



A Project on
Network Integration of **Smart City** for Effective Business Process

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LETTER OF TRANSMITTAL

September 04, 2019

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Subject- A Project on Network Integration of Smart City for Effective Business Process

Dear Sir,

I would like to submit my Project titled “Network Integration of Smart City for Effective Business Process”, which has been prepared as a requirement for the completion of the BBA Program of United International University.

While working on the project, I have tried to follow each and every guideline that you have advised and It has been a very enlightening experience to work in this new venture and I have thoroughly enjoyed my Project about Smart City.

Sincerely,

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I would like to thank the internship Supervisor **Ahmed Imran Kabir**, United International University for helping to fruitful end of the project since he has provided me significant guidance throughout the entire journey of making this project.

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Finally, I would like to thank all concerned personnel and respected teacher of BBA Program of UIU for their assistance and cooperation during my entire BBA Program.

DECLARATION

I am Merajul Islam Shanchay, student of School of Business and Economic (Management Information Systems) of United International University, Bangladesh, do hereby declare that the Project on “A Project on Network Integration of Smart City for Effective Business Process” is real work and has not previously been submitted for a degree or accreditation.

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ABSTRACT

It includes the identification, determination, and characterization of data communication services that best meet user needs while allowing for network scalability, redundancy, and efficient management. The project also focuses on the design of a Smart City network by effectively deploying technologies and protocols as Voice over IP, Access Control Lists, EIGRP routing, Fiber Optics, VLSM for addressing, Inter VLAN routing, Network Address Translation, use of DHCP and wireless routing. This project should be effective for network communication builders as it covers the core need of a smart city network.

LIST OF ABBREVIATIONS

SERIAL	NAME	DESCRIPTION
01	NAT	NETWORK ADDRESS TRANSLATOR
02	DHCP	DYNAMIC HOST CONFIGURATION PROTOCOL
03	DNS	DOMAIN NAME SERVER
04	VoIP	VOICE OVER INTERNET PROTOCOL
05	EIGRP	ENHANCED INTERIOR GATEWAY ROUTING PROTOCOL
06	RIP	ROUTING INFORMATION PROTOCOL
07	OSPF	OPEN SHORTEST PATH FIRST
08	BGP	BORDER GATEWAY PROTOCOL
09	OSI	OPEN SYSTEMS INTERCONNECTIONS
10	ISO	INTERNATIONAL STANDARDS OF ORGANISATION
11	CPU	CENTRAL PROCESSING UNIT
12	Wi-Fi	WIRELESS FIDELITY
13	CIDR	CLASSLESS INTER DOMAIN ROUTING
14	VLSM	VARIABLE LENGTH SUBNET MASKING
15	ACL	ACCESS CONTROL LISTS
16	NIC	NETWORK INTERFACE CARD
17	VLAN	VIRTUAL LOCAL AREA NETWORK
18	LAN	LOCAL AREA NETWORK
19	WLAN	WIRELESS LOCAL AREA NETWORK
20	CLI	COMMAND LINE INTERFACE
21	TTL	TIME TO LEAVE
22	HTML	HYPER TEXT MARKUP LANGUAGE
23	DOD	DEPARTMENT OF DEFENSE



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Chapter 01

INTRODUCTION

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Background

The Information and Communication Sector Unit is one of the two strategic issues that are critical to success in each city. A considerable range of computers and communication equipment (telephone, fax, and personal hand-operated devices) are used almost everywhere these days, but they are usually still isolated.

Networking is all imaginable and difficult to detect packets over time, so different networking considerations are created by creating a virtual environment, allowing packets to appear immediately, as they occur over time. The network must meet these wishes and be able to support the growing technologies as new technology sector units are adopted. This project introduces network-style concepts, theories, models and architectures. This includes the benefits the field unit receives by employing a systematic style approach. Technical trends that can affect the development of the network are also mentioned.

In addition to the smart city, it contains economic competitiveness, general livability and also environmental stability. As networking is the core element of the smart city it also upgrades the lifestyle of city people, allows to advance financial service as well as political processes. Apart from the smart city it creates opportunities for the urban people via networking development.

Aim and Objectives

This project targets the appearance and simulation of the packet tracer of **Smart City** network abuse. The design classification depends on the design.

The objectives of the study area unit are as follows:

- A) Design and simulation of smart city networks using packet tracer
- B) Analysis of network device configuration and point-to-point connection

Problem Statement

When network resources work with many other devices, the CPU task on the devices becomes difficult. For example, large urban networks, advertising packages are heavy. The modular design of the artificial interface adds to the relevant experience in each of the products, reducing bandwidth loss. The responsibilities of network management and network management systems need to be divided into several components.

Methodology

The latter method was used to design and implement a hierarchical model of **Smart City** networks:

- a) Making ideas
- b) Come up with a network masonry
- c) Use connection of fiber optic
- d) Configuration of device according to topology
- e) Troubleshooting network problems

Project Outline

The first chapter briefly introduces the background, objective, problem statement and method of use. The second chapter discusses the literature review of basic concepts. More important is the methodology used in the design and implementation of Chapter three of the project. Chapter four introduces elaborate simulation and network problem solving with different results. Chapter five gives Smart City the format of smart cities and ideas and finally, chapter six concludes with brief conclusions and suggestions for future projects.

Chapter 02

LITERATURE REVIEW

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Network Design

According to Chan, Perrig, and Song (2003), any type of network design is essential for the successful implementation, notwithstanding of network size or terms, is to follow the well-structured engineering principles listed:

Hierarchy

While the rules should apply to Smart City, it is important to first address the problem from two perspectives. First, the general character of the smart city and what features and functions should be used at all levels of the team. ? Second, how are the core module or key structure associated with each option and key team input? Starting with the basics, Smart Town has been chosen as an example of three integrated levels of distribution, broadcast and accessibility levels. The principle behind the hierarchical structure is that each part of the hierarchy provides a specific function and services that give it a unique role and function in each project.

Modularity

Area module of church building protection unit, the advantage of the modular system is largely due to the stimulation it provides. The module applications can be distinguished from the rest of the network, and each has a slight difference in fault detection and overall system access. Changes, upgrades, or upgrades to the latest services can be done in a controlled and sustainable way, providing the flexibility to maintain and manage smart city networks. As the selected module lacks sufficient power, the operating system or service will be lost.

Flexibility

The capability to alter portions of the network, add new services and strengthen capacity, while improved versions of the city's design work have not yet been explored. The hierarchical architecture of structures can be very flexible as it allows specialized modules to be configured or configured in a trusted network.

Resilience

The principle of structural design is also central to modernization and the use of fragmentation as a smart city, not enough to create a sustainable and sustainable infrastructure. Not enough to see smart cities around the entire city, creating a famous destination for other destinations. As evidenced by various security issues seen in systems and computer operating programs over the years, the software designers learned that the actual availability is not enough. The system must also be designed to avoid extraordinary or unusual circumstances for bankruptcy. One of the easiest ways to thwart a system is to emphasize the boundary conditions - look for the design end of the system and look for weaknesses. This is the same approach, limiting the network. Determine the amount of traffic, the number of traffic flows, or unusual conversion conditions for weaknesses.

Multi-Tiered Architecture

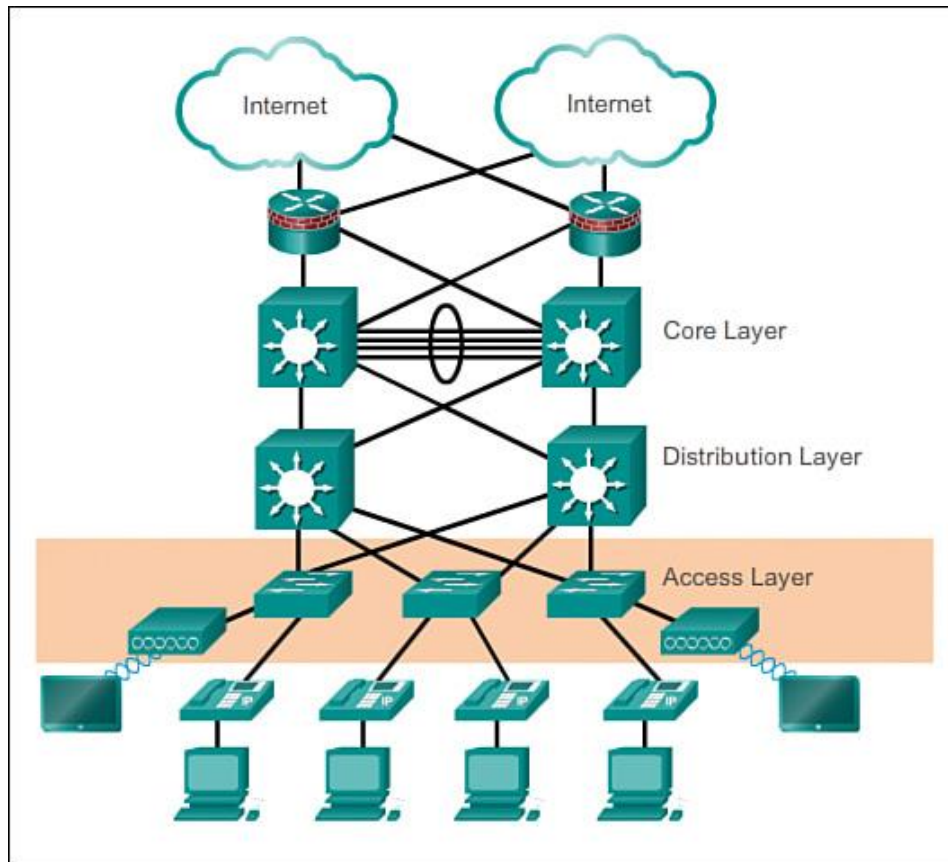
The use of multi-tiered design, smart city networking, network security, ACL (Battou et al., 2006), network protocols, IP addressing, VoIP are the key factors that formation this project. Explains as follows:

Network design specialists have created a hierarchical network design model to assist you to improve topologies at different levels. Each layer can be focused on specific tasks, allowing you to choose appropriate systems and options for the layer. For example, high-speed WAN routers can carry traffic with the Smart City WAN backbone, medium-speed routers can connect buildings to each city, and switches can connect user devices and servers to the building.

A general classification topology includes:

- a) An upper layer of router and super switch are optimized for availability and performance.
- b) Distribution strategy of routers and switches that execute policies.
- c) An access layer that connects users through low power switches and wireless access points.

Each layer of the hierarchical model includes a specific role. The main layer provides the best transport within the site. During WAN design, the access layer has a router on the edge of the smart city network.



A Network of Hierarchical-Architecture

Smart City Networks

A Smart City network can be thought of as a "plug-and-play" platform for connecting many different computing devices. No users and groups are among the islands when it comes to operating system status. All systems can communicate with all different systems while maintaining performance, security and reliability.

This is largely achieved by web protocols and web technologies that deliver lower cost and lower results in less configuration problems than the smart city computing model. TCP / IP can be a seamless Internet work protocol that allows companies to connect workgroups and departmental networks and connect to the network. The web protocol (HTTP, HTML, and XML) integrates the user interface, applications, and data to create an internal Internet organization. A web browser is like a public client, and the web server can send information to any of those clients. Web servers are looking for distributed computing models in the smart city. A multipurpose architecture is used, where a web client accesses a web server and a web server accesses backup information sources such as the master and the farm server. A smart city network connects all segmentation or workgroup networks in one connected network, enabling all users of an organization's PCs to access any computing information or resources. This can

make the difference between autonomous and heterogeneous systems and the ultimate goal is to reduce the number of communication protocols used.

Requirements of Smart City Network

The following provides insight into the Smart City network

A) Scalability - But below the volume and the scale of the system will load. It includes horizontal and vertical scaling. Horizontally implies that the system can easily scale by adding additional resource units.

B) Reliability - What is the elasticity or fault tolerance under many conditions and stimuli

C) Extensibility - What will be the key functionality without having to rewrite

D) Flexibility - Although the system responds well to integration or implementation in various situations

E) Availability - Although system uptime is secure

F) Maintainability - Although system code and components are easy to maintain

G) Usability - Has an intuitive and interesting interface.

Network Protocol

A network protocol is a standard that permits machines to interact. Protocols identify each other on a computer, the form of data transfer and how the data is processed when it reaches its final destination(Frank & Holloway, 2000). The protocol defines an additional mechanism for handling lost or malicious infections or "packets". TCP / IP , IPX DC Web,, and NetBIOS/NetBIOS and Windows. Currently used NT networks are the principal kinds of network protocols. This simple technique of reaching the physical network supports various protocols to coexist inoffensively through network media and provides network authors to use common hardware for various protocols.

Network Devices

This section describes a common network device.

