**Introducción a Sistemas Distribuidos**

**Trabajo Práctico Grupal**

**Diseño y configuración sobre una topología de red**

**Grupo 3**

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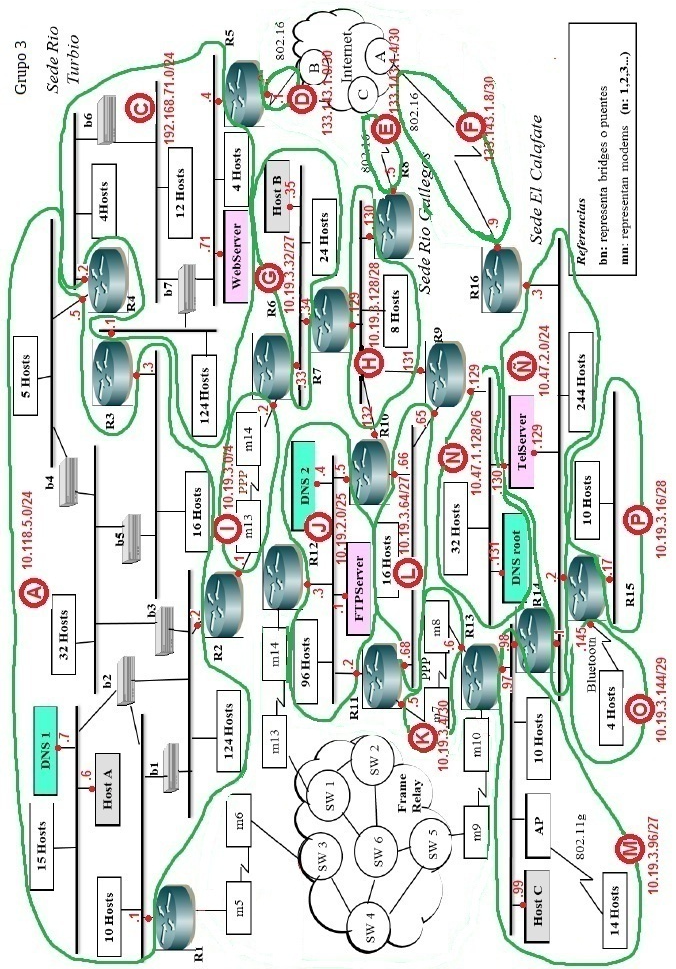
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**Subnetting**

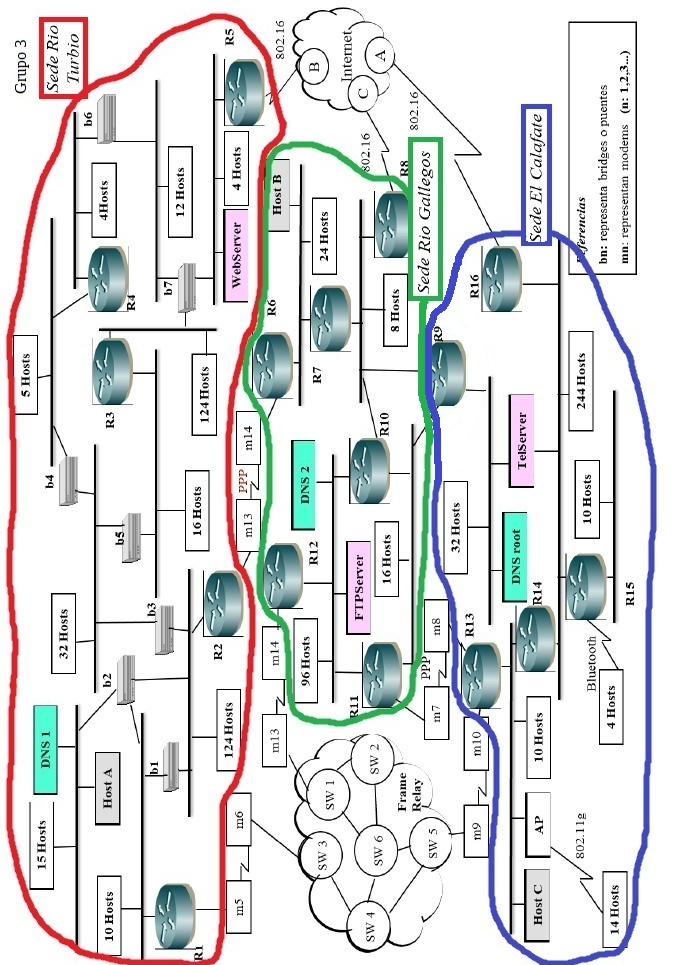
A partir de la topología entregada y el espacio de direccionamiento asignado se procedió a realizar el subnetting de la red. La resolución de direcciones asignadas se realizó siguiendo la RFC 950. El espacio de direccionamiento asignado a cada subred es el que se muestra en la siguiente tabla:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Red | Marca | Routers que la forman | Direcciones necesarias | Mascara IP | Direccion de red IP |
| **A** | Trek | R1-R2-R3-R4 | 211 | /24 | 10.118.5.0 |
| **B1** | Coluer | R1-R12 (FrameRelay) | 4 | /30 | 172.143.0.64 |
| **B2** | Bianchi | R1-R13 (FrameRelay) | 4 | /30 | 172.143.0.68 |
| **B3** | Yeti | R12-R13 (FrameRelay) | 4 | /30 | 172.143.0.72 |
| **C** | Specialized | R3-R4-R5 | 151 | /24 | 192.168.71.0 |
| **D** | Pinarello | R5-Rint (cloud) | 4 | /30 | 133.143.1.0 |
| **E** | Cube | R8-Rint (cloud) | 4 | /30 | 133.143.1.4 |
| **F** | Fuji | R16-Rint (cloud) | 4 | /30 | 133.143.1.8 |
| **G** | GT | R6-R7 | 29 | /27 | 10.19.3.32 |
| **H** | Lapierre | R7-R8-R9-R10 | 15 | /28 | 10.19.3.128 |
| **I** | Raleigh | R2-R6 | 4 | /30 | 10.19.3.0 |
| **J** | BH | R10-R11-R12 | 103 | /25 | 10.19.2.0 |
| **K** | MMR | R11-R13 | 4 | /30 | 10.19.3.4 |
| **L** | Cannondale | R9-R10-R11 | 22 | /27 | 10.19.3.64 |
| **M** | Scott | R13-R14 | 29 | /27 | 10.19.3.96 |
| **N** | Giant | R9 | 37 | /26 | 10.47.1.128 |
| **Ñ** | Orbea | R14-R15-R16 | 250 | /24 | 10.47.2.0 |
| **O** | Kona | R15.1 | 7 | /29 | 10.19.3.144 |
| **P** | Merida | R15.2 | 13 | /28 | 10.19.3.16 |
| **Q** | Conor | GRE - R5-R8 | 4 | /30 | 10.19.3.8 |
| **R** | Marin | GRE - R16-R8 | 4 | /30 | 10.19.3.12 |
| **S** | Ghost | GRE - R5-R16 | 4 | /30 | 10.19.3.152 |

