

# Smart City with Wi-Max Technology

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**Abstract** - A smart city (also smarter city) uses digital technologies to enhance performance and wellbeing, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens. Key 'smart' sectors include transport, energy, health care, water and waste. A smart city should be able to respond faster to city and global challenges than one with a simple 'transactional' relationship with its citizens. For implementing such type of smart city we suggest to use wi-max technology for better data connectivity and communication.

## I. INTRODUCTION

People move the city for better life and in search of job. Therefore a smart city should be sustained for its economic actives and employment opportunity and also regardless for education income level.

For developing such a smart city we recues institutional, physical, social and economic infrastructure for attracting investor and profession to participate in such activity. It also required environment for reaction of economic and employment opportunity.

It also must accomplished the life style of the people and should provide a high quality of life i.e. good quality but affordable having such as vast infrastructure , as 24 x 7 water supply, sanitation, 24 x 7 electric supply, clean air, quality education, health care, security, entertainment, sports, robust and high speed interconnectivity, fast & efficient urban mobility etc.

Smart city itself become genuine digital platform that maximizes the economy, society, environment and welfare of cities and facilities the shift towards more sustainable behavior among all stakeholders' users, companies and administration. It also seeks to maximize public budgets specifically owing to the improvement of processes of the city themselves and its inhabitants.

On the other hand, it enables new business models, thus constituting an excellent platform for innovation in their environment. To achieve the aim of smart city it is essential that government structure is also smart. For citizen friendly smart city a 24\*7 call center should be established at each prostate .Lack of co-ordination between governance and citizens reflects poor services to the citizens.

In order to modernize our cities and make them internationally competitive, the Government has decided to support the development of 100 Smart Cities in the country. In this context, one has to recognize the federal structure of the country as well. Moreover, it has been the experience world over that developing Greenfield city has seldom been successful. A city can grow on a sustainable basis only if there

are opportunities for economic activity, entertainment, education, healthcare and a wide range of such services for residents. However, some new cities need to be developed in the Hills and Coastal areas. In view of these boundary conditions, satellite towns of cities with a 1 – 4 million population would seem to be appropriate. Besides, mid-sized cities would also make very good candidates. Given their economic activities potential some of smaller cities also need to be taken up.

## II. PILLARS OF SMART CITY

The pillars are backbone of smart city. Pillars of smart city includes Institutional Infrastructure, Economic Infrastructure, Physical Infrastructure, Social infrastructure. This infrastructure is explained as follows:

### a. Institutional Infrastructure

Due to the adequate people participation do not have to the current governs. So that the people do not get feel of own ship of city. So there is a need of involvement of citizen in decision making processes. Besides of this intuition report to different department of the state government and local bodies have little influence of them. For example: even within the transport system, metro rails, buses roads, parking, traffics lights, street lights, etc. Are dealt with by different institutions typically the principle to be followed is "Governance by Incentives rather than Governance by Enforcement"

### b. Economic Infrastructure

To create the appropriate economic infrastructure for employment opportunities and for a city to attract investments it has to first identify its core competence, comparative advantages and analyse its potential for generating economic activities. Once that is done, the gaps in required economic infrastructure can be determined. This generally comprise the following: Industrial Parks and Export Processing Zones, IT / BT Parks, Trade centres, Service Centres, Skill Development Centres, Financial Centres and Services, Logistics hubs, warehousing and freight terminals, Mentoring and Counselling services.

### c. Physical Infrastructure

It includes energy management, water supply management, Drainage system, mining systems, sewerage system etc. It also deals with housing stock manage system. To build up all this issues or to develop this all sectors technologies is used.

#### 1. Mobility:

Rapid motorization leads to degradation of air which directly affects environment increase in road accidents and consumption of energy and increase in bills using mobility reflects the idea of public transports such as metro rail , monorails , trams , local buses, etc. in sad of personal motor vehicles . it also includes walking as well as cycling which are the smallest choice of transportation

#### 2. Reliable utility services:

It inclines 24\*7 activation of electricity, telephone and internet services through Wi-Fi.

#### 3. Sanitation:

Lack of sanitation cause unhealthy environment, virus such as swine flu etc.

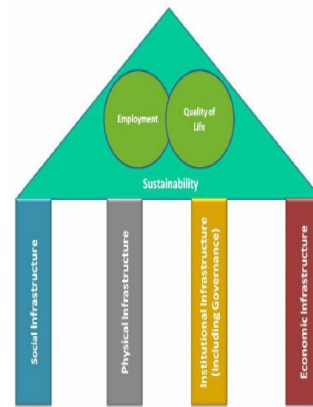
#### 4. Solid waste management:

Waste management is the "generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes". Indian cities are facing many issues with regard to waste management, which include:

- A) Absence of segregation of waste at source
- B) Lack of technical expertise and appropriate institutional arrangement
- C) Lack of proper collection, segregation, transportation, and treatment and disposal system.

