cr.) (Euro Billion)	Total Area Based Development Cost (₹ Cr.) (Euro billion)	Total Pan City Solution Cost (₹ Cr.) (Euro billion)	Total Urban Population Impacted (In Million) (approx.)
R1 (20 cities)	Jan-16	48,064	37,123	10,941	37
		(6.02 Euro bn)	**(4.65 Euro bn)**	**(1.37 Euro bn)**	
Fast-track (13 cities)	May-16	29,795	25,974	3,821	10
		(3.73 Euro bn)	**(3.25 Euro bn)**	**(0.48 Euro bn)**	
R2 (27 cities)	Sep-16	53,903	42,524	11,379	26
		(6.75 Euro bn)	**(5.32 Euro bn)**	(**1.42 Euro bn**)	
R3 (30 cities)	Jun-17	57,393	46,879	10,515	24
		(7.18 Euro bn)	**(5.87 Euro bn)**	**(1.32 Euro bn)**	

R4 (9 cities)	Jan-18	12,824	10,639	2,185	4
		(1.60 Euro bn)	**(1.33 Euro bn)**	**(0.27 Euro bn)**	
Total (99 cities)		201979	**1,63,138**	**38,841**	**100**
		(25.28 Euro bn)	**(20.42 Euro bn)**	**(4.86 Euro bn)**	

Source: Smartnet Smart City

- In January 2016, MoUD announced 20 cities as winners from the first phase of the Smart City Challenge (Table 3).

Table 3: First List of Smart Cities (1st Round)

Ranking	Name of State/UT	Cities Shortlisted
1.	Odisha	Bhubaneswar
2.	Maharashtra	Pune
3.	Rajasthan	Jaipur
4.	Gujarat	Surat
5.	Kerala	Kochi
6.	Gujarat	Ahmedabad
7.	Madhya Pradesh	Jabalpur
8.	Andhra Pradesh	Visakhapatnam
9.	Maharashtra	Solapur
10.	Karnataka	Davangere
11.	Madhya Pradesh	Indore
12.	New Delhi	New Delhi
13.	Tamil Nadu	Coimbatore

14.	Andhra Pradesh	Kakinada
15.	Karnataka	Belagavi
16.	Rajasthan	Udaipur
17.	Assam	Guwahati
18.	Tamil Nadu	Chennai
19.	Punjab	Ludhiana
20.	Madhya Pradesh	Bhopal

- In May 2016, MoUD released the second list of an additional 13 cities (Table 4), selected on a fast-track basis, to be included in the first phase of the Mission.

Table 4: Second List of Smart Cities (Fast-track)

Ranking	Name of State/UT	Cities Shortlisted
1.	Uttar Pradesh	Lucknow
2.	Bihar	Bhagalpur
3.	West Bengal	New Town, Kolkata
4.	Haryana	Faridabad
5.	Chandigarh	Chandigarh
6.	Chhattisgarh	Raipur
7.	Jharkhand	Rachi
8.	Himachal Pradesh	Dharamasala
9.	Telangana	Warangal
10.	Goa	Panaji
11.	Tripura	Agartala

12.	Manipur	Imphal
13.	Andaman & Nicobar	Port Blair

- In September 2016, in the second round of the Smart Cities Challenge, the government announced the third list of 27 additional cities (table 5).

Table 5: Third List of Smart Cities (2nd Round)

Ranking	Name of State/UT	Cities Shortlisted
1	Punjab	Amritsar
2	Maharashtra	Kalyan
3	Madhya Pradesh	Ujjain
4	Andhra Pradesh	Tirupati
5	Maharashtra	Nagpur
6	Karnataka	Mangalore
7	Tamil Nadu	Vellore
8	Maharashtra	Thane
9	Madhya Pradesh	Gwalior
10	Uttar Pradesh	Agra
11	Maharashtra	Nashik
12	Odisha	Rourkela
13	Uttar Pradesh	Kanpur
14	Tamil Nadu	Madurai
15	Karnataka	Tumakuru
16	Rajasthan	Kota

17	Tamil Nadu	Thanjavur
18	Sikkim	Namchi
19	Punjab	Jalandhar
20	Karnataka	Shimoga
21	Tamil Nadu	Salem
22	Rajasthan	Ajmer
23	Uttar Pradesh	Varanasi
24	Nagaland	Kohima
25	Karnataka	Hubli-Dharwad
26	Maharashtra	Aurangabad
27	Gujarat	Vadodara

- In June 2017, 30 cities were added to the list as a part of fourth list of the Smart City Mission (see table 6).

