



Relatório

Trabalho Prático

Beatriz Santos - 50473
Inês Santos - 49436
Manoela Azevedo - 50034

Trabalho para a Unidade Curricular

Redes e Serviços Internet

(1º ciclo de estudos em Informática Web)

Docente: Rui Cardoso

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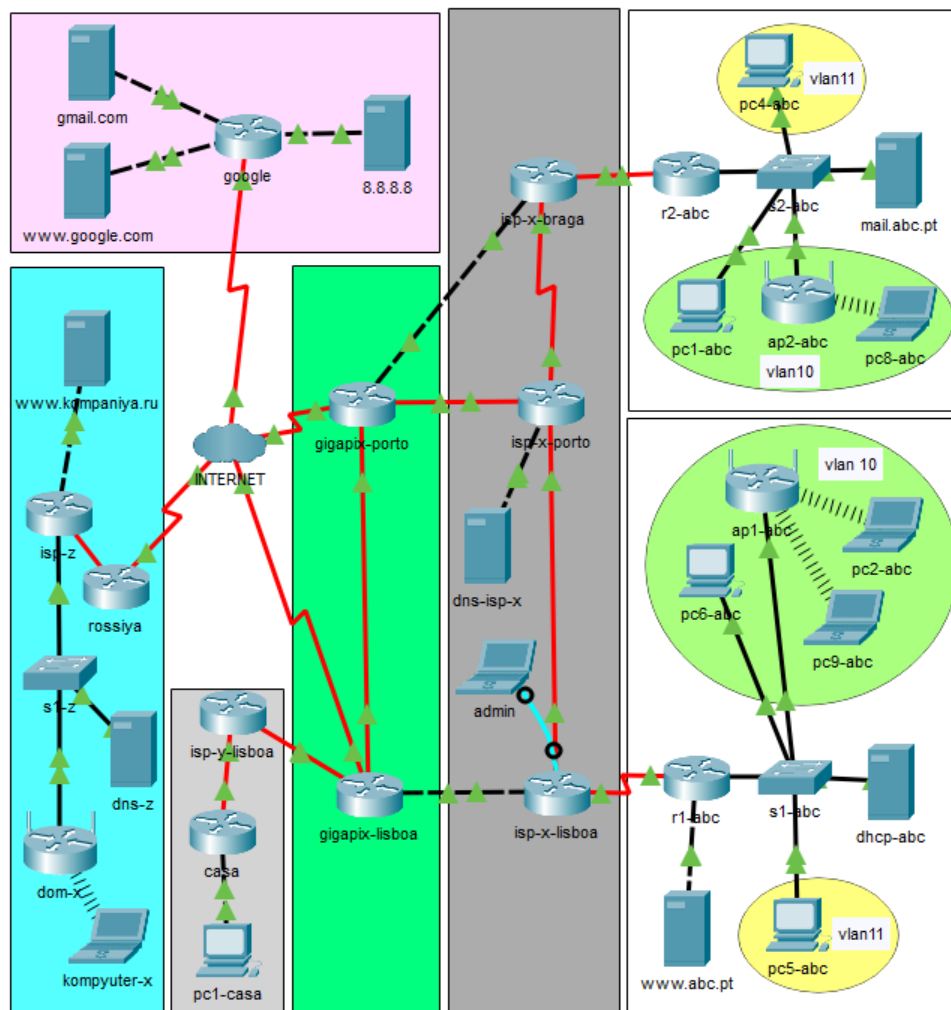
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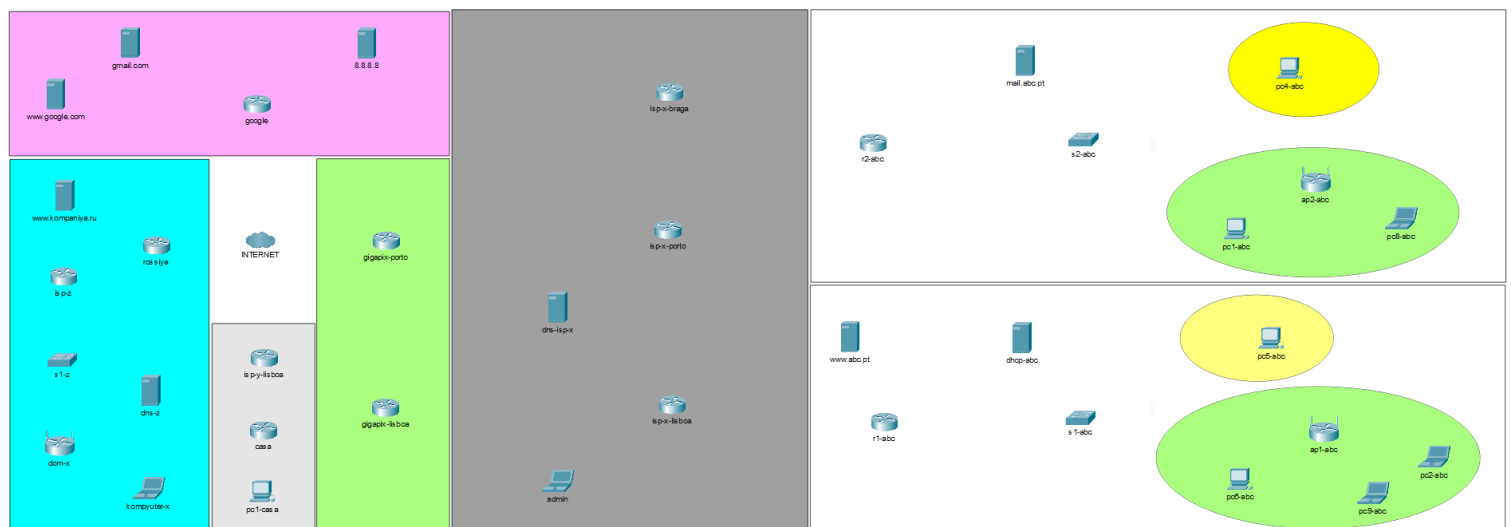
Tarefa 1

Adicionar todos os equipamentos à topologia da Fig. 1 [15].

De acordo com a topologia da figura 1:



Adicionamos os seguintes equipamentos:



Tarefa 2

Ligar todos os equipamentos entre si utilizando a cablagem indicada na Fig. 1 [20].

Interfaces usadas nos Routers e Switchs			
INTERNET	4 vezes: 1S	isp-x-braga	1 vez: 1S
			1 vez: 1FFE
			1 vez: 1CFE
rossiya	1 vez: 1S	isp-x-porto	1 vez: 1S
	1 vez: 1FFE		2 vezes: 1FFE
isp-z	1 vez: 1FFE	isp-x-lisboa	1 vez: 1CFE
	2 vezes: 1CFE		1 vez: 1S
			1 vez: 1FFE
			1 vez: Console
s1-z	3 vezes: 1CFE	r2-abc	1 vez: 1FFE
			1 vez: 1CFE
google	3 vezes: 1CFE	s2-abc	5 vezes: 1CFE
	1 vez: 1S		
gigapix-lisboa	1 vez: 1S	r1-abc	1 vez: 1S
	2 vezes: 1FFE		2 vezes: 1CFE
	1 vez: 1CFE		
gigapix-porto	1 vez: 1S	s1-abc	5 vezes: 1CFE
	2 vezes: 1FFE		
	1 vez: 1CFE		
isp-y-lisboa	2 vezes: 1FFE		
casa	1 vez: 1FFE		
	1 vez: 1CFE		

Tarefa 3

Configurar os endereços de forma eficiente e seguindo as indicações dadas, apresentando os respetivos mapas de endereços [20].

Para configurarmos os IP's dos routers utilizamos os seguintes comandos, por exemplo:

```
!
interface FastEthernet1/0  <-- (interface)
 ip address 10.0.50.6 255.255.255.252 <-- (Define o endereço
 ip e a máscara usado(a) nesta interface)
!
```

Router 1	Ligado ao Router 2	Rede	Endereço de Rede (sub-rede)	Router 1	Router 2	Endereço de Broadcast
gigapix-lisboa	gigapix-porto	10.0.0.0/24	10.0.0.0/30	10.0.0.1	10.0.0.2	10.0.0.3
gigapix-porto	gigapix-lisboa			10.0.0.2	10.0.0.1	
gigapix-lisboa	isp-x-lisboa		10.0.0.4/30	10.0.0.5	10.0.0.6	10.0.0.7
isp-x-lisboa	gigapix-lisboa			10.0.0.6	10.0.0.5	
gigapix-lisboa	isp-y-lisboa		10.0.0.12/30	10.0.0.13	10.0.0.14	10.0.0.15
isp-y-lisboa	gigapix-lisboa			10.0.0.14	10.0.0.13	
gigapix-porto	isp-x-porto		10.0.0.16/30	10.0.0.17	10.0.0.18	10.0.0.19
isp-x-porto	gigapix-porto			10.0.0.18	10.0.0.17	
gigapix-porto	isp-x-braga		10.0.0.20/30	10.0.0.21	10.0.0.22	10.0.0.23
isp-x-braga	gigapix-porto			10.0.0.22	10.0.0.21	
gigapix-porto	INTERNET-Google-100		10.0.0.24/30	10.0.0.25	10.0.0.26	10.0.0.27
gigapix-porto	INTERNET-Rossiya-200		10.0.0.28/30	10.0.0.29	10.0.0.30	10.0.0.31
gigapix-lisboa	INTERNET-Rossiya-400		10.0.0.32/30	10.0.0.33	10.0.0.34	10.0.0.35
gigapix-lisboa	INTERNET-Google-300		10.0.0.8/30	10.0.0.9	10.0.0.10	10.0.0.11
rossiya	INTERNET-Google-500	178.210.92.0 /30	178.210.92.0 /30	178.210.92.1	178.210.92.2	178.210.92.3
rossiya	isp-z	178.210.91.0 /30	178.210.91.0 /30	178.210.91.1	178.210.91.2	178.210.91.3
isp-z	rossiya			178.210.91.2	178.210.91.1	
isp-y-lisboa	casa	10.0.100.0/24	10.0.100.0/30	10.0.100.1	10.0.100.2	10.0.100.3
isp-x-lisboa	isp-x-porto	10.0.200.0/24	10.0.200.0/30	10.0.200.1	10.0.200.2	10.0.200.3
isp-x-porto	isp-x-lisboa			10.0.200.2	10.0.200.1	

Servidores	
dhcp-abc	10.50.1.254 255.255.255.0

8.8.8.8

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 8.8.8.8

Subnet Mask 255.255.255.0

Default Gateway 8.8.8.1

DNS Server 8.8.8.8

gmail.com

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 142.250.200.133

Subnet Mask 255.255.255.0

Default Gateway 142.250.200.1

DNS Server 8.8.8.8

www.google.com

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 142.250.201.68

Subnet Mask 255.255.255.0

Default Gateway 142.250.201.1

DNS Server 8.8.8.8

www.kompaniya.ru

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 62.122.170.171

Subnet Mask 255.255.255.0

Default Gateway 62.122.170.1

DNS Server 178.210.90.1

dns-z

Physical Config Services Desktop Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 178.210.90.1

Subnet Mask 255.255.255.0

Default Gateway 178.210.90.2

DNS Server 8.8.8.8

dns-isp-x

Physical Config Services Desktop Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 10.200.8.8

