

The Kingdom Of Holfort

You are a civil engineer who suddenly found yourself in the Kingdom of Holfort, tasked with building roads and creating a communication network among the influential royalty and nobility household domains of the kingdom. The households you need to focus on are the [Holfort Royal Family in Holfort Royal Capital](#), the [Redgrave Household in Redgrave Domain](#), the [Roseblade Household in Roseblade Domain](#), the [Atlee Household in Atlee Domain](#) and the [Bartfort Household in Bartfort Domain](#). The king of Holfort also asked you to pinpoint an approximate location of the [Elven Island](#) which is secluded from the rest of the kingdom.

These are some general information about the kingdom you must know:

- The Holfort Royal Family is located in the capital which is at the centre of the kingdom and is connected to all the household domains and can take any open path they want.
 - The domain of the Bartfort Household is essentially divided into two separate households, one is a baron-rank household, and the other is a duke-rank household.
 - The Redgrave Household is a duke-rank household, and their daughter is engaged to Duke Bartfort, so they have a direct path to the Bartfort domain. This path can be used to communicate with each other.
 - The Atlee Household is an earl-rank household, and the head of the family is a royal court minister. Earl Atlee wants to create a favourable relationship with Duke Bartfort and hence has requested a [secret](#) path between them. This path is only used when going from the Atlee Household to Duke Bartfort Household in the Bartfort domain.
 - Every other communication between the domains has to go through the capital.
 - Nobody knows the exact location of the Elven Island, but you received an anonymous letter that says the Elven Island is located to the west of the Bartfort Household.
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- The royal capital is estimated to have a population of 2789.
 - The Redgrave domain has a population of 1000.
 - The Roseblade and Atlee domains have a population of 411 each.
 - The Bartfort barony has a population of 120 while the duchy population is 50.
 - Although unconfirmed, rumours say that the population of the Elven Island has been stuck at 20 for the past few centuries.

Here are some additional requirements for making the perfect infrastructure for the kingdom:

- Every household domain and island is represented by a router. Every household is represented by a separate LAN that extends from the router using a switch. **You can use a maximum of six routers and seven switches. Each LAN must have one computer representing the household.**
- The royal capital has its own Web Server which will handle the query for the URL 'capital.holfort.kingdom' and show a webpage that will say 'Welcome to the Capital of the Kingdom of Holfort'. There will be another webpage for the URL 'royal.holfort.kingdom' that will say 'You are now in the presence of the Holfort Royal Family.'

- The Bartfort duchy will also have its own Web Server which will handle the query for the URL 'duke.bartfort.kingdom' and show a webpage that will say 'Welcome to the Domain of Duke Bartfort'.
- The DNS Server is located in the Redgrave duchy and handles the DNS query for all three webpages from any household domain.
- The royal court minister often receives special instructions from the king and reports back to the king, so the Atlee domain and the royal capital have their dedicated Email Servers set up for communication. They use 'mail.atlee.kingdom' with '<user>@atlee.kingdom' and 'mail.holfort.kingdom' with '<user>@holfort.kingdom' respectively.
- Logical Address:
 - Choose a suitable network address for the kingdom, create subnets and assign to each domain with the least amount of waste. Note that the population of each domain does not include the IP addresses required in the router interfaces.
 - The royal capital uses static IP addresses for the Holfort Royal Family and its various vassal families in the capital. The rest are assigned dynamically using a DHCP Server. Exclude 20 additional IP addresses for the vassal families.
 - All the Web Servers, DNS Servers, DHCP Servers and Email Servers have static IP addresses.
 - All the other domains assign IP addresses dynamically.
- Routing:
 - The direct path between Redgrave and Bartfort domains uses static routing.
 - The direct path from the Atlee domain to Bartfort duchy is a one-way path and also uses static routing. Only the Atlee domain knows about this path. This path cannot be used to communicate with Bartfort barony.
 - All the remaining paths will be routed dynamically.
 - No default routes should be used for communication.
- Showing two additional end devices in each domain is enough to represent the entire population.
- Elven Island:
 - The isolated island has a separate network address: [59.68.96.32/27](#).
 - Show at least two end devices in the Elven Island that receive their IP addresses dynamically from the router.

You are allowed to make any valid and necessary assumptions while designing the network infrastructure.

You will have to fulfill the following:

1. The network mentioned above should be implemented in Cisco Packet Tracer, with the necessary devices and full configuration.
2. After completion, you should be able to test the conditions imposed.
3. Things you need to submit:
 - a. Cisco Packet Tracer file.
 - b. Network Topology Diagram with proper labels.
 - c. Configuration Commands of all the Routers.
 - d. VLSM/Network Address Table.
 - e. IP Address Table
 - f. Any assumptions made.