Routers

A router is a physical network device (usually powered by proprietary software) that cannot connect multiple network segments to a single network or connect existing large networks to smaller subnets (Kohler, Morris, Chen, Jannotti, & Kaashoek, 2000). The router focuses on the three network layers of the OSI model and connects multiple physical network segments to an undisclosed logical network, which explains how traffic is sent from the sender to the intended recipient. This means that routing behavior is strongly influenced by the protocol used. Therefore, routing to some extent should be reasonable but network-layer protocol behavior. Routers use direct routing protocols in their network or web destination packets to exchange

information and ensure routing preferences. Routing devices and computer accessory computer networks on the ISP network have a boundary between routing routers and routers. The router maintains a routing table and advises packets to be directed to one interface or another step. Routes are usually added manually to routing tables - managing policies based on network size is extremely secure but difficult - or automatically extended routing protocol updates below:

- a) Routing Information Protocol (RIP) / RIPv2
- b) Internal Gateway Routing Protocol (IGRP)
- c) Increase Internal Gateway Routing Protocol (EIGRP)
- d) Open Shortest Path First (OSPF), Border Gateway Protocol (BGP)
- e) External Gateway Protocol (EGP)
- f) Intermediate System - Intermediate System

Routing protocols use a completely different policy to prevent routing loops (when packets are redirected indefinitely and no destination is available). Here are some strategies

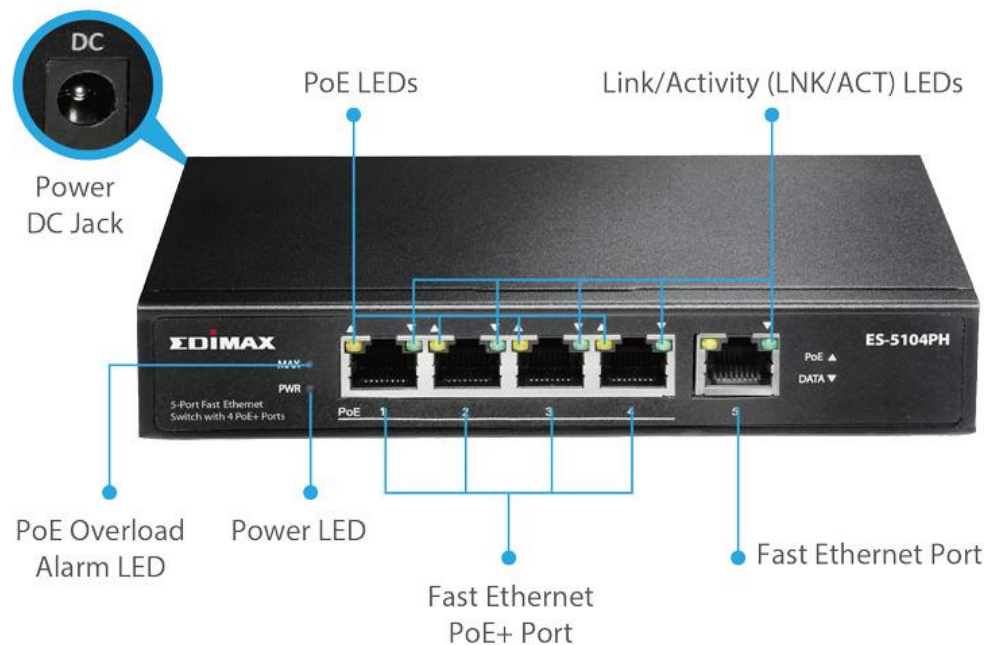
- a) Calculate eternity
- b) Path poisoning
- c) Split horizons

However, it is important to understand routing protocols to avoid annoying issues, such as:

- a) Updating hacker's reasons (identified as shut down) to hack your network and poison is an important way to create DoS situation.
- b) Create a routing loop that overloads the router and activates the network very slowly, slowing down, or activating the maneuver to send all outbound traffic to different hosts - taking updated routes and sending them to the ISP. Goes - Occasionally attacks occur.

Switches

The switch is a special type of hub that provides an extra layer of intelligence for the core physical layer repeater center (Irie, 2000). The switch must be able to read the MAC address of each received frame. This information allows only replication of incoming message frames or computer-directed frames. It can speed up the network and reduce the crowd. The OSI model switches



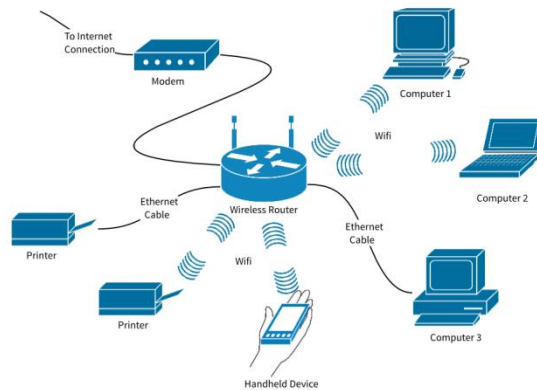
The Interface of a Switch with Ports

Virtual LANS in Switches

VLAN is a logical group of network users and sources that are related to management-defined ports on a switch (Seifert, 2000). Once a VLAN is created, a short broadcast domain can be created on the Layer two switched internet network via a completely separate port on the switch to serve different subnets. A VLAN is considered as its own subnet or broadcast domain, which means that frames transmitted over the network are grouped logically to switch between ports in the VLAN only.

Wireless Access Point (WAP)

A wireless network adapter card with a transceiver, seldom pointed to as an access point, transmits signals from nearby computers, and trails back and forth between wireless computers and wired networks (Gast, 2005). The access point acts as a wireless hub, connecting multiple wireless NICs to a subnet. The Traditional Wireless Wired Ethernet Network (Network Device) has at least one fixed Ethernet port on the access point to bridge the wireless network.

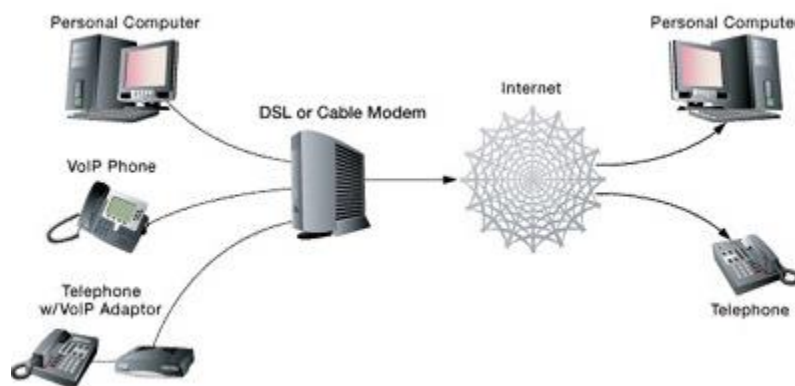


Wireless Connections of Networks

Voice over Internet Protocol (VoIP)

The Internet Protocol is a piece of voice hardware and software that allows the Internet to be used as a means of broadcasting telephone calls by transmitting voice information over packets using IPs instead of traditional legacy circuits(Akbar, 2010).

One of the benefits of VoIP is that users do not pay more for Internet calls than they pay for individual emails on the Internet network.



How a VoIP Works In Networks

Access Control Lists

The Access Control List (ACL) is a filter that allows the user to manage which routing updates or packets have been approved or rejected on the network or rejected from the

network(Ioannidis, Keromytis, Bellovin, & Smith, 2000). These are used exclusively by network administrators to filter traffic and provide additional security to their networks. ACL provides a powerful way to control traffic to and from the network; this control is as simple as allowing or denying a network host or address. ACLs can be configured for all routing network protocols. One of the most important reasons for configuring ACLs is to provide network protection. However, ACLs can also be used to control network traffic on the basis of TCP ports. Here are some reasons to configure ACLs on your network:

- a) Limit network traffic to increase network efficiency.
- b) ACL provides flow control, limiting the supply of route updates.
- c) It can be used for additional protection.
- d) Control the traffic that is on the router or on the block.
- e) Ability to manage the areas visited by the customers.

Types of Access Control Lists

The types of ACLs used in the network are described in the following sections:

Standard Access-List

The list of standard accesses creates filters based on the source address for server-based filtering. An address-based access list contains an address list or a range of addresses and indicates whether access to the access is authorized or denied.

Extended Access Lists

The filter is built based on the source address, a target address, protocol, port number and other functions of the expanded access list and is used for packet-based filtering of packets over the network.

IP Addressing

IP (Internet Protocol) address is a unique identifier for a node or host connection to an IP network(Valkó, 1999). The IP address is a 32-bit binary number, usually expressed as 4 decimal values, each representing 8 bits, between 0 and 255 (called octet), by a decimal point. This is called "dotted decimal" notation. Each IP address has two parts, one part identifies the network and the other part identifies the node. Address classes and subnet masks determine which part belongs to the network address and which part belongs to the node address.

There are 5 separate address classes. By checking the first 4 bits of the IP address, you can determine which category the IP address belongs to:

Class A addresses begin with 0xxx, or 1 to 126 decimal.
Class B addresses begin with 10xx, or 128 to 191 decimal.
Class C addresses begin with 110x, or 192 to 223 decimal.
Class D addresses begin with 1110, or 224 to 239 decimal.
Class E addresses begin with 1111, or 240 to 254 decimal.

Subnet Masking

Applying a subnet mask to an IP address allows you to identify the network and address part nodes, allowing the network bit to be represented by mask 1 and node bit by 0. A network address or number results in some logical performance.

Default subnet masks

Class A - 255.0.0.0 - 11111111.00000000.00000000.00000000

Class B - 255.255.0.0 - 11111111.11111111.00000000.00000000

Class C - 255.255.255.0 - 11111111.11111111.11111111.00000000

Classless Inter Domain Routing:

Many years ago CIDR was created to prevent IP addresses from running the Internet. A "classification" system for classifying IP addresses can be very obsolete; a person who may need more than 254 host addresses is given a Class B address block of 65533 host addresses. Companies and entities that provide Class A address blocks are more useless with over 16 million addresses! In fact, only a small portion of the assigned Class A and Class B address space is allotted to hosts on the Internet.

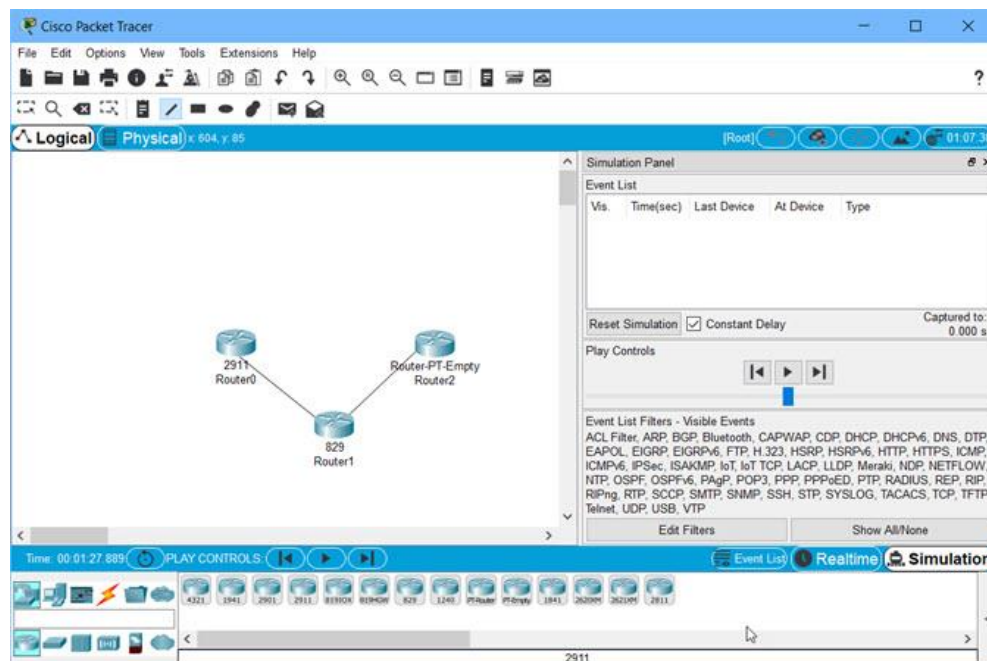
The CIDR address used is the same as the class address. In CIDR notation, class addresses are easy to write (Class A = 8, Class B = 16, and Class C = 24).

Network Address Translation

Addresses can be dynamically assigned to network address translation (Guttman, 2001). Dynamic NAT allows a private network host to access public networks such as the Internet through an IP address. Dynamic NAT occurs when a router provides a default address on an internal private network device or an external global address for an address pool.

Cisco Packet Tracer

Cisco Packet Tracer is a powerful network emulator for testing network behavior and asking "is there a problem"(Lukasik, 2000). Packet Tracer provides the capability of simulation, visualization and composing, evaluation and collaboration, and facilitates learning and learning complex technical concepts. Packet Tracker allows students to create a network with virtual unlimited devices through practice, discovery and problem solving, complementing physical devices in the classroom. With Packet Tracer you can create, configure, or create network issues either alone or together with other students, using virtual tools and simulated connections. Most importantly, Packet Tracer helps create your own virtual "Network World" for search, test and networking concepts and technical interpretation.



A Packet Tracer Interface

Network Models

These models look at web features and how they work. There are many evening models related to the organization or start of the organization. Two important cases are described below.

The TCP/IP Model

This model is also called the DOD model because it was developed by the Department of Defense. The model with the Internet is also advocated because TCP / IP are the principle used in the Internet. It is the main language of communication and the basics of the Internet. It can

be used as a communication protocol for a private network (intranet or extranet). Providing access to the Internet, which is a copy of the TCP / IP process, if on a computer, as every copy of the computer has a TCP / IP that allows you to send or receive data.

OSI Network Model

International Organization Standardization (ISO) defines a standard known as this Open System Connection (OSI) model. The conceptual model exemplifies and limits the internal functions of the communication system and divides it into non-linear systems. The model is a product of the international Open Source Internationalization Interconnection Project. The purpose of this OSI benchmark model is to target marketers and developers to enable transparency and comparison between digital communication tools and software communication tools.

Layer	Function	Example
Application (7)	Services that are used with end user applications	SMTP,
Presentation (6)	Formats the data so that it can be viewed by the user Encrypt and decrypt	JPG, GIF, HTTPS, SSL, TLS
Session (5)	Establishes/ends connections between two hosts	NetBIOS, PPTP
Transport (4)	Responsible for the transport protocol and error handling	TCP, UDP
Network (3)	Reads the IP address form the packet.	Routers, Layer 3 Switches
Data Link (2)	Reads the MAC address from the data packet	Switches
Physical (1)	Send data on to the physical wire.	Hubs, NICS, Cable

The OSI and TCP/IP Layers

Internet

The Internet is a global network of interactive computer networks that connects billions of devices across a common Internet Protocol (TCP / IP) package (Leiner et al., 2009). The global network of multimillion, public, academic, commercial and government network packages is connected through a variety of electronic, wireless and fiber optic network

technologies. The Internet has a variety of data centers and campaigns, such as Hyper Articles and the World Wide Web, email support tools and peer-to-peer file sharing and telephony tools.

Intranet

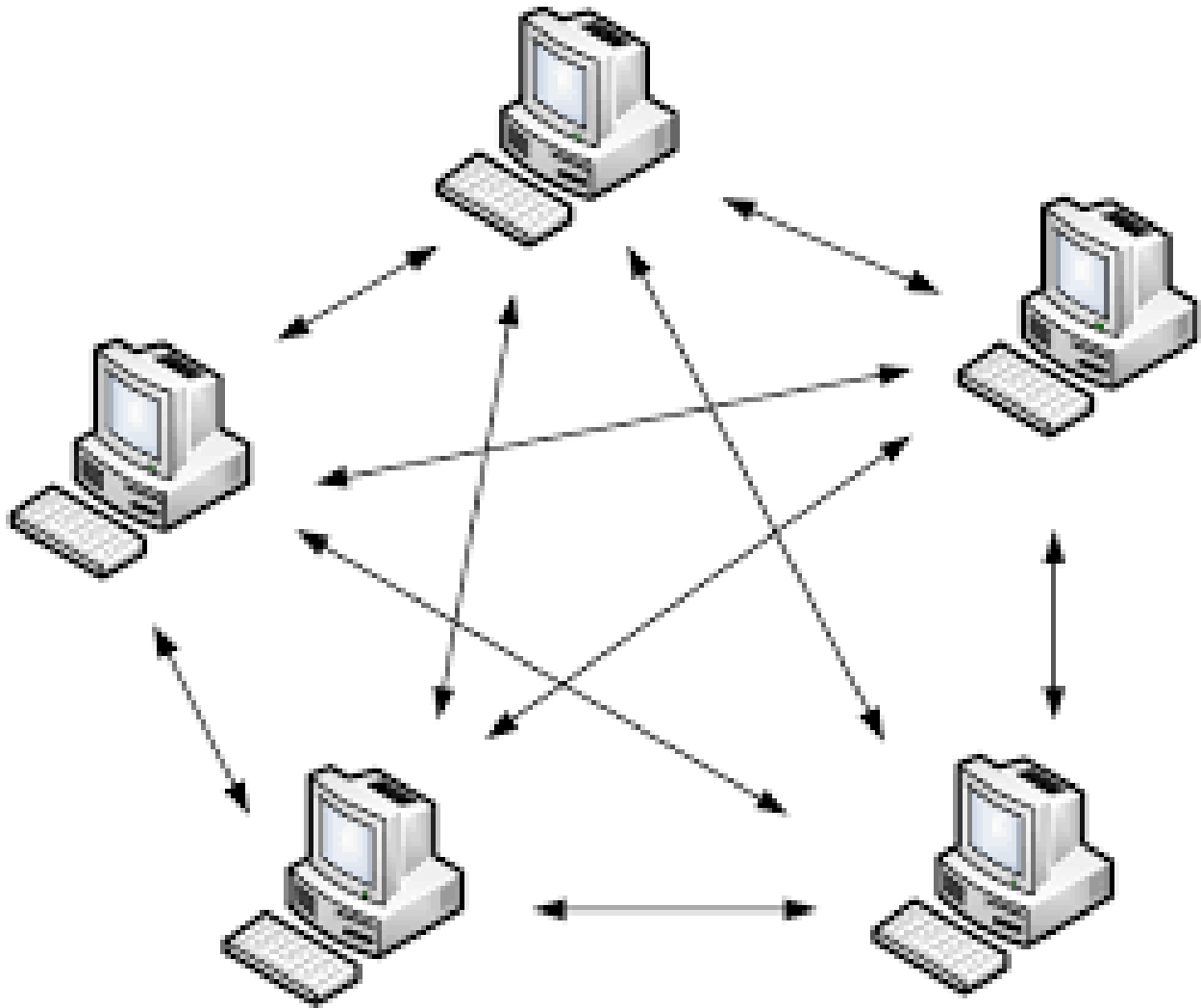
The Internet has a computer network that uses Internet Protocol technology to share data between company, operating system, or computer support. This term is opposed to an external network, but refers to a network within an organization.

Sometimes this term simply refers to a website's internal network, but it can be a major part of a professional network of information resources and can be integrated into multiple networked network resources. The goal is to coordinate every desk with low prices, time and effort to maximize product, effective price, timeliness and competition.

The internet can conduct many websites and an important part of monitoring internal communication and interaction. Internet services are often designed to provide a modern interface to social information management systems.

Peer-To-Peer Networks

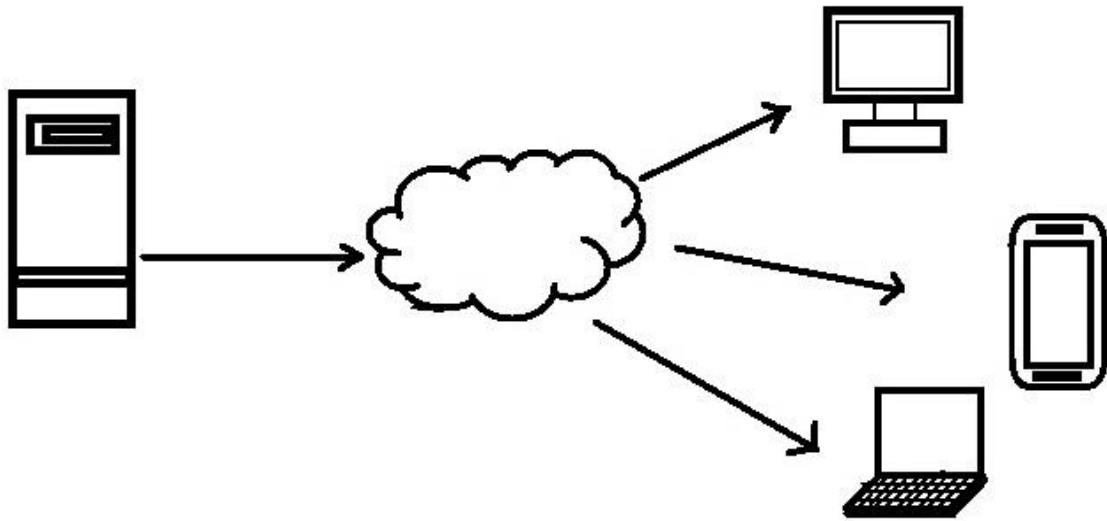
All computers have the same authority, so the term is "peer" and they communicate with each other on the same basis. Files such as word processing or parity documents can be distributed over the network and then distributed to all computers on the Internet, such as print or hardware integrated on the same computer.



A Peer-to-Peer Network

Client/server networks

Clients/server is better suited to larger networks. A central computer or "server" seems to be a repository for shared files and applications on the network. Generally, the server controls access to other computers, also known as "consumer" computers, which are higher than the average computer performance. Typically, school teachers and students will work on computer clients and just a network manager will access the server.



A Client-Server Network

Chapter 03

DESIGN METHODOLOGY

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Network Design

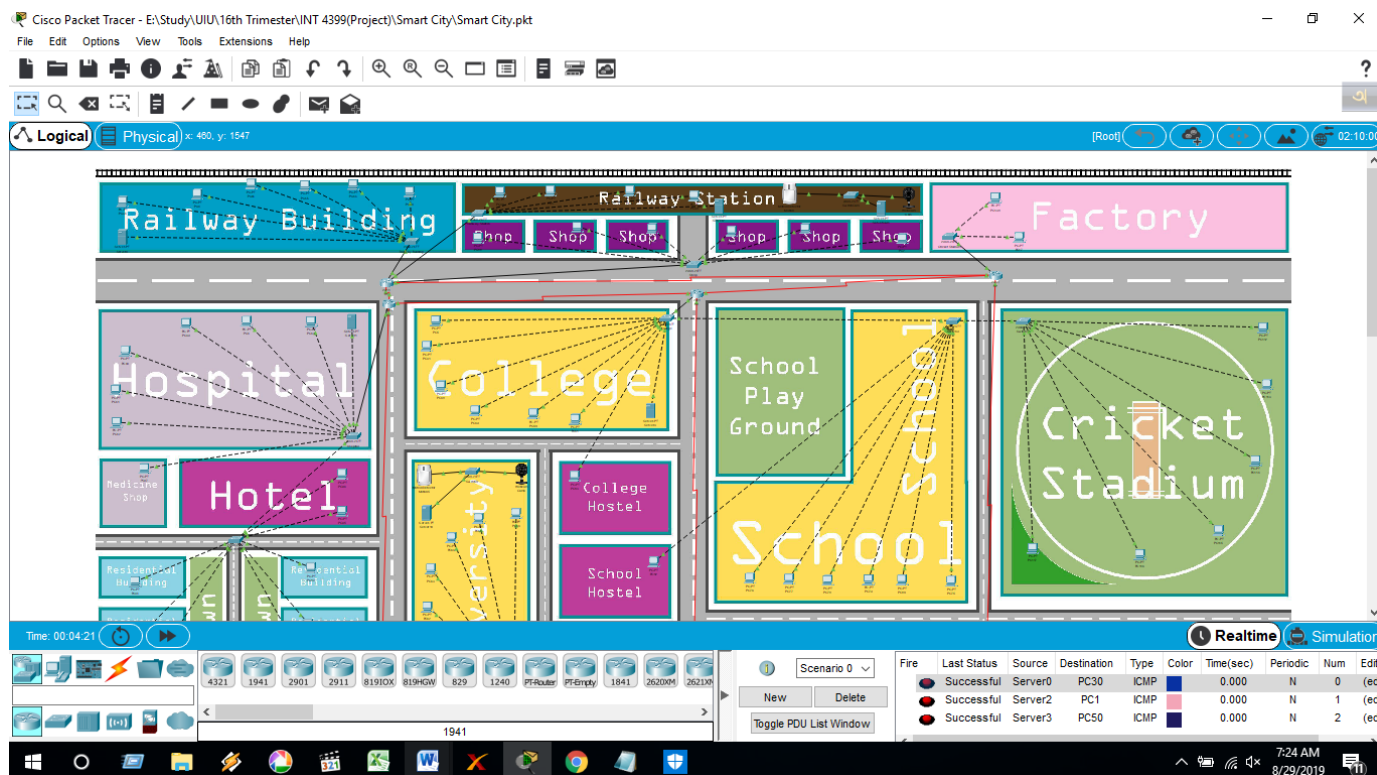
The network is comprised of various technologies that have been criticized and criticized for doing hands-on work. This technology is deployed

- a) Network Architecture
- b) Network Connection
- c) EIGRP Routing Protocol
- d) VLAN
- e) DHCP Configuration
- f) Wireless Routing Configuration
- g) VoIP
- h) Access Control Lists Configuration
- i) Network Address Translation

Network technology is required to run as a smart city network. Select them for this purpose to meet the requirements of city networks for fiber and topology.

Network Architecture

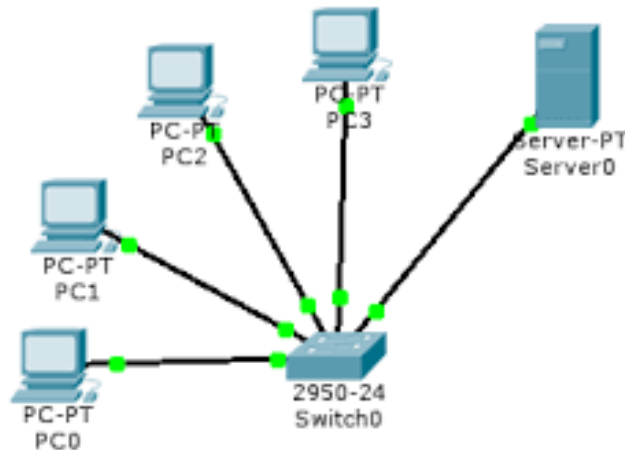
One of the primary routers has an interface ISP, and the other connects to a Demilitarized Zone (DMZ)(Wool, 2004). The DMZ contains a switch that hosts a server organization that represents FTP, web, email and firewall servers. At the distribution layer, the smart city region has one master router and 10 total routers. Wireless access point management is connected to the switch's A2 VLAN. Each switch is connected to a server that causes different network addresses and VLANs, so the server automatically helps access point to all PC IP addresses Also, IP phones are connected to management block and room switches. A personal IP address is configured across the entire network, including the IP address. In the sense that the network address of the ISP router is 192.168.0.0, the network address of the source, distribution and access layer is 10.10.10.0/30. The wireless adapter's network interface has a network address of 10.10.10.0/30, and the router's address is 10.10.10.1



The Architectural Network Design

Network Connection

Since the three switches (multilayer switches) at the packet tracer layer cannot provide fiber connections, a generic device is used (Dobbins et al., 1998). This is because the fiber optic connections travel over long distances. At the root and distribution layer, general-purpose routers are used because they have interfaces for serial and fiber connectivity. A general-purpose switch is also used for the access layer.



Section of the Fiber Optic Connectivity

Network Protocol

Use EIGRP, as it is a hybrid routing protocol designed to route multiple routers on a smartphone's network (McFarland, Sambi, Sharma, & Hooda, 2011). Only ten routers are configured using a single routing protocol. Therefore, use network addresses to identify neighbors on each router.

For example,

```
COREROUTER (config)#router eigrp 1
COREROUTER (router)#network 10.10.10.0
```

Neighbor routers with IP addresses placed on the same network that will see each other through the network address of the network.

VLAN Configuration

Each switch acts as its own VLAN, sharing blocks and devices. VLANs are first configured using the number and name for each VLAN from each VLAN database.

When an IP address is assigned, all ports on the switch are assigned to VLAN, which is used for this purpose and then configured in global configuration mode:

```
A-CLASS (config) #interface VLAN 100
A-CLASS (config-if) #IP add 10.10.10.0.2 255.255.255.0
A-CLASS (config-if) #IP default-gateway 192.168.3.1
```

The above configuration includes the transfer of packets and switching interfaces.

Dynamic Host Configuration Protocol (DHCP)

There are many devices at the access layer that seem to be expanding, so the DHCP router automatically uses the IP address at the bottom of each switch.

```
Router (config)#IP DHCP POOL COMPUTERLAB
Router (dhcp-config)#network 10.0.40.0.255.255.255.0
Router (dhcp-config)#default-router 10.10.10.0
Router (dhcp-config)#ip dhcp excluded-address 10.10.10.1 10.10.10.2
```

Wireless Connectivity

Wireless entrance point is configured to automatically assign an IP address to acquaintance computers (Raniwala & Chiueh, 2005). Flexibility is required whenever devices need to connect to a network. To connect it to the network, its interface must be connected to the switch port. Neighbor devices must be connected to the Linksys WPC-300N module.

Physical Config Desktop Software/Services

Web Browser

< >

URL http://192.168.2.1

Go Stop

LINKSYS®
A Division of Cisco Systems, Inc.

Firmware Version: v0.93.3

Wireless-N Broadband Router WRT300N

Setup

Setup

Wireless

Security

Access Restrictions

Applications & Gaming

Administration

Status

Basic Setup

DDNS

MAC Address Clone

Advanced Routing

Internet Setup

Internet Connection type

Static IP

Internet IP Address:

192

.

168

.

1

.

2

Subnet Mask:

255

.

255

.

255

.

0

Default Gateway:

192

.

168

.

1

.

1

DNS 1:

192

.

168

.

1

.

1

DNS 2 (Optional):

0

.

0

.

0

.

0

DNS 3 (Optional):

0

.

0

.

0

.

0

Optional Settings

Host Name:

Help...

Linksys

VoIP Configuration

Routers and switches are configured for voice over IP phones(Varshney, Snow, McGivern, & Howard, 2002). Router 2811 is the only router that can include telephony. Therefore, the connection must be made through a fast Ethernet cable network from an IP phone to a 2811 router. Use NM8A / S module support to connect the router to a 2811 router using a serialized DCE cable to a DMZ router. The setup is done correctly, as shown below

Commands on Router for VOIP *Router(config)#IP
DHCP pool voice Router(DHCPconfig)#option 150
IP 10.10.10.0 Router(DHCPconfig)#exit
Router(config)#telephony-service Router(config-
telephony)#max-dn 10
Router(config-telephony)#max-ephones 10
Router(config-telephony)#IP source-address 10.10.10.0 port 2000
Router(config-telephony)#auto assign 1 to 10
Router(config-telephony)#exit
Router(config)#ephone-dn 1
Router(config-ephone-dn)#number 12345
Router(config-ephone-dn)#exit
Router(config)#ephone-dn 2
Router(config-ephone-dn)#number 33341
Router(config-ephone-dn)#exit*

Access Control List Configuration

Some of the networks and manage network access, protect, and configure the access control lists, for example, F 3/0 interface to manage these interfaces, the reason for the block in order to prevent students from accessing Web servers configured for individual Not belong.

CORE ROUTER>enable

CORE ROUTER#configure terminal

CORE ROUTER(config)#access-list 10 deny 10.0.20.0 0.0.0.255

CORE ROUTER(config)#access-list 10 permit host 10.0.92.1 0.0.0.255

CORE ROUTER(config)#access-list 10 deny 10.0.30.0 0.0.0.255

CORE ROUTER(config)#access-list 10 permit any

CORE ROUTER(config)#interface Fa 3/0 CORE

ROUTER(config-if)#ip access-group 1 in CORE

ROUTER(config-if)#exit

CORE ROUTER(config)#interface Fa 0/0 CORE

ROUTER(config-if)#ip access-group 1 in CORE

ROUTER(config-if)#exit

Configuring Network Address Translation

There are two types of NAT configurations: inside and outside. Internal signals indicate that traffic from the school network and the external network comes from the external network.

Router(config)#interface fa 0/0

Router(config-if)#IP add 192.168.1.2 255.255.255.252

Router(config-if)#IP nat outside

Router(config-if)#int s1/0

Router(config-if)#IP add 192.168.2.1 255.255.255.252

Router(config-if)#IP nat inside

Chapter 4

ANALYSIS AND RESULTS

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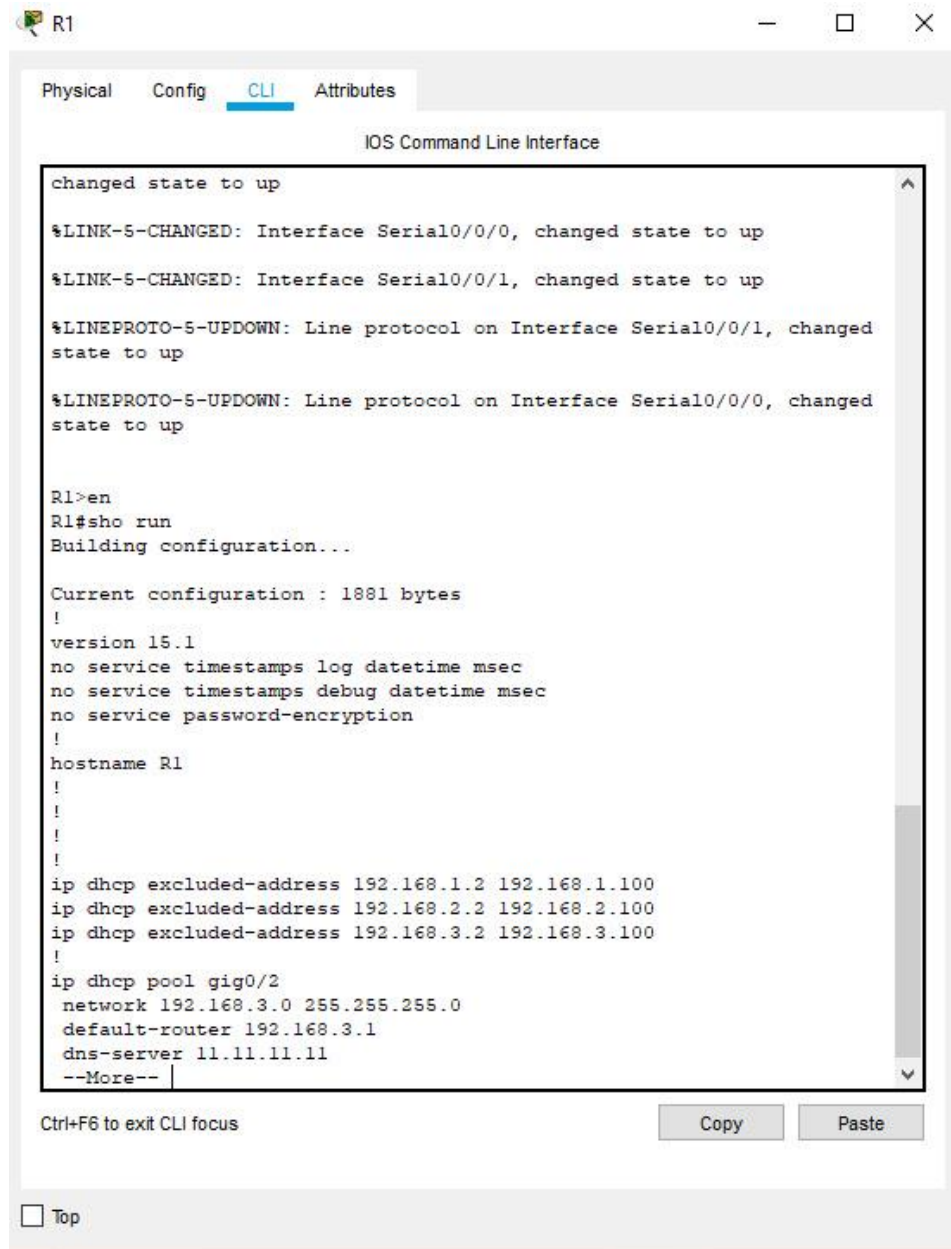


Analysis

The results and analysis of tests carried out are discussed in the following sections

Show IP-Route

“Show run”



The screenshot shows a window titled 'R1' with a tabbed interface. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The output of the 'show run' command is shown, indicating that the configuration has been built successfully. The configuration includes version 15.1, service timestamps, hostname R1, and DHCP settings for three pools (gig0/2, gig0/1, and gig0/0). The output is as follows:

```
changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed
state to up

R1>en
R1#sho run
Building configuration...

Current configuration : 1881 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
!
!
ip dhcp excluded-address 192.168.1.2 192.168.1.100
ip dhcp excluded-address 192.168.2.2 192.168.2.100
ip dhcp excluded-address 192.168.3.2 192.168.3.100
!
ip dhcp pool gig0/2
network 192.168.3.0 255.255.255.0
default-router 192.168.3.1
dns-server 11.11.11.11
--More--
```

At the bottom of the CLI window, there is a 'Ctrl+F6 to exit CLI focus' message and 'Copy' and 'Paste' buttons. Below the CLI window, there is a 'Top' button.

Core-Router

Automatic assignment of IPs-Using DHCP

PC0

Physical Config **Desktop** Programming Attributes

☒ DHCP ☐ Static

IP Address 192.168.3.103

Subnet Mask 255.255.255.0

Default Gateway 192.168.3.1

DNS Server 11.11.11.11

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::20C:CFFF:FE8E:4B8B

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

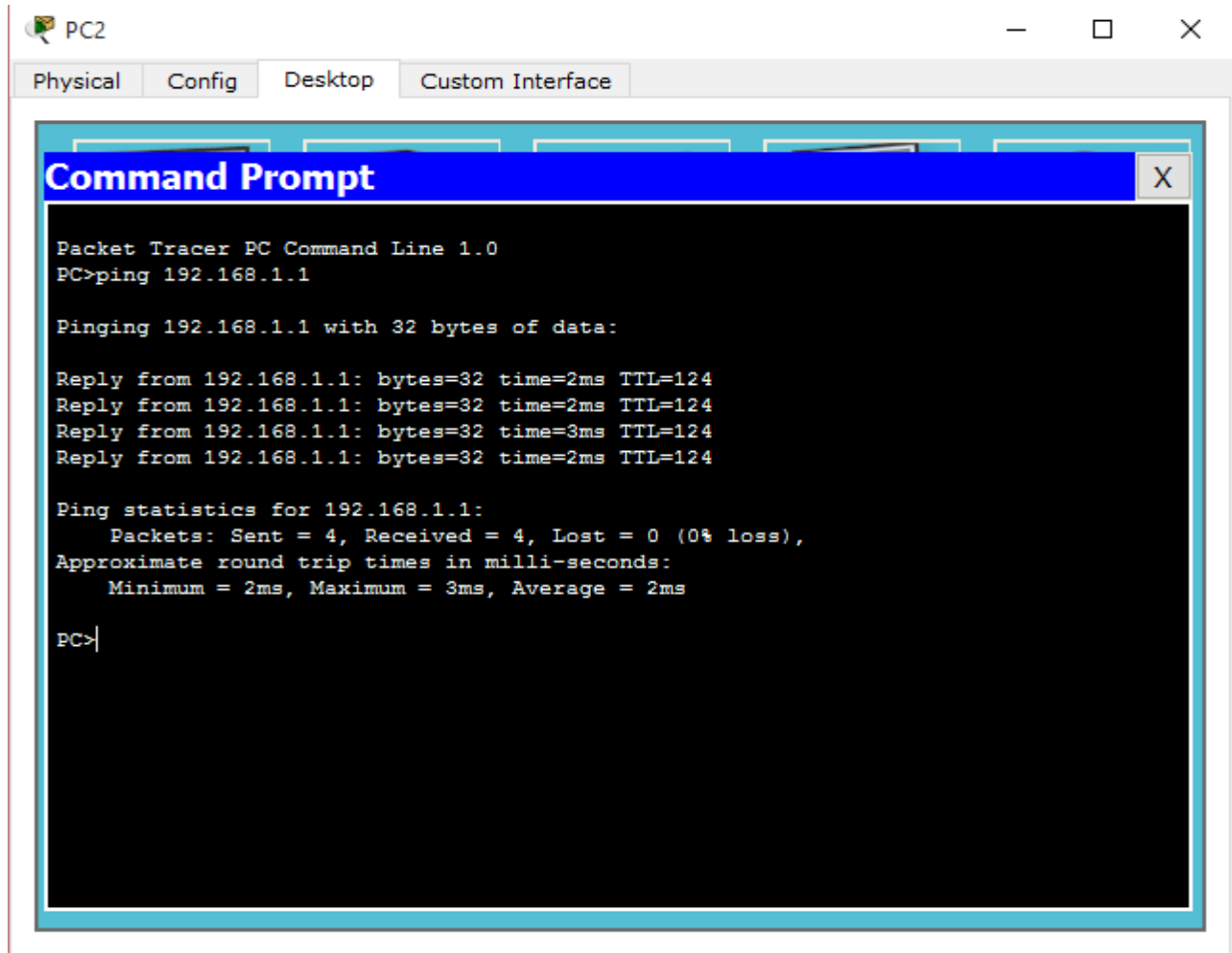
Password

☐ Top

The Automatically Allocated IP Locations of PC0

PING Command

The ping command is the main command to test connections between devices(Snay & Syed, 2001). It can be done on a switch, router, server or computer. Routers and switches, in command priority mode, on servers and routers - are implemented in the command-line interface.

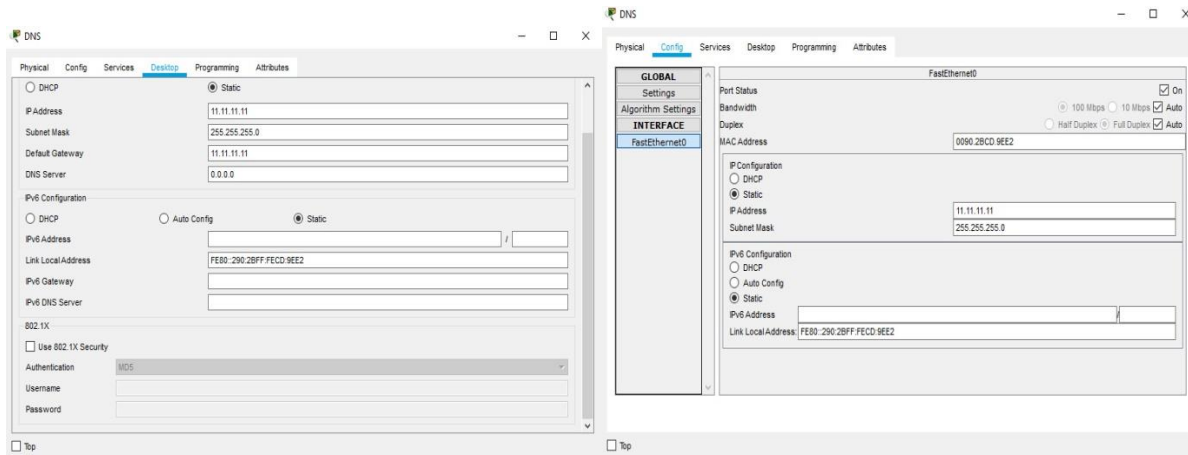


Ping-Statistics

The results and analysis of tests carried out are discussed in the following sections

Main Server Configuration

We used static routing for the IP Addressing of the main server.



Configuration: DNS

- IP Address: 11.11.11.11
- Subnet Mask: 255.255.255.0
- Gateway: 11.11.11.11

FastEthernet0

- IP Address: 11.11.11.11
- Subnet Mask: 255.255.255.0

Server Configuration for PC's

The image displays two side-by-side screenshots of the MikroTik WinBox configuration interface. The left window is titled 'Server1' and shows the 'Config' tab. It has a sidebar with 'Physical', 'Config', 'Services', 'Desktop', 'Programming', and 'Attributes'. The 'Config' section is expanded, showing 'DHCP' and 'Static' options. The 'Static' option is selected, and the following fields are filled: IP Address (192.168.3.2), Subnet Mask (255.255.255.0), Default Gateway (192.168.3.1), and DNS Server (11.11.11.11). Below this, the 'IPv6 Configuration' section is visible, with 'Static' selected and fields for IPv6 Address, Link Local Address, IPv6 Gateway, and IPv6 DNS Server. The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked. The right window is titled 'FastEthernet0' and also shows the 'Config' tab. It has a sidebar with 'Physical', 'Config', 'Services', 'Desktop', 'Programming', and 'Attributes'. The 'Config' section is expanded, showing 'GLOBAL' and 'INTERFACE' options. The 'INTERFACE' option is selected, and the 'FastEthernet0' interface is configured. The 'Port Status' is 'On', 'Bandwidth' is '100 Mbps', 'Duplex' is 'Full Duplex', and 'MAC Address' is '00D0:BCE7:3240'. The 'IP Configuration' section is visible, with 'Static' selected and fields for IP Address (192.168.3.2), Subnet Mask (255.255.255.0), IPv6 Address, and Link Local Address (FE80::2D0:BCFF:FE07:3240).

Configuration: PC

- IP Address: 192.168.3.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.3.1
- DNS Server: 11.11.11.11

FastEthernet0

- IP Address: 192.168.3.2
- Subnet Mask: 255.255.255.0

Server Configuration for Webcams

The screenshot shows the 'Server11' configuration window with the 'Desktop' tab selected. The window has tabs for Physical, Config, Services, Desktop, Programming, and Attributes. Under the Desktop tab, there are three main sections: DHCP/Static IP configuration, IPv6 Configuration, and 802.1X Security.

DHCP/Static Configuration:

- ☐ DHCP
- ☒ Static
 - IP Address: 192.168.15.1
 - Subnet Mask: 255.255.255.0
 - Default Gateway: 192.168.3.1
 - DNS Server: 11.11.11.11

IPv6 Configuration:

- ☐ DHCP
- ☐ Auto Config
- ☒ Static
 - IPv6 Address: [empty] / [empty]
 - Link Local Address: FE80::201:97FF:FE06:EDA0
 - IPv6 Gateway: [empty]
 - IPv6 DNS Server: [empty]

802.1X Security:

- ☐ Use 802.1X Security
 - Authentication: MD5
 - Username: [empty]
 - Password: [empty]

At the bottom left, there is a 'Top' button.

Configuration: **Webcam**

- IP Address: 192.168.15.1
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.3.1
- DNS Server: 11.11.11.11

Router Configuration

The screenshot shows the configuration window for router R1. The 'Config' tab is active, and the 'INTERFACE' section is selected in the left sidebar. The 'GigabitEthernet0/0' interface is highlighted. The main configuration area shows the following settings:

- Port Status:** ☒ On
- Bandwidth:** ☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex:** ☐ Half Duplex ☒ Full Duplex ☒ Auto
- MAC Address:** 00D0.D371.BE01
- IP Configuration:**
 - IP Address:** 192.168.1.1
 - Subnet Mask:** 255.255.255.0
- Tx Ring Limit:** 10

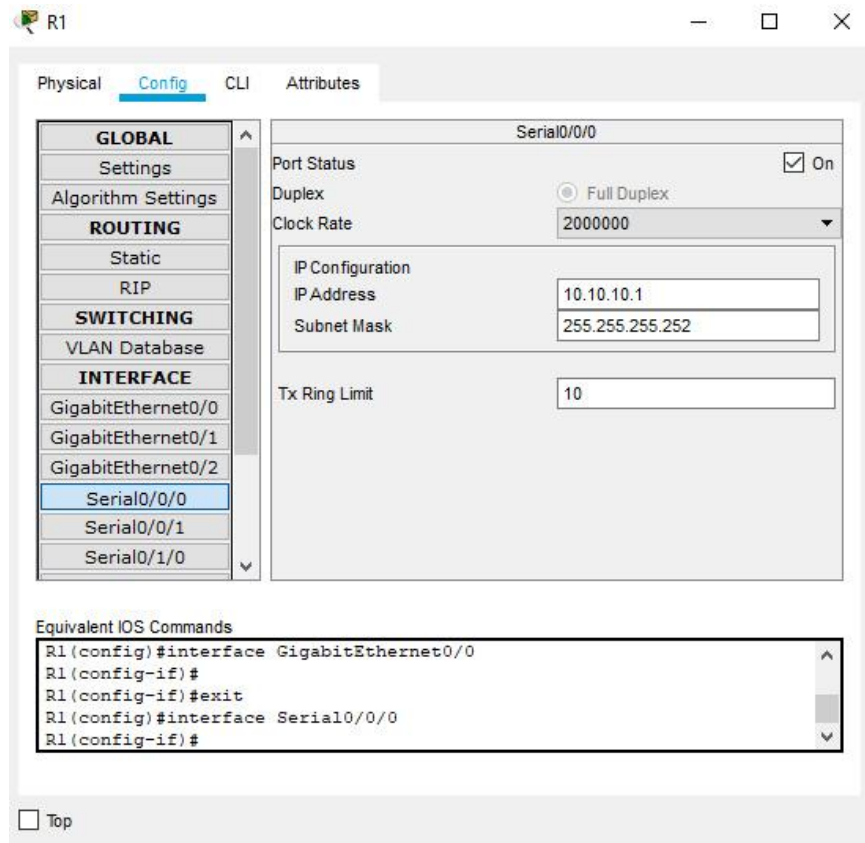
Below the configuration area, the 'Equivalent IOS Commands' section shows the following commands:

```
R1#  
R1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R1(config)#interface GigabitEthernet0/0  
R1(config-if)#
```

At the bottom left, there is a 'Top' button.