Subnet Mask 255.255.255.0

Default Gateway 10.200.8.1

DNS Server 8.8.8.8

mail.abc.pt

Physical Config Services Desktop Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 193.140.2.100

Subnet Mask 255.255.255.128

Default Gateway 193.140.2.1

DNS Server 10.200.8.8

www.abc.pt

Physical Config Services Desktop Programming Attributes

IP Configuration X

IP Configuration

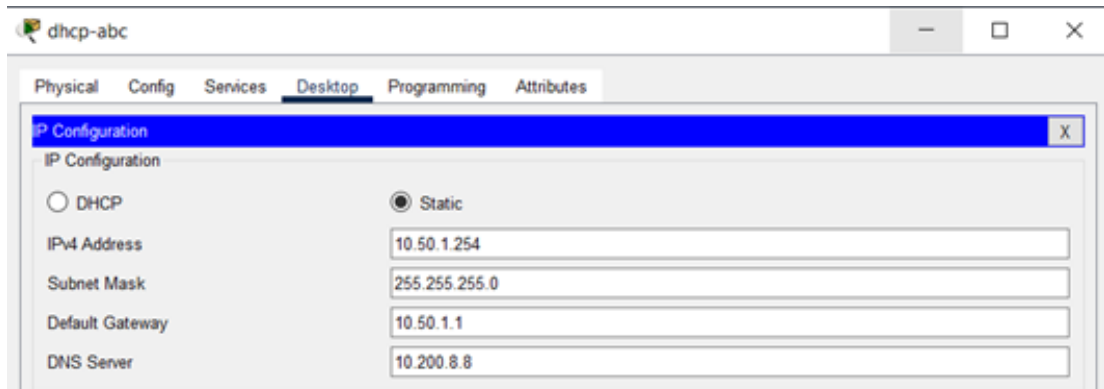
☐ DHCP ☒ Static

IPv4 Address 193.140.2.200

Subnet Mask 255.255.255.128

Default Gateway 193.140.2.1

DNS Server 10.200.8.8



Tarefa 5

Configurar as rotas OSPF entre os routers GigaPix [20].

Para configurarmos o OSPF nos routers (Gigapix) utilizamos os seguintes comandos, por exemplo:

```
!
router ospf 10 <-- (inicia a configuração do ospf com
process ID = 10)
  router-id 1.1.1.1 <-- (estabelece o id do router)
  log-adjacency-changes <-- (mostra as mensagens de
alterações de adjacência)
  redistribute connected subnets <-- (redistribuir as subnets
diretamente ligadas)
  network 10.0.0.0 0.0.0.3 area 0 <-- (define o ip da rede da
interface que se pretende incluir no ospf , a máscara
invertida e a área usada)
!
```

Tarefa 6

Configurar os circuitos Frame-Relay na Internet Cloud [10].

Frame Relay				
DLCI	INTERNET Port		DLCI	INTERNET Port
100	Serial 1 (Google)	< - >	100	Serial 3 (Gigapix-porto)
200	Serial 4 (Gigapix-lisboa)		200	Serial 2 (Rossiya)
300	Serial 1 (Google)		300	Serial 4 (Gigapix-lisboa)
400	Serial 3 (Gigapix-porto)		400	Serial 2 (Rossiya)
500	Serial 1 (Google)		500	Serial 2 (Rossiya)

Para configurarmos os circuitos Frame-Relay nos routers utilizamos os seguintes comandos, por exemplo:

```
!  
interface Serial0/0.100 point-to-point <-- (Cria uma  
sub-interface correspondente a este DLCI - 100)  
description Google-Gigapix-porto <-- (Usada como orientação)  
ip address 10.0.0.26 255.255.255.252 <-- (IP address e  
mascara respectivos)  
frame-relay interface-dlci 100 <-- (Define o DLCI da  
interface)  
!
```

Tarefa 7

Configurar as VLANs nos vários switches [5].

Para configurarmos as Vlan nos switches utilizamos os seguintes comandos, por exemplo:

```
s1-abc#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
s1-abc(config)#vlan 10 <-- (Cria a Vlan 10)  
s1-abc(config-vlan)#exit  
s1-abc(config)#vlan 11 <-- (Cria a Vlan 11)  
s1-abc(config-vlan)#exit
```

Para associarmos as Vlan às interfaces utilizamos os seguintes comandos, por exemplo:

```
!  
interface FastEthernet0/1 <-- (interface)  
switchport mode trunk <-- (coloca a interface em mode trunk,  
e assim permite todas as vlans do switch nesta interface -  
Router)  
!  
interface FastEthernet1/1 <-- (interface)  
switchport mode trunk <-- (coloca a interface em mode trunk,  
e assim permite todas as vlans do switch nesta interface -  
DHCP)  
!  
interface FastEthernet2/1 <-- (interface)  
switchport access vlan 11 <-- (associa a interface à vlan  
11)  
!  
interface FastEthernet3/1 <-- (interface)  
switchport access vlan 10 <-- (associa a interface à vlan  
10)  
!  
interface FastEthernet4/1 <-- (interface)  
switchport access vlan 10 <-- (associa a interface à vlan  
10)
```

Tarefa 8

Configurar os servidores de DNS para funcionarem de forma hierárquica com duas camadas (sendo a de topo constituída pelo servidor DNS 8.8.8.8) [15].

8.8.8.8		
DNS		
Name	Type	Detail
8.8.8.8	A Record	8.8.8.8
dns-z	A Record	178.210.90.1
gmail.com	A Record	142.250.200.133
dns-isp-x	A Record	10.200.8.8
mail.abc.pt	NS	dns-isp-x
www.abc.pt	NS	dns-isp-x
www.google.com	A Record	142.250.201.68
www.kompaniya.ru	NS	dns-z

dns-z		
DNS		
Name	Type	Detail
gmail.com	NS	raiz
mail.abc.pt	NS	raiz
raiz	A Record	8.8.8.8
www.abc.pt	NS	raiz
www.google.com	NS	raiz
www.kompaniya.ru	A Record	62.122.170.171

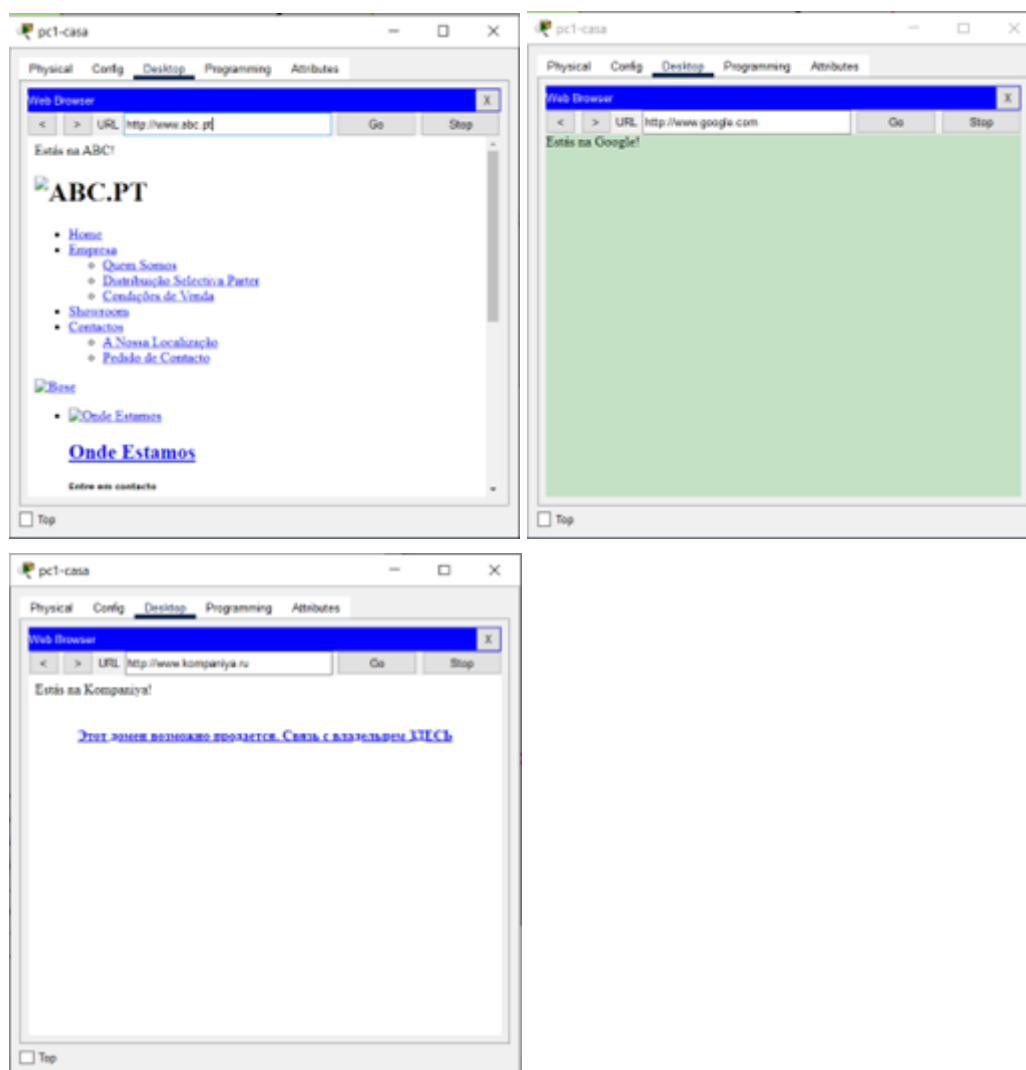
dns-isp-x		
DNS		
Name	Type	Detail
gmail.com	NS	raiz
mail.abc.pt	A Record	193.140.2.100
raiz	A Record	8.8.8.8

www.abc.pt	A Record	193.140.2.200
www.google.com	NS	raiz
www.kompaniya.ru	NS	raiz

Tarefa 9

Configurar os servidores Web para HTTP, cada um dos servidores com uma página index.html distinta [5].

Ativamos o serviço HTTP em cada um dos servidores Web e configuramos as suas páginas index.html. Resultado final de cada página:

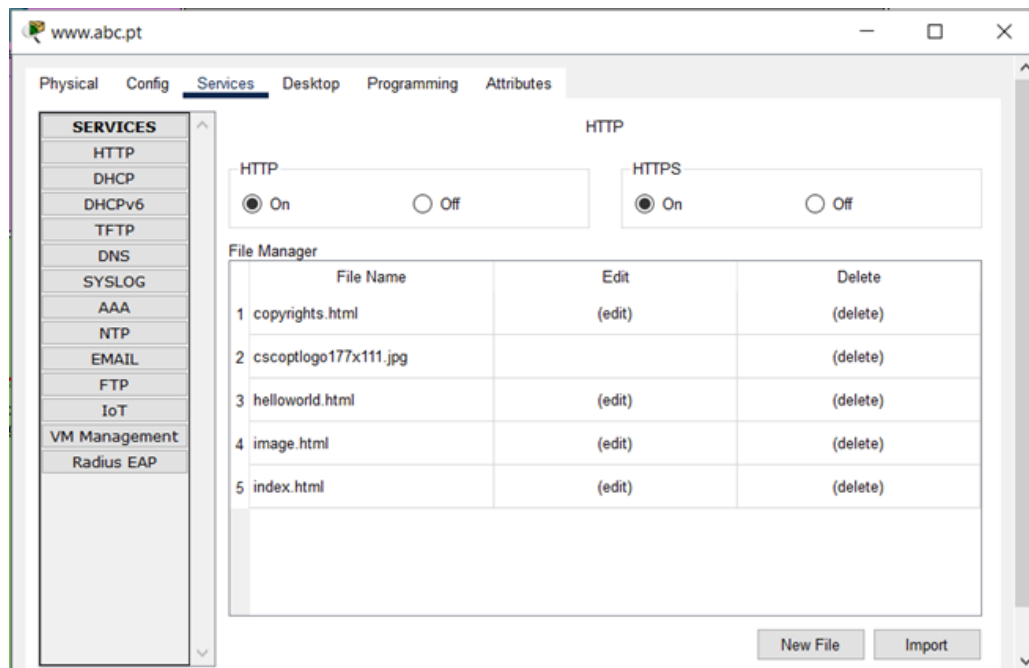


Ao colocarmos os IPs dos servidores Web no DNS, (www.google.com, www.abc.pt e www.kompaniya.ru) quando os restantes pcs acedem às páginas Web de cada um dos servidores é mostrada a página index.html de cada um.

Tarefa 10

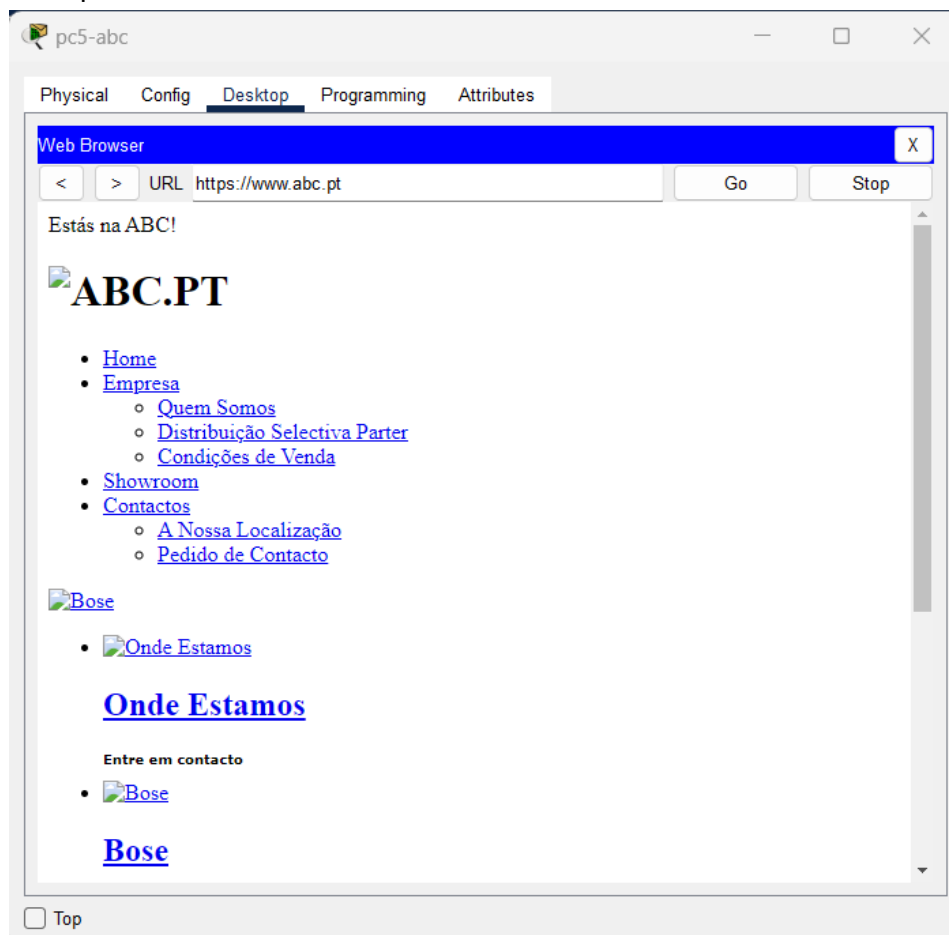
Configure o servidor de Web www.abc.pt para responder também a HTTPS [5].

No servidor Web (www.abc.pt) colocamos “On” também o serviço HTTPS.



É utilizado o DNS para resolver o nome no IP correspondente ao servidor.

Exemplo final:



Tarefa 11

Defina Gateway of Last Resort no router gigapix-porto [10].

```
!  
ip route 0.0.0.0 0.0.0.0 10.0.0.17 <-- (qualquer pacote com  
um IP de destino desconhecido ou sem um, é enviado para o  
router isp-x-porto)  
!
```

Porquê o isp-x-porto?.

Escolhemos o isp-x-porto como Gateway de Last Resort, por estar centralizado na rede e possuir ligações semelhantes ao gigapix-porto.

Tarefa 12

Configure os servidores de email [10].

gmail.com	
EMAIL	
SMTP Service ON	POP3 Service ON
User	Password
kompyuter	1234
casa	1234
pc1	1234

mail.abc.pt	
EMAIL	
SMTP Service ON	POP3 Service ON
User	Password
pc4	1234
pc5	1234
pc6	1234
pc2	1234
pc8	1234
pc9	1234

Tarefa 13

Configurar contas de correio em pelo menos um pc de cada rede [10].

The image shows a screenshot of a software window titled "pc4-abc". Inside the window, there are several tabs: "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is currently selected. Within this tab, a "Configure Mail" dialog box is open. This dialog box is divided into three sections: "User Information", "Server Information", and "Logon Information".