**Fragmentación de la red**



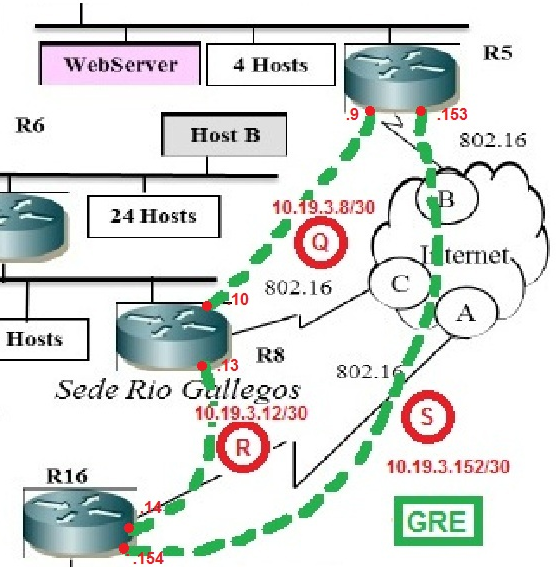
**Diagrama de las sedes**



**Configuración IP de routers, servers, hosts y dns**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Router** | **(Red )IP** | | | |
| **R1** | (A) 10.118.5.1 | (B1) 172.143.0.65 | (B2) 172.143.0.69 |  |
| **R2** | (A) 10.118.5.2 | (I) 10.19.3.1 |  |  |
| **R3** | (A) 10.118.5.3 | (C) 192.168.71.1 |  |  |
| **R4** | (A) 10.118.5.4 | (C) 192.168.71.2 |  |  |
| **R virtual 3-4** | (A) 10.118.5.5 | (C) 192.168.71.3 |  |  |
| **R5** | (C) 192.168.71.4 | (D) 133.143.1.1 | (Q) 10.19.3.9 (T-10) | (S) 10.19.3.153 (T-20) |
| **R6** | (G) 10.19.3.33 | (I) 10.19.3.2 |  |  |
| **R7** | (G) 10.19.3.34 | (H) 10.19.3.129 |  |  |
| **R8** | (E) 133.143.1.5 | (H) 10.19.3.130 | (Q) 10.19.3.10 (T-40) | (R) 10.19.3.13 (T-50) |
| **R9** | (H) 10.19.3.131 | (L) 10.19.3.65 | (N) 10.47.1.129 |  |
| **R10** | (H) 10.19.3.132 | (J) 10.19.2.5 | (L) 10.19.3.66 |  |
| **R virtual 9-10** | (H) 10.19.3.133 | (L) 10.19.3.67 |  |  |
| **R11** | *(J) 10.19.2.2* | (K) 10.19.3.5 | (L) 10.19.3.68 |  |
| **R12** | (B1) 172.143.0.66 | (J) 10.19.2.3 | (B3) 172.143.0.73 |  |
| **R13** | (B2) 172.143.0.70 | (K) 10.19.3.6 | (M) 10.19.3.97 | (B3) 172.143.0.74 |
| **R14** | (M) 10.19.3.98 | (Ñ) 10.47.2.1 |  |  |
| **R15** | (Ñ) 10.47.2.2 | (O) 10.19.3.145 | (P) 10.19.3.17 |  |
| **R16** | (F) 133.143.1.9 | (Ñ) 10.47.2.3 | (R) 10.19.3.14 (T-80) | (S) 10.19.3.154 (T-70) |
| **R Internet** | (D) 133.143.1.2 | (E) 133.143.1.6 | (F) 133.143.1.10 |  |
| **HostA** | (A) 10.118.5.6 |  |  |  |
| **HosB** | (G) 10.19.3.35 |  |  |  |
| **HostC** | (M) 10.19.3.99 |  |  |  |
| **TelServer** | (N) 10.47.1.130 | (Ñ) 10.47.2.129 |  |  |
| **FTP Server** | (J) 10.19.2.1 |  |  |  |
| **WebServer** | (C) 192.168.71.71 |  |  |  |
| **DNS root** | (N) 10.47.1.131 |  |  |  |
| **DNS 1** | (A) 10.118.5.7 |  |  |  |
| **DNS 2** | (J) 10.19.2.4 |  |  |  |

**Túneles GRE**



Utilizando el tutorial expuesto en la cátedra, se crearon túneles GRE para encapsular en la red las conexiones de los routers R5, R8 y R16 a Internet. En el diagrama anterior se puede observar el equivalente de la topología luego de implementar los túneles GRE. Gracias al mismo, se crea una conexión punto a punto entre R5 y R8, R8 y R16, R16 y R5.

Se exhibe a continuación, la configuración pertinente al protocolo GRE en los routers mencionados anteriormente:

**R5**

interface Tunnel10

ip address 10.19.3.9 255.255.255.252

tunnel source 133.143.1.1

tunnel destination 133.143.1.5

interface Tunnel20

ip address 10.19.3.153 255.255.255.252

tunnel source 133.143.1.1

tunnel destination 133.143.1.9

**R8**

interface Tunnel40

ip address 10.19.3.10 255.255.255.252

tunnel source 133.143.1.5

tunnel destination 133.143.1.1

interface Tunnel50

ip address 10.19.3.13 255.255.255.252

tunnel source 133.143.1.5

tunnel destination 133.143.1.9

**R16**

interface Tunnel70

ip address 10.19.3.154 255.255.255.252

tunnel source 133.143.1.9

tunnel destination 133.143.1.1

interface Tunnel80

ip address 10.19.3.14 255.255.255.252

tunnel source 133.143.1.9

tunnel destination 133.143.1.5

**Frame Relay**

Para el armado de la red Frame Relay se usaron 6 routers con las siguientes configuraciones de DLCI en cada uno:

**FR1**

|  |  |  |  |
| --- | --- | --- | --- |
| **Interface In** | **DLCI In** | **Interface Out** | **DLCI Out** |
| s0/0 | 21 | Serial0/1 | 211 |
| s0/0 | 21 | Serial0/2 | 211 |
| s0/0 | 23 | Serial0/1 | 231 |
| s0/0 | 23 | Serial0/2 | 231 |
| s0/1 | 122 | Serial0/0 | 21 |
| s0/1 | 322 | Serial0/0 | 23 |
| s0/2 | 126 | Serial0/0 | 21 |
| s0/2 | 326 | Serial0/0 | 23 |

**FR2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Interface In** | **DLCI In** | **Interface Out** | **DLCI Out** |
| s0/0 | 211 | Serial0/1 | 212 |
| s0/0 | 231 | Serial0/1 | 232 |
| s0/1 | 126 | Serial0/0 | 122 |
| s0/1 | 326 | Serial0/0 | 322 |

**FR3**

|  |  |  |  |
| --- | --- | --- | --- |
| **Interface In** | **DLCI In** | **Interface Out** | **DLCI Out** |
| s0/0 | 13 | Serial0/1 | 133 |
| s0/0 | 12 | Serial0/1 | 123 |
| s0/1 | 214 | Serial0/0 | 12 |
| s0/1 | 314 | Serial0/0 | 13 |

**FR4**

|  |  |  |  |
| --- | --- | --- | --- |
| **Interface In** | **DLCI In** | **Interface Out** | **DLCI Out** |
| s0/0 | 133 | Serial0/1 | 134 |
| s0/0 | 133 | Serial0/2 | 134 |
| s0/0 | 123 | Serial0/1 | 124 |
| s0/0 | 123 | Serial0/2 | 124 |
| s0/1 | 216 | Serial0/0 | 214 |
| s0/1 | 316 | Serial0/0 | 314 |
| s0/1 | 236 | Serial0/2 | 234 |
| s0/2 | 215 | Serial0/0 | 214 |
| s0/2 | 315 | Serial0/0 | 314 |
| s0/2 | 325 | Serial0/1 | 324 |

**FR5**

|  |  |  |  |
| --- | --- | --- | --- |
| **Interface In** | **DLCI In** | **Interface Out** | **DLCI Out** |
| s0/0 | 31 | Serial0/1 | 315 |
| s0/0 | 31 | Serial0/2 | 315 |
| s0/0 | 32 | Serial0/1 | 325 |
| s0/0 | 32 | Serial0/2 | 325 |
| s0/1 | 134 | Serial0/0 | 31 |
| s0/1 | 124 | Serial0/2 | 125 |
| s0/1 | 234 | Serial0/0 | 32 |
| s0/2 | 136 | Serial0/0 | 31 |
| s0/2 | 236 | Serial0/0 | 32 |
| s0/2 | 216 | Serial0/1 | 215 |

**FR6**

|  |  |  |  |
| --- | --- | --- | --- |
| **Interface In** | **DLCI In** | **Interface Out** | **DLCI Out** |
| s0/0 | 211 | Serial0/2 | 216 |
| s0/0 | 211 | Serial0/3 | 216 |
| s0/0 | 231 | Serial0/2 | 236 |
| s0/0 | 231 | Serial0/3 | 236 |
| s0/1 | 212 | Serial0/2 | 216 |
| s0/1 | 212 | Serial0/3 | 216 |
| s0/1 | 232 | Serial0/2 | 236 |
| s0/1 | 232 | Serial0/3 | 236 |
| s0/2 | 124 | Serial0/0 | 126 |
| s0/2 | 124 | Serial0/1 | 126 |
| s0/2 | 134 | Serial0/3 | 136 |
| s0/2 | 324 | Serial0/0 | 326 |
| s0/2 | 324 | Serial0/1 | 326 |
| s0/3 | 315 | Serial0/2 | 126 |
| s0/3 | 325 | Serial0/0 | 326 |
| s0/3 | 325 | Serial0/1 | 326 |
| s0/3 | 125 | Serial0/0 | 126 |
| s0/3 | 125 | Serial0/1 | 126 |