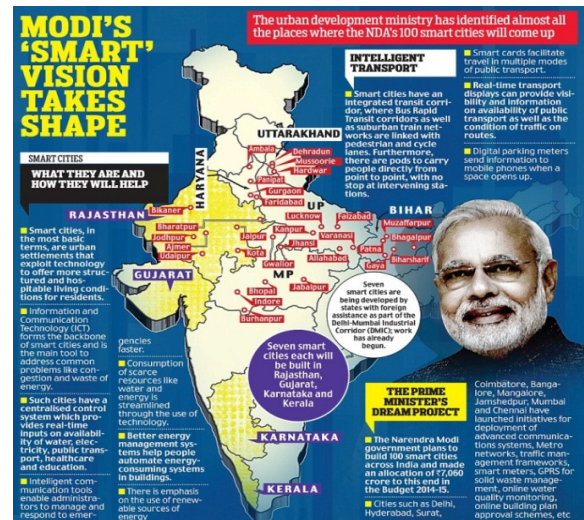
### d. Social Infrastructure

It includes education health care, entertainment, good sports facilities etc. Education such as e-education and digital content city is essential for development of city. Proper and high quality health facilities are important for this it is necessary you create electronics health record. Entertainment is one of the important aspects. Theatres, concerts calls, auditorium, culture events, which result in healthy happy environment.



## III. VISION OF NARENDRA MODI

The Prime Minister has a vision of developing 'one hundred Smart Cities', as satellite towns of larger cities and by modernizing the existing mid - size d cities. ”



## IV. INSTRUMENT THAT MAKE SMART CITY POSSIBLE

### 1. Energy efficiency:

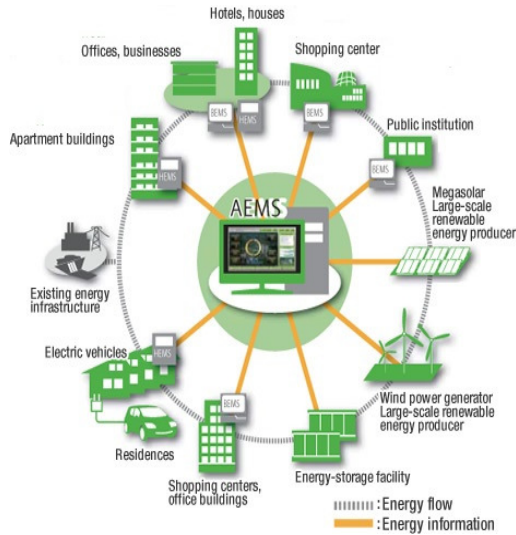
Energy efficiency is the main feature of the smart city. It adopted in transportation system, lighting and all other services that require energy. The application that require energy are street light, air conditioning system and daily appliances.

### 2. Smart Grid:

A smart grid is an electricity network that uses digital and other advanced technologies to monitor and manage the

transport of electricity from all generation sources to meet the varying electricity demands of end-users.

## V. IMPLEMENTATION OF ELECTRICAL SMART GRID



Following steps should be followed to implement electrical smart grid over the region:

1. There is need to implement secure and resilient grid supported by strong communication infrastructure that enables greater visibility and control of efficient power flow between all sources and production and consumption.
2. Implementation of wide area monitoring system (WAMs) by using phase measurement units (PMUs) for entire transmission system.
3. The need of large energy supply will fulfill by renewable energy monitoring contours (REMCs).
4. Around 50,000 km of optical fiber reduce transmission Losses to below 3.5-2.5% should be installed.
5. By implementing power system enhancements to facilitate evacuation and integration 30Gw-13Gw or mutually agreed between MOP and MNRE, is backbone of electric smart grid technology.
6. The concept of Area Energy Managements System (AEMs) should be followed which defines as "Saving, creating and storing energies" with the goal of optimization to use and regional interchange of energy. While preserving unique natural environment and traditions.
7. AEMs aim for integration energy management not simply the management but effective use of electricity within region, but by harnessing the 'Community' and health of the region as a form of 'Energy'.

8. In according to fulfill the requirements of large power supply renewable energy sources such as wind and solar energies should use.

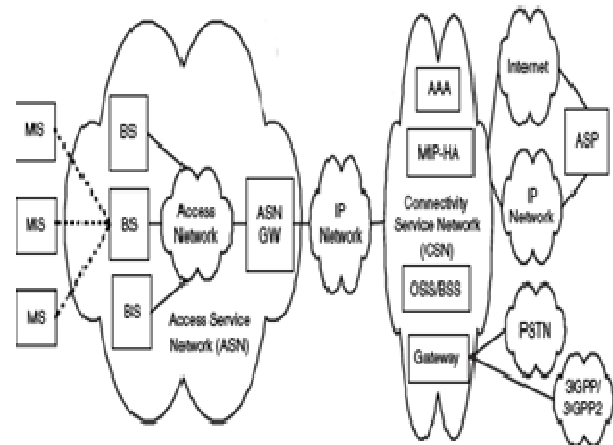
## VI. IMPLEMENTATION OF WI-MAX IN SMART CITY

Wi-max is a telecommunication and mobile technology used for broadcasting of wireless data by the use of a number of transmission methods. Wi-max stands for worldwide interoperability for microwave access offering internet access point to point or point to multipoint or path.