Table 6: Fourth List of Smart Cities (3rd Round)

Ranking	Name of State/UT	City Shortlisted
1	Kerala	Thiruvanathapuram
2	Chhattisgarh	Naya Raipur
3	Gujarat	Rajkot
4	Andhra Pradesh	Amaravati
5	Bihar	Patna
6	Telangana	Karimnagar
7	Bihar	Muzaffarpur

8	Puducherry	Puducherry
9	Gujarat	Gandhinagar
10	Jammu & Kashmir	Srinagar
11	Madhya Pradesh	Sagar
12	Haryana	Karnal
13	Madhya Pradesh	Satna
14	Karnataka	Bengaluru
15	Himachal Pradesh	Shimla
16	Uttarakhand	Dehradun
17	Tamil Nadu	Tiruppur
18	Maharashtra	Pimpri chinchwad
19	Chhattisgah	Bilaspur
20	Arunachal Pradesh	Pasighat
21	Jammu & Kashmir	Jammu
22	Gujarat	Dahod
23	Tamil Nadu	Tirunelveli
24	Tamil Nadu	Thootukkudi
25	Tamil Nadu	Tiruchirapalli
26	UP	Jhansi
27	Mizoram	Aizawl
28	UP	Allahabad
29	UP	Aligarh
30	Sikkim	Gangtok

- In January 2018, Government had announced the final list of nine smart cities and had kept the slot for the 10th city. In June 2018, Government finally announced the name of last city and with this announcement selection process of 100 smart cities has been completed after city challenge process.

Table 7: Fifth list of smart Cities (4rth Round)

Ranking	Name of State/UT	Cities Shortlisted
1	Dadra & Nagar Haveli	Silvassa
2	Tamil Nadu	Erode
3	Daman & Diu	Diu
4	Bihar	Biharsharif
5	Uttar Pradesh	Bareilly
6	Arunachal Pradesh	Itanagar
7	Uttar Pradesh	Moradabad
8	Uttar Pradesh	Saharanpur
9	Lakshadweep	Kavaratti
10	Shillong	Meghalaya

3.2. Implementation status

Two and a half years after announcement of the Smart City Mission, 6.4 Percent of the total identified projects have been completed with utilization of just 1.6 percent of the total envisaged investment of Rs. 1,38,730 crore (17.36 billion euro).

Many projects are stuck as local governing bodies are unable to raise money using their own resources. Many cities are also facing resistance in execution of projects as citizens have opposed user charges for services provided under the mission.

As on 17 January 2018 there are 2,948 projects worth around Rs. 1.4 crore (17.36 billion euro) are in various stages of implementation under the scheme.

- 189 projects worth Rs. 2,237 crore (280 million euro) have been completed
- Implementation is underway for 495 projects with a cost of Rs. 18,616 crore (2.33 billion euro);
- Tenders have been floated for 277 projects with a cost of Rs.15,885 crore (2 billion euro)
- 1,987 projects worth Rs.1,01,992 crore (12.76 billion euro) are at detailed project report (DPR) stage.

Table 8: The Round wise progress of the 90 Smart Cities is given below:

		Work Started & Completed		Tender Issued		Total	
Round of Selection	**Year of selection**	**Projects**	**Cost (Cr.) (bn euro)**	**Projects**	**Cost (Cr.) (bn euro)**	**Projects**	**Cost (Cr.) (bn euro)**
R1 (20 Cities)	Jan-16	367	11934 **(1.5 bn Euro)**	140	8498 **(1.06 bn euro)**	966	46,313 **(5.80bn euro)**
R2 (40 Cities) &	May and Sept 2016 &	317	8918 **(1.12 bn euro)**	137	7386 **(0.92 bn euro)**	1,982	92,417 **(11.57bn euro)**
R3 (30 Cities)	Jun-17						
Total (90 Cities)		684	20852 **(2.61 bn euro)**	277	15885 **(2 bn euro)**	2948	1,38,730 **(17.36 bn euro)**

Source: Ministry of Housing & Urban Affairs

4. Challenges in Developing and Implementing Smart Cities

Those states that measure up to the guidelines and nominate cities could get funding of Rs 100 crore (12.5 million euro) per year per city for the next five years. While the funding is a golden chance for states to rejuvenate their urban areas but the Smart Cities Mission still has its own challenges to face. Here are the top 10:

i. **Financing smart cities:** The High Power Expert Committee (HPEC) on Investment Estimates in Urban Infrastructure has assessed a per-capita investment cost (PCIC) of Rs 43,386 (543 euro) for a 20-year period. Using an average figure of 1 million people in each of the 100 smart cities, the total estimate of investment requirements for the smart city comes to Rs 7 lakh crore (87.61 bn euro) over 20 years (with an annual escalation of 10 per cent from 2009-20 to 2014-15). This translates into an annual requirement of Rs 35,000 crore (4.38 bn euro). One needs to see how these projects will be financed as the majority of project need would move through complete private investment or through PPPs (public-private partnership).

ii. **Financial sustainability of ULBs:** Most ULBs are not financially self-sustainable and tariff levels fixed by the ULBs for providing services often do not mirror the cost of supplying the same. Even if additional investments are recovered in a phased manner, inadequate cost recovery will lead to continued financial losses.

iii. **Availability of master plan or city development plan:** Most of our cities don't have master plans or a city development plan, which is the key to smart city planning and implementation and encapsulates all a city needs to improve and provide better opportunities to its citizens. Unfortunately 70-80 per cent of Indian cities don't have one.

iv. **Retrofitting existing legacy city infrastructure to make it smart:** There are a number of latent issues to consider when reviewing a smart city strategy. The most important is to determine the existing city's weak areas that need utmost consideration, e.g. 100-per-cent distribution of water supply and sanitation. The integration of formerly isolated legacy systems to achieve citywide efficiencies can be a significant challenge.

v. **Technical constraints of ULBs:** Most ULBs have limited technical capacity to ensure timely and cost-effective implementation and subsequent operations and maintenance owing to limited recruitment over a number of years along with inability of the ULBs to attract best of talent at market competitive compensation rates.

vi. **Three-tier governance:** Successful implementation of smart city solutions needs effective horizontal and vertical coordination between various institutions providing various municipal amenities as well as effective coordination between central government (MoUD), state government and local government agencies on various issues related to financing and sharing of best practices and service delivery processes.

vii. **Providing clearances in a timely manner:** For timely completion of the project, all clearances should use online processes and be cleared in a time-bound manner. A regulatory body should be set up for all utility services so that a level playing field is made available to the private sector and tariffs are set in a manner that balances financial sustainability with quality.

viii. **Dealing with a multivendor environment:** Another major challenge in the Indian smart city space is that (usually) software infrastructure in cities contains components supplied by different vendors. Hence, the ability to handle complex combinations of smart city solutions developed by multiple technology vendors and its networking becomes very significant.

ix. **Capacity building programme:** Building capacity for 100 smart cities is not an easy task and most ambitious projects are delayed owing to lack of quality manpower, both at the centre and state levels. In terms of funds, only around 5 per cent of the central allocation may be allocated for capacity building programs that focus on training, contextual research, knowledge exchange and a rich database. Investments in capacity building programs have a multiplier effect as they help in time-bound completion of projects and in designing programs, developing faculty, building databases as well as designing tool kits and decision

support systems. As all these have a lag time, capacity building needs to be strengthened right at the beginning.

x. **Reliability of utility services:** For any smart city in the world, the focus is on reliability of utility services, whether it is electricity, water, telephone or broadband services. Smart cities should have universal access to electricity 24×7; this is not possible with the existing supply and distribution system. Cities need to shift towards renewable sources and focus on green buildings and green transport to reduce the need for electricity.

5. Smart Cities: Technological instruments and Role of IoT/M2M

There are several technological instruments are available that facilitate the development of a Smart City. These are:

5.1. Use of Clean Technologies

As per the **World Health Organization** (WHO) report, Indian cities are amongst the most polluted in the world, creating severe health hazards. The trend needs to be reversed by promoting the use of clean technologies that harness renewable materials and energy sources and have a lower smaller environmental footprint. In smart cities buildings, transport and infrastructure should be energy efficient and environmentally benign.

5.2. Use of Information and Communication Technology (ICT)

The extensive use of ICT is a must and only this can ensure information exchange and quick communication. Most services will need to be ICT enabled, and this often helps reduce the need for travel. The ability to shop on-line or book tickets online or converse online are very powerful ways of reducing the need for travel, thereby reducing congestion, pollutants and energy use.

5.2.1. Role of IoT/M2M in Smart cites

As per Brocade's George Chacko, "The 100 Smart Cities project, aimed at helping transform India into a country of digitally connected cities, is offering immense opportunities to IT companies. IoT and machine to Machine(M2M) will play key roles in the evolution of the Smart Cities.M2M establishes intelligent communication between IoT devices, providing online data gathering, remote control and process automation. They can report on the status of IoT devices and sensors being monitored via the internet and enable intelligent, real time decision-making for an array of services, such as traffic lights, parking and energy usage. It is rightly considered as a horizontal layer in the smart city framework rather than one of the pillars which means sustainable Smart City will have forms of Smart Energy, Smart Transportation, Smart Data, Smart ICT infrastructure, Smart Parking, Smart governance and Smart Waste Management and all of this will ride on M2M & IOT.

I. **Smart Energy**: Smart energy provides deep insights about overall power consumption by buildings, commercials and residential. It helps in designing and executing various strategies to cut down power consumption. These days, few of the cities are using smart grids and smart streets. Even, smarts meters are also installed in the homes. Integration of IoT helps cities in optimizing power production, improving grid management, and providing effective distribution of energy production. On the other hand, the smart grid allows businesses to improve data capture, grid modernization, outage detection, field operations and disaster recovery techniques.

II. **Smart Transportation:** It helps in reducing the traffic, easy movement of goods, and travel management for people. For example; smart traffic systems help citizens by reducing the chances of road accidents. Additionally, it also helps in avoiding traffic jams, reducing pollution, and promoting a healthier life.

III. **Smart Data:** Smart city collects the massive data related to various amenities used by the population. It allows to analyze the data quickly and has useful customer insights. Install the data on a portal and publish it at an online platform, these data can be utilized for predictive analysis to define future patterns.

IV. **Device Connectivity:** The concept of smart city is based on the IoT devices. Sensors embedded into IoT devices collect the useful data that can be analyzed to gain relevant insights. With the support of IoT, complex city systems can exchange and manage the information quickly in real-time. Integration of data analytics with the system enables to minimize unintended consequences and accidents.

V. **Data Mobility:** In order to build a smart city, seamless movement of data amongst several administrative and municipal systems is highly essential. As data is moving freely amongst the systems, it raises security, intellectual property, and privacy issues. Governments and enterprises should adopt revolutionary trends to plan out their legal technology needs and public policy.

VI. **Smart Infrastructure:** Smart infrastructure offers big data analytics that helps in better planning and proactive maintenance for future. For example; you can prevent health issues growing due to water through real-time testing of lead content in the water supply. To collect the data, a smart infrastructure needs integration of big data, IoT, and various other technologies. Using the data, you can make future administrative changes.

VII. **Smart Parking:** Smart parking enables the city to earn a higher profit by utilizing the same parking space frequently. The spaces can be utilized up to their fullest capacity. It also boosts the number of bucks.

VIII. **Smart Waste Management:** Implementation of smart waste management solution enables cities to reduce operational costing by installing sensors inside the bins. It helps in monitoring the level of trash in each bin. Bins can be emptied only when they are full. So, there is no need to follow any standardize process to collect the waste from bins frequently.

When the bins are full, the respective department will get notifications through the sensors. Waste collecting truck can empty the bin. This project reduces the number of waste collecting vehicles on the street on average. It obviously reduces the traffic and fuel cost.

IX. **Smart Lighting:** Decrease electricity consumption using the smart lighting. Intelligent lighting control can contain dimming lights on streets without traffic and pedestrians. Many times, smart lighting systems are equipped with central management software that tracks usage and leads to maintenance efficiency.

X. **Smart Governance:** The existing Government setup in the Urban Local Bodies (ULBs) is rather fragmented with each department working in silos. The result of this is lack of coordination which is reflected in the form of poor services to the citizens. Therefore, for cities to become smart, it is essential that the governance structure is also smart. Therefore, ULBs would need to make effective use of ICTs in public administration to connect and coordinate between various departments. This combined with organizational change and new skills would improve public services and strengthen support to public. This will mean the ability to seek and obtain services in real time through online systems and with rigorous service level agreements with the service providers.

It is also pertinent to mention that State-run telecom research and development (R&D) company C-DoT (Centre for Development of Telematics) has successfully built and demonstrated world's first open standards-based machine to machine (M2M) communications platform. Backed by oneM2M, a worldwide standards initiative for a common M2M application, the indigenous solution is designed to open up the M2M space which is still in its infancy in a country like India. C-DoT through its department of telecom (MoC) has approached MoUD for the adoption of this standards-compliant open M2M platform for ambitious Smart City deployments.

6. Smart City Mission: Convergence with other Government Schemes

Comprehensive development occurs in areas by integrating the physical, institutional, social and economic infrastructure. Many of the sectoral schemes of the Government converge in this goal, although the path is different. There is a strong complementarity between the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Smart Cities Mission in achieving urban transformation. While AMRUT follows a project-based approach, the Smart Cities Mission follows an area-based strategy.

Similarly, great benefit can be derived by seeking convergence of other Central and State Government Programs/Schemes with the Smart Cities Mission. At the planning stage itself, cities must seek convergence in the SCP with AMRUT, Swachh Bharat Mission (SBM), National Heritage City Development and Augmentation Yojana (HRIDAY), Digital India, Skill development, Housing for All, construction of Museums funded by the Culture Department and other programs connected to social infrastructure such as Health, Education and Culture.

In this report we have briefly described AMRUT, HARIDAY and Swachh Bharat Mission as below:

6.1. Atal Mission for Rejuvenation and Urban Transformation (AMRUT)

The Atal Mission for Rejuvenation and Urban Transportation (AMRUT) scheme, launched on 25th June 2015, is aimed at providing basic services to households and build amenities in cities to improve the quality of life, especially the poor and the disadvantaged. AMRUT focuses on ensuring water supply, sewerage and septage management, storm water drainage, urban transport and availability of green and open spaces, reform management and support, and capacity building. This Mission will be implemented in 500 cities and towns each with a population of 100,000 and above, some cities situated on stems of main rivers, a few capital cities and important cities located in hilly areas, islands and tourist areas. The total outlay for AMRUT is Rs. 50,000 crore (6.26 billion euro) for five years from FY 2015-16 to FY 2019-20. The project fund will be divided among States/UTs at the beginning of each year. The Central Assistance (CA) for the projects will be in three installments of 20:40:40 of the approved cost.

For more information please click here
- **http://mohua.gov.in/cms/amrut.php**

6.2. Heritage City Development and Augmentation Yojana (HRIDAY)

The Ministry of Housing and Urban Affairs (MoHUA), Government of India, launched the National Heritage City Development and Augmentation Yojana (HRIDAY) scheme on 21st January, 2015, with a focus on holistic development of heritage cities. The scheme aims to preserve and revitalise soul of the heritage city to reflect the city's unique character by encouraging aesthetically appealing, accessible, informative & secured environment. With a duration of 4 years (Completing in November, 2018) and a total outlay of INR 500 Crores (0.063 bn euro), the Scheme is being implemented in 12 identified Cities namely, Ajmer, Amaravati, Amritsar, Badami, Dwarka, Gaya, Kanchipuram, Mathura, Puri, Varanasi, Velankanni and Warangal. The scheme is implemented in a mission mode. The Scheme supports development of core heritage infrastructure projects which shall include revitalization of urban infrastructure for areas around heritage assets identified / approved by the Ministry of Culture, Government of India and State Governments. These initiatives shall include development of water supply, sanitation, drainage, waste management, approach roads, footpaths, street lights, tourist conveniences, electricity wiring, landscaping and such citizen services.

For more information please click here
- **http://mohua.gov.in/cms/hariday.php**

6.3. Swachh Bharat Mission (SBM)

Swachh Bharat Abhiyan (SBA) or Swachh Bharat Mission (SBM) or Clean India Mission is a campaign that was launched on 2 October 2014 that aims to clean up the streets, roads and infrastructure of India's cities, smaller towns, and rural areas. The objectives of Swachh Bharat include eliminating open defecation through the construction of household-owned and

community-owned toilets and establishing an accountable mechanism of monitoring toilet use. Run by the Government of India, the mission aims to achieve an Open-Defecation Free (ODF) India by 2 October 2019, the 150th anniversary of the birth of Mahatma Gandhi, by constructing 12 million toilets in rural India at a projected cost of ₹1.96 lakh crore (24.53 bn euro).

For more information please click here

- **http://mohua.gov.in/cms/swachh-bharat-mission.php**

7. Liveability Index Programme commenced by MoUD to support smart city

The Ministry of Urban Development developed a set of **liveability standards for cities** which was launched in June 2017 with an objective of developing these standards to generate a liveability index and rate cities against these standards to facilitate a competitive environment amongst cities and result in systematic improvement in the quality of life of citizens.

Subsequently, the Ministry of Housing and Urban affairs (MoHUA) launched the Liveability index based on the livability standards to rate 116 Indian cities including the 99 smart cities already identified, state capitals, and cities with 1 million-plus population. The index is set of indicators to assess the liveability standards in cities. It will assess cities on comprehensive set of 79 parameters. Marks scored will decide the quantum of incentive. These 79 parameters (57 core indicators and 22 supporting indicators) are based on four broad pillars: physical (weightage 45%), institutional (25%), social (25%) and economic (5%).

These parameters will include:

- Local governance
- Economic condition
- Education & Employment
- Health Safety and Security
- Availability of open spaces
- Water and Power supply
- Pollution level etc.

The cities, which together account for a total population of 134 million people, will be ranked in order of the quality of life they offer. It would be funded by the World Bank, and the assessment would be of relative nature, with the 116 cities graded against each other.

