

# Smart Mesh Networking City by New Method

D.Sivakumar<sup>1</sup> and N.Legapriyadharshini<sup>2</sup>

<sup>1</sup>Department of Computer Science and Engineering  
Easwari Engineering College, Chennai, Tamil Nadu,

<sup>2</sup>Department of Information Technology  
Adhiparasakthi Engineering College, Melmaruvathur, Tamil Nadu, India  
E-mail: dgsivakumar@gmail.com, Legasakthi108@gmail.com

(Received 13 February 2017; Revised 28 February 2017; Accepted 18 March 2017; Available online 24 March 2017)

**Abstract** - Current Trend in Networking is Wireless Mesh Networking (WMN) that makes rural village, a smart city (Mesh City) with their new technical infrastructure and characteristics. Wireless Mesh Networking provide excellent broad band connection to the rural region for making rural smart city. Although several planning is carried for mesh networking using various Protocols, Algorithms in this paper we design a new method with low cost network deployment in rural regions.

**Keywords:** Wireless Mesh Network, Multipurpose Community Telecentre, Deployment, Smart City

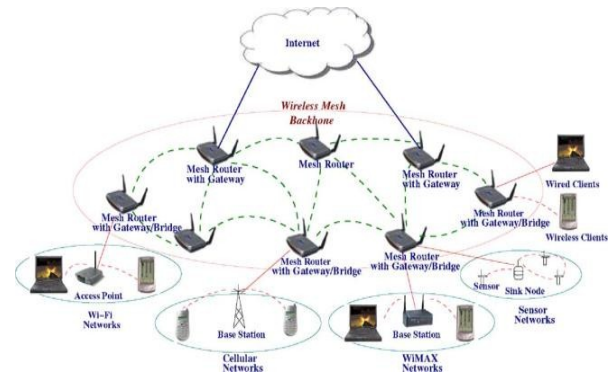


Fig.1. Infrastructure of WMNs

## I. INTRODUCTION

A mesh is a multi-path, multi-hop wireless Networking. WMNs significantly improve the performance of wireless LANs, PANs, and MANs to provide Internet access for fixed and mobile wireless devices like smart phones, mobile phones, PDAs, laptops *etc.* is on the increase[1]. They are intended to deliver wireless services for a large variety of applications in personal, local, campus, and metropolitan areas. They will greatly impact the development of wireless-fidelity (Wi-Fi), worldwide interoperability for microwave access (WiMAX), UltraWideBand (UWB), Wireless Mesh Networking dream is to connect the urban areas to the current world[2].ICT makes Urban to Smart city. Smart City is growing faster with the help of Information and Communication Technologies (ICT). Smart city monitors Urban people living, landscape through various powerful sensors. Through this various sensors data is transmitted ,aggregated and analyzed by government and other various private authorities for security purpose, However, there are still lots of issues need to be solved such as scalability, QoS assurance, better performance metrics, throughput improvement and considerable research efforts are still needed in routing protocols, algorithms, methods are still needed to make rural areas to smart city or e-city or mesh city which possess all technical infrastructure for future generation[4][6]. Below Fig 1 represents the smart city diagram

## II. DEPLOYING PROTOCOLS FOR SMART CITY WMN

Mesh networking their technical wireless architecture delivering service applications in personal, local, departmental, campus and metropolitan areas [2].Deployment of wireless application in Mesh Networking makes rural smart city. Smart city vision is to make rural smart building, smart energy, smart water, smart mobility, and smart public services. Smart city mission is to making best individual, best economy, best infrastructure, best environmental services.

### A. Rural Network Planning

Better Planning in rural areas is more important for safety, communication purpose. Information and Communication Tele Services (ICT) are provided by Multipurpose Community Tele Centre's (MCTs).Planning and developing MCTs is to increase the internet Usage in rural areas. MCTs important role to educate(computer training, word processing, documentation, scanning, photocopy, Internet, Email, Webhosting, Software downloading, online banking, Fax, Mobile services etc) the rural community for quick processing in mesh networks. Types of MCTs are represented in Fig 2. MCTs services are e-Learning, e-Government, e-Health, e-Commerce etc [4].

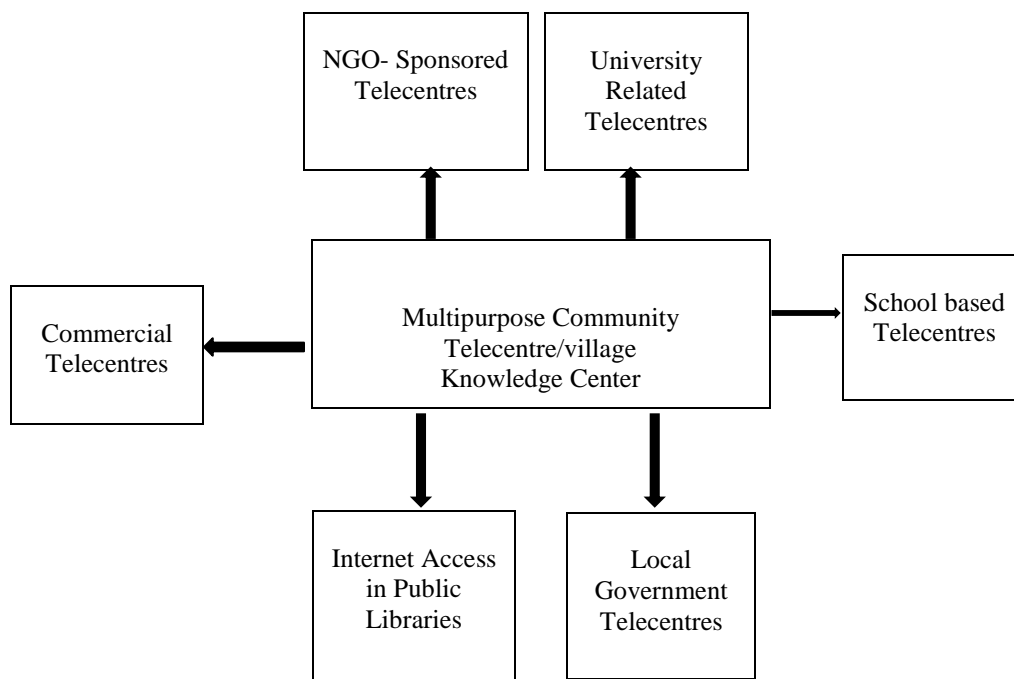


Fig.2 Types of MCTs

In WMN deploying protocols has no systematic approach in the planning. so network deployments can cause problems like connectivity problem, lack of coverage, less number of performance etc. Many approaches has been proposed for better planning in WMN. For Efficient network better planning new methodology is proposed. This new methodology aims to educate the village people and make rural smart city in future.

**III. DESIGN A NEW METHODOLOGY**

**A. Best Approach**

In this method technically improving smart city with internet connection. Let us consider in two steps:

1. Outdoor deployments is costly and requires more energy.
2. Indoor network deployments is low cost and low energy utilization.

For outdoor network deployments more number of antennas are involved for power supply solar panel or high battery power has to used is costly. But Indoor network deployments security is more and utilization is less which is low cost . But mixed approach like indoor – outdoor network deployments should be concentrated on coverage and throughput for better network deployments.

**B. Design A New Steps**

**1. Analyse the Regions**

Analysing the regions in rural is not only in geographical factor but in the socio- economic factor. Survey is carried out in the regions[4][6].

Geographical region consideration: Population growth like rural people activities, income, topology climate brings more changes in the network requirement

Structural Considerations: Roads, energy supply, buildings, markets and Internet access points.

Many Technical Considerations: computer, mobile device (cell phones, tablet) network operator, radio, TV Spectrum availability.

Government considerations (Public and Private): Specturm regulation, other laws and regulations, government interest services.

In this analysis, the above socio economic factors are analyzed. Appropriate information is gathered for rest of the process.

**2. Identifying Coverage Area Requirements**

The main characteristics in coverage is area of interest, place and type of node.

The coverage area must be low cost ie. Area of interest it may be school, hospital, home or market etc where the signal can reach quickly to preserve time. After selecting area location ,then find out the place may be indoor or outdoor deployments. The node may be placed in indoor or outdoor .If wifi is deployed means it is cost less but coverage area is low when compared with WiMax. WiMax have greater coverage area but infrastructure is complicated. So deploying parameters should be carefully analysed.

To increase the WMN performance in coverage omnidirectional antennas (like dipoles) can be deployed. Utilization of bandwidth is high and costly. Low cost

technical aspects can be taken for considerations .Landline Internet connection Which is low cost is taken[4].

**3. Identifying the hardware and software requirements:**

A detailed checklist should be prepared for hardware software requirements like wireless mesh router consists of computer, antenna, server with all necessary equipments, suitable operating system and server admin to manage all hardware and software resources. Landline Internet connection is low cost.

**4. Identifying Services**

Relevant applications and their requirements should be identified carefully. Broadband connectivity has enabled Urban farming community to remain competitive within a highly aggressive market. For example, farmers can use IT to register newborn calves online, which saves paperwork, postage, and (most crucially) time. Also, the use of ecommerce Web sites has transformed some local stores into international businesses VoIP technology such as email, video conferencing, chatting, messaging and several blogging make social communication to the wide region through broad band internet. Online meeting makes rural people to know wide knowledge than physical meeting. Villagers use web cameras for communication to clear their doubts regarding issues regarding farming and social threats etc[6].

Especially in this method for relevant application and services let us consider throughput with low bandwidth can be taken for model or frame work.

**5. Estimating the Qos:**

For Indoor Deployments chipsets like IEEE 802.11 with NICs characterization has low transmission power is

preferred. Certain methods , routing protocols can be taken to increase the bandwidth efficiency. Here less number of bandwidth is consider for high volume of traffic flow in QoS mechanism. For example if we take grid power compared with battery for buildings and houses it reduces the cost for indoor deployment.

**6. Mesh Network Deployment:**

In the Design Phase network deployment is important process. Identifying the nodes, their type of parameters, type of protocols for deployment in the network.

Multi objective approach can be implemented in which minimize the total number of outdoor deployments and maximizing the throughput for better coverage.

Mesh Networking consists of various routing protocols like AODV, OLSR, HWMP routing metrics like end to end delay, throughput, energy that connects smart city to world wide. Finally in Verification process checking whether all requirements are met or else the process is repeated until all the requirements are met for final result.

**7. Cost Estimation Factor:**

Cost Estimation is the final step where estimating the cost for overall methods for implementation. In this method for Indoor deployments are carried out at low cost. Dial up services are used in indoor deployments which is low cost.

Internet Utilization in the world is growing faster with the help of new technologies like Wifi, WiMax, VOIP etc also omnidirectional antennas in hill areas for spreading signals faster. The below fig.3 represents the Internet Utilization in the world statistics. Increasing usage in internet makes rural smarter city.

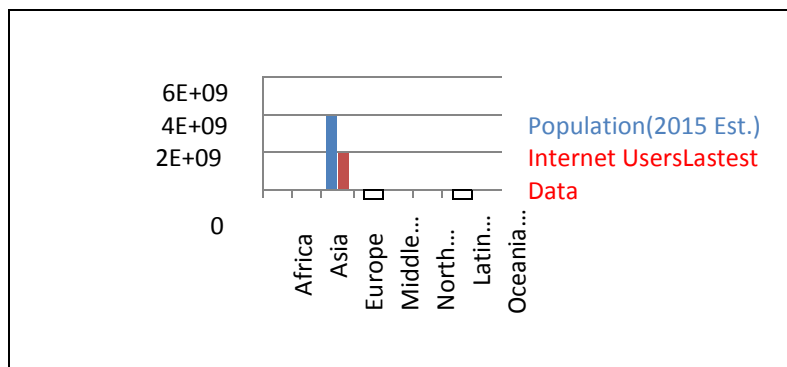


Fig.3 Utilization of Internet in the world

#### IV.CONCLUSION

Incubating MCTs in rural areas makes individuals knowing the current technology by Conducting Community based training centers offer internet surfing and developing technical digital libraries tends to make rural a smarter city.

Several protocols, algorithms, methods have been illustrated for making rural region smarter through mesh networking. In this paper we design a method only considering the indoor deployments which is low cost for making city smarter. But in future several outdoor network deployments can be taken for research.

#### REFERENCES

- [1] Miniwatts Marketing Group (2014) Internet Usage for Africa.<http://www.internetworldstats.com/stats.html>.
- [2] Jean Louis Ebongue Kedieng Fendji1,Jean Michel Nlong, "Rural Wireless Mesh Network: A Design Methodology", Communications, Network and System Sciences,2015,8,1- 9, Published Online January 2015 in SciRes.
- [3] NoorShed Khanand Dawid Bawden, "The Emerald Research Register", New Library world Vol 106. No.1218/1219,2005 pp 532- 540, Emerald Group Publication Limited 03077-4803.
- [4] Szabo,C,Hovith,Z. and Farkas,K (2007)Wireless Community Networks:Motivation,Design and Business Moels,Proceedings of the 3<sup>rd</sup> International Conference on Wireless Internet WICON '07,ICT,Austin,1-10
- [5] Butler,J.,*et al*, "Wireless Networking in the Developing World",3<sup>rd</sup>Edition, 2013..
- [6] Ishmael,J.,Bury,S,Pezaros.D, and Race.N, (2008) Deploying Rural Community Wireless Mesh Networks, Internet Computing, IEEE 1222-29.