Wi-max makes possible the broadband access to conservative cable or DSL line. The working method of Wi-max is little different from Wi-Fi network because Wi-Fi computer can be connected via LAN card, Router or Hotspot while the connectivity of wi-max network constitutes of two parts in which one is wi-max tower or booster also known as wi-max base station and second is wi-max receiver (wi-max CPE).

## VII. IP- BASED WI-MAX NETWORK ARCHITECTURE

IP-Based WIMAX Network Architecture



The overall network may be logically divided into three parts:

1. Mobile Stations (MS) used by the end user to access the network.
2. The access service network (ASN), which comprises one or more base stations and one or more ASN gateways that form the radio access network at the

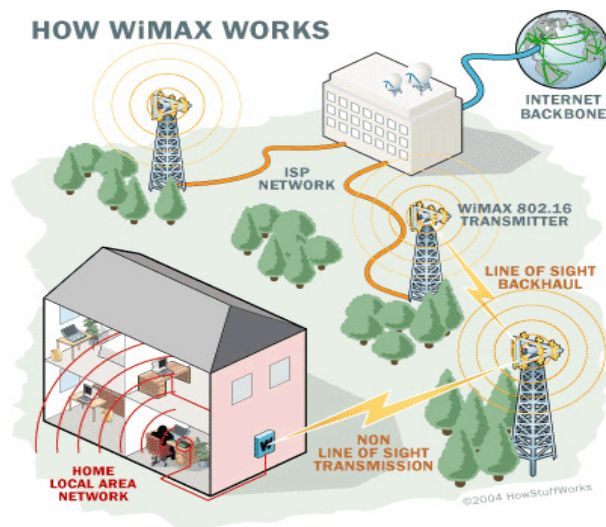


edge.

3. Connectivity service network (CSN), which provides IP connectivity and all the IP core network functions.

The network reference model developed by the Wi-MAX Forum NWG defines a number of functional entities and interfaces between those entities. Fig below shows some of the more important functional entities.

## VIII. HOW WI-MAX WORKS?



The Wi-max network is just like a cell phone. When a user send data from a subscriber device to a base station then that base station broadcast the wireless signal into channel which is called uplink and base station transmit the same or another user is called downlink. The base station of Wi-max has higher broadcasting power, antennas and enhanced additional algorithms. The low POTS penetration and the low quality of the copper pair prevent mass scale DSL deployment and foster the need for alternate broadband technologies. In this context, Wi-MAX is positioned as an excellent option. Moreover, the possibility of offering broadband services in combination with voice services will gradually lead to narrowband WLL substitution.

Wi-MAX is of interest for large enterprises with several locations in the same metropolitan area. Wi-MAX will permit Operator's bypass under license conditions: building a metropolitan private network of IP lines at a very low cost (no civil works). The comparison to leased lines rental fee is in favor of Wi-MAX even for two sites only.

Wi-MAX offers developing and poor areas wireless access without the need to a proper infrastructure such as cabling and jacking the wireless.

Wi-MAX advantages exceed the performance and cost advantages that people talk about always.

Within five years, we expect Wi-MAX to be the dominant technology for wireless networking.

Wi-MAX has many optional features, such as ARQ, sub-channeling, diversity, and space-time coding that will prove invaluable to operators wishing to provide quality and performance that rivals wire line technology.

Wi-MAX will become the dominant solution in China, the world's largest potential market for broadband users. The standard has already been adopted by the government and will fill in many of the gaps in the sketchy 3G coverage. It also supports 4G technology.

## IX. ADVANTAGES

Wi-MAX will be the most significant technology to date in making wireless access efficient and, as more free spectrum is opened up, in creating a major shake-up of the traditional shape of the wireless and mobile communications sector which helps to spread the spectrum all over the city.

1. By starting with a TDMA approach with intelligent scheduling, Wi-MAX will be able to deliver not only high speed data but latency sensitive services such as voice and video or data base accesses are also supported.
2. Within five years, we expect Wi-MAX to be the dominant technology for wireless networking. By that time it will be fully mobile as well as providing low cost fixed broadband access that will open up regions where internet access has so far not been practical.
3. Public WLAN, while offering clear benefits, is limited in coverage and mobility capabilities. Wi-MAX by-passes these limitations and offers broadband connectivity in larger areas (hot zones).
4. Wi-MAX provides a media access control (MAC) layer that uses a grant-request mechanism to authorize the exchange of data. This feature allows better exploitation of the radio resources, in particular with smart antennas, and independent management of the traffic of every user.

## X. DISADVANTAGE

The main disadvantage of wi-max is its installation and operational cost. Due to heavy structure tower, antenna, etc. makes the wi-max network collectively high cost network.

## XI. CONCLUSION

Various initiatives are being taken by the government of India to convert 100 cities into smart cities. The real challenge before the Government is to build inclusive smart cities for all its residents, irrespective of whether they are rich or poor. In a country like India, the process of making smart city should be people centric. The idea should be to make cities work for the people. In order to fulfill the vision of smart city wi-max technology should be implemented. So people get cost free surfing and downloading which enhance the networking.

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