The rating will help cities attain a liveable city status, get them more investments and improve tourism. It will also serve as a knowledge base for taking policy decisions and for planning. The index marks shift to data driven approach to urbanisation and promote competitive spirit among cities. These indicators are organised in 15 distinct 'Categories', designed for measuring various institutional, social, economic and physical aspects that affect the quality of life of citizens and determine the 'Liveability' of a city.

The ministry has decided to involve the **Economist Intelligence Unit (EIU),** which brings out an annual liveability index of cities across the world, for the purpose. Currently, the EIU's 'Global Liveability Ranking' for 140 cities includes only two Indian cities — Mumbai and Delhi. As per the 2015 index, both cities fare poorly, with Delhi at 100th spot and Mumbai at 115th. The ranking is based on parameters like stability, healthcare, culture, environment, education and infrastructure.

For more information please click here

- **http://smartcities.gov.in/upload/uploadfiles/files/LiveabilityStandards.pdf**

8. Standardization bodies & other related work

8.1. Ministry of Electronics and Information Technology (Meity)

Ministry of Electronics and Information Technology (Meity) is responsible for formulation of National policies, regulations and guidelines in the field of Electronics and IT in India. Currently it is driving some of the most challenging initiatives to bring the Nation at par with Developed Nations. Some of the crucial initiatives being:

- E-Governance
- Digital India
- Cyber Security
- Standards, Testing, Quality and Certification in Electronics and IT products, systems and solutions

Meity is working very closely with MoHUA and Industry to support the Smart City initiatives by providing guidance on relevant standards, policies and Innovation & R&D support to realize the Smart City Mission and empower the citizens.

For more info please click here

- **http://meity.gov.in/home**

8.2. Ministry of Communication (MoC)

Ministry of Communication is responsible for formulation National policies, regulation and guidelines in Telecommunication in India. The technical wing of the MoC is Telecom Engineering Centre (TEC). TEC, in its M2M Working groups has been working to review the telecom aspects of Smart Cities and has been releasing reports addressing various vertical and horizontal aspects of telecommunication relevant to Smart City, Smart infrastructure, M2M/IoT paradigms.

Department of communication (DoC) is also responsible for all matters relating to Centre for Development of Telematics (C-DOT). C-DOT has developed CCSP(C-DOT Common Service Platform), the oneM2M standards compliant common service platform which can be deployed on any off-the-shelf generic server platforms or cloud infrastructure. The business application providers can deploy their oneM2M compliant applications in either co-located infrastructure or on any public or private cloud. Using the CCSP platform from C-DOT, the smart cities can reap all the benefits of using a standards compliant horizontal service layer and thus be more efficient, economical and future proof. Along with the CCSP C-DOT has also developed various oneM2M indigenously designed hardware nodes like ADN (Application Dedicated Node), ASN (Application Service Node) and MN (Middle node). To effectively showcase the strength of the platform, C-DOT has also developed various applications like Smart Living, Smart Street Light, Carbon Footprint Monitoring Application and Power Monitoring which are fully oneM2M compliant. C-DOT has also participated in two international interoperability events where the CCSP and the ADN were tested for interoperability with many other oneM2M compliant nodes from various international organizations like Interdigital, Herit, Huawei, HPE, NTT, KETI, LAAS-CNRS etc. C-DOT also participated in the conformance testing with ETSI. Read more

For more information about DoT/MoC please click here (http://www.dot.gov.in/) and M2M/IoT technical reports released by TEC are available here (http://www.tec.gov.in/technical-reports/)

8.3. Telecommunications Standards Development Society, India (TSDSI)

TSDSI is the government recognized body working on ICT including M2M standards. It aims at developing and promoting research based India-specific requirements, standardizing solutions for meeting these requirements, contributing to global standardization in the field of telecommunications, maintaining the technical standards and other deliverables of the organization and safe-guarding the related IPR. TSDSI WG published reports on M2M/IoT given below:

TSDSI WG on M2M/IOT published report covering Indian Use cases:

M2M Use Cases for Utilities-V0.2.0-20151003 advance for NWG
M2M Use Cases for Environment Pollution Monitoring & Control
M2M use cases for SmartCities-V0.2.0-20151003 advance release for NWG20
M2M Use Cases for Smart Governance -V0.2.0-20151003 advance for NWG
M2M Use Cases for Remote Asset Management-V0.2.0-20151003 advance for NWG
M2M Use Cases on Smart Villages V0.2.0-20151003 advance release for NWG

M2M Use Cases for Transportation V0.2.0 20151003 advance for NWG
M2M Use Cases on Industrial Automation V0.2.0-20151003
M2M Use Cases on Smart Homes V0.2.0-20151003 advance release for NWG
M2M Use Cases on Health V0.2.0- 20151003 advance for NWG

