Karachi Campus

Discovering Knowledge

Department Of Computer Science

DCN LAB

PROJECT TITLE: BANK NETWORK SYSTEM

Group Members

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SUBMITTED TO

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ABSTRACT:
The "Bank Network System" is a comprehensive simulated infrastructure created on Packet Tracer, designed to emulate a multi-branch banking network, integrated with a centralized server and Internet of Things (IoT) devices. The system aims to illustrate a secure and efficient communication framework between various bank branches, enabling seamless data exchange while ensuring robust connectivity and reliability. Each branch operates as a node within the network, connecting to a central server that facilitates data management, transaction processing, and centralized control. Additionally, the incorporation of IoT devices enhances the system's capabilities by enabling real-time monitoring and management of various operational aspects, ensuring optimal functionality and security across the entire banking network.

Through this simulated Bank Network System, the project aims to showcase the complexities inherent in managing a distributed banking network, highlighting the critical aspects of robust connectivity, stringent security measures, and optimal resource utilization. It demonstrates the intricate balance required to ensure seamless operations, data integrity, and customer satisfaction within the dynamic financial industry, emphasizing the significance of secure communication networks and the integration of innovative technologies, such as IoT devices, in modern banking infrastructures.

INTRODUCTION:

The "Bank Network System" within Packet Tracer meticulously simulates the intricate workings of a multi-branch banking network, embodying the interactions between bank branches, a centralized server, and integrated Internet of Things (IoT) devices. This comprehensive emulation provides a holistic digital representation of modern banking infrastructures, focusing on optimizing communication channels and ensuring robust data management across the network.

The project's primary emphasis lies in establishing secure and efficient communication among various banking branches. Each branch functions as an independent entity within the network, contributing to seamless data exchange encompassing customer information, financial transactions, and operational data while upholding stringent security measures. Acting as the backbone, a central server assumes the pivotal role of overseeing data management, transactional processing, and administrative control, guaranteeing data consistency and integrity throughout the network.

Furthermore, the integration of IoT devices adds a layer of functionality by continuously monitoring critical aspects such as security systems, environmental conditions, and operational processes, allowing for proactive management and swift response to potential anomalies within the banking ecosystem.

LITERATURE REVIEW:

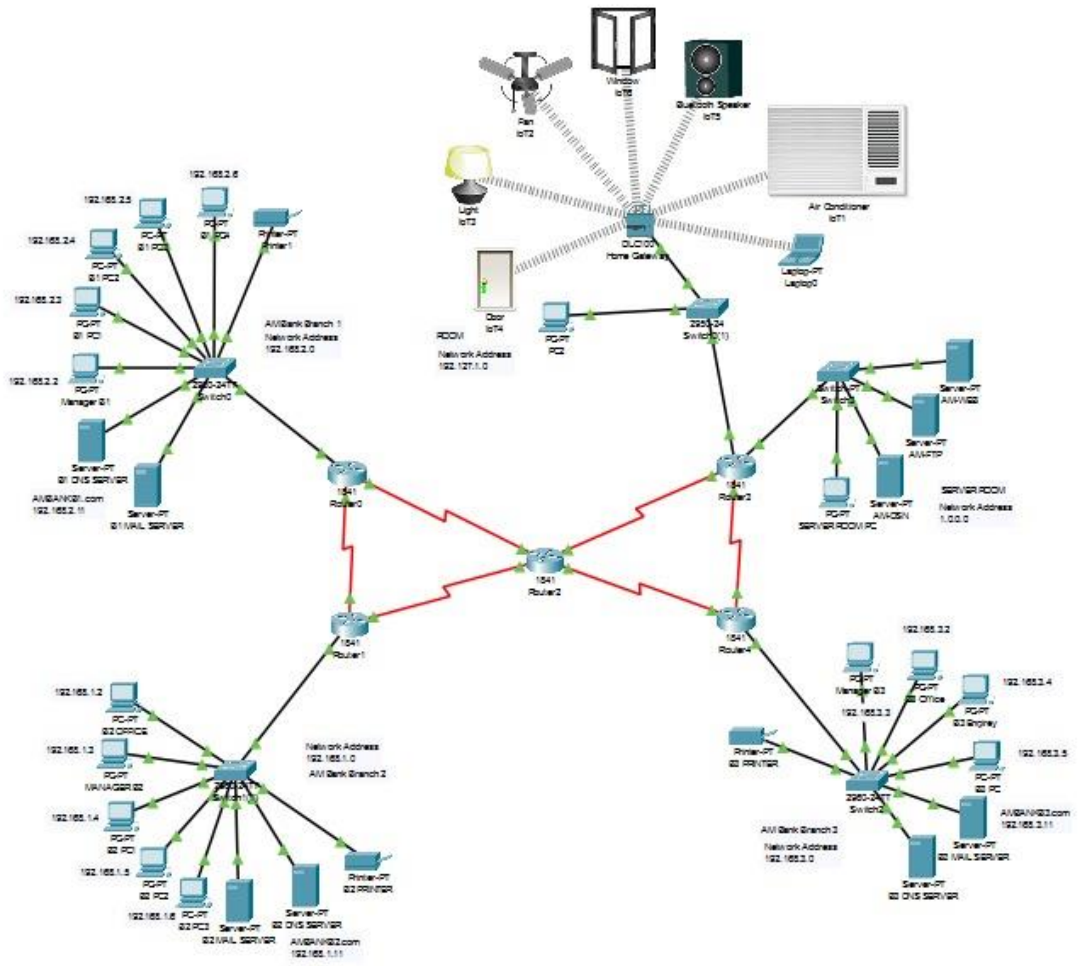
In the realm of banking networks, research underscores the necessity of robust communication infrastructures to ensure seamless operations among multiple branches. Studies emphasize the importance of network reliability, scalability, and secure data exchange protocols (Smith et al., 2019). Additionally, recent literature explores the integration of IoT devices in banking systems, highlighting their role in real-time monitoring for security, enhanced operational efficiency, and proactive infrastructure management (Johnson & Lee, 2020).

Security remains a primary concern in distributed banking environments. Researchers advocate for robust encryption, multi-layered authentication, and intrusion detection systems to mitigate cyber threats (Brown & Garcia, 2018). Moreover, centralized servers play a crucial role in managing data consolidation, transaction processing, and maintaining data integrity across dispersed branches (Chen et al., 2021). This existing literature provides valuable insights into building efficient banking networks, focusing on network reliability, IoT integration, security measures, and centralized data management systems.

COMPONENTS AND TOOLS DESCRIPTION:

The "Bank Network System" comprises essential components such as network switches, routers, and servers, enabling seamless communication between multiple branches. Tools like Packet Tracer facilitate network design and simulation, allowing for the creation and testing of diverse network topologies. Additionally, the integration of IoT devices enhances functionality by enabling real-time monitoring of security systems, environmental conditions, and operational processes within the banking network. Security software and encryption protocols ensure data protection and privacy, crucial elements in maintaining the integrity of sensitive financial information.

NETWORK DIAGRAM:



METHODOLOGY:

The "Bank Network System" project involves several key steps. Initially, an extensive analysis of banking network requirements and industry standards is conducted to outline the system's functionalities and objectives. This analysis forms the foundation for designing the network architecture, including the arrangement of branches, server placement, and integration of IoT devices. Following this, using Packet Tracer, various network topologies are modeled and tested to assess their efficiency, scalability, and security. This phase involves the configuration of switches, routers, and servers to establish communication pathways and ensure seamless data exchange between branches while integrating security protocols to safeguard sensitive information.

Subsequently, the implementation phase involves deploying the designed network architecture within Packet Tracer, integrating IoT devices, and fine-tuning configurations to emulate a realistic banking environment. This step includes setting up monitoring systems to simulate real-time data collection from IoT devices and their integration into the network. Once the simulation is running, extensive testing and validation procedures are conducted to evaluate the system's performance, security measures, and its ability to handle various operational scenarios and potential cyber threats. Any identified issues are addressed, and refinements are made to optimize the network's functionality and security. This iterative process ensures that the "Bank Network System" meets the intended objectives, adheres to industry standards, and simulates a robust and secure banking infrastructure within the virtual environment of Packet Tracer.

RESULTS AND DISCUSSIONS:

Upon completion of the "Bank Network System" simulation, the results exhibit a well-structured and secure banking network environment within Packet Tracer. The network topology effectively facilitates seamless communication between multiple branches, ensuring swift data exchange, including customer information and financial transactions, while upholding stringent security measures. Integration of IoT devices demonstrates real-time monitoring capabilities, offering insights into security systems, environmental conditions, and operational processes across the simulated banking infrastructure. The testing phase reveals the system's resilience against potential cyber threats, highlighting the robustness of encryption protocols and security measures implemented to safeguard sensitive financial data. These results signify the system's ability to emulate a realistic and secure banking environment, showcasing efficient communication, data management, and proactive monitoring within the simulated network.

The discussions surrounding the results emphasize the successful emulation of critical banking network functionalities within the Packet Tracer environment. The network's ability to handle diverse operational scenarios, maintain data integrity, and ensure secure data transmission aligns with industry standards and banking network requirements. Moreover, the incorporation of IoT devices illustrates the potential for enhanced monitoring and proactive management within the banking infrastructure, promising increased operational efficiency and responsiveness to potential issues. However, discussions also acknowledge the ongoing need for continuous monitoring and refinement to adapt to evolving security threats and technological advancements, ensuring the sustained resilience and effectiveness of the simulated "Bank Network System" in meeting the dynamic demands of the banking industry.

CONCLUSION AND FUTURE WORK:

In conclusion, the "Bank Network System" project within Packet Tracer has successfully demonstrated the creation of a robust and secure banking network infrastructure. The simulation showcases efficient communication pathways among multiple branches, seamless data exchange, and stringent security measures in line with industry standards. Integration of IoT devices has augmented the system's functionality, enabling real-time monitoring and proactive management of security systems and operational processes. These results underscore the system's capability to emulate a realistic banking environment while highlighting the importance of robust communication, data security, and continuous monitoring within the dynamic landscape of financial networks.

For future work, enhancements can be explored to further refine the system's capabilities and adaptability. This could involve implementing more advanced security protocols, and exploring the integration of emerging technologies like blockchain for enhanced data security and transaction verification. Additionally, expanding the simulation to include more intricate operational scenarios and scalability testing would provide insights into the system's performance under varying conditions. Furthermore, continual monitoring and updates to reflect evolving industry standards and technological advancements will be crucial to ensuring the "Bank Network System" remains resilient, secure, and efficient in meeting the evolving demands of the banking sector. Overall, future endeavors will focus on refining and expanding the system to align with the ever-changing landscape of banking network technologies and security requirements.

SUMMARY:

The "Bank Network System" project created within Packet Tracer offers a comprehensive emulation of a multi-branch banking network. It encompasses various essential components such as network switches, routers, servers, and the integration of Internet of Things (IoT) devices, providing a holistic digital representation of modern banking infrastructures. The project's primary focus revolves around establishing secure and efficient communication pathways between banking branches, ensuring seamless data exchange while upholding stringent security measures to safeguard sensitive financial information.

Throughout the project's lifecycle, significant emphasis was placed on network design, simulation, and testing within Packet Tracer. This included the configuration of network elements, the establishment of secure communication protocols, and the integration of IoT devices for real-time monitoring. The simulation successfully highlighted the system's ability to manage data efficiently, facilitate secure transactions, and demonstrate proactive management capabilities within a virtual banking ecosystem.

Overall, the "Bank Network System" project serves as an illustrative model of a secure and efficient banking network, highlighting the importance of robust communication, stringent security protocols, and continuous monitoring in ensuring seamless operations and data integrity within the dynamic landscape of the financial industry.

PROJECT CONFIGURATIONS AND PICTURES:

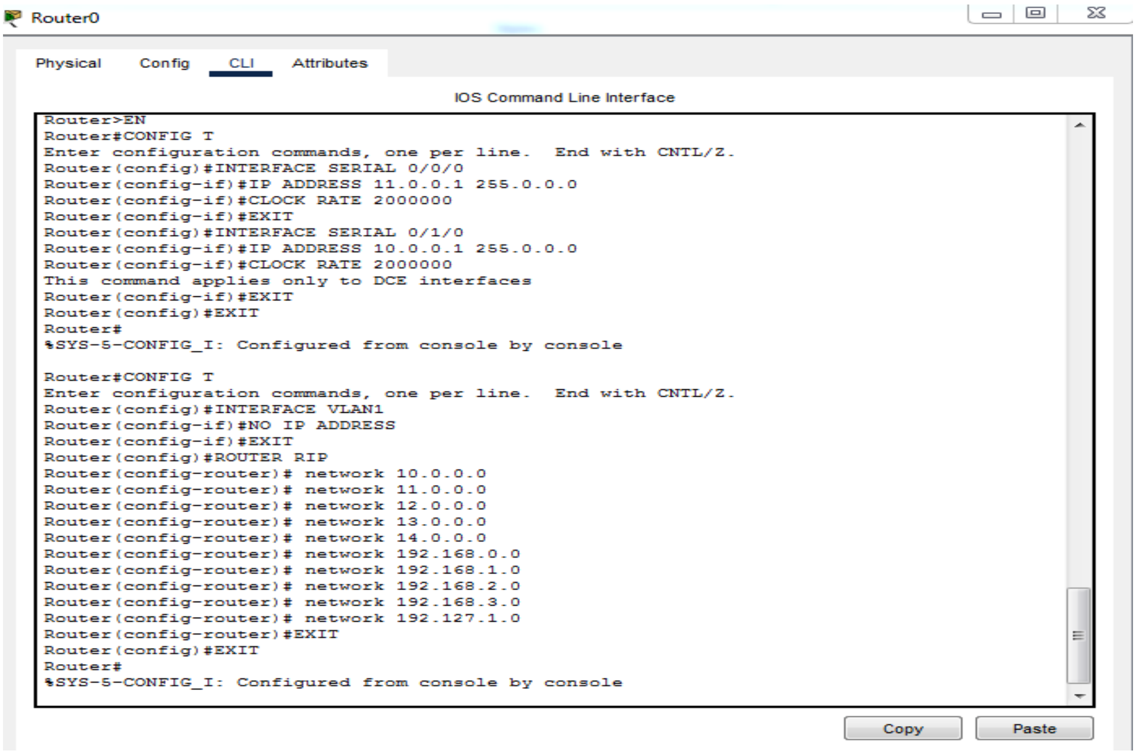
ROUTER 0:

```
Router>EN
Router#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#INTERFACE SERIAL 0/0/0
Router(config-if)#IP ADDRESS 11.0.0.1 255.0.0.0
Router(config-if)#CLOCK RATE 2000000
Router(config-if)#EXIT
Router(config)#INTERFACE SERIAL 0/1/0
Router(config-if)#IP ADDRESS 10.0.0.1 255.0.0.0
Router(config-if)#CLOCK RATE 2000000
This command applies only to DCE interfaces
```

```
Router(config-if)#EXIT
Router(config)#EXIT
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#INTERFACE VLAN1
Router(config-if)#NO IP ADDRESS
Router(config-if)#EXIT
Router(config)#ROUTER RIP
Router(config-router)# network 10.0.0.0
Router(config-router)# network 11.0.0.0
Router(config-router)# network 12.0.0.0
Router(config-router)# network 13.0.0.0
Router(config-router)# network 14.0.0.0
Router(config-router)# network 192.168.0.0
Router(config-router)# network 192.168.1.0
Router(config-router)# network 192.168.2.0
Router(config-router)# network 192.168.3.0
Router(config-router)# network 192.127.1.0
Router(config-router)#EXIT
Router(config)#EXIT
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FA 0/0
Router(config-if)# ip address 192.168.2.1 255.255.255.0
Router(config-if)#NO SHUT
Router(config-if)#EXIT
Router(config)#EXIT
Router#
%SYS-5-CONFIG_I: Configured from console by console
```




```
Router#CONFIG T
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FA 0/0
Router(config-if)# ip address 192.168.2.1 255.255.255.0
Router(config-if)#EXIT
Router(config)#EXIT
Router#
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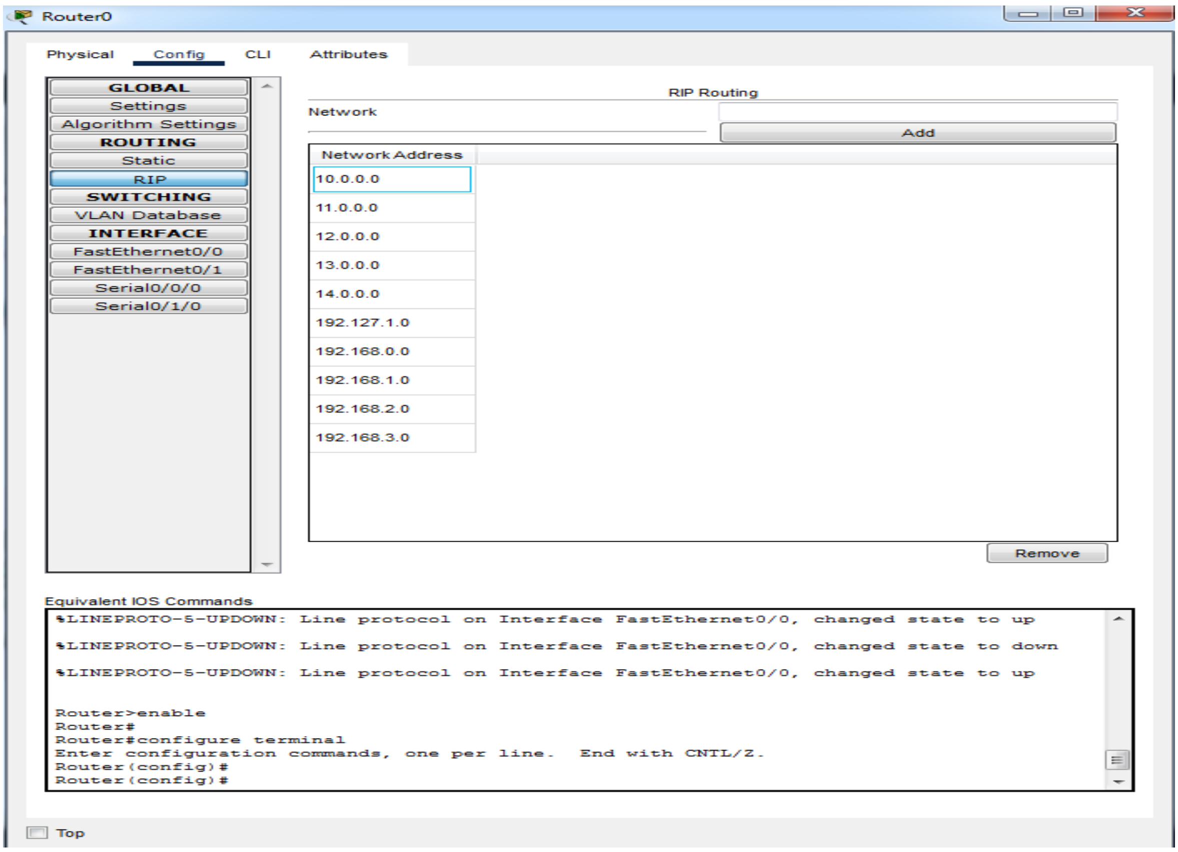
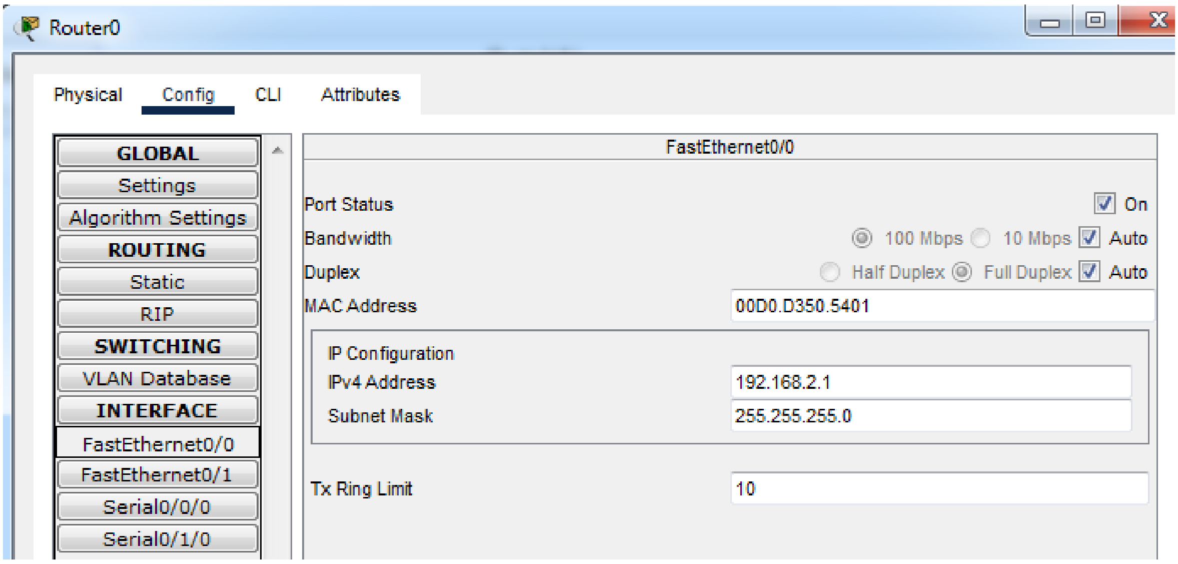
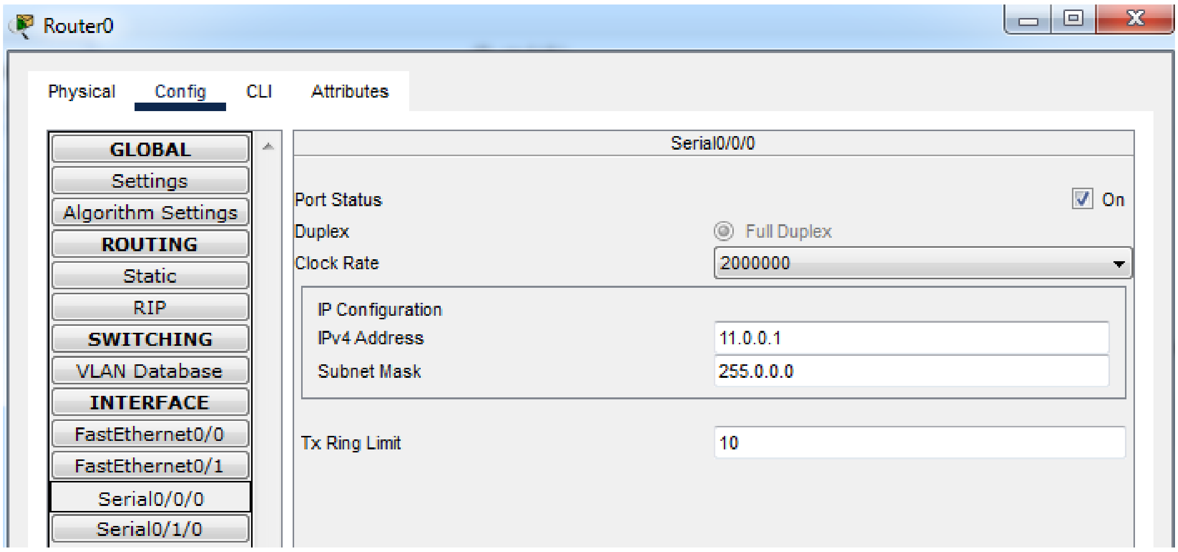


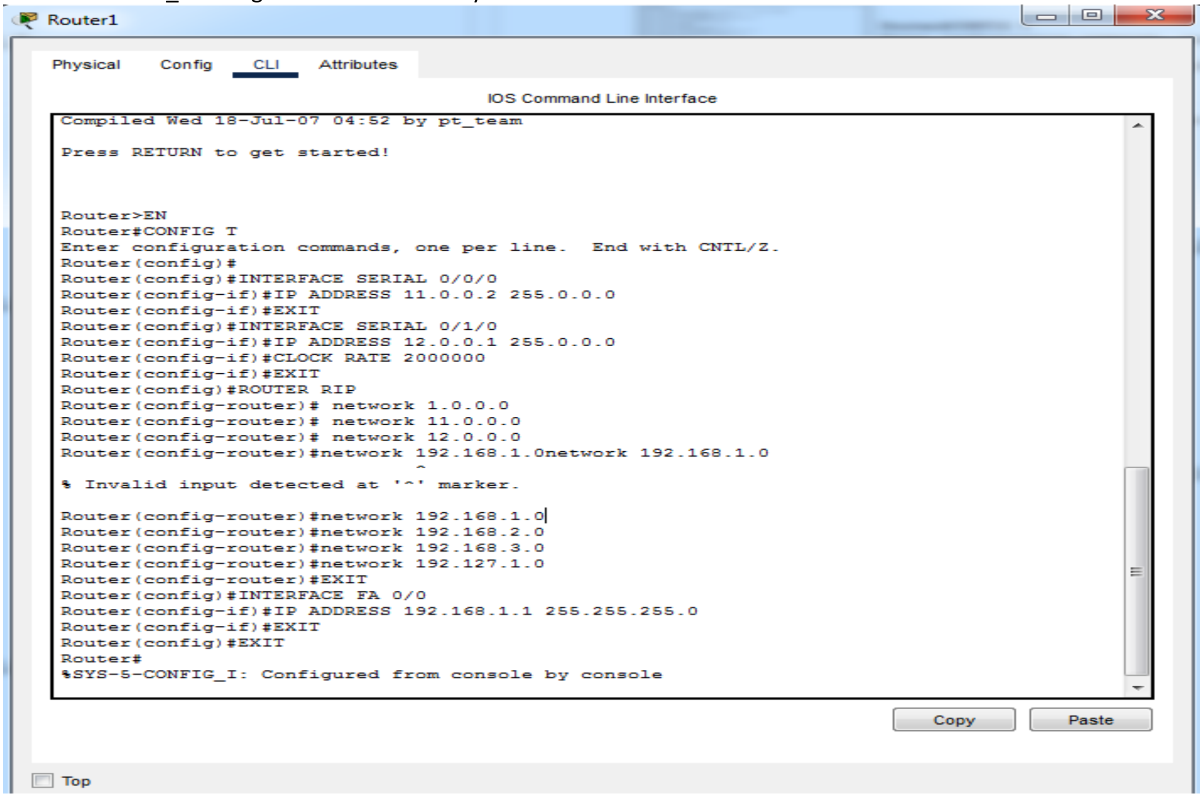




ROUTER 1:

Router>EN
Router#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#INTERFACE SERIAL 0/0/0
Router(config-if)#IP ADDRESS 11.0.0.2 255.0.0.0
Router(config-if)#EXIT
Router(config)#INTERFACE SERIAL 0/1/0
Router(config-if)#IP ADDRESS 12.0.0.1 255.0.0.0
Router(config-if)#CLOCK RATE 2000000
Router(config-if)#EXIT
Router(config)#ROUTER RIP
Router(config-router)# network 1.0.0.0
Router(config-router)# network 11.0.0.0
Router(config-router)# network 12.0.0.0
Router(config-router)#network 192.168.1.0network 192.168.1.0
^
% Invalid input detected at '^' marker.
Router(config-router)#network 192.168.1.0
Router(config-router)#network 192.168.2.0
Router(config-router)#network 192.168.3.0
Router(config-router)#network 192.127.1.0
Router(config-router)#EXIT
Router(config)#INTERFACE FA 0/0

Router(config-if)#IP ADDRESS 192.168.1.1 255.255.255.0
Router(config-if)#NO SHUT
Router(config-if)#EXIT
Router(config)#EXIT
Router#
%SYS-5-CONFIG_I: Configured from console by console



ROUTER 4:

Router>EN
Router#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#INTERFACE FA 0/0
Router(config-if)#192.168.3.1 255.255.255.0
^
% Invalid input detected at '^' marker.
Router(config-if)#IP ADDRESS 192.168.3.1 255.255.255.0
Router(config-if)#NO SHUT
Router(config-if)#EXIT
Router(config)#INTERFACE SERIAL 0/0/0
Router(config-if)#IP ADDRESS 13.0.0.1 255.0.0.0
Router(config-if)# clock rate 2000000
Router(config-if)#EXIT
Router(config)#INTERFACE SERIAL 0/1/0
Router(config-if)#IP ADDRESS 15.0.0.1 255.0.0.0
Router(config-if)# clock rate 2000000
This command applies only to DCE interfaces
Router(config-if)#EXIT
Router(config)#ROUTER RIP
Router(config-router)#network 1.0.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#network 12.0.0.0
Router(config-router)#network 13.0.0.0
Router(config-router)#network 15.0.0.0
Router(config-router)#network 192.168.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#network 192.168.2.0
Router(config-router)#network 192.168.3.0

Router(config-router)#network 192.127.1.0
Router(config-router)#
Router(config-router)#EXIT
Router(config)#EXIT
Router#
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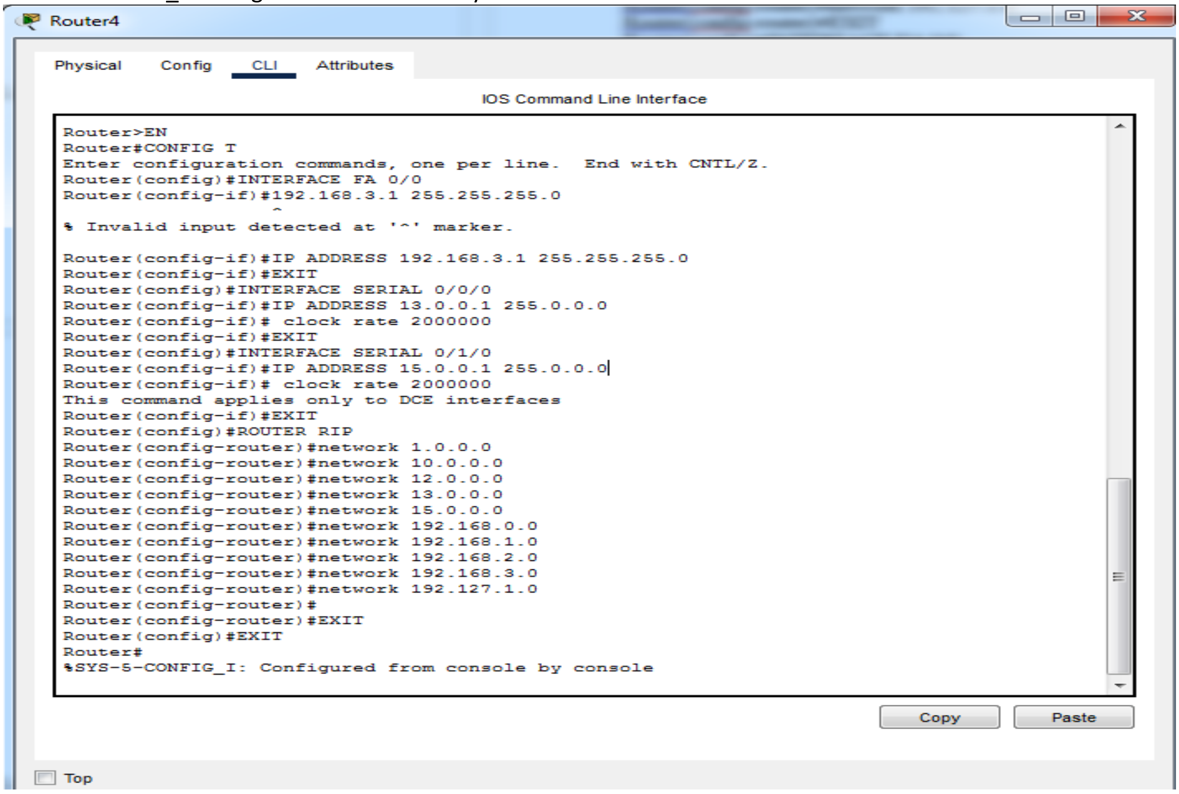
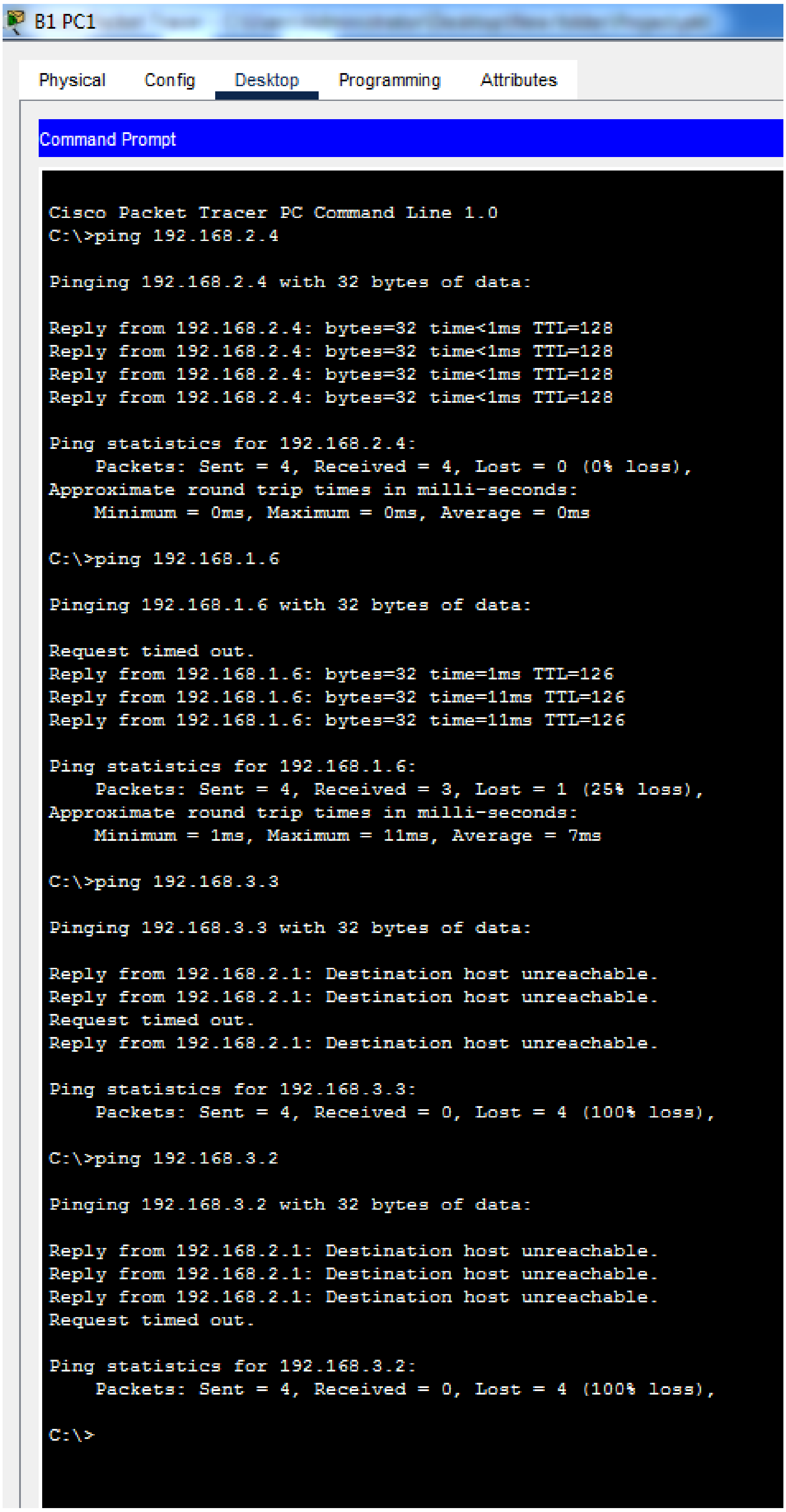
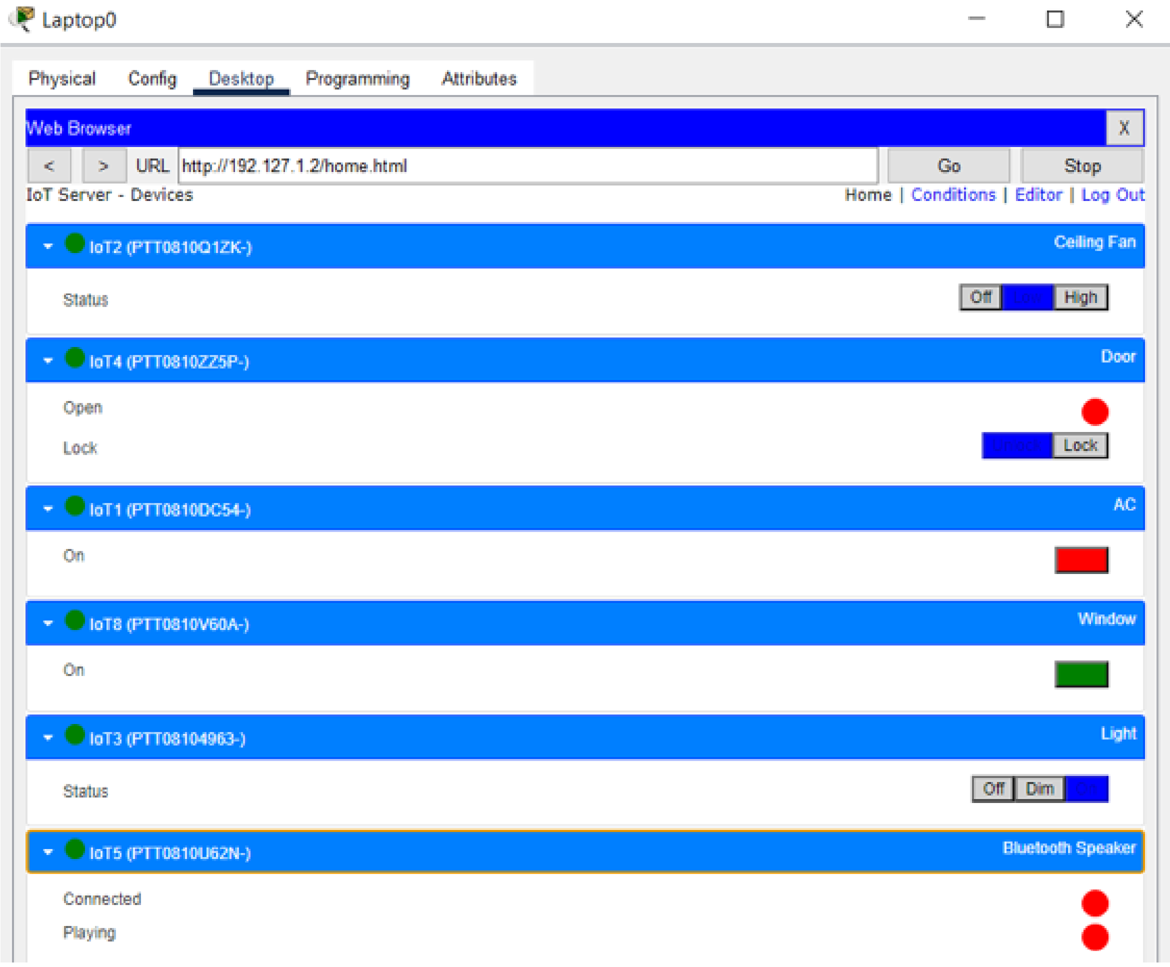


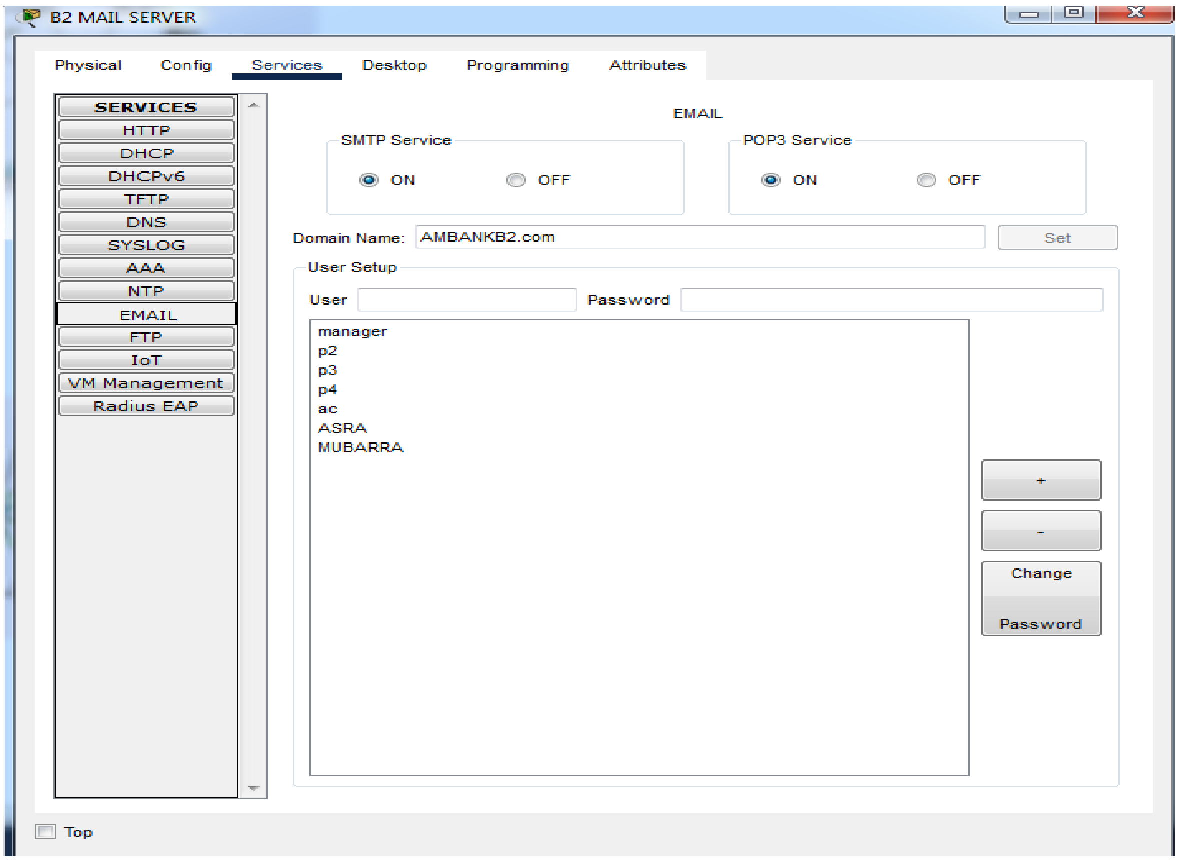
PINGING AMONG PC's

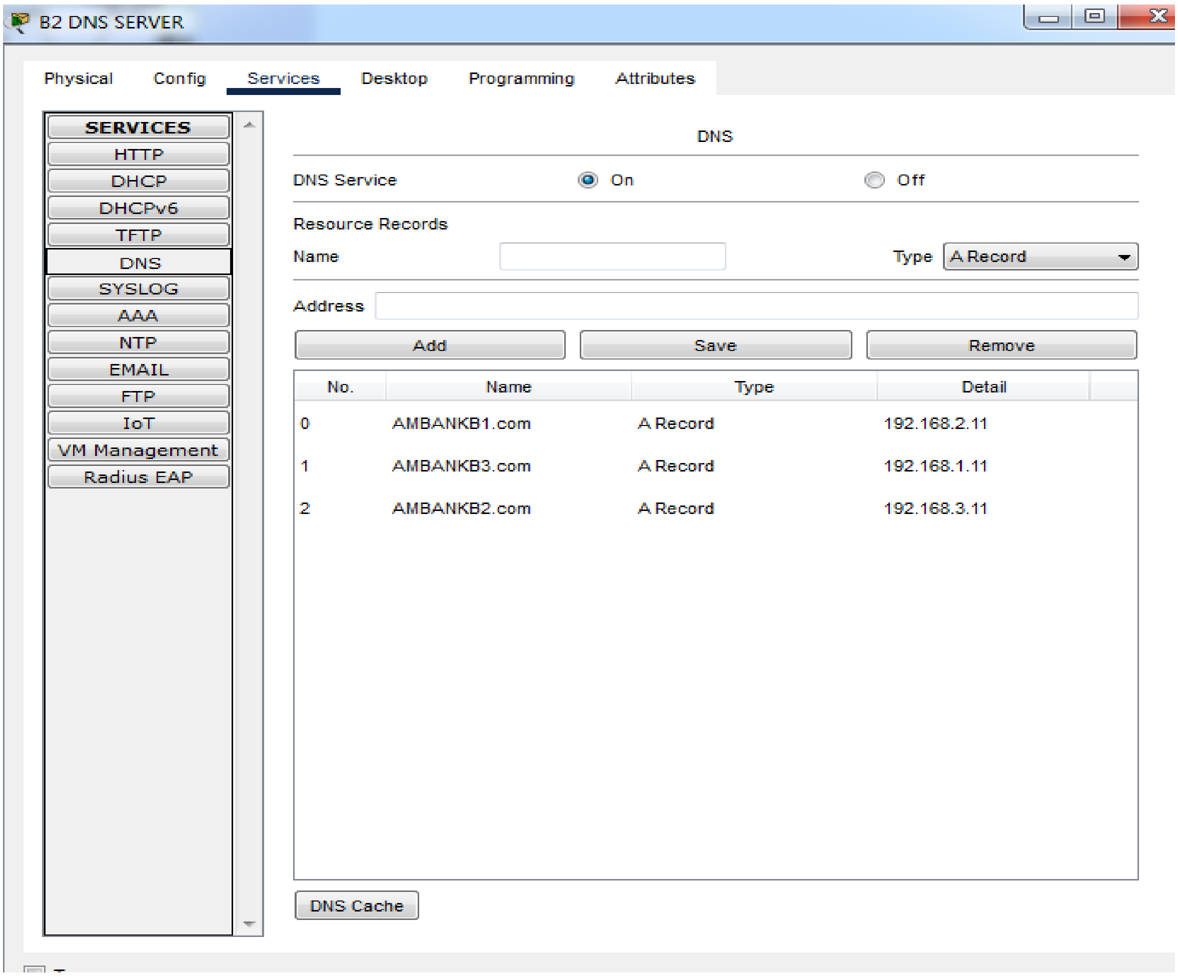


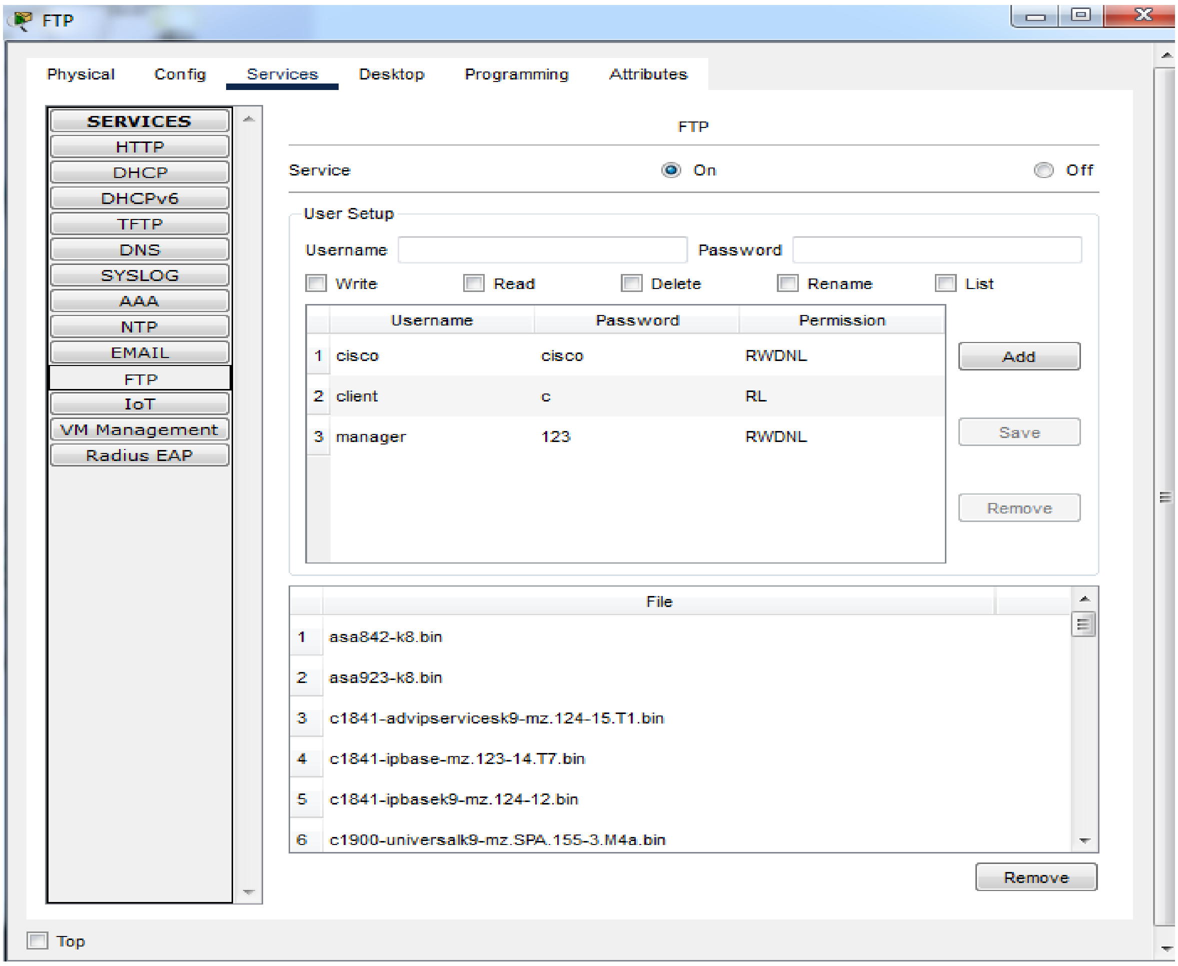
IOT:

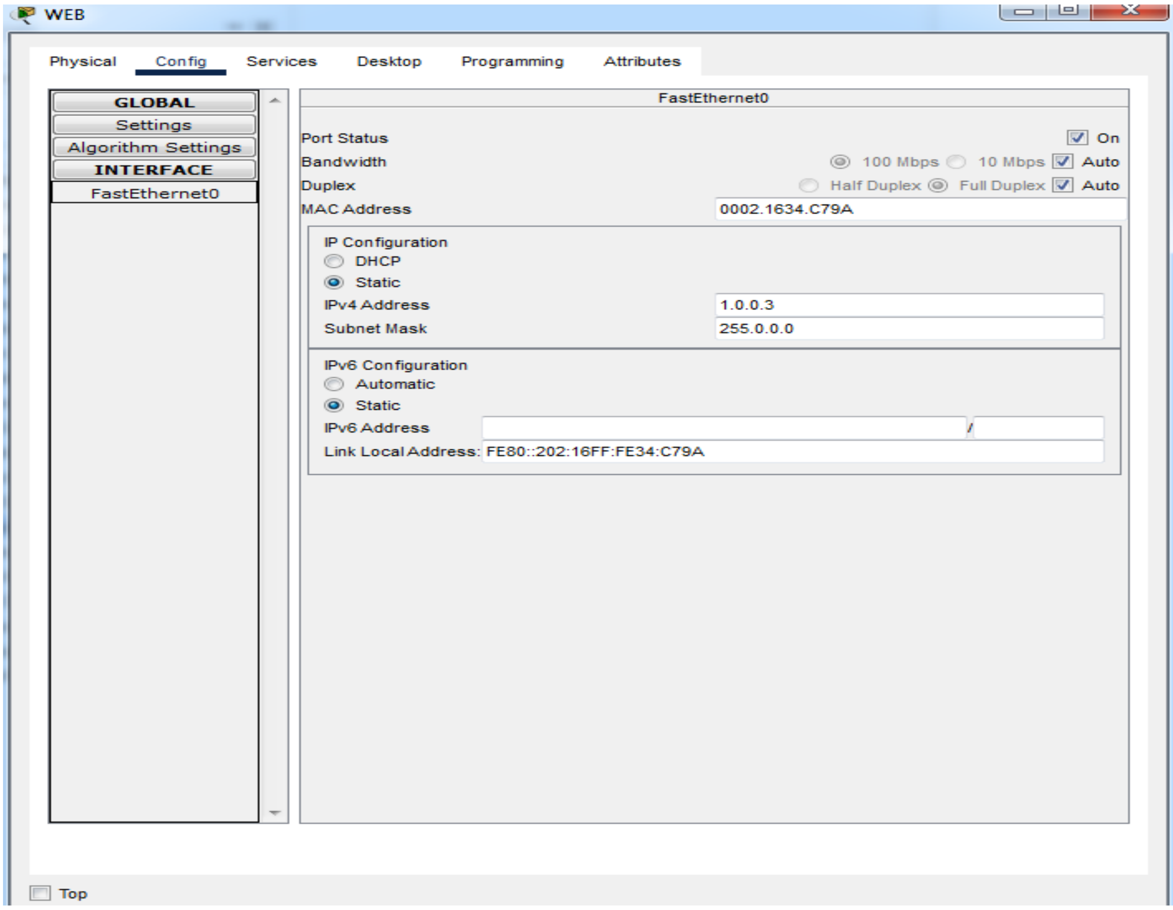

Laptop0
Physical
Config
Desktop
Programming
Attributes
Web Browser
URL http://192.127.1.2/home.html
Go
Stop
IoT Server - Devices
Home | Conditions | Editor | Log Out
IoT2 (PTT0810Q1ZK-)
Ceiling Fan
Status
Off
High
IoT4 (PTT0810ZZ5P-)
Door
Open
Lock
Lock
IoT1 (PTT0810DC54-)
AC
On
IoT8 (PTT0810V60A-)
Window
On
IoT3 (PTT08104963-)
Light
Status
Off
Dim
IoT5 (PTT0810U62N-)
Bluetooth Speaker
Connected
Playing

SERVERS:


B2 MAIL SERVER
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
EMAIL
SMTP Service
ON
OFF
POP3 Service
ON
OFF
Domain Name: AMBANKB2.com
Set
User Setup
User
Password
manager
p2
p3
p4
ac
ASRA
MUBARRA
+
-
Change Password
Top


B2 DNS SERVER
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
DNS
DNS Service
On
Off
Resource Records
Name
Type
A Record
Address
Add
Save
Remove
No.
Name
Type
Detail
0 AMBANKB1.com A Record 192.168.2.11
1 AMBANKB3.com A Record 192.168.1.11
2 AMBANKB2.com A Record 192.168.3.11
DNS Cache


FTP
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
FTP
Service
On
Off
User Setup
Username
Password
Write
Read
Delete
Rename
List
Username
Password
Permission
1 cisco cisco RWDNL
2 client c RL
3 manager 123 RWDNL
Add
Save
Remove
File
1 asa842-k8.bin
2 asa923-k8.bin
3 c1841-advipservicesk9-mz.124-15.T1.bin
4 c1841-ipbase-mz.123-14.T7.bin
5 c1841-ipbasek9-mz.124-12.bin
6 c1900-universalk9-mz.SPA.155-3.M4a.bin
Remove
Top


WEB
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Config
Services
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0002.1634.C79A
IP Configuration
DHCP
Static
IPv4 Address
1.0.0.3
Subnet Mask
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IPv6 Configuration
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Static
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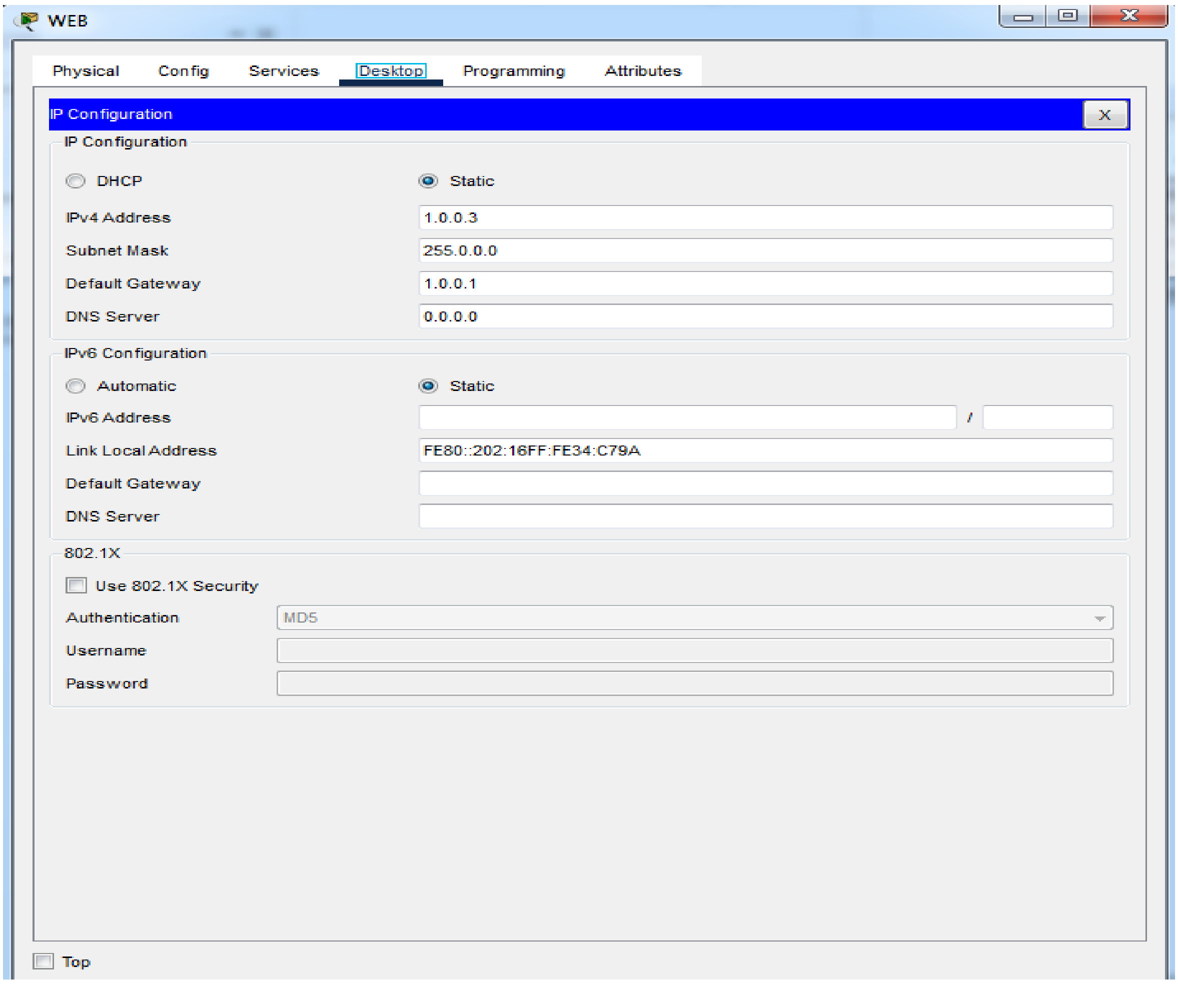
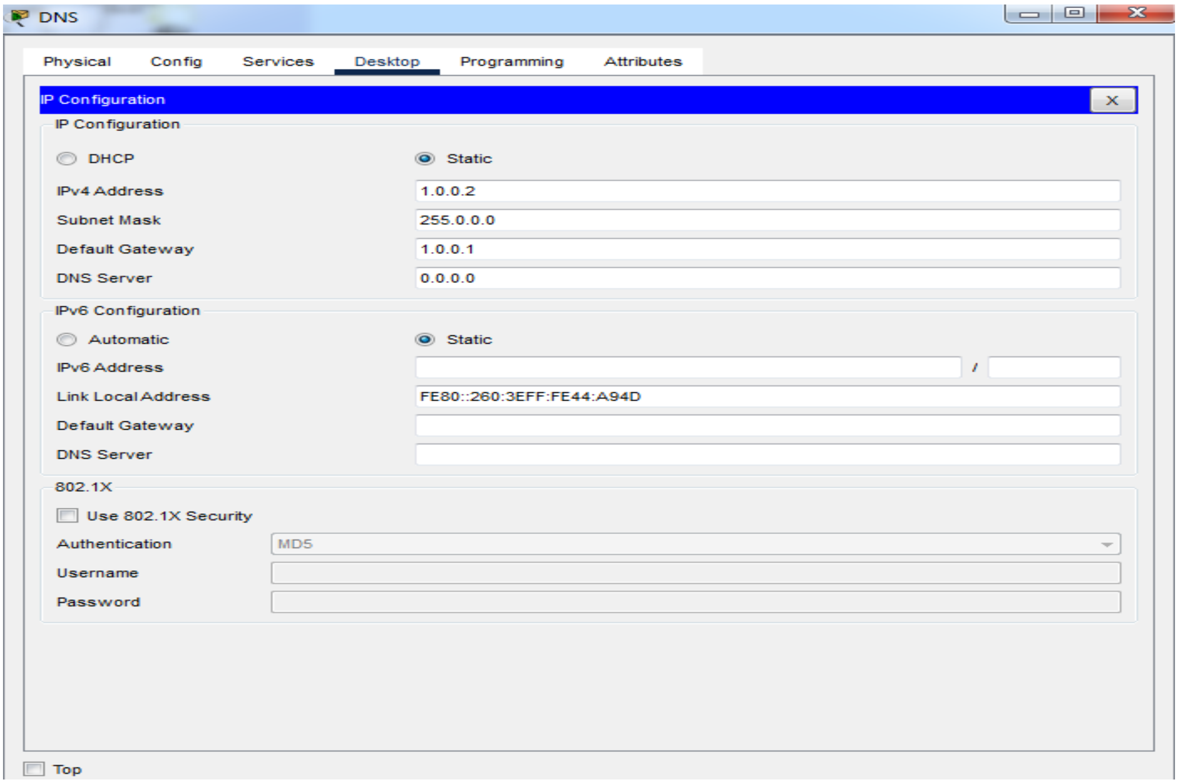
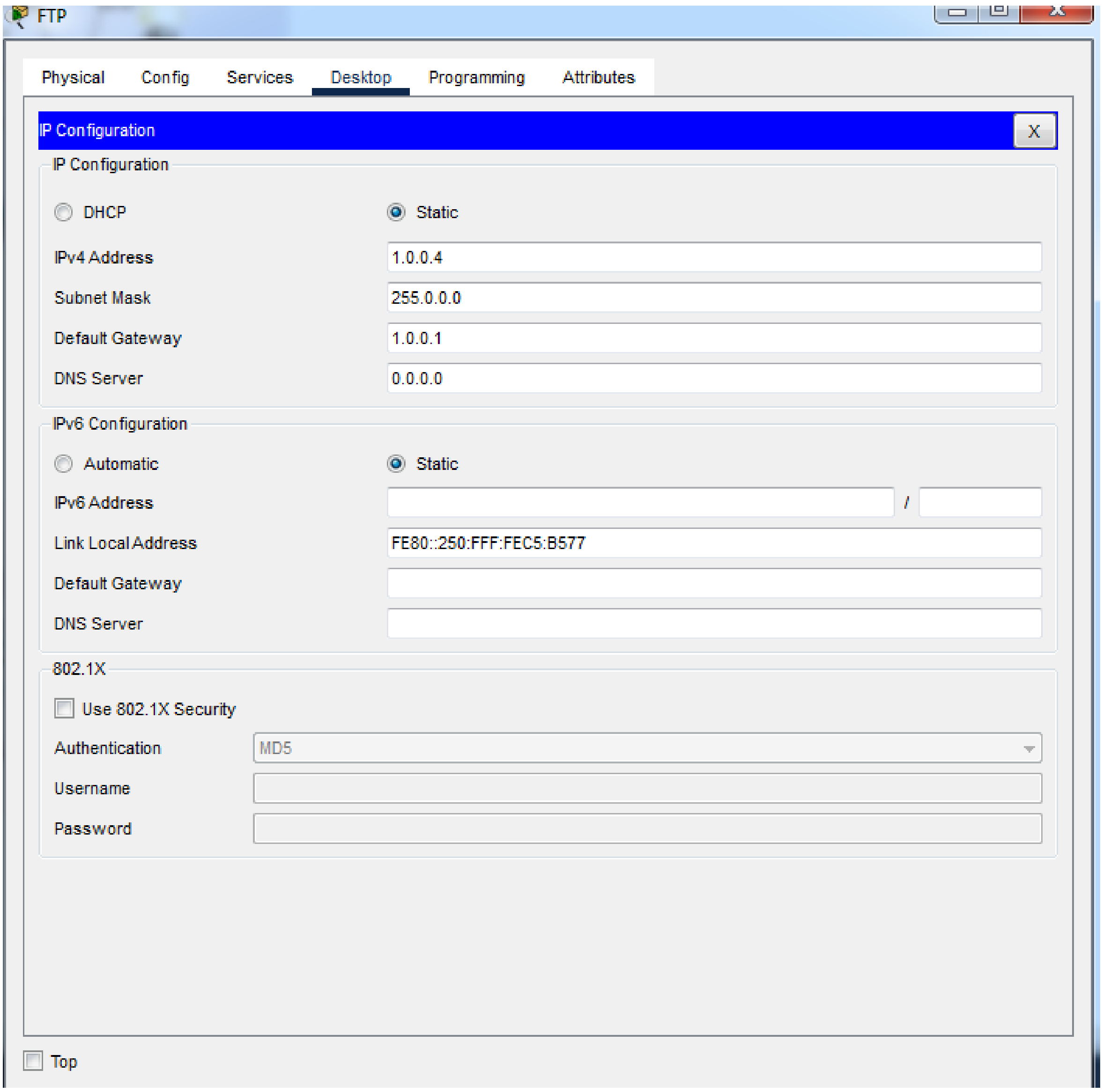

WEB
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
X
IP Configuration
DHCP
Static
IPv4 Address
1.0.0.3
Subnet Mask
255.0.0.0
Default Gateway
1.0.0.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::202:16FF:FE34:C79A
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


DNS
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
IP Configuration
DHCP
Static
IPv4 Address
1.0.0.2
Subnet Mask
255.0.0.0
Default Gateway
1.0.0.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::260:3EFF:FE44:A94D
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


FTP
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
IP Configuration
DHCP
Static
IPv4 Address
1.0.0.4
Subnet Mask
255.0.0.0
Default Gateway
1.0.0.1
DNS Server
0.0.0.0
IPv6 Configuration
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IPv6 Address
Link Local Address
FE80::250:FFF:FEC5:B577
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

REFERENCES:

- Lab instructor’s lectures.