

MINOR PROJECT 2

SYNOPSIS

ON

Data Communication Using Software-defined Wireless Network

Submitted By

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Abstract

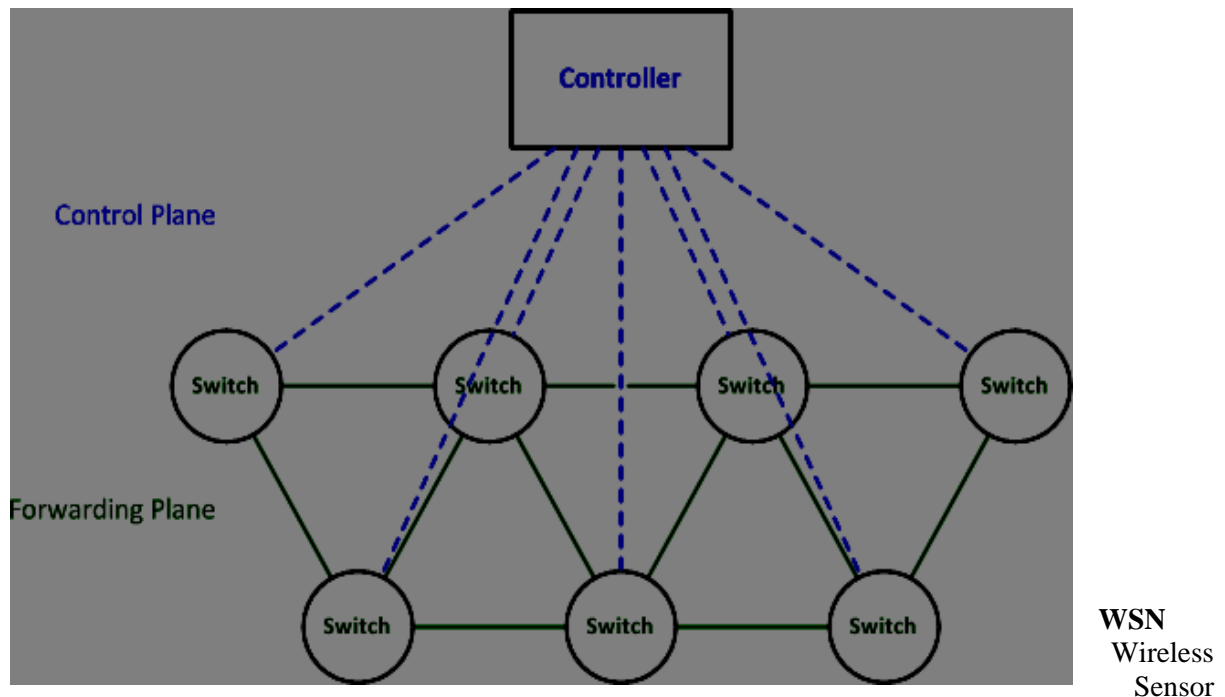
Software Defined Network is an emerging paradigm that promises to change this state of affairs, by breaking vertical integration, separating the network's control logic from the underlying routers and switches, promoting (logical) centralization of network control, and introducing the ability to program the network. SDN brings many well-known benefits such as manageability and adaptability, it also poses some challenges. Scalability becomes an issue in large scale networks, where the forwarding rules of single elements must be updated at a high pace by central controller. This problem can be solved using Dynamic Flow rule. Dynamic Flow rules enables network elements to change their forwarding behaviour locally according to pre-defined instruction set up by central controller.

1) Introduction:

SDN

Software-Defined Networking (SDN) is a network architecture approach that enables the network to be intelligently and centrally controlled, or 'programmed,' using software applications. This helps operators manage the entire network consistently and holistically, regardless of the underlying network technology.

SDN enables the programming of network behaviour in a centrally controlled manner through software applications using open APIs. By opening up traditionally closed network platforms and implementing a common SDN control layer, operators can manage the entire network and its devices consistently, regardless of the complexity of the underlying network technology.



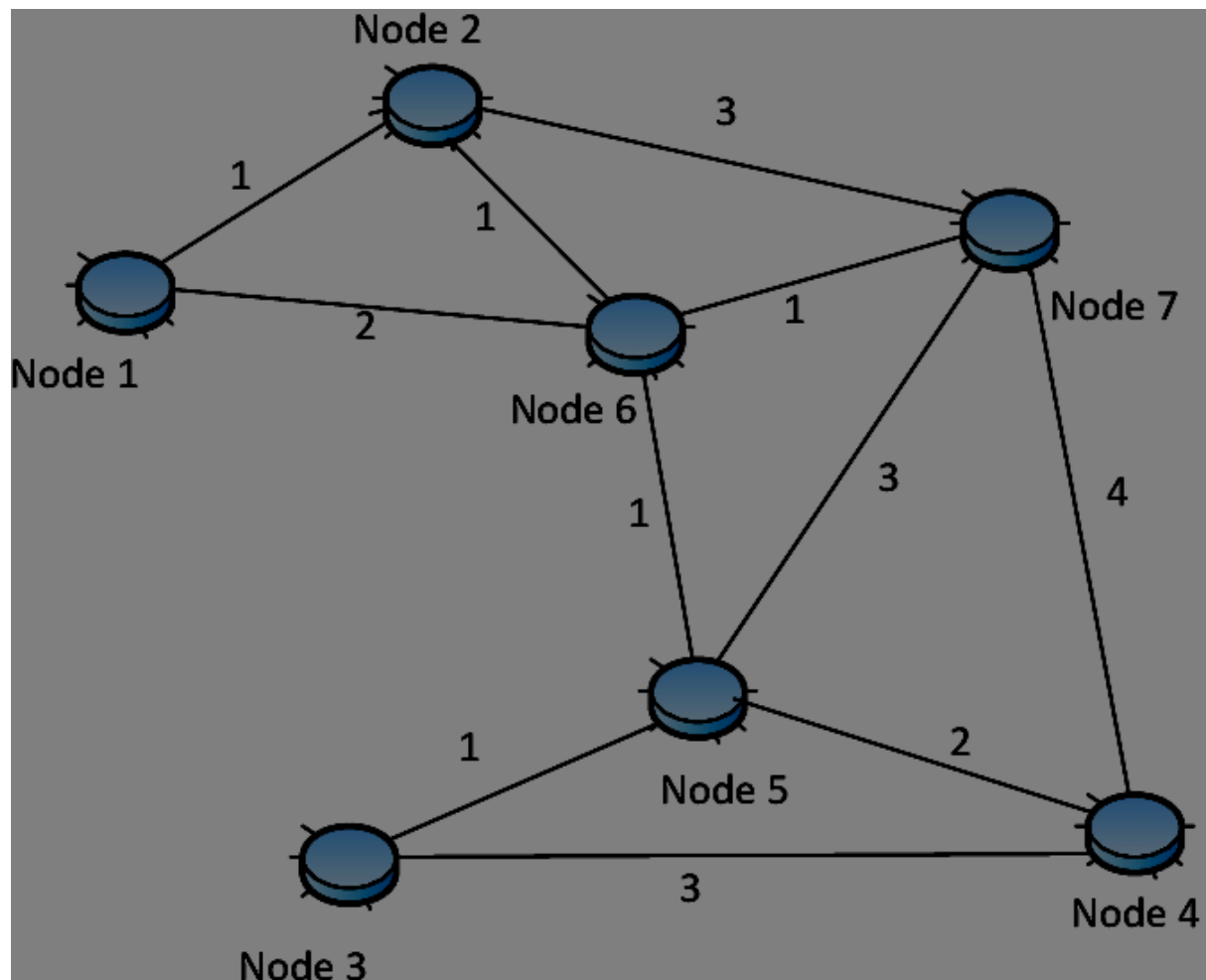
Networks (WSNs) can be defined as a self-configured and infrastructure-less wireless networks to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion

or pollutants and to cooperatively pass their data through the network to a main location or sink where the data can be observed and analysed.

Typically a wireless sensor network contains hundreds of sensor nodes. The sensor nodes can communicate among themselves using radio signals.

In this project Sensor network is assumed as a graph in which nodes and edges are present. Graph is implemented using Adjacency list, Adjacency list uses two types of Data Structure first is Hash Map other is Linked List. Graph has attributes named Nodes, Dynamic Array. Dynamic Array contains every node so that we can retrieve data from each node.

The design complexity of a WSN depends on the specific application requirements such as the number of nodes, the power consumption, the life span of the sensors, information to be sensed and its timing.



2) Objective:

- Generations of centralized control wireless sensor networks.
- Data communications through flow rules.

3) Problem Statement:

Flow rule-based data transmission from source to destination with minimum cost in software-defined wireless network.

4) Literature Review:

Software-Defined Networking (SDN) is an emerging architecture that is dynamic, manageable, cost-effective, and adaptable, making it ideal for the high-bandwidth, dynamic nature of today applications. Software-Defined Networking (SDN) plays an important role in paving the way for effectively virtualizing and managing the network resources in an on demand manner. [1]The control plane is heart of the SDN architecture, so it is very important to give proper concern towards the design parameter of controller. Controller provides a programming interface to the network. Multiple controllers are being used to hold the backup of data of controller that controls the whole network. [2]

In recent years an efficient design of a Wireless Sensor Network has become a leading area of research, A Wireless sensor network can be defined as a network of devices that can communicate the information gathered from a monitored field through wireless links. [3]The data is forwarded through multiple nodes, and with a gateway, the data is connected to other networks. WSN is a wireless network that consists of base stations and numbers of nodes (wireless sensors) WSNs are highly useful in several fields of research, overall in computer science and telecommunications.[4] Such networks provide a great applicability from the point of view of monitoring to obtain important information in a system or an environment. the union between WSN and SDN architecture allows for multitasking in WSN. Architecture comprised of WSN and SDN allowing multitasking sharing the same network resources. Therefore, each sensor contains several programs running within them, which belongs to these applications based on user requirements. In order to support multitasking in an efficient way, it offers an optimization (in terms of load and energy) in all applications managed by a global controller with a scheduling process. [5]

5) Methodology:

5.1) Introduction: This module covers details of planning, implementation, testing and analysis of our project based on the requirement.

5.2) Planning: In planning phase we study information from various research paper, article, blogs related to Software Defined Network(SDN) and Wireless Sensor Network(WSN) and also we identifies the hardware and software requirements of the project, software requirement like operating system(Windows 10), Programming language(Java), Eclipse compiler.