8.4. Bureau of Indian Standards (BIS)

8.4.1. Civil Engineering Division Council (CEDC) of BIS

The Civil Engineering Division Council (CEDC), of BIS took up responsible for preparation of Smart City indicators in India. The work scope of CEDC is as follows: 'Standardization in field of Civil Engineering including structural engineering, building materials and components, planning, design, construction and maintenance of civil engineering structures and built environment, construction practices, safety in building; but excluding those subjects which specifically relate to Water Resources Development and Management'. The Division Council is working towards achieving the above goal through 35 Sectional Committees covering wide range of subjects for basic building materials, design and construction to very high technical areas like Offshore Installations, Ports and Harbours, Cyclone Resistant Structures, etc.

The Bureau says elements of aspirations for cities must be factored into consideration while measuring the delivery of services. For instance, a city would like to remain a 'Heritage City', a cultural hub, an industrial city, a business city or a tourism city in the course of its development. There must be scope for these features to remain at the core of its planning and growth.

CED had drafted the indicators for the proposed 'Smart Cities' to be implemented in India. The Document (CED-59) 10,000 WC has placed in the public domain for eliciting opinion, it had been guided by 'ISO 37120:2014-Sustainable Development of Communities: Indicators for city services and quality of life' ' while preparing the Standards.

8.4.2. Electronics and Information Technology Division Council (LITDC) of BIS

BIS ICT divisional council has setup a Panel on Smart Infrastructure LITDC/P2. Panel had formed following WGs:

- LITDC/P2 WG1 Smart cities
- LITDC/P2 WG2 Active Assisted Living
- LITDC/P2 WG3 Smart Energy
- LITDC/P2 WG4 Smart Manufacturing

This panel is now transformed into a technical committee LITDC 28. The BIS Smart Infrastructure Sectional Committee LITD 28 is responsible for standardization work in the field of Smart Cities (Electro-technical and ICT aspects) and related domains including Smart manufacturing & Active assisted living.

Current Standards development on the following:

- Reference Architecture for Unified Secure & Resilient ICT Infrastructure for Smart Cities
- Unified Last Mile Communication Architecture & Protocols for Smart Infrastructure
- Common Service Layer for Unified Smart Cities/Infrastructure ICT Architecture
- Unified Data Semantics, Data Models & Ontology in Smart Cities & Smart Infrastructure Paradigm
- Security & Resilience Framework
- Use Cases in Smart Infrastructure Paradigm
- Standards Inventory & Mapping for Smart Infrastructure Paradigm

The LITD 28 has also released a Pre-Standardization Study Report on Technical Requirements Analysis of Unified, Secure & Resilient ICT Framework for Smart Infrastructure. It is aimed at providing some critical Actionable Insights for **Smart City Planner** in context of Unified Secure & Resilient ICT Infrastructure in Smart Cities. As an outcome of the in-depth studies of Indian requirements the report illustrates a new Architecture for Unified & Secure ICT Backbone for Smart Cities leveraging the M2M/IoT technologies in a Standardized & interoperable framework.

8.5. Role of SESEI In the Smart City Standardization

In the Phase 3 of SESEI Project, SESEI expert proposed to incorporate Smart City as the priority sector for the Project, understanding the importance of the subject and the engagement and harmonization that can be established between India and Europe.

In a matter of short span SESEI has developed Credible working **relationship** with Telecommunication Engineering Centre (TEC), TSDSI and Centre for Development of Telematics (CDOT), BIS etc. on M2M/IoT subject and its role and importance in Smart City while promoting oneM2M platform & specifications. This is **well recorded** through:

- Various Technical reports of TEC: http://www.tec.gov.in/technical-reports/
- BIS Pre-standardization study report on "Unified, Secure & Resilient ICT Backbone for Smart Cities/Smart Infrastructure"
- Transposition of oneM2M standards by TSDSI

- SESEI expert is an **invitee member of BIS Panel on Smart Infrastructure and Technical committee on IoT and SMART CITIES** and using this access to promote EU work and best

practice around smart cities, Smart Homes and oneM2M common service Layer platform suitability in Smart City.

- IET, which is the world's largest engineering institutions with Over 167,000 members in 150 countries. IET India had established an IOT Panel and SESEI expert was identified as the key personnel on standards to Chair their Working Group on Standards. SESEI continues to be the **Chair of this IET IoT Panel WG on Standards, Policy & Legislation.** SESEI expert also used this platform to **publish a** white paper highlighting work around the world especially by oneM2M around M2M/IoT

- SESEI expert is also invited to become the **Chair of India m2m + iot Forum** which is a M2M/IoT+ Smart City + Smart Village Focused Forum. SESEI usage this opportunity to promote EU work around M2M/IoT and Smart Cities.

