基于 Packet Tracer的医院局域网仿真设计说明文档

项目说明

本项目基于Packet Tracer仿真软件模拟出了医院的局域网，以应对如下场景：医院中有许多部门，如门诊部,急诊部,住院部,检验科,财务部,后勤,人事部,行政管理部门等。实现功能如下：
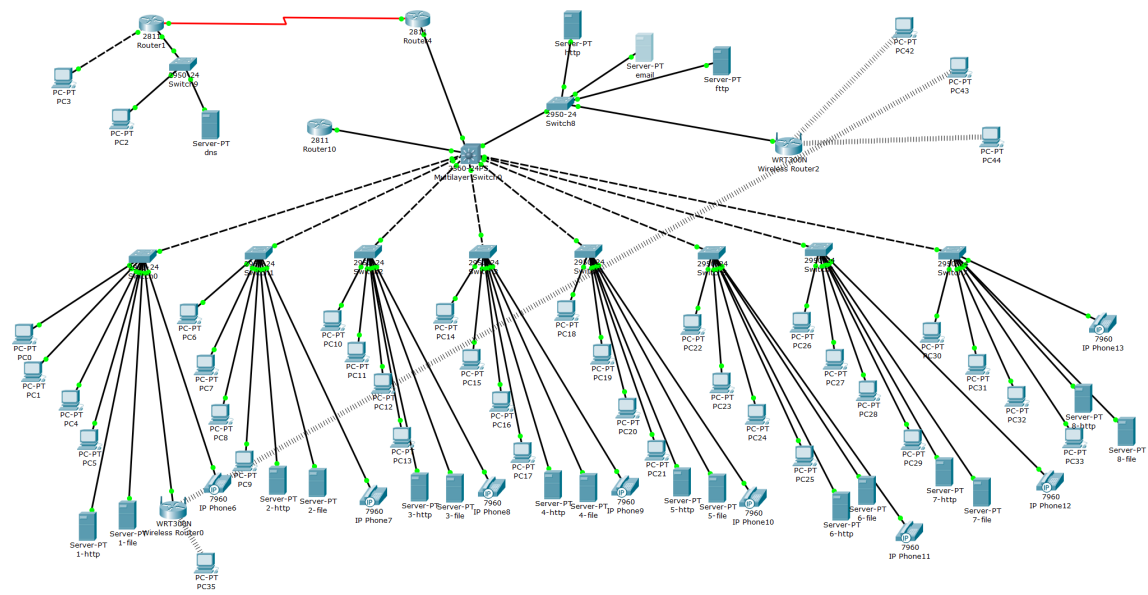
- 每个部门有自己独立局域网,且有部门内部能够使用的文件服务器和Web服务器,几个部门连接成一个大的局域网,并通过医院提供接入到互联网的接口接入到互联网。
- 医院统一提供一个外网访问的邮件服务器和Web服务器,以及一个内部各部门公用的文件服务器。
- 网络提供WIFI接入功能。
- 每个部门有若干内部独立的局域网。
- 医院局域网提供VOIP服务。
- 能够随机抓取某类型的数据包。

技术栈说明

1. 利用DHCP协议来给PC动态分配IP，并提供WIFI接入功能。
2. 利用VLAN协议使各部门拥有各自独立的局域网。
3. 利用ACL协议进行访问控制，使得各部门内部拥有若干独立的局域网。
4. 利用RIP协议使得医院能够接入互联网。
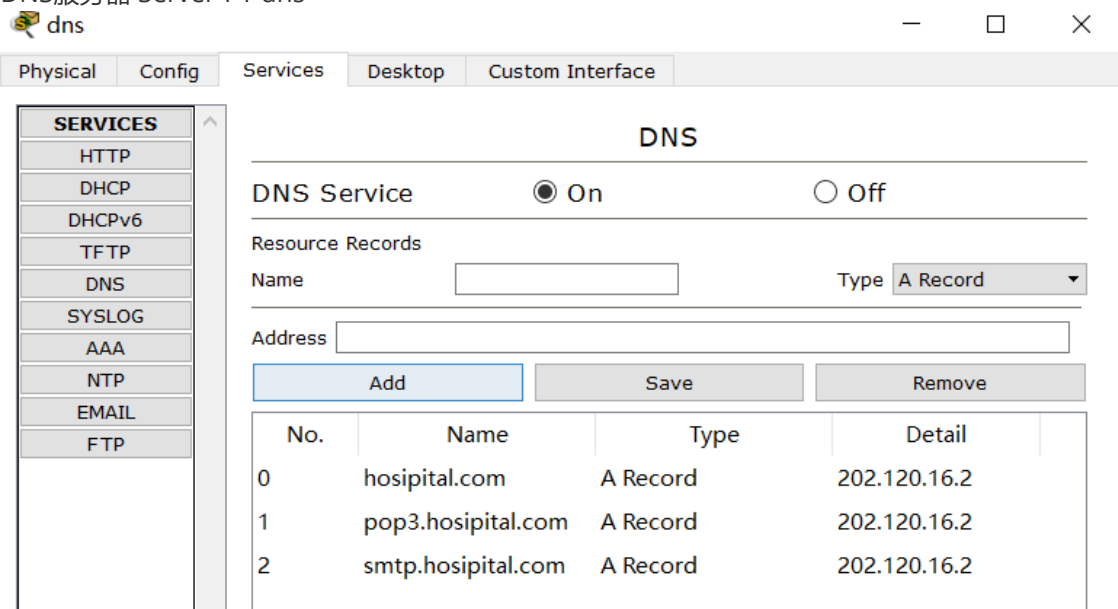5. 利用NAT协议映射公网IP。
6. IP电话为医院提供VOIP服务。

网络拓扑规划设计

整体拓扑图

- 各部分IP划分

    - 部门1第一组：192.168.1.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
    - 部门1第二组：192.168.2.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
    - 部门2第一组：192.168.11.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11

- 部门2第二组：192.168.12.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门3第一组：192.168.21.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门3第二组：192.168.22.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门4第一组：192.168.31.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门4第二组：192.168.32.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门5第一组：192.168.41.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门5第二组：192.168.42.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门6第一组：192.168.51.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门6第二组：192.168.52.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门7第一组：192.168.61.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门7第二组：192.168.62.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门8第一组：192.168.71.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11
- 部门8第二组：192.168.72.0，子网掩码255.255.255.0，DNS服务器 192.168.203.11

- 内网公用文件服务器Server-PT http：

IP地址：192.168.201.11/24 Static VLAN201

默认网关 IP地址：192.168.201.1

- DNS服务器 Server-PT dns

- 邮件服务器配置：

- WIFI接入：

LAN的IP地址：192.168.0.1/24 设置VLAN204

DNS服务器 IP地址：172.16.1.2

- VoIP服务：

Phone6 号码：10001

Phone7 号码：10002

Phone8 号码：10003

Phone9 号码：10004

Phone10 号码：10006

Phone11 号码：10008

Phone12 号码：10005

Phone13 号码：10007

部门局域网实现

　　本项目一共模拟了医院的八个部门，每个部门下有两个小组，部门内部的文件服务器的邮件服务器、WIFI以及IP电话，分属于不同的局域网，通过VLAN进行划分，三层交换机的接口分别配置了不同的VLAN，使用DHCP为不同VLAN中的PC动态分配IP。

```
Vlan1              Down   1      192.168.100.1/24
Vlan100            Up     100    192.168.0.1/24
Vlan101            Up     101    192.168.1.1/24
Vlan102            Up     102    192.168.2.1/24
Vlan111            Up     111    192.168.11.1/24
Vlan112            Up     112    192.168.12.1/24
Vlan121            Up     121    192.168.21.1/24
Vlan122            Up     122    192.168.22.1/24
Vlan131            Up     131    192.168.31.1/24
Vlan132            Up     132    192.168.32.1/24
Vlan141            Up     141    192.168.41.1/24
Vlan142            Up     142    192.168.42.1/24
Vlan151            Up     151    192.168.51.1/24
Vlan152            Up     152    192.168.52.1/24
Vlan161            Up     161    192.168.61.1/24
Vlan162            Up     162    192.168.62.1/24
Vlan171            Up     171    192.168.71.1/24
Vlan172            Up     172    192.168.72.1/24
Vlan201            Up     201    192.168.201.1/24
Vlan202            Up     202    192.168.202.1/24
Vlan203            Up     203    192.168.203.1/24
Vlan204            Up     204    172.16.1.1/16
```

每个部门下的WIFI只能供各部门使用，在其对应的VLAN上进行ACL配置使得其只能被部门内的PC访问；医院公用的WIFI以及服务器分别配置在VLAN201、202、203、204上，ACL未作限制，因此整个医院的PC都能够访问。

接入公网配置

在接入公网的边界路由器router4与三层交换机上使用RIP配置路由器使得IP接入公网，RIP配置如下所示：

Router4

Physical | Config | CLI

| GLOBAL |
| Settings |
| Algorithm Settings |
| **ROUTING** |
| Static |
| RIP |
| **SWITCHING** |
| VLAN Database |
| **INTERFACE** |

RIP R

Network

| twork Addre |
| 202.120.16.0 |

Multilayer Switch0

— □

Physical | Config | CLI

| GLOBAL |
| Settings |
| Algorithm Settings |
| **ROUTING** |
| Static |
| RIP |
| **SWITCHING** |
| VLAN Database |
| **INTERFACE** |
| FastEthernet0/1 |
| FastEthernet0/2 |
| FastEthernet0/3 |
| FastEthernet0/4 |
| FastEthernet0/5 |

RIP Routing

Network

Add

| twork Addre |
| 192.168.1.0 |
| 192.168.2.0 |
| 192.168.11.0 |
| 192.168.12.0 |
| 192.168.21.0 |
| 192.168.22.0 |
| 192.168.31.0 |

Remo

| 192.168.32.0 |
| 192.168.41.0 |
| 192.168.42.0 |
| 192.168.51.0 |
| 192.168.52.0 |
| 192.168.61.0 |
| 192.168.62.0 |

| 192.168.201.0 |
| 192.168.202.0 |
| 192.168.203.0 |
| 202.120.17.0 |

公网内网映射

在route4上使用NAT协议映射公网IP:202.120.16.2

```
Router#show ip nat translations
Pro  Inside global      Inside local      Outside local     Outside
global
udp 202.120.16.1:520    202.120.16.1:520
255.255.255.255:520255.255.255.255:520
tcp 202.120.16.2:25     192.168.202.11:80 ---               ---
tcp 202.120.16.2:80     192.168.201.11:80 ---               ---
```

访问控制实现

在三层交换机上使用ACL协议进行访问控制，以部门一的两个组为例，两个组分属VLAN101和102，加入access-list 101，使得192.168.1.0网段无法与192.168.2.0网段访问，从而使得各部门内部拥有若干独立的局域网。ACL配置如下图所示：

```
Switch#show ip access-lists
Extended IP access list 101
    10 permit ip any host 192.168.1.254
    20 permit ip any host 192.168.1.253
    30 permit ip any 192.168.1.0 0.0.0.255
    40 permit ip any host 192.168.201.11
    50 permit ip any host 192.168.202.11
    60 permit ip any host 192.168.203.11
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any (6 match(es))
Extended IP access list 102
    10 permit ip any host 192.168.1.253
    20 permit ip any host 192.168.1.254
    30 permit ip any host 192.168.202.11
    40 permit ip any host 192.168.203.11
    50 permit ip any host 192.168.201.11
    60 permit ip any 192.168.2.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 111
    10 permit ip any host 192.168.11.253
    20 permit ip any host 192.168.11.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.11.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 112
    10 permit ip any host 192.168.11.253
    20 permit ip any host 192.168.11.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.12.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 121
    10 permit ip any host 192.168.21.253
    20 permit ip any host 192.168.21.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.21.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 122
    10 permit ip any host 192.168.21.253
    20 permit ip any host 192.168.21.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.22.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
```

```
Extended IP access list 131
    10 permit ip any host 192.168.31.253
    20 permit ip any host 192.168.31.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.31.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 132
    10 permit ip any host 192.168.31.253
    20 permit ip any host 192.168.31.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.32.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 141
    10 permit ip any host 192.168.41.253
    20 permit ip any host 192.168.41.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.41.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 142
    10 permit ip any host 192.168.41.253
    20 permit ip any host 192.168.41.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.42.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 151
    10 permit ip any host 192.168.51.253
    20 permit ip any host 192.168.51.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.51.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 152
    10 permit ip any host 192.168.51.253
    20 permit ip any host 192.168.51.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.52.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 161
    10 permit ip any host 192.168.61.253
    20 permit ip any host 192.168.61.254
    30 permit ip any host 192.168.201.11
    40 permit ip any host 192.168.202.11
    50 permit ip any host 192.168.203.11
    60 permit ip any 192.168.61.0 0.0.0.255
    70 deny ip any 192.168.0.0 0.0.255.255
    80 permit ip any any
Extended IP access list 162
    10 permit ip any host 192.168.61.253
```
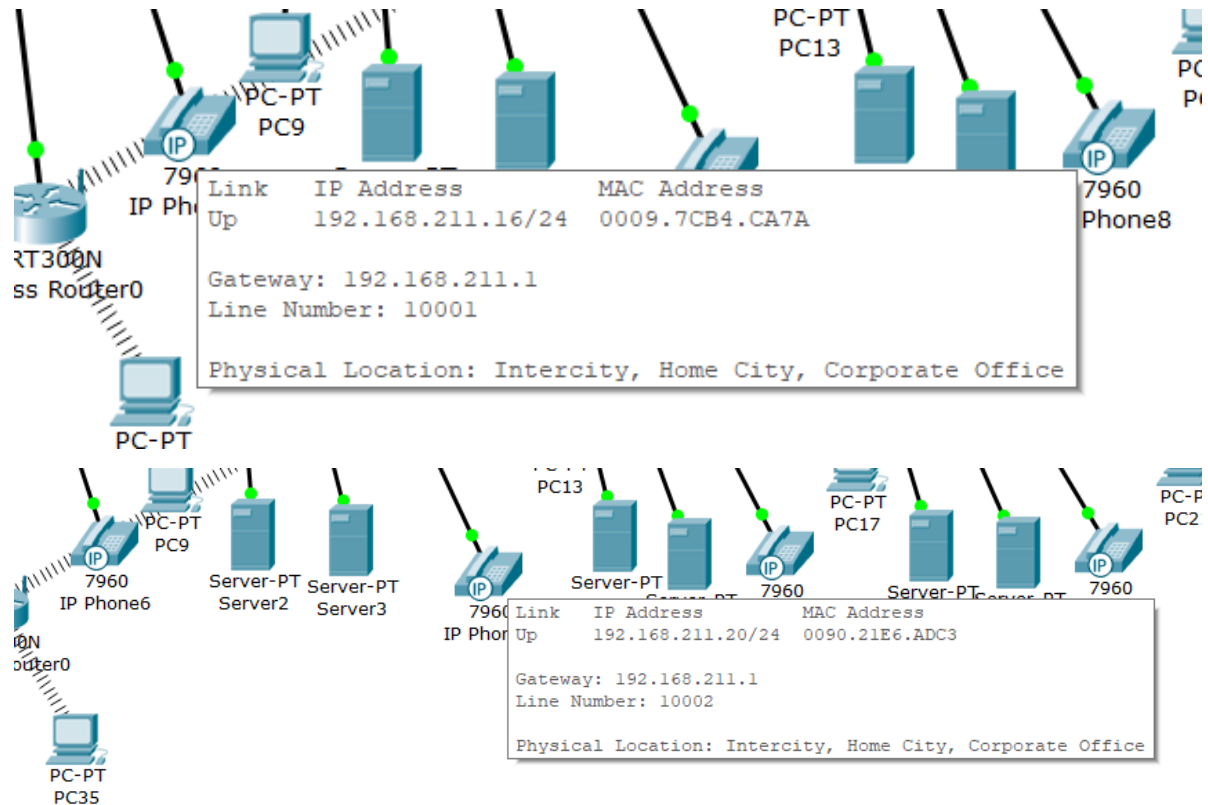
```
         20 permit ip any host 192.168.61.254
         30 permit ip any host 192.168.201.11
         40 permit ip any host 192.168.202.11
         50 permit ip any host 192.168.203.11
         60 permit ip any 192.168.62.0 0.0.0.255
         70 deny ip any 192.168.0.0 0.0.255.255
         80 permit ip any any
Extended IP access list 171
         10 permit ip any host 192.168.71.253
         20 permit ip any host 192.168.71.254
         30 permit ip any host 192.168.201.11
```

IP电话服务

为IP电话提供VOIP服务，使得两个部门之间的电话能够互相拨通。


```
Link      IP Address            MAC Address
Up        192.168.211.16/24     0009.7CB4.CA7A

Gateway: 192.168.211.1
Line Number: 10001

Physical Location: Intercity, Home City, Corporate Office
```

```
Link     IP Address            MAC Address
Up       192.168.211.20/24     0090.21E6.ADC3

Gateway: 192.168.211.1
Line Number: 10002

Physical Location: Intercity, Home City, Corporate Office
```

Physical   Config   GUI

CISCO IP PHONE
7960

00:10a 03/01/'   10002
From: 10001

Connected

messages   directo
services   settin

VOLUME
▼   ▲

HEADSET   MUTE   S