Configuration: **GigabitEthernet0**

- IP Address: 192.168.1.1
- Subnet Mask: 255.255.255.0



Configuration: **Serial0/0/0**

- IP Address: 10.10.10.1
- Subnet Mask: 255.255.255.255

Webcam Configuration

Cam5

Specifications Physical **Config** Attributes

GLOBAL

- Settings
- Algorithm Settings
- Files

INTERFACE

- FastEthernet0

☐ DHCP

☐ Auto Config

☒ Static

IPv6 Gateway

IPv6 DNS Server

IoT Server

☐ None

☐ Home Gateway

☒ Remote Server

Server Address

User Name

Password

Refresh

☐ Top Advanced

Configuration: Setting

- Server Address: 192.168.15.1
- User Name: admin
- Password: admin

Cam5

Specifications Physical **Config** Attributes

GLOBAL

- Settings
- Algorithm Settings
- Files

INTERFACE

- FastEthernet0

FastEthernet0

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address

IP Configuration

☐ DHCP

☒ Static

IP Address

Subnet Mask

IPv6 Configuration

☐ DHCP

☐ Auto Config

☒ Static

IPv6 Address

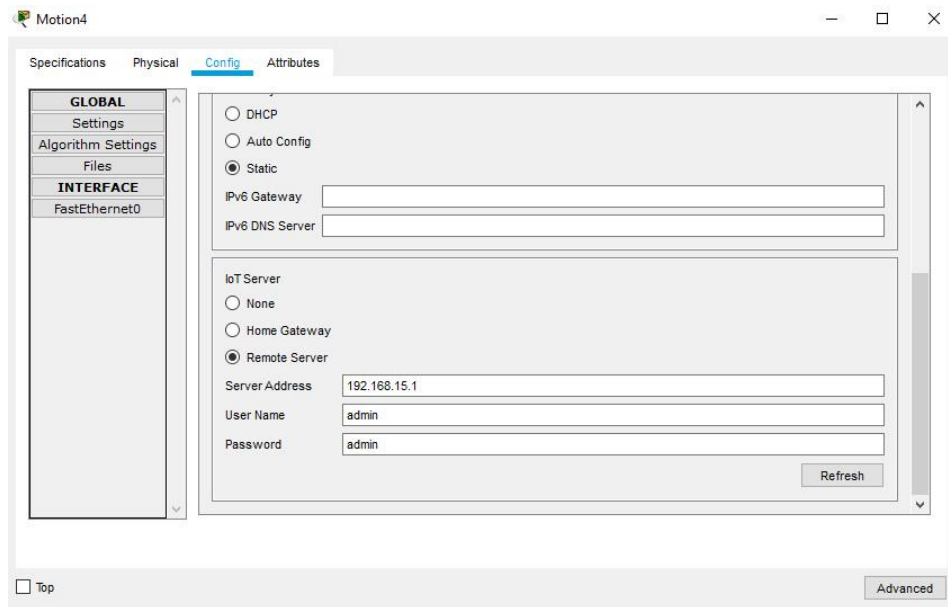
Link Local Address:

☐ Top Advanced

Configuration: FastEthernet0

- IP Address: 192.168.15.3
- Subnet Mask: 255.255.255.0

Motion Detector Configuration



The screenshot shows the 'Motion4' configuration window with the 'Config' tab selected. The left sidebar has a tree view with 'GLOBAL' (Settings, Algorithm Settings, Files) and 'INTERFACE' (FastEthernet0). The main area is divided into two sections. The top section has radio buttons for 'DHCP', 'Auto Config', and 'Static' (selected). Below are text boxes for 'IPv6 Gateway' and 'IPv6 DNS Server'. The bottom section is for 'IoT Server' with radio buttons for 'None', 'Home Gateway', and 'Remote Server' (selected). It includes text boxes for 'Server Address' (192.168.15.1), 'User Name' (admin), and 'Password' (admin), along with a 'Refresh' button. At the bottom are 'Top' and 'Advanced' buttons.

GLOBAL

- Settings
- Algorithm Settings
- Files

INTERFACE

- FastEthernet0

Static Configuration

☐ DHCP
☐ Auto Config
☒ Static

IPv6 Gateway:
IPv6 DNS Server:

IoT Server

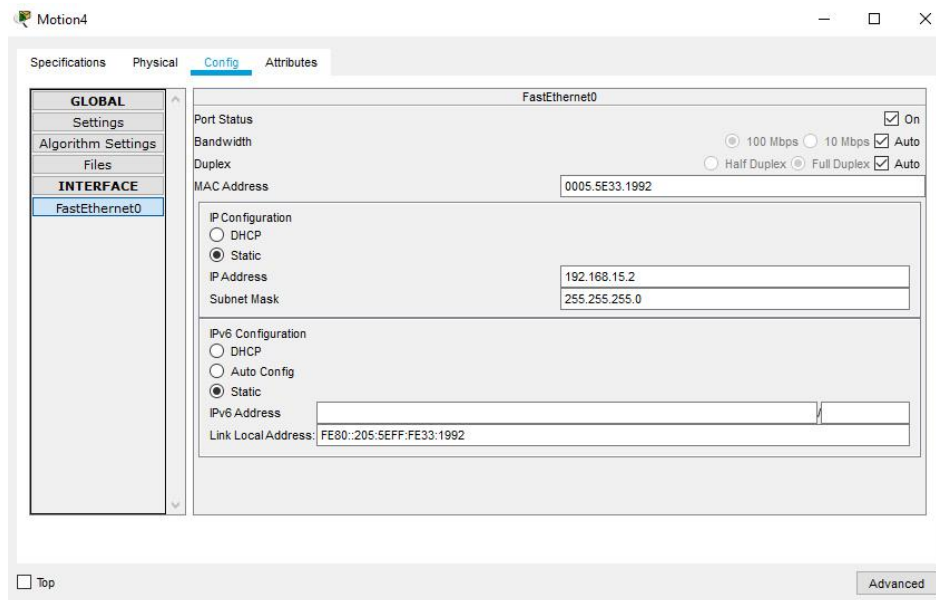
☐ None
☐ Home Gateway
☒ Remote Server

Server Address:
User Name:
Password:
Refresh

Top Advanced

Configuration: **Setting**

- Server Address: 192.168.15.1
- User Name: admin
- Password: admin



The screenshot shows the 'Motion4' configuration window with the 'FastEthernet0' tab selected. The left sidebar is the same as the previous window. The main area shows physical settings for 'FastEthernet0': 'Port Status' (On), 'Bandwidth' (100 Mbps, 10 Mbps, Auto), 'Duplex' (Half Duplex, Full Duplex, Auto), and 'MAC Address' (0005.5E33.1992). Below are 'IP Configuration' and 'IPv6 Configuration' sections. 'IP Configuration' has radio buttons for 'DHCP', 'Static' (selected), and 'Auto Config', with text boxes for 'IP Address' (192.168.15.2) and 'Subnet Mask' (255.255.255.0). 'IPv6 Configuration' has radio buttons for 'DHCP', 'Auto Config', and 'Static' (selected), with text boxes for 'IPv6 Address' and 'Link Local Address' (FE80::205:5EFF:FE33:1992). At the bottom are 'Top' and 'Advanced' buttons.

FastEthernet0

Port Status: ☒ On
Bandwidth: ☒ 100 Mbps ☐ 10 Mbps ☒ Auto
Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
MAC Address: 0005.5E33.1992

IP Configuration

☐ DHCP
☒ Static
☐ Auto Config

IP Address:
Subnet Mask:

IPv6 Configuration

☐ DHCP
☐ Auto Config
☒ Static

IPv6 Address:
Link Local Address: FE80::205:5EFF:FE33:1992

Top Advanced

Configuration: **FastEthernet0**

- IP Address: 192.168.15.2
- Subnet Mask: 255.255.255.0

PC Configuration

The screenshot shows the configuration window for PC0. The 'Desktop' tab is selected, displaying network configuration options. The 'DHCP' radio button is selected for the main IP configuration, with fields for IP Address (192.168.3.103), Subnet Mask (255.255.255.0), Default Gateway (192.168.3.1), and DNS Server (11.11.11.11). The 'IPv6 Configuration' section has the 'Static' radio button selected, with fields for IPv6 Address, Link Local Address (FE80::20C:CFFF:FE8E:4B8B), IPv6 Gateway, and IPv6 DNS Server. The '802.1X' section has 'Use 802.1X Security' unchecked, and 'Authentication' set to 'MD5'. There are fields for Username and Password. A 'Top' button is at the bottom left.

PC0

Physical Config **Desktop** Programming Attributes

☒ DHCP ☐ Static

IP Address: 192.168.3.103

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.3.1

DNS Server: 11.11.11.11

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::20C:CFFF:FE8E:4B8B

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

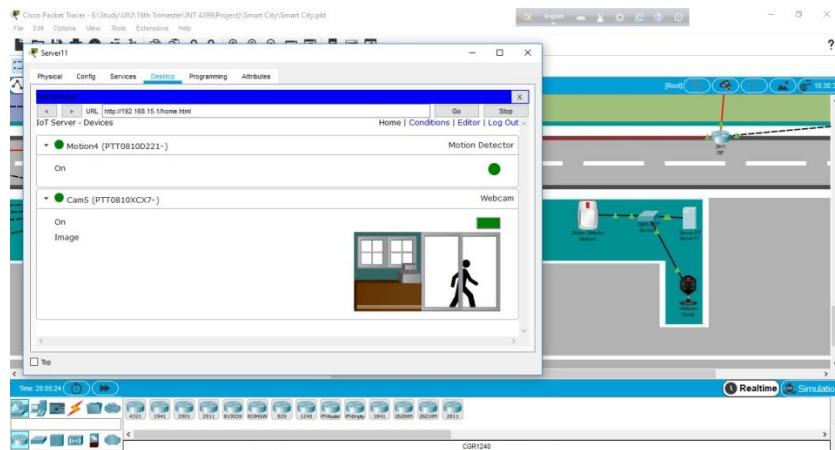
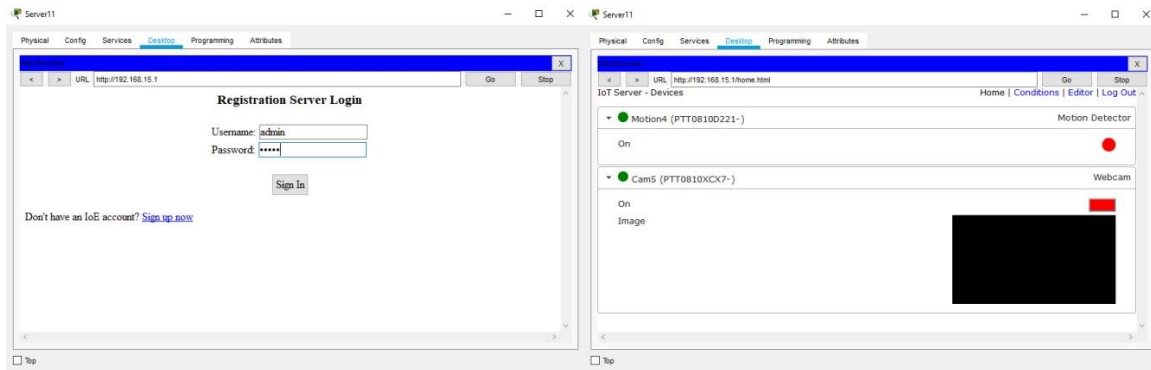
☐ Top

Configuration:

- IP Address: 192.168.3.103
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.3.1
- DNS Server: 11.11.11.11

Webcam Access

Shows if pictures are taken by the smart webcam



Network Design of Smart City

Results of Smart City Network Design



Chapter 5

SMART CITY

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Steps to be taken in Application Areas	46
Recommendation actions for Smart City Development	49
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Smart City

The Digital Society ensures an ICT-driven knowledge-based society where information is available online and all possible work in the public, semi-public and private sectors will be processed using sophisticated technology(Wimmer & Codagnone, 2007). Therefore, in order to establish good governance, we must ensure the effective and efficient use of modern information and communication technology in all areas of society.

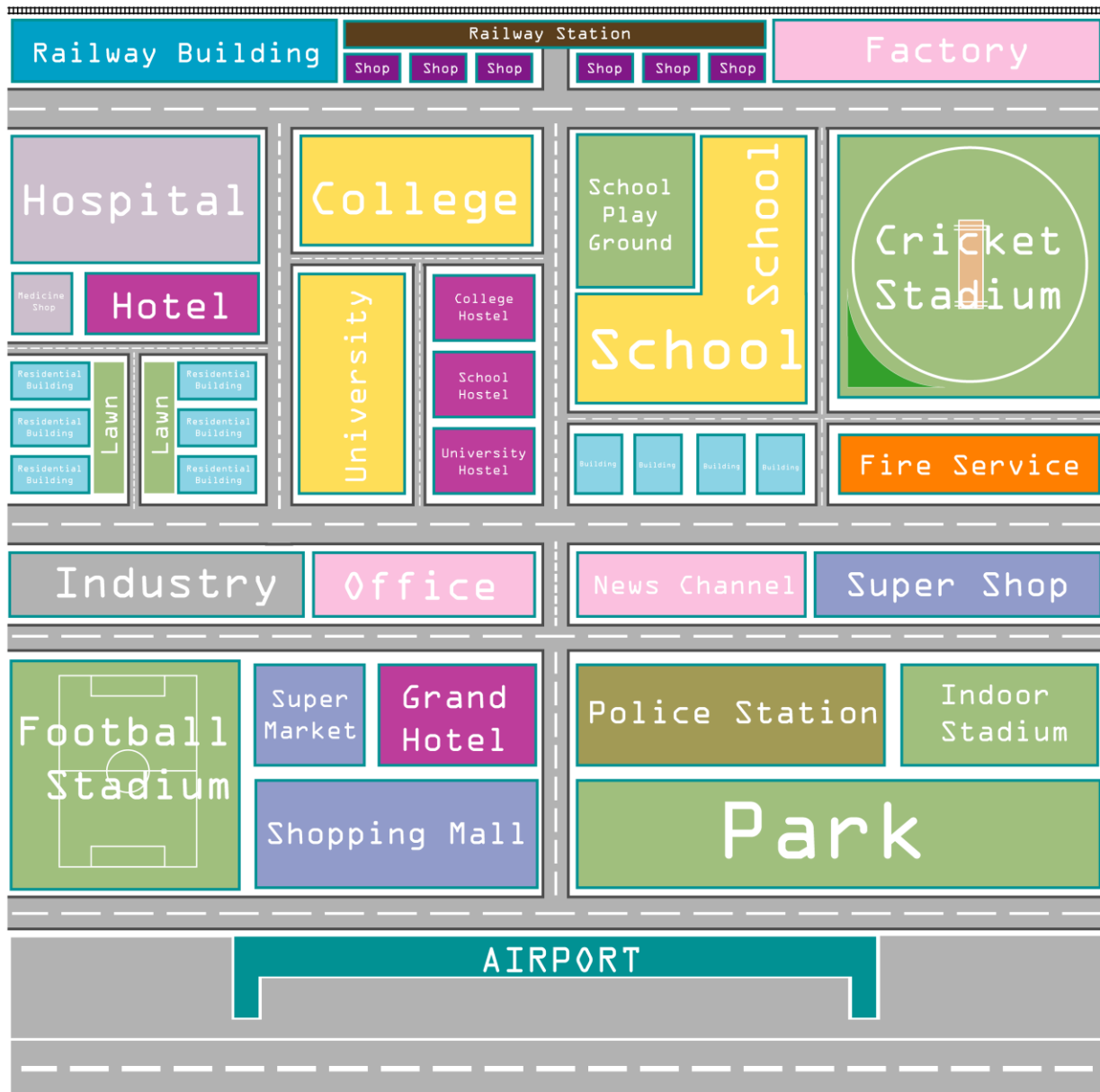
Smart cities are safe; neighborhoods are friendly and functional city. Administer all uses, whether electrical, water, gas or transportation using advanced sensors integrated, electronic equipment and network. Finally, these services are integrated with the computer database system, analysis algorithm and solution. Technology has revolutionized the way traditional structures have transformed into a tea house. Smart City Features:

- Applications and services in various fields such as security, health, education, and the economy.
- Inter-community interconnection through integrated service architecture.
- An innovative platform for the development of new applications and services.

A wireless technology rapid and efficient Metropolitan Area Network (MAN) technology, it has become a huge driving force for various cities around the world. The availability of improved broadband communications, services, and efficient electronic applications helps limit "digital segmentation" and increase economic efficiency. In short, Information and Communication Technology (ICT) is recognized as a powerful tool for increasing poverty and promoting and promoting sustainable good governance.

The Government has developed a major initiative to transform it into digital. The government has focused on specific areas to make this initiative a success. These areas are (i) Private Public Partnership Development Model (ii) development of speculative policies and legal background (iii) best practices for emergence (iv) implementation of statistics and (vi) ICTs as development enablers and (vi) relevant sections. Ensure involvement.

Smart City Layout



Application Area of Smart City Concept

Education

Ensure the educational connectivity of smart cities through distance learning. More benefits can be achieved by setting up an interactive learning process. While the effects are not great, offline digital learning is a modern educational tool. Digital learning includes the provision of digital handouts, e-books, and journals. In addition to teaching, the education system is computerized by providing web-based results, course content and student "record and or teacher" editing.

Public Utility Services

All utility services offered to the citizens: using advanced information and communication technology such as electricity, water, natural gas, etc. uses sophisticated technology to change the service system. These technologies are used to improve customer service, productivity, efficiency, and efficiency.

Public Health Care

Need for an effective public health care system for a quick and accurate diagnosis. For this purpose, a distributed database is created using patient records. Most importantly, patient access to physician records has been established. This information includes patient examination reports.

Public safety

In severe deployment and security-sensitive areas, network-based security cameras are installed to prevent crime. Also, synchronized traffic signals are computerized to make public life easier, smoother and reduce traffic. An online traffic updating system has also been introduced to track roads with less traffic for the public.

Business

Encourage various ICT projects in the public and private sectors to educate local ICTs Graduate; it has created more ICT-related jobs for the younger generation. Experts are slowly evolving to create more business opportunities at home and abroad. This in turn improves internal communication, helps prioritize strategic planning and resources, and promotes innovative thinking and collaboration. In a short time, people will learn how to be a successful entrepreneur.

Standard of life

In a smart city, uses modern technology provides new "value-added" services to citizens to improve their standard of living. Everyone is expected to gain financial benefits through access to information in a cost-effective manner. Smart Cities provides the information age with tools and infrastructure for citizens and community organizations to participate and express their views as part of the local decision-making process. By providing open information, everything becomes transparent. As a result, incidents of abuse and corruption in the society have decreased and the economic development of the country is ensured.

Need for a Smart City

If the state meets two conditions, they can only function effectively in the global economy: they must have adequate information and communication technology infrastructure and must create human resources to manage it. The ability to make the most of knowledge is now seen as one of the most important issues for countries to compete with their decisions, as well as a single case of empowering citizens by increasing access. Smart cities are needed for a variety of reasons. Some of them are discussed as follows:

- (a) The world has become more urbanized. The size and impact of cities and cities are growing.
- (b) Governments are empowering lower level governments to decentralize.
- (c) Cities are becoming more global.
- (d) Government is reforming.
- (e) Technology development and e-commerce have a profound impact on the society.
- (f) The increasing pressure on alternative services is through the search for creative ways in which municipalities can combine the power and resources outside the municipality to develop the region.
- (g) Increasing pressure on service and customer orientation
- (h) The pressure of people's involvement in municipal work is increasing.
- (i) There is increasing pressure on governments, communities and other stakeholders to provide all relevant information at other levels.
- (j) More and more work is being entrusted to local governments.
- (k) Lack of solidarity between departments and the board of directors.
- (l) Increasing bureaucracy - huge reliance on manual processes and people-based processes.
- (m) IT systems are primarily focused on cost reporting rather than business support.
- (n) Information technology promotes social and economic development.
- (o) Enables IT management / service delivery.
- (p) Information technology enables effective administration.

Steps to be taken in Application Areas

In order to make full use of the application area, different steps should be taken in different areas.

The main steps are:

Get information about setting up an Internet connection and reducing digital splitting,

- (a) ICT training human resources development
- (b) Improve student access to knowledge through ICT,
- (c) Establish and strengthen all areas of research and development,
- (d) Establishing an ICT virtual network;

Reduction of digital divide

In the current days, the term "digital divide" is a fundamental consideration for modern city planners. It is difficult to achieve the development of a gap without bridging the smart cities. The digital divide is due to the severity of socioeconomic disparity as the knowledge system is widened. Digital segmentation and knowledge gaps are increasing due to the conditions of Internet establishment. ICT-based education with Internet access has entered large urban centers and highly educated social groups, while most regions and most people still have no opportunity. This is happening because of unable to access ICT or the use of ICT. One of the limitations is the ability to process information locally and via the Internet.

The role of ICT is to help bridge the knowledge gap by promoting knowledge sharing, education, research and development, manufacturing processes, financial services and other activities that support the knowledge society. According to the modern theory of modernization and evolution, it is impossible to develop it without the use of ICT. It has been said that "development without the internet is the same as electricity without industrialization." Digital segmentation can be reduced through computer basics and youth access to information and communication technology. The program may begin with a project that offers a "Basic PC and Internet" course. A one-week computer course that offers basic PC, Internet and email skills will be very successful. An important asset of this initiative will be the multiplier effect of students' knowledge on their successors.

Development of ICT trained human resources

Various aspects of the shortage of ICT professionals while the community of ICT professionals available is of concern, the special focus of strengthening management and professional skills is the depth of the pool of experienced senior managers with more than five years of relevant experience. This flaw is strongly felt in software design, project management and software business consulting. Special emphasis should be placed on strengthening management and professional skills in this series of activities, and industry benefits are expected to be realized in the near to medium term.

A plan to strengthen the human capital of the ICT industry's workforce should be developed

to improve the skills and competencies of people entering the ICT industry and already employed. Initiatives should encourage innovation and growth. One of the main challenges for training and workforce initiatives is to strike a balance between short-term solutions and long-term goals for urgent issues that can take five to ten years to take effect.

At national universities (both public and private), a large number of graduates should be prepared each year in the field of computers and communications. More advanced degrees, such as masters and doctoral degrees, should be introduced in these areas. Brain drain should be minimized to ensure sustainable growth in the ICT industry. In addition, different training companies with different training courses should be allowed to conduct business in the country. National courses need to be extended to computer labs that include computer courses and primary and secondary education levels.

National ICT seminars, conferences and exhibitions, including Internet, e-commerce, telecommunications, software development, etc., should be arranged annually.

Access to knowledge for students

The current era of the knowledge revolution is largely due to dramatic scientific advances and the development and promotion of information and communication technology (ICT). This has dramatically changed the global business environment and governance conditions. The emerging new economic form is published by the "Knowledge Economy" or "Knowledge Economy" (KE). Knowledge-Economy is an economy where all departments and agents are filled with knowledge, the source of new industries and renewals of established industries, the cause of competition and improvement in social welfare. Thus, it is clear that the knowledge economy requires more than just the development of ICT industries and services, even if they constitute infrastructure. It requires a skilled and creative population, a vibrant and innovative atmosphere where new products are created and promoted to gain local and global knowledge.

The increasing importance of the Internet and new developments in ICTs has contributed to our knowledge dissemination and access to information. Knowledge is a universal right, and equitable access to information is important for all to educate and stimulate innovation critical in this age, change and information are two things that are always ongoing, always promoting the next development of society. Thus, the latest information is a compelling requirement for promoting social development. Now we get information about almost all the subject fields. Recently in India, a project was used to digitize 1 million books as part of a global program that allows these books to be accessed and accessed online so that knowledge can be shared. Knowledge in the form of information is transmitted through the Internet. However, amazingly, great knowledge can be gained, especially on the Internet. How to find relevant things? How to get more knowledge in a short time? In this case, online information retrieval is a necessity in any modern society. It must be created in this national-friendly way to be able to receive people with little or no training or experience with the search

information and to allow them to work at their preferred location and time. Unfortunately, the user-friendly interface has no common system architecture, design details, or even standardization of the architecture.

Strengthening Research and Development

Emphasis should be placed on research and development of ICT based education. It is an open platform [1] and should be built on tools that benefit the collaborative use of learning objects and resources, including cultural and scientific content. The work should be consolidated and validated, supported by sound research methods and address the key success factors of the next larger deployment plan. Pilot projects can be conducted to test the effectiveness of the development. Research and develop advanced eHealth systems and services based on integrated health information systems, a smart environment for health professionals and online healthcare for patients and citizens. The network should take advantage of the progress of network and mobile communication and ensure interoperability with existing networks. Also, eHealth applications should be based on best practices established around the world and ensure all aspects of privacy and privacy. Examples of applications include regional health information networks, decision support for health professionals, mobile applications for health monitoring, home care monitoring and support for patient autonomy.

Citizens should research and develop home automation systems to automate daily operations. The best use of energy, paying utility bills at home, building intelligence systems, home security systems, etc. can be the subject of research and development. This field involves the application of ICT and engineering skills.

Research and development of ICT-based systems should be undertaken to improve and innovate key public service delivery systems, integrate interpersonal identity management systems and achieve good governance in the areas of efficiency, inclusion, democracy, openness, and accountability. Multiple back-end management systems should be integrated and secure and interoperable infrastructure should be created for e-government. Furthermore, it should address the key success factors involved in the next large-scale deployment. Examples of applications are electronic public collections, civic services, such as one-stop life events, job search or social security.

Research and development address specific e-collaboration issues, enabling specific SME clusters to produce solutions and solutions tailored to local business needs as a specific business entity; B2B and B2C e-commerce provide faster response times at lower costs and more dynamic business models.

Involvement of Expatriate

A large number of qualified and experienced human resources can contribute to the development process in this area. Studies conducted by different institutions regarding foreigners living abroad show that a large number of talented and experienced foreigners are

interested in contributing to their home country.

Most importantly, expatriates should create a conducive environment for "repatriation" for international ICT skills by connecting the international migrants to the international ICT network, improving the ICT industry's image and penetration skills. The ICT staff team interactive activities should be arranged to give local ICT graduates the opportunity to meet with foreigners, share their experiences and interact with top personalities in the ICT industry. This will create investment opportunities for ICTs and highlight the opportunities for expatriates to collaborate on these investment projects and initiatives.

To reduce the impact of the "brain drain", high-quality foreign consulting services may be invited to develop their country. This will help transfer the latest technology from the developed country. The development of all the big cities is equally important and all measures will be taken to develop big cities as smart cities. If all the big cities become Smart Cities, people will get all the amenities at the door. So, the goal of Digital Smart will be successful.

Recommendation actions for Smart City Development

- (1) The concept of a smart city must be a key feature of the city. Ideally, technology policies and strategies should be explored at the level of CEOs, mayors, and elected politicians. A plan should be launched to enable and understand senior politicians and officials on technology policies and strategies. All members should be equipped and trained in the house with personal computers and internet connection.
- (2) All new regulations adopted by the city should be made to ensure the accuracy of the digital age. Cities must ensure that they are represented and participated in relevant legislative and policy processes, rather than negatively impacted.
- (3) Local governments should use IT as a strategic tool for redesign: (i) to create efficient and effective local government services; (ii) reducing transaction costs and (iii) providing services to citizens should be allowed at any time, and these services are traded in a unified manner, (iv) making local government more customer-friendly and citizen-friendly and (v) Can reduce discretion and arbitrariness by providing relevant and convenient ways. Correct information.
- (4) Information technology should be used as a tool for economic and social development. Specific steps should be taken: (i) growth and retention of the urban IT industry, (ii) attracting more IT participants, (iii) attracting investment from out of town, and (iv) providing high-quality services in all areas, (v) employment. Creating possibilities, (vi) disseminating knowledge as a key source of personal and institutional economic development, (vii) providing information technology infrastructure and the Internet, (viii) promoting technology education and information technology training, (ix) promotion of local language interface, and (x) better, more targeted interventions to ensure coordinated planning and local government activities from a wide range of social and economic data collected electronically.

Few Successful Initiative

Al-Madinah Knowledge Economic City

Some successful Arab projects have become models of the effective use of information and communication technology for development; one of these is Medina Knowledge-Economy City. The billion-dollar high-tech project aims to transform the Al Madinah region into a knowledge-based industry hub where young Saudi entrepreneurs can be trained and trained. It intends to attract the second-most holy Islamic city of the best Muslim ICT talent in the world. ICT is the key driver of economic growth. KEC is currently using ICT to promote quantitative and qualitative changes in development witness ICT plays a key role in the city. Commercial and residential users can access applications that use ultra-mobile personal computers using ultra-high-speed networks. In addition, a centralized management system has been arranged to reduce operating costs and maximize service levels. Medina Knowledge-Economy City will be one of the first truly integrated smart cities in the world, while other cities in Europe, the United States and Asia have some specific components of Smart City.

Smart City Malta

The goal is to complete the project within five years and the first office in Smart City, Malta, will be open for business within 20 years. Smart City Malta is expected to attract approximately \$300 million in investment. In addition, Smart City may develop into a regional knowledge economy centre in Malta, where the government is committed to knowledge-based development, a reliable ICT infrastructure and well-educated employees. The main focus of the smart city of Malta is to “create an ICT and media cluster that is defined as a core activity”. “About 46% of the project will be used for ICT and media-related activities, 29% for commercial purposes and 20% for housing use. The remaining land will be allocated for public space. Who is interested in investing in the government welcomes Establish a company with a strong long-term relationship with Smart City Malta.

Dubai Internet City

Dubai Internet City (DIC), a member of TECOM Investments, one of the world's largest managed ICT clusters, recently announced that 112 new companies, compared with a 33% increase, chose to operate a bunch of businesses in 2006, including British Telecom, Qualcomm, Google, In Layton International, Tele New Zealand, Dimension Data Logo Business Solutions and VeriSign and other global companies, showcasing the ICT industry. Top brands. From its inception, the positive development of the Dubai Internet City regional ICT industry has played an important role. It makes the business partners through government initiatives, with knowledge and skills leadership in the area successfully. The government has maintained sustainable growth in the DIC region, at the forefront of the ICT sector, with the international company enriching the business community. Which is not an important factor in attracting foreign investment - for various reasons to promote the growth of the ICT sector in the region

in 2008, it is increased government spending, improved infrastructure, availability of qualified UAE, as well as investment and international companies with political stability and security personnel. Many existing companies have doubled the ICT cluster or expanded their site, as a result of the 2007 lease area increases by 84% over 2006. Dubai Internet City Free Zone was established to bring benefits to more than 1000 IT companies providing business partners, including service delivery networks, partnerships and business development platforms. Dubai Internet City's parent company is the pinnacle of success, self-recognition, speech recognition concepts, Dubai Holding international property development firm Sama Dubai, and even with successful collaboration with Dubai Border, TECOM Investments. . Malta Recognition, Speech Recognition in Southern Europe, India, Kerala Recognition, Speech Recognition Kochi, there are many other cities under construction - the Alliance has established a self-contained city in two strict locations. Dubai Internet City has become a global ICT hub, with Fortune 500 companies and more than 1,000 specialized industry leaders in various fields of information and communications technology.

Chapter 6

CONCLUSION AND RECOMMENDATIONS

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Significance

Implemented and tested over the network; no complicated routing interactions, so troubleshooting is easier. It has been observed that these devices are capable of reaching any network connection point between all devices. If there are no major design changes, the size of the network can be doubled or tripled, which means at any time it can be flexible.

Conclusion

With recent advances in technology, the network will need to design a more reliable and convenient approach. The goal of the project is to ensure that Smart City networks, without maintaining a device itself, and accelerate the connection of the devices. As a result of taking data-driven decision more effectively. Improvement in “big data” and networked devices will help cities access to obtain more information that’s never been easy before. And, accordingly meaningful and actionable insights will come out. Besides, a smart city will enhance the citizens and government engagement where services in communities will make smart cities a more attractive place for residents to live and promote a connected citizen experience. Additionally, smart city is ever a safer city than an unsmart one where Leveraging technology advances and engaging private and public bodies help to reduce unlawful action. As a final point, with following my project idea a city will get improved transportation, new economic development opportunities, efficient public utilization, better info structure and revised workforce engagement for conducting business and improve lifestyle.

Limitations:

When evaluating management solutions for smart city networks, the following aspects of the design simulator are considered:

- a) A fiber optic module needs to be built on a 3560 layer 3 switches.
- b) Generic routers must-have modules that enable the telephony service without specifying only 2811 routers.
- c) Servers require interfaces that enable VoIP configuration.
- d) The access point should have a command-line interface (CLI).

Recommendations for Future Work

- a) Additional access control lists (ACLs) should be applied throughout the network to provide end-to-end security.
- b) IPv6 addressing may be applied to overcome any limitation on the number of hosts used due to the address space.
- c) Additional configurations can be executed across the network for video conferencing.

References

- Akbar, I. M. (2010). Method and system for providing private virtual secure Voice over Internet Protocol communications: Google Patents.
- Battou, A., Kim, M. W., Tzathas, A., Walters, D. H., Alvarez, M. F., Brooks, D. M., . . . Chen, C. J. (2006). Multi-tiered control architecture for adaptive optical networks, and methods and apparatus therefor: Google Patents.
- Chan, H., Perrig, A., & Song, D. (2003). Random key predistribution schemes for sensor networks.
- Dobbins, K., Grant, T. A., Ruffen, D. J., Kane, L., Len, T., Andlauer, P., . . . Oliver, C. (1998). Distributed connection-oriented services for switched communications networks: Google Patents.
- Frank, E. H., & Holloway, J. T. (2000). Network protocol--based home entertainment network: Google Patents.
- Gast, M. (2005). *802.11 wireless networks: the definitive guide*: " O'Reilly Media, Inc."
- Guttman, E. (2001). Autoconfiguration for ip networking: Enabling local communication. *IEEE Internet computing*, 5(3), 81-86.
- Ioannidis, S., Keromytis, A. D., Bellovin, S. M., & Smith, J. M. (2000). Implementing a distributed firewall.
- Irie, M. (2000). Diarylethenes for memories and switches. *Chemical Reviews*, 100(5), 1685-1716.
- Kohler, E., Morris, R., Chen, B., Jannotti, J., & Kaashoek, M. F. (2000). The Click modular router. *ACM Transactions on Computer Systems (TOCS)*, 18(3), 263-297.
- Leiner, B. M., Cerf, V. G., Clark, D. D., Kahn, R. E., Kleinrock, L., Lynch, D. C., . . . Wolff, S. (2009). A brief history of the Internet. *ACM SIGCOMM computer communication review*, 39(5), 22-31.
- Lukasik, S. (2000). Will we consider ourselves better off? *IEEE Internet computing*, 4(1), 47-49.
- McFarland, S., Sambi, M., Sharma, N., & Hooda, S. (2011). *IPv6 for enterprise networks*: Pearson Education.
- Raniwala, A., & Chiueh, T.-c. (2005). *Architecture and algorithms for an IEEE 802.11-based multi-channel wireless mesh network*. Paper presented at the Proceedings IEEE 24th Annual Joint Conference of the IEEE Computer and Communications Societies.
- Seifert, R. (2000). *The switch book: the complete guide to LAN switching technology*: John Wiley & Sons, Inc.
- Snay, D. K., & Syed, F. (2001). Generic test execution method and apparatus: Google Patents.
- Valkó, A. G. (1999). Cellular IP: A new approach to Internet host mobility. *ACM SIGCOMM computer communication review*, 29(1), 50-65.
- Varshney, U., Snow, A., McGivern, M., & Howard, C. (2002). Voice over IP. *Communications of the ACM*, 45(1), 89-96.
- Wimmer, M. A., & Codagnone, C. (2007). Roadmapping eGovernment: Research Visions and Measures towards Innovative Governments in 2020.
- Wool, A. (2004). The use and usability of direction-based filtering in firewalls. *Computers & Security*, 23(6), 459-468.

Appendix

R1#show interface

GigabitEthernet0/0 is up, line protocol is up (connected)

Hardware is CN Gigabit Ethernet, address is 00d0.d371.be01 (bia 00d0.d371.be01)

Internet address is 192.168.1.1/24

MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,

reliability 255/255, txload 1/255, rxload 1/255

Encapsulation ARPA, loopback not set

Keepalive set (10 sec)

Full-duplex, 100Mb/s, media type is RJ45

output flow-control is unsupported, input flow-control is unsupported

ARP type: ARPA, ARP Timeout 04:00:00,

Last input 00:00:08, output 00:00:05, output hang never

Last clearing of "show interface" counters never

Input queue: 0/75/0 (size/max/drops); Total output drops: 0

Queueing strategy: fifo

Output queue :0/40 (size/max)

5 minute input rate 0 bits/sec, 0 packets/sec

5 minute output rate 17 bits/sec, 0 packets/sec

0 packets input, 0 bytes, 0 no buffer

Received 0 broadcasts, 0 runts, 0 giants, 0 throttles

0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort

0 watchdog, 1017 multicast, 0 pause input

0 input packets with dribble condition detected

--More-- %DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.1.1.

%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.3.1.

%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.1.

R1#show run

Building configuration...

Current configuration : 1881 bytes

!

version 15.1

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname R1

!

!

!

!

ip dhcp excluded-address 192.168.1.2 192.168.1.100

ip dhcp excluded-address 192.168.2.2 192.168.2.100

ip dhcp excluded-address 192.168.3.2 192.168.3.100

!

ip dhcp pool gig0/2

network 192.168.3.0 255.255.255.0

default-router 192.168.3.1

dns-server 11.11.11.11

Switch>show run

^

% Invalid input detected at '^' marker.

Switch>show interface

FastEthernet0/1 is up, line protocol is up (connected)

Hardware is Lance, address is 00e0.8f8e.2401 (bia 00e0.8f8e.2401)

BW 100000 Kbit, DLY 1000 usec,

reliability 255/255, txload 1/255, rxload 1/255

Encapsulation ARPA, loopback not set

Keepalive set (10 sec)

Full-duplex, 100Mb/s

input flow-control is off, output flow-control is off

ARP type: ARPA, ARP Timeout 04:00:00

Last input 00:00:08, output 00:00:05, output hang never

Last clearing of "show interface" counters never

Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0

Queueing strategy: fifo

Output queue :0/40 (size/max)

5 minute input rate 0 bits/sec, 0 packets/sec

5 minute output rate 0 bits/sec, 0 packets/sec

956 packets input, 193351 bytes, 0 no buffer

Received 956 broadcasts, 0 runts, 0 giants, 0 throttles

0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort

0 watchdog, 0 multicast, 0 pause input

0 input packets with dribble condition detected

2357 packets output, 263570 bytes, 0 underruns

Webcam

A camera device that records and sends data

Features:

- *Registration Server Compatible*
- *Off*
- *On*
- *Video recording*

Usage:

- *N/A*

Direct Control:

- *ALT-click to interact*

Local Control:

- *Connect device to MCU/SBC/Thing. Use the "customWrite" API per Data Specifications*

Remote Control:

- *Connect device to Registration Server using Config Tab*

Data Specifications:

Message Format: [state]

state: 0 = off, 1 = on

Example:

- *Use motion_detector.pkt sample file.*