Deck Seventeen of the Star of the Seas

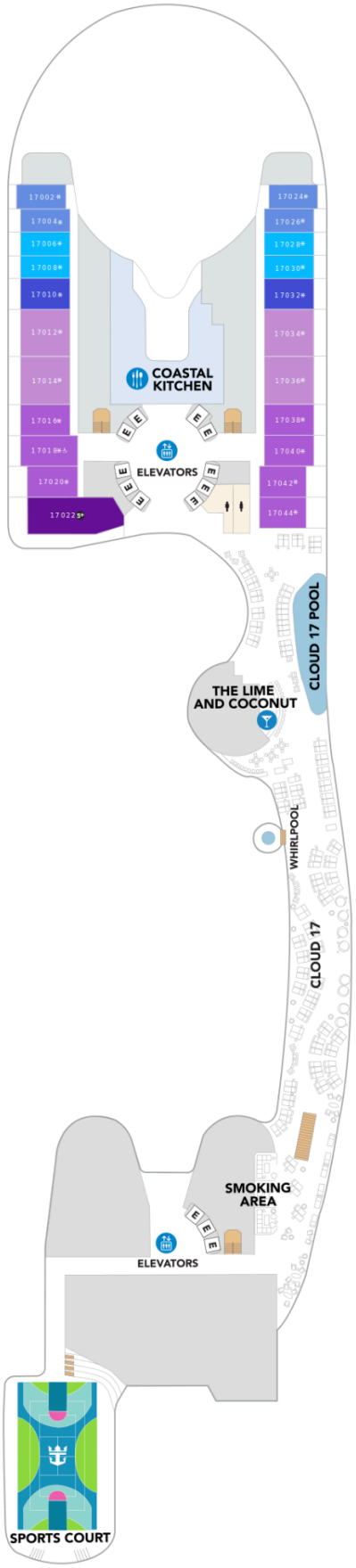
The Royal Caribbean Star of the Seas is currently the world's largest cruise ship alongside her sistership, the Icon of the Seas. The ship was commissioned in August 2025 comprising twenty decks and a certified capacity of over 7000 people.

Running such a large-scale operation requires flawless communication between all the different parties involved. Royal Caribbean employs talented network engineers like yourself to design and maintain the networking infrastructure onