

**Team Members**

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**Computer Network Project**

**FCDS Case Study**

**Supervised by**

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# **Computer Network Project**

**Case Study New Building of FCDS**

# **1.Project’s Structure**

|  |  |
| --- | --- |
| Structure | Topology Used |
| Whole project | **Star** |
| Data Science Dep | **Ring** |
| AI Dep | **Partially connected** |
| Media Dep | **Bus** |
| Business | **Tree** |
| Cybersecurity | **Tree** |

|  |  |  |  |
| --- | --- | --- | --- |
| Structure | # of Routers | # of Switches | # of PCs |
| Whole project | **8** | **34** | **68 as prototype** |
| Data Science Dep | **1** | **8** | **16** |
| AI Dep | **1** | **7** | **14** |
| Media Dep | **1** | **5** | **10** |
| Business | **1** | **7** | **14** |
| Cybersecurity | **1** | **7** | **14** |
| Backbone Router | **1** | **X** | **X** |
| General Router | **1** | **X** | **X** |
| Special Router | **1** | **X** | **X** |

**Department’s internal structure: -**

**Basic details**

**After the construction of the project was done, we made 3 copies of the project, to apply different type of routing techniques, with applying NAT to save private IP and make consume of internal IP much less, and finally applied Security to save Servers from unknown Actions.**

A screenshot of a computer game

Description automatically generated

# **2.Subnetting Step**

**Subnetting step just to show the importance of saving the cost of buying a million IP’s.**

**What’s the main IP for this case study?**

**For All Departments, we have found our departments.**

|  |  |
| --- | --- |
| **Department** | **Number** |
| **Data Science** | **212** |
| **AI** | **47** |
| **Cyber Security** | **36** |
| **Business** | **125** |
| **Media** | **10** |
| **Total** | **430** |

**So, by supplying 193.158.1.0 for DS is enough for it.**

**Giving Ai and CS with Media to 193.158.2.0**

**And setting 193.158.3.0 Business to fit all data on.**

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**This step will show the subnetting for Each Department**

1. **Data Science**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.0** |
| **Network** | **193.158.1.0** |
| **Broadcast** | **193.158.1.255** |
| **Usable Range for Ips** | **193.158.1.1 to 193.158.1.254** |
| **Number of Needed** | **212** |
| **Number of Usable** | **254** |
| **Achieved Requirements** | **Yes** |

1. **Business**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.128** |
| **Network** | **193.158.3.0** |
| **Broadcast** | **193.158.3.127** |
| **Usable Range for Ips** | **193.158.3.1 to 193.158.3.126** |
| **Number of Needed** | **126** |
| **Number of Usable** | **128** |
| **Achieved Requirements** | **Yes** |

**Subnetting Steps Next**

1. **Media**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.240** |
| **Network** | **193.158.2.0** |
| **Broadcast** | **193.158.2.15** |
| **Usable Range for Ips** | **193.158.2.1 to 193.158.2.14** |
| **Number of Needed** | **14** |
| **Number of Usable** | **16** |
| **Achieved Requirements** | **Yes** |

1. **AI**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.192** |
| **Network** | **193.158.2.64** |
| **Broadcast** | **193.158.2.127** |
| **Usable Range for Ips** | **193.158.2.65 to 193.158.2.126** |
| **Number of Needed** | **47** |
| **Number of Usable** | **64** |
| **Achieved Requirements** | **Yes** |

1. **Cybersecurity**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.192** |
| **Network** | **193.158.2.128** |
| **Broadcast** | **193.158.2.191** |
| **Usable Range for Ips** | **193.158.2.129 to 193.158.2.190** |
| **Number of Needed** | **36** |
| **Number of Usable** | **64** |
| **Achieved Requirements** | **Yes** |

1. **Server for General**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.0.0** |
| **Network** | **172.125.0.0** |
| **Broadcast** | **172.125.255.255** |
| **Needed IP Ranges Only** | **172.125.12.9 - 172.125.12.10** |
| **Number of Needed** | **2** |
| **Achieved Requirements** | **Yes** |

1. **Server for Special**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.0.0** |
| **Network** | **174.125.0.0** |
| **Broadcast** | **174.125.255.255** |
| **Needed IP Ranges Only** | **174.125.12.9 - 174.125.12.10** |
| **Number of Needed** | **2** |
| **Achieved Requirements** | **Yes** |

1. **Serials**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.252** |
| **Main IP Network** | **10.0.0.0** |

1. **Backbone and Data Science**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.252** |
| **Main IP Network** | **10.0.0.0** |
| **First IP** | **10.0.0.1** |
| **Second IP** | **10.0.0.2** |
| **Broadcast** | **10.0.0.3** |

1. **Backbone and AI**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.252** |
| **Main IP Network** | **10.0.0.4** |
| **First IP** | **10.0.0.5** |
| **Second IP** | **10.0.0.6** |
| **Broadcast** | **10.0.0.7** |

1. **Backbone and CS**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.252** |
| **Main IP Network** | **10.0.0.8** |
| **First IP** | **10.0.0.9** |
| **Second IP** | **10.0.0.10** |
| **Broadcast** | **10.0.0.11** |

1. **Backbone and Business**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.252** |
| **Main IP Network** | **10.0.0.12** |
| **First IP** | **10.0.0.13** |
| **Second IP** | **10.0.0.14** |
| **Broadcast** | **10.0.0.15** |

1. **Backbone and Media**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.252** |
| **Main IP Network** | **10.0.0.16** |
| **First IP** | **10.0.0.17** |
| **Second IP** | **10.0.0.18** |
| **Broadcast** | **10.0.0.19** |

1. **Backbone For General and Special**

|  |  |
| --- | --- |
| **Subnetwork** | **255.255.255.252** |
| **Main IP Network** | **10.0.0.20 – 10.0.0.24** |
| **First IP** | **10.0.0.21 – 10.0.0.25** |
| **Second IP** | **10.0.0.22 – 10.0.0.26** |
| **Broadcast** | **10.0.0.23 – 10.0.0.27** |

# **3.Routing Steps**

**Routing is the process of path selection in any network.**

* **Each routing technique is applied in a unique copy of the project, to make sure each technique is working independently.**

**As explained in the project introduction, we used 3 types of routing techniques: -**

1. **OSPF (Open Shortest Path First)**

* **Builds a complete map of the network topology and shares it with all routers in the same area.**
* **Configuration code for the OSPF: -**

1. **router ospf (process ID)**
2. **network (Network IP) (Wild mask) area #**
3. **network (Serial IP) (Wild mask) area #**
4. **EIGRP (Enhanced Interior Gateway Routing Protocol)**

* **EIGRP sends partial updates to neighbors only when there is a change in the network topology.**
* **EIGRP has a fast convergence time due to its partial updates and Diffusing Update Algorithm (DUAL).**
* **Configuration code for the EIGRP:-**

1. **router eigrp (process ID)**
2. **network (Network IP) (Wild mask)**
3. **network (Serial IP) (Wild mask)**
4. **RIP (Routing Information Protocol)**

* **Is a distance-vector routing protocol that uses hop count as its metric.**
* **Has a slow convergence time due to its periodic updates and count-to-infinity problem.**
* **Configuration code for the RIP: -**

1. **router rip (process ID)**
2. **network (Network IP)**
3. **network (Serial IP)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Protocol | Type | Metric | Convergence Time | Complexity |
| RIP | Distance-Vector | Hop count | Slow | Low |
| OSPF | Link-state | Multiple | Fast | High |
| EIGRP | Hybrid | Composite | Fast | Medium |

# **4.NAT Steps**

# **5.Security Steps**

# **6.Additional Points**