User Information:

- Your Name: Sou PC4
- Email Address: pc4@mail.abc.pt

Server Information:

- Incoming Mail Server: mail.abc.pt
- Outgoing Mail Server: mail.abc.pt

Logon Information:

- User Name: pc4
- Password: (represented by four dots)

At the bottom of the dialog box, there are four buttons: "Save", "Remove", "Clear", and "Reset".

Below the dialog box, there is a checkbox labeled "Top".

pc1-abc

Physical Config **Desktop** Programming Attributes

Configure Mail X

User Information

Your Name:

Email Address:

Server Information

Incoming Mail Server:

Outgoing Mail Server:

Logon Information

User Name:

Password:

☐ Top

kompyuter-x

Physical Config **Desktop** Programming Attributes

Configure Mail X

User Information

Your Name:

Email Address:

Server Information

Incoming Mail Server:

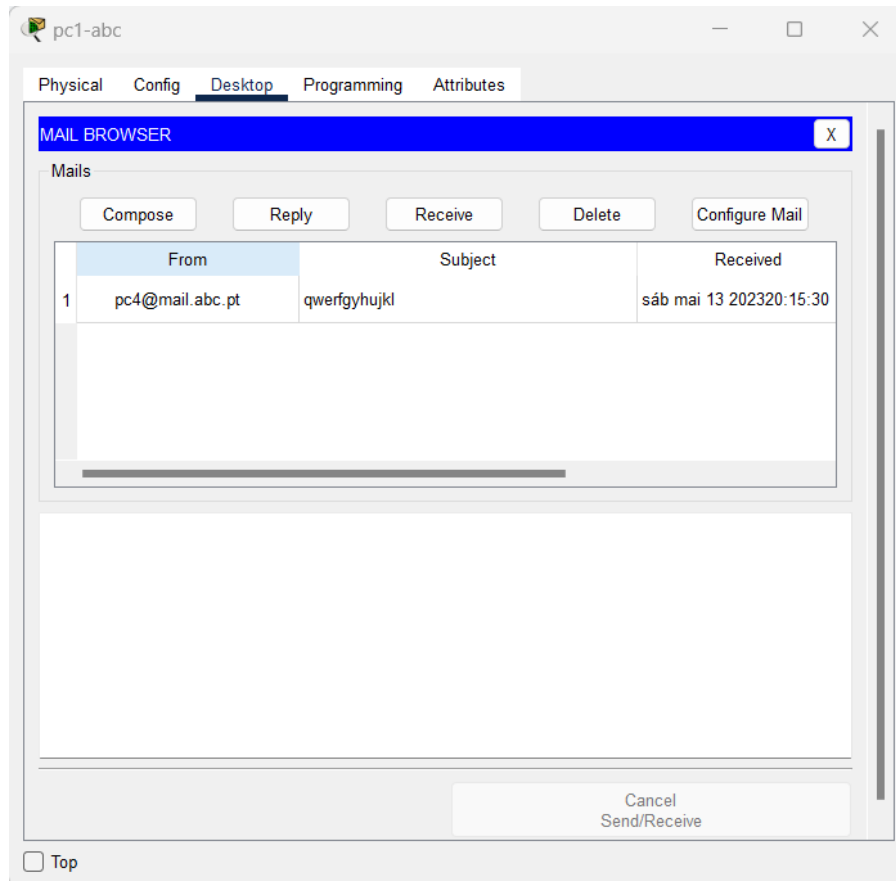
Outgoing Mail Server:

Logon Information

User Name:

Password:

☐ Top

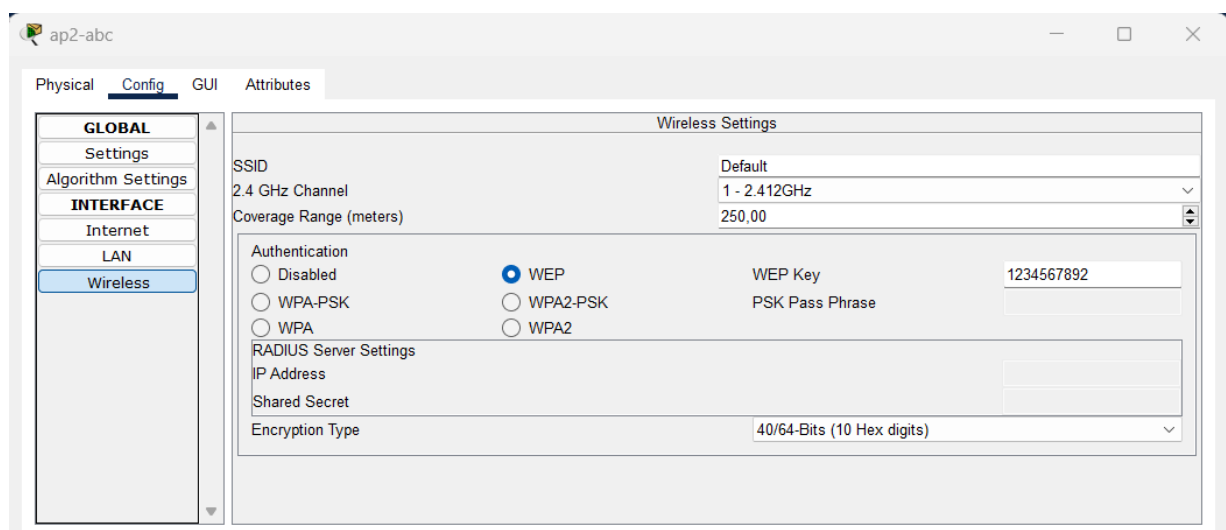


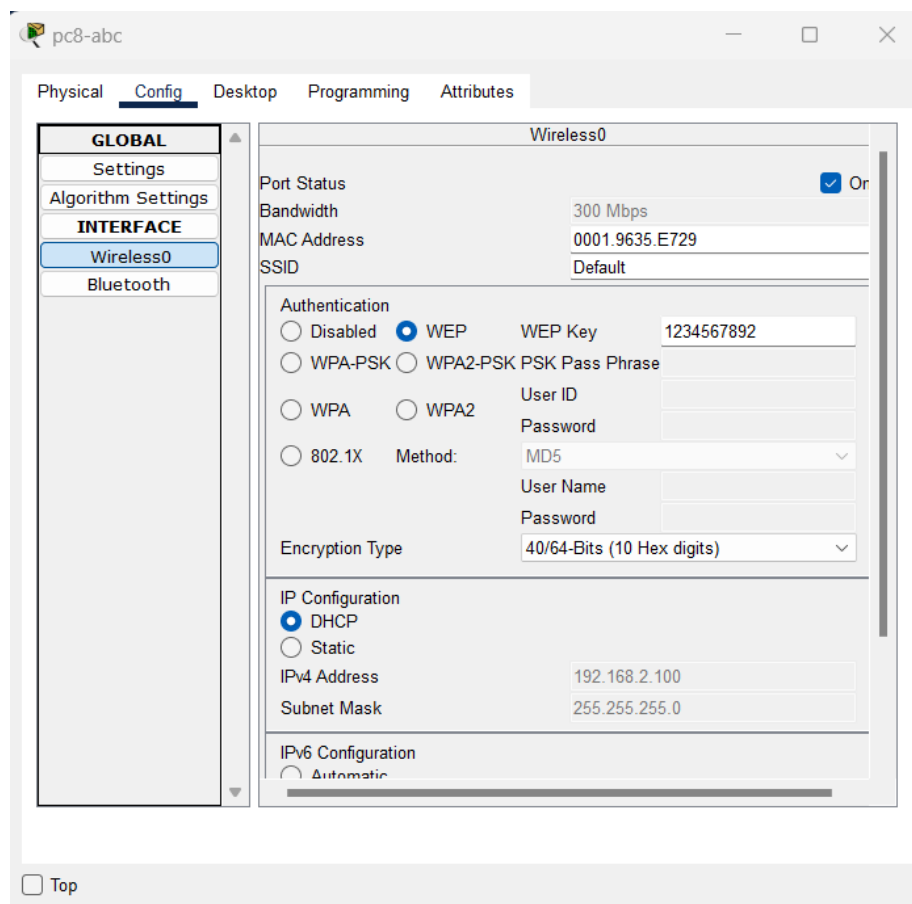
Tarefa 14

Nos locais com um Access Point e um equipamento portátil com acesso Wi-Fi, configure uma senha WEP para permitir acesso através da rede Wi-Fi [10].

Interface colocada no pc ligado ao router wireless: PT-LAPTOP-NM-1W-AC.

Em cada um dos routers “ap” foi configurada uma WEP Key diferente na interface Wireless, que os computadores terão que utilizar para se poderem ligar ao respetivo “ap”. Exemplo:





Tarefa 15

Configurar a ligação por Cabo de Consola para gerir o router isp-x-lisboa [5].

Para se ligar à consola, deve-se utilizar no “Desktop” o “Terminal”.

Port Configuration	
Bits Per Second:	9600
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	None

Tarefa 16

Configurar as passwords de login e de acesso aos routers no gigapix-porto e gigapix-lisboa como “gpix” e “xipg” [5].

!

```

enable password xipg <-- (Define uma senha para aceder ao
modo privilegiado no router)
!
line con 0 <-- (Acede à Console Line)
password gpix <-- (Define a senha de acesso)
login <-- (Habilita a autenticação de login)
!

```

Tarefa 17

Configurar a partilha de rotas entre RIP e OSPF [15].

Exemplo da configuração no gigapix-porto:

```

!
router ospf 10
  router-id 1.1.1.1 <-- (estabelece o id do router)
  log-adjacency-changes <-- (mostra as mensagens de
alterações de adjacência)
  redistribute connected subnets <-- (redistribuir as subnets
diretamente ligadas)
  network 10.0.0.0 0.0.0.3 area 0 <-- (define o ip da rede da
interface que se pretende incluir no ospf , a máscara
invertida e a área usada)
!
router rip <-- (Ativa o protocolo RIP)
version 2 <-- (Define a versão 2 do protocolo RIP)
network 10.0.0.0 <-- (Identifica a rede do processso RIP)
no auto-summary <-- (evita sumarização das rotas)

```

Exemplo da configuração no google:

```

!
router rip
version 2
redistribute connected
network 10.0.0.0
network 178.210.0.0
no auto-summary
!

```

Exemplo da configuração no rossiya:

```

!
router rip
version 2
network 10.0.0.0
network 178.210.0.0
no auto-summary
!

