**PROJECT SYNOPSIS**

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| DEPARTMENT | COMPUTER SCIENCE AND ENGINEERING | | | |
| TITLE OF THE PROJECT | Designing and Implementing Wide Area Network Using OSPF Protocol | | | |
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| STUDENT NAMES/ Roll No / PHONE/ MAIL ID | Devansh Khandelwal | Arpit Sharma |  |  |
| 21BCON078 | 21BCON067 |  |  |
| 7357448339 | 89495 99497 |  |  |
| devkhandelwal25082002@gmail.com | Arpitsha2003@gmail.com |  |  |
| PROJECT TIMELINE  (Tentative Start date- End Date) | March 2024 to May 2024 | | | |
| PROJECT GUIDE | , Dept. of CSE | | | |
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| PROJECT - DOMAIN | Computer Networks | | | |
| INTRODUCTION | A Wide Area Network (WAN) is a crucial component of modern data communication, extending beyond the confines of Local Area Networks (LANs) to facilitate the transmission of data across vast geographical distances. WANs rely on facilities provided by service providers or carriers and employ serial connections to ensure connectivity over expansive areas. Enterprises seeking to utilize WAN services must subscribe to a WAN service provider, granting access to carrier network services.  Dynamic routing protocols serve as the backbone of contemporary network infrastructures, offering several essential benefits. These protocols dynamically adjust routing tables based on real-time network conditions, optimizing data transmission and ensuring efficient utilization of network resources. In many network setups, dynamic routing protocols complement static routes, providing flexibility and adaptability to evolving network environments.  Among dynamic routing protocols, OSPF (Open Shortest Path First) stands out as a cornerstone technology, particularly in complex network architectures. OSPF implementation necessitates coordination among internal routers, area border routers (interconnecting multiple areas), and autonomous system boundary routers. At its core, OSPF routers or access servers can be configured with default parameter values, devoid of authentication, with interfaces assigned to specific areas. However, for tailored network environments, meticulous coordination is essential to ensure consistent and optimized configurations across all routers.  In summary, WANs, powered by dynamic routing protocols like OSPF, form the backbone of modern data communication networks, enabling seamless connectivity and efficient data transmission across vast geographical expanses. | | | |
| APPLICATIONS | Enterprises are increasingly harnessing the power of multiple WAN links to interconnect their branch offices with data centers and headquarters. In managing these complex network architectures, one historically prevalent option is the utilization of Open Shortest Path First (OSPF), an Interior Gateway Protocol (IGP).  OSPF facilitates efficient routing within an organization's network infrastructure, offering dynamic adaptation to changing network conditions. By leveraging OSPF, enterprises can optimize data transmission across their interconnected branches, data centers, and headquarters, ensuring seamless communication and resource utilization.  The flexibility and scalability of OSPF make it particularly well-suited for managing diverse WAN environments, where multiple links and routing paths necessitate dynamic routing protocols for optimal performance. Through OSPF, enterprises can achieve robust connectivity, enhanced network resilience, and streamlined management of their distributed network infrastructure. | | | |
| CHALLENGES IN THE CURRENT WORK | **Challenges :**   * Inflexible OSPF area structure   OSPF's area structure can sometimes be rigid, making it challenging to adapt to evolving network requirements. Enterprises may find it difficult to reconfigure OSPF areas to accommodate changes in network topology or traffic patterns.   * OSPF’s limitations on filtering prefixes   OSPF has limitations when it comes to filtering prefixes, which can lead to difficulties in controlling the flow of traffic and managing routing tables efficiently. Enterprises may struggle to implement granular filtering policies, potentially impacting network performance and security.   * Consequent pockets of BGP or separate OSPF processes to filter when redistributing — sometimes to the point where it seems BGP is becoming the IGP for the organization * Using VLANs to extend many WAN areas and area 0 between two datacenters | | | |
| PROJECT PROBLEM STATEMENT | Design and Simulate a Wide Area Network. To design a topology which consists of 10 networks. Implement the scenario using OSPF Protocol (multi Area Concept) (Minimum 10 networks with subnet 198.100.1.0) | | | |
| OBJECTIVES OF THE PROJECT | * To Design a Wide Area Network consisting of 10 networks. * To connect networks using the Internet Protocol (IP), and OSPF (Open Shortest Path First). * To find the best path for packets as they pass through a set of connected networks. | | | |
| PROPOSED SOLUTION | * Creating representation LAN topologies * Connecting all the LANs into a WAN through routers. * Configuring the OSPF(Open Shortest Path First) Protocol | | | |
| PLATFORM THAT WILL BE USED FOR IMPLEMENTATION | **Cisco Packet Tracer** | | | |
| Demonstration Details | Demonstration of packet routing and real time Simulation mode of Cisco’s network simulation tool, Packet Tracer. | | | |
| ARE THERE ANY STANDARD DATASETS AVAILABLE | No | | | |
| REFERENCES | [1] [Ahmed Abo Ghazala](https://www.computer.org/csdl/search/default?type=author&givenName=Ahmed%20Abo&surname=Ghazala), [Ayman El-Sayed](https://www.computer.org/csdl/search/default?type=author&givenName=Ayman&surname=El-Sayed), [Mervat Mousa](https://www.computer.org/csdl/search/default?type=author&givenName=Mervat&surname=Mousa), 2008, Implementation of Open Shortest Path First to Wide Area Networks, IEEE, Retrieved December 05, 2022  {<https://www.computer.org/csdl/proceedings-article/isa/2008/3126a111/12OmNxaNGnF>}  [2] [Kazuya Odagiri](https://www.computer.org/csdl/search/default?type=author&givenName=Kazuya&surname=Odagiri), [Shogo Shimizu](https://www.computer.org/csdl/search/default?type=author&givenName=Shogo&surname=Shimizu), [Makoto Takizawa](https://www.computer.org/csdl/search/default?type=author&givenName=Makoto&surname=Takizawa), [Naohiro Ishii](https://www.computer.org/csdl/search/default?type=author&givenName=Naohiro&surname=Ishii),2012, Concept of Policy-Based Wide Area Network Management System, IEEE, Retrieved December 05, 2022  {<https://www.computer.org/csdl/proceedings-article/icis/2012/06211105/12OmNqHqSoT>} | | | |