9. Conclusion

Introducing the concept of smart cities in India is a great idea but due to lack of infrastructure and basic amenities, the cities might have to face a lot of challenges. As part of Smart City Mission, the government should try to attend to the basic issues of the nation such as implementing a proper drainage system, providing good water, sanitation and health care facilities etc.

India's Smart City Programme hopes to revolutionize city life and improve the quality of life for India's urban population. Smart city would require smart economy, bright people, smart organization, smart communication, smart engineering, smart transit, fresh environment and bright living. Nevertheless, with mass migration leading to basic publications, like water shortages and overcrowding, the rate at which these cities will be developed will be the key. Several initiatives are being led by the Government of India to convert 100 cities into smart cities. The government is concentrating on encouraging Public Private Partnership (PPP) for successful implementation of the smart city project in India.

Financial and IT services sectors are on the priority list of the government to garner investments from leading companies such as Cisco, Synoate, Knight Frank, AECOM India etc.

Leading economies around the world have shown interest in India's smart city mission and are looking forward to participate in the development of smart cities. Major funding partners include Spain, the United States of America, Germany, Japan, France, Singapore and Sweden. Recently fresh efforts have been infused as twenty cities across three Indian states of Punjab, Haryana and Rajasthan are likely to have a fast-track development under a new Indo-Canadian initiative to train smart city planners on capacity-building and governance, reform implementation, water supply, sewerage amongst others. The proposal aims at training at least 150 official urban planners and designers and build localized platforms and tools for efficient and predictable planning and execution of smart cities

The real challenge before the Government is to build inclusive smart cities for all its residents, regardless of whether they are rich or poor. These smart cities would concretize the dream of every Indian to live in an urban city. Not only there will be cleaner streets but also advanced public transport and other well managed infrastructural facilities. The big challenge will be to create self-sustaining cities, which create jobs, use resources wisely and also train people.

10. Glossary

S. No.	Acronym	Expansion
1	5G	Fifth Generation
2	AC	Apex Committee
3	AI	Artificial Intelligence
4	AMRUT	Atal Mission for Rejuvenation and Urban Transformation
5	AND	Application Dedicated Node
6	API	Application programming interface
7	ASN	Application Service Node
8	BIS	Bureau of Indian Standards
9	Bn	Billion
10	CCS	Centrally Sponsored Scheme
11	CCSP	C-DOT Common Service Platform
12	C-DAC	Centre for Development of Advances Computing
13	C-DoT	Centre for Development of Telematics
14	CEDC	Civil Engineering Division Council
15	CSC	Centre for Smart Cities
16	DECT	Digital Enhanced Cordless Telecommunications
17	DPR	Detailed Project Report
18	DSL	Distributed Systems Laboratory
19	EIU	Economist Intelligence Unit
20	ETSI	European Telecommunications Standards Institute
21	eUICC	Embedded Universal Integrated Circuit Card
22	GDP	Gross Domestic Product
23	HPEC	High Power Expert Committee
24	HPSC	High Powered Steering Committee
25	HRIDAY	Heritage City Development and Augmentation Yojana
26	ICT	Information and Communication Technology
27	IoT	Internet of things
28	IPv6	Internet Protocol version 6
29	IT	Information Technology

30	ITS	Intelligent Transport System
31	LITDC	Electronics and Information Technology Division Council
32	M2M	Machine to Machine
33	MEITY	Ministry of Electronics and Information Technology
34	MoHUA	Ministry of Housing and Urban Affairs
35	MoT	Ministry of Telecommunication
36	MoUD	Ministry of Urban Development
37	NFV	Network function virtualization
38	NGO	Non-Governmental Organization
39	NIUA	National Institute of Urban Affairs
40	PCIC	Per-Capita Investment Cost
41	PLT	Power line telecommunications
42	PMC	Project Management Consultant
43	PPP	Public Private Partnership
44	R&D	Research and Development
45	RFP	Request for Proposal
46	SAAP	State Annual Action Plan
47	SBM	Swachh Bharat Mission
48	SCM	Smart City Mission
49	SCPs	Smart City Proposals
50	SDN	Software-defined networking
51	SDO	Standards Development Organization
52	SPV	Special Purpose Vehicle
53	TEC	Telecom Engineering Centre
54	TSDSI	Telecommunications Standards Development Society, India
55	UDA	Urban Development Authority
56	ULBs	Urban Local Bodies
57	UT	Urban Transformation
58	UWB	Ultra Wideband
59	WG	Working Group
60	WHO	World Health Organization

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