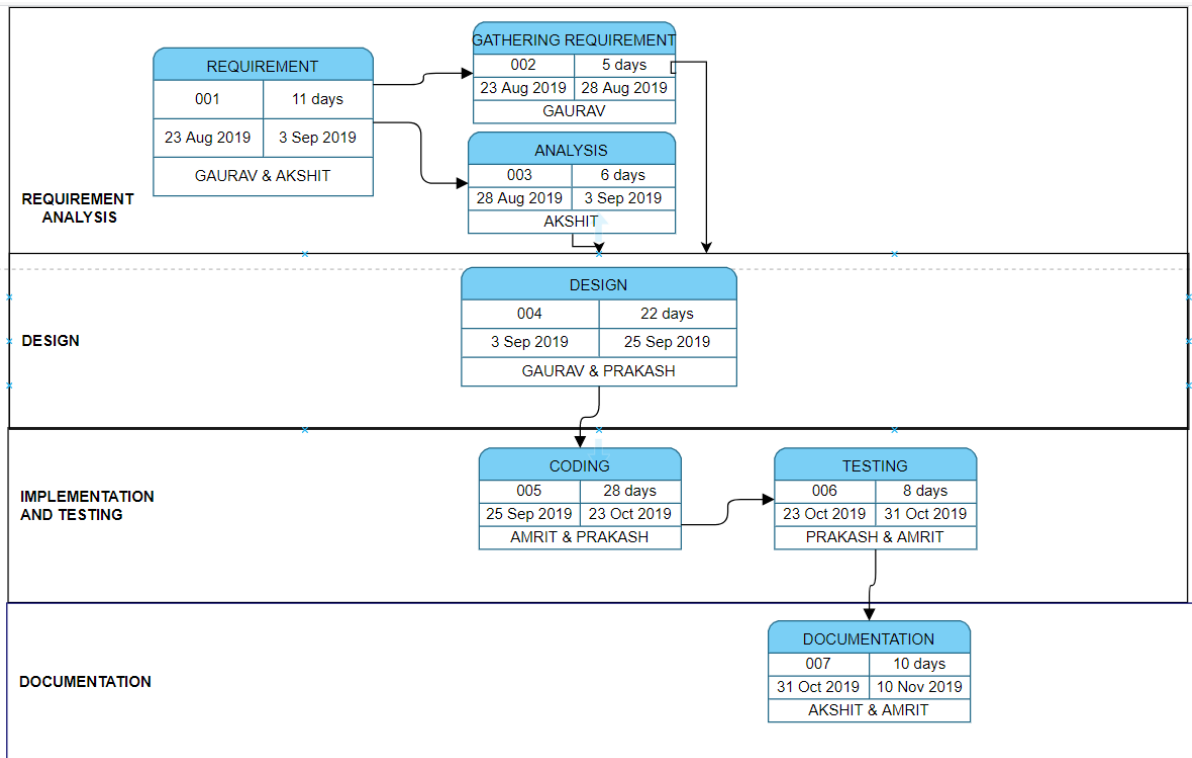
5.3) Implementation: Sensor network is assumed as a graph in which nodes and edges are present. Graph is implemented using Adjacency list, Adjacency list uses two types of Data Structure first is Hash Map other is Linked List. Graph has attributes named Nodes, Dynamic Array. Dynamic Array contains every node so that we can retrieve data from each node.

Each Node contains its name, Output Queue which contains forwarding packets, Flow table decides the flow rules. Information is send from source node to destination node with minimum cost. Every node contains information of packets to be sent to which node.

6) System Requirement:

Operating System	:	Ubuntu 18.04/Windows
Programming Language	:	Java
IDE	:	Eclipse
Processor	:	Pentium IV
Disk Drive	:	Floppy or Hard Disk Drive
RAM	:	512 MB (min)
Monitor	:	with 80 columns

7) Schedule (PERT Chart):



8) References:

- [1]. Wei, Qing, & David,P. Dynamic Flow Rules in Software Defined Networks,Retreived from Huawei Technologies - European Research Center, Riesstrasse 25,80992 Munich, Germany.
- [2].Open Networking Foundation, “Software-Defined Networking: The New Norm for Networks,” Open Networking Foundation, Palo Alto, CA, USA, White paper, Apr. 2012.
- [3]. G. Bianchi, M. Bonola, A. Capone, and C. Cascone, “OpenState: Programming Platform-independent Stateful OpenFlow Applications Inside the Switch,” ACM SIGCOMM Computer Communication Review, vol. 44, no. 2, pp. 44–51, 2014.
- [4].Y. Fu, J. Bi, Z. Chen, K. Gao, B. Zhang, G. Chen, and J. Wu, “A Hybrid Hierarchical Control Plane for Flow-Based Large-Scale Software-Defined Networks,” Network and Service Management, IEEE Transactions on, vol. 12, no. 2, pp. 117–131, June 2015.
- [5].B. Raghavan, M. Casado, T. Koponen, S. Ratnasamy, A. Ghodsi, and S. Shenker, “Software-defined internet architecture: Decoupling architecture from infrastructure,” in Proceedings of the 11th ACM Workshop on Hot Topics in Networks, ser. HotNets-XI. New York, NY, USA: ACM, 2012, pp. 43–48.

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