

## GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES A CONNECTED DOMINATION SET (CDS) BASED CITY SECURITY MANAGEMENT SYSTEM (CSMS)

Preeti Gupta<sup>\*1</sup>, Omprakash Sikhwal<sup>2</sup> & Mahaveer Jain<sup>3</sup>

<sup>\*1</sup>Department of Mathematics, PIEMR, Indore (M.P.) India

<sup>2</sup>Department of Mathematics, PIET, Poornima Foundation, Jaipur (Raj.) India

<sup>3</sup>Department of Computer Science, PIEMR, Indore ( M.P. ) India

### ABSTRACT

This paper puts forward the idea of the necessity and urgency in further enhancement of city security management system.(CSMS) This needs to be solved by new network architecture, named as Connected Security Dominating System (CSDS), has been proposed. Considering that the Connected Dominating Sets (CDSs) are commonly used to support data collection and network communication and thus we will also investigate the CDS construction problem in Security Devices. Such technology extremely expands the scope of the IoT applications. In this paper, the problem of constructing CDS in a CSDS network is formally used in City Security Management System. Due to the practical demand, it also mainly introduces the general structure, function, technology and operational pattern in city security management network.

MSC 2010: 05C40, 05C69, 05C85, 05C99

**Keywords-** Graph, CDS, CSDS, CSMS, Dominating Nodes, Security Nodes.

## I. INTRODUCTION

Smart city concept can be used for transforming any city into a smart city. Smart cities have various overwhelming advantages & it a win – win situation for both, government & the citizens. Smart solutions can be helpful in controlling the ever increasing population in the cities. The Government of India launched the smart city project for developing 100 smart cities (now 98 smart cities) in the country and also concentrates on the challenges as well as the key areas for development of smart cities in India.

Now days we are witnessing a rapid urbanization because of which there has been a steady increase in migration from rural to urban areas. It is expected that about around 70 per cent of the global population will be living in cities by the year 2050. We need about 500 new cities to accommodate the inundation.

India is a no exception to this urban migration. There has been an increase in the load on rural land due to the expansion in the urban population. Indian government has now realized the need of hour i.e., to build new cities that can cope up with the challenges of urban living.

The announcement of ‘100 Smart Cities’ falls in line with the vision of providing ample living space in the urban regions. This also allows for investment opportunities in the infrastructure sector in India.

When it comes to benefits or advantages which a Smart City has over a normal one is that these cities are highly advanced in terms of overall infrastructure, sustainable real estate, communications and market viability.

In a Smart City the information technology play a pivotal role in providing the essential services to its residents. The information technology is the major infrastructure of these cities. Automated sensor networks and data centers are the examples of technological platforms involved in these Smart Cities.

These Smart Cities have sustainable economic development which benefits everyone, including citizens, businesses, the government and the environment.

The concept of Smart Cities has its origins way back to 2008 when IBM began working on a smarter cities concept as a part of its Smarter Planet initiative. By the beginning of 2009, this concept of Smart Cities has captivated the imagination of various nations across the globe.

After the year 2009 many countries like UAE, South Korea and China began to invest heavily for research and formation of these Smart Cities.

The India cities which have current or proposed smart cities include Kochi in Kerala, Ahmedabad in Gujarat, Aurangabad in Maharashtra, Manesar in Delhi NCR, Khushkera in Rajasthan, Krishnapatnam in Andhra Pradesh, Ponneri in Tamil Nadu and Tumkur in Karnataka.

Both central as well as the respective state governments in India have created Special Economic Zones (SEZs) and Special Investment Regions (SIRs), where regulations and tax structures are eased, thereby attracting foreign investment. Majority part of funding for these projects is from the private developers and from foreign investors, hence the modification in regulations and tax structures.

Every project has to go through many restrictions, hardships, hurdles and challenges to reach the successful outcome. The Smart City projects are no exception to this. The success of a smart city depends on its residents, entrepreneurs who are actively involved in energy saving and implementation of new technologies.

There are a number of ways in which the sustainability of residential, commercial and public spaces be achieved by using advanced technology. But the choice of using these technologies to reduce energy usage is in the hands of the end users itself.

Successful completion of these **Smart City projects** in the given time with the required quality is also one of the major challenges which infrastructure sector is facing.

#### **Features of Smart Cities**

- Adequate Water Supply (WMS)
- Safety & Security (CSMS)
- Assured electricity supply,
- Sanitation, including solid waste management,
- Efficient urban mobility and public transport,
- Affordable housing, especially for the poor,
- Robust IT connectivity and digitalization,
- Good governance, especially e-Governance and citizen participation,

## **II. SAFETY AND SECURITY**

As urbanization intensifies and public sector technology initiatives advance quickly, the once-futuristic promise of “smart cities” is coming to fruition.

Cities have always been “smart” to a degree, using technology to boost the productivity and efficiency of municipal services. But today, the proliferation of digital connectivity and big data explosion are creating new opportunities for beneficial smart-city projects across a range of sectors.

The speed and stability with which our cities optimize for efficiency, sustainability and safety will broadly impact quality of life issues around the world. Information and communications technology, including demographic analytics, the Internet of Things (IoT) and cyber-physical infrastructure, will obviously play a central role.

Unfortunately, connectivity and data factors also bring risks, including breaches of personal information, disruption to critical infrastructure and damaged public trust. While a failure of internal systems is a relatively private misfortune, a failure between interconnected sectors presents risks of a much larger magnitude.

The fallout of disruption can extend to cascading failures, wherein highly interconnected entities rapidly transmit adverse consequences to each other. It's no easy task to invest in information security while creating a sustainable urban environment, but this is the challenge we face as digital connectivity and data-driven services become tightly woven into the fabric of smart cities.

Public security is a growing problem for cities worldwide. Huawei's LTE technology helps knit together a private Internet of Things (IoT) to provide police and emergency services with new technologies to fight crime and make cities safer. . These devices need to be fixed and has to communicate to get the actual information. Hence in this section in order to optimize the usage of these devices, dominating set is used to identify the CSDS and thus minimizes the number of devices used which will increase the perform control tasks more effectively.

### **III. CITY SECURITY MANAGEMENT SYSTEM (CSMS)**

CSMS, is a modular monitoring and imaging system used in urban areas for law enforcement to ensure public security, to defend against internal security threats and to perform control tasks more effectively.

Tracking and Monitoring Devices in CSMS:

- Command and control center,
- Vehicle tracking system,
- Mobile vehicle inquiry system,
- Police station holding cell improvement and control system,
- Regional imaging system,
- Automatic number plate recognition system,
- Mobile operations management and
- Police computer network.
- AI based tracking system

### **IV. NEED FOR CSMS**

Security consists of the policies and practices adopted to prevent and monitor unauthorized events. India is now in a period of rapid urbanization, and in it is expected that about around 70 per cent of the global population will be living in cities by the year 2050. With the acceleration of urbanization, cities will encounter internal development unbalance and social fracture as well as widening gap between cities and country side, which endangers the overall development of urban development.

With the acceleration of social information diversification, in absence of CSMS, once a security accident occurs, it will immediately cause social panic and worries. Once a security accident occurs, it will immediately cause social panic and worries.

CSMS should focus on daily management mechanism by taking correct measures before a disaster happens and by controlling the source of dangers, so as to improve the management level of cities.

The CSMS will responsible for taking emergency actions to unexpected contingencies, handling the safety and making random checking and supervision of the city.

The Technology Support to the Building of CSMS are: Wireless communication technology; Network scheduling based on real-time message notification mechanism; Business data analysis based on data mining technology; Distributed CTI technology; GIS technology Multimedia technology.

In general, the building of city security management system has a lot of difficulties, but as soon as it is completed, it will substantially improve the overall level of society in disaster prevention and alleviation, assure people's life and property safety and do well for future generations.

## V. PROPOSED ARCHITECTURE

### Connected Dominating Set (CDS)

A Dominating Set DS is a subset of nodes such that each node is either in DS or has a neighbor in DS. A Connected Dominating Set CDS is a connected DS, that is, there is a path between any two nodes in CDS that does not use nodes that are not in CDS. A CDS is a good choice for a backbone. It might be favorable to have few nodes in the CDS. This is known as the Minimum CDS problem.

### Dominating Set In CSMS

How to keep our city safe and secure, always a challenge, Technology can help us to do the same. Security devices installed in every point of city but it increases the cost. Hence in this section in order to optimize the usage of these devices, dominating set is used to identify the CSDS and thus minimizes the number of devices used which will optimize CSMS cost.

City Security Management System needs to be done using security devices in the places where traffic, accidents, crime etc. points is more. In order to optimize the usage of these devices, dominating set is used to identify the CSDS and thus minimizes the number of devices used, which will increase the clarity in communication.

To reduce the usage of security devices CSDS is used. Various parameters used for identifying Dominating set

These parameters help to find DS within the city. These DS can be used to fix CCTV monitoring camera, Speed Analyzers and other tracking devices can be used.

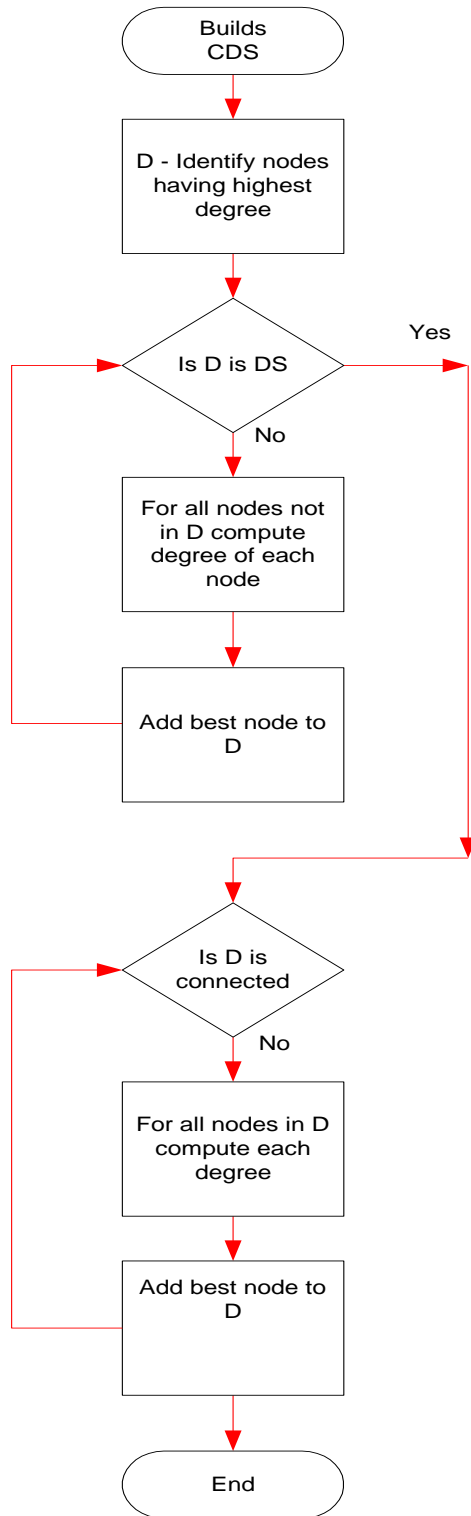
Covering all the points of city may be quite expensive. We can minimize the cost and maintenance with the help of various parameters as Dominating set. Parameters used for identifying Dominating set are –

1. Traffic Congestion
2. Disaster Centers
3. Critical Sectors ,
4. Vehicle Tracking
5. Other Criteria

These parameters helps to find the DS and security devices were fixed in the places of dominating set. Area are represented as nodes and by considering anyone of the above parameters, the edges are drawn between the nodes. The number of security nodes where the devices need to be fixed is more which leads to lot of interferences. In order to avoid this we need to reduce the nodes. By Connected Dominating Set we can identify Dominating nodes through the above mentioned parameters. These CSDS will communicate to other nodes and helps to reduce the usage of security devices which in turn to optimize the usage of these devices.



Fig 1 Security Nodes after CDS



Proposed architecture can implement by using domination set in computer networks. The information between the nodes is well routed using the dominating set nodes between the computer and communication networks. A wireless network is a type of computer network that uses wireless data transmission by connecting the wireless network nodes. Cell-phone network, mobile Ad-hoc network, wireless sensor network etc. are some of the examples of Wireless Sensor Network. The mobile devices in wireless mode are connected using the less self configurable infrastructure network Mobile Ad Hoc Network (MANET). In Mobile Ad Hoc networks for routing and broadcasting the information the dominating set theory has been used. To provide different communication primitives such as routing, broadcasting etc. A Connected Dominating Set (CDS) is widely used for MANETs.

## VI. ADVANTAGE OF CDS IN CDMS

In order to build a robust and sustainable smart city –Safety and Security is very important. The main advantage of CDS in CDMS helps to reduce the usage of security devices which in turn to optimize the usage of these devices

## VII. CONCLUSION

In this paper we have proposed reference architecture for city security management based on CSDS capabilities to achieve a scalable and feasible security system. Hence in order to optimize the usage of these security devices, dominating set is used to identify the CSDS and thus minimizes the number of devices used which will increase the perform control tasks more effectively. This Connecting Dominating Set Architecture will reduce the number of usage of security devices and helps to minimize the CSMS cost.

## VIII. ACKNOWLEDGEMENT

The authors are highly thankful to everyone who contributed to the success of this work.

## REFERENCES

1. *Anuj Tiwari and Dr. Kamal Jain*, “GIS Steering Smart Future for Smart Indian Cities.” International Journal of Scientific and Research Publications, Volume 4, Issue 8, (August2014).
2. *Charbel Aoun*, “The Smart city Cornerstone: Urban Efficiency.” Schneider Electric White Paper, (2013).
3. **Du**, Ding-Zhu, **Wan**, Peng-Jun, Connected Dominating Set: Theory and Applications ( 2013)
4. *Faisal Razzak*, "Spamming the Internet of Things: A Possibility and It's probable Solution", The 9th International Conference on Mobile Web information Systems, Procedia Computer Science 10,658-665, (2012)
5. *Hafedh Chourabi, Taewoo Nam, Shawn Walker, J. Ramon Gil-Garcia, SehlMellouli, Karine Nahon, Theresa A. Pardo & Hans Jochen Scholl*, “Understanding Smart Cities: An Integrative Framework.” Hawaii International Conference on System Sciences, (2012).
6. *Kehua Su, Jie Li and Hongbo Fu*, “Smart City and the Applications.” IEEE, 2011.
7. *Leyla Zhuhadar, Evelyn Thrasher, Scarlett Marklin, Patricia Ordóñez de Pablos*, The next wave of innovation—Review of smart cities intelligent operation systems, Computers in Human Behavior, Volume 66, 273-281, (January 2017),
8. *Miorandi, Daniele, Sabrina Sicari, Francesco De Pellegrini, and Imrich Chlamtac*. "Internet of things: Vision, applications and research challenges." Ad Hoc Networks 10, no. 7, 1497-1516, (2012)
9. *Pinank R. Patel, Himanshu J. Padhya*, review paper for smart city, International journal of advanced research in Engineering, Science and Management.
10. *Robert E. Hall*, “The Vision of a Smart City.” 2nd International Life Extension Technology Workshop, 2000.
11. *Rocco Papa, Carmela Gargiulo and Adriana Galderisi*, “Smart cities: Researches Projects and good practices for the cities.” TeMa Journal of Land Use, Mobility and Environment, 5-17.( 2013)
12. *Somayya Madakam, R. Ramaswamy*, The State of Art: Smart Cities in India: A Literature Review Report (Dec2013)

13. Vijayan, A., and T. Anitha Baby. "Connected Total Domination Polynomials Of Graphs." International Journal of Mathematical Archive ISSN 2229-5046 [A UGC Approved Journal] **1.11** (2015)