```

Tabela de routing do gigapix-porto:

```
gigapix-porto#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 10.0.0.17 to network 0.0.0.0

      8.0.0.0/24 is subnetted, 1 subnets
R       8.8.8.0 [120/1] via 10.0.0.26, 00:00:09, Serial0/0.100
     10.0.0.0/8 is variably subnetted, 21 subnets, 2 masks
C       10.0.0.0/30 is directly connected, FastEthernet1/0
O E2    10.0.0.4/30 [110/20] via 10.0.0.1, 00:49:15, FastEthernet1/0
O E2    10.0.0.8/30 [110/20] via 10.0.0.1, 00:49:15, FastEthernet1/0
O E2    10.0.0.12/30 [110/20] via 10.0.0.1, 00:49:15, FastEthernet1/0
C       10.0.0.16/30 is directly connected, FastEthernet2/0
C       10.0.0.20/30 is directly connected, FastEthernet3/0
C       10.0.0.24/30 is directly connected, Serial0/0.100
C       10.0.0.28/30 is directly connected, Serial0/0.200
O E2    10.0.0.32/30 [110/20] via 10.0.0.1, 00:49:15, FastEthernet1/0
R       10.0.50.0/30 [120/2] via 10.0.0.18, 00:00:04, FastEthernet2/0
          [120/2] via 10.0.0.1, 00:00:02, FastEthernet1/0
R       10.0.50.4/30 [120/1] via 10.0.0.22, 00:00:20, FastEthernet3/0
R       10.0.100.0/30 [120/2] via 10.0.0.1, 00:00:02, FastEthernet1/0
R       10.0.200.0/30 [120/1] via 10.0.0.18, 00:00:04, FastEthernet2/0
R       10.0.200.4/30 [120/1] via 10.0.0.22, 00:00:20, FastEthernet3/0
          [120/1] via 10.0.0.18, 00:00:04, FastEthernet2/0
R       10.50.1.0/24 [120/3] via 10.0.0.1, 00:00:02, FastEthernet1/0
          [120/3] via 10.0.0.18, 00:00:04, FastEthernet2/0
R       10.50.10.0/24 [120/3] via 10.0.0.1, 00:00:02, FastEthernet1/0
          [120/3] via 10.0.0.18, 00:00:04, FastEthernet2/0
R       10.50.11.0/24 [120/3] via 10.0.0.1, 00:00:02, FastEthernet1/0
          [120/3] via 10.0.0.18, 00:00:04, FastEthernet2/0
R       10.51.1.0/24 [120/2] via 10.0.0.22, 00:00:20, FastEthernet3/0
R       10.51.10.0/24 [120/2] via 10.0.0.22, 00:00:20, FastEthernet3/0
R       10.51.11.0/24 [120/2] via 10.0.0.22, 00:00:20, FastEthernet3/0
R       10.200.8.0/24 [120/1] via 10.0.0.18, 00:00:04, FastEthernet2/0
     62.0.0.0/24 is subnetted, 1 subnets
R       62.122.170.0 [120/2] via 10.0.0.30, 00:00:06, Serial0/0.200
    142.250.0.0/24 is subnetted, 2 subnets
R       142.250.200.0 [120/1] via 10.0.0.26, 00:00:09, Serial0/0.100
R       142.250.201.0 [120/1] via 10.0.0.26, 00:00:09, Serial0/0.100
    178.210.0.0/16 is variably subnetted, 3 subnets, 2 masks
R       178.210.90.0/24 [120/2] via 10.0.0.30, 00:00:06, Serial0/0.200
R       178.210.91.0/30 [120/1] via 10.0.0.30, 00:00:06, Serial0/0.200
R       178.210.92.0/30 [120/1] via 10.0.0.26, 00:00:09, Serial0/0.100
          [120/1] via 10.0.0.30, 00:00:06, Serial0/0.200
R       192.168.0.0/24 [120/3] via 10.0.0.1, 00:00:02, FastEthernet1/0
R       192.168.1.0/24 [120/3] via 10.0.0.1, 00:00:02, FastEthernet1/0
          [120/3] via 10.0.0.18, 00:00:04, FastEthernet2/0
R       192.168.2.0/24 [120/2] via 10.0.0.22, 00:00:20, FastEthernet3/0
R       192.168.3.0/24 [120/2] via 10.0.0.30, 00:00:06, Serial0/0.200
    193.140.2.0/25 is subnetted, 2 subnets
R       193.140.2.0 [120/2] via 10.0.0.22, 00:00:20, FastEthernet3/0
R       193.140.2.128 [120/3] via 10.0.0.1, 00:00:02, FastEthernet1/0
          [120/3] via 10.0.0.18, 00:00:04, FastEthernet2/0
S*      0.0.0.0/0 [1/0] via 10.0.0.17
```

Tarefas Adicionais

Tarefa 2

Implementar listas de acesso (ACL) no isp-x que impeçam o acesso ao servidor www.kompaniya.ru a partir dos computadores da empresa abc [10].

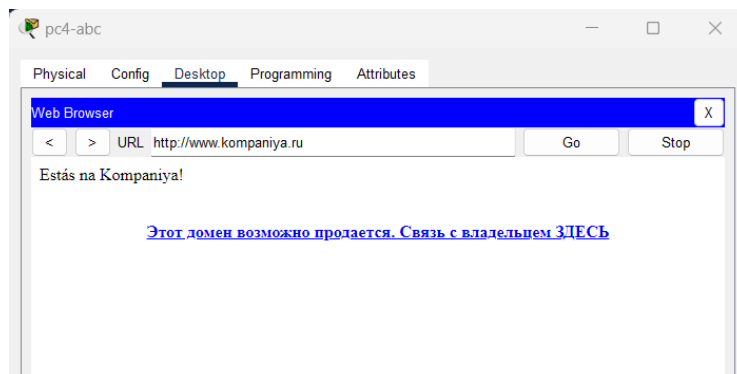
Configuração no isp-x-lisboa:

```
!  
access-list 101 deny tcp any host 62.122.170.171 eq www  
access-list 101 permit ip any any  
!  
interface Serial2/0  
 ip address 10.0.50.1 255.255.255.252  
 ip access-group 101 in  
!
```

Configuração no isp-x-braga:

```
!  
access-list 101 deny tcp any host 62.122.170.171 eq www  
access-list 101 permit ip any any  
!  
interface FastEthernet1/0  
 ip address 10.0.50.5 255.255.255.252  
 ip access-group 101 in  
!
```

Antes de aplicar a ACL na interface:



Depois de aplicar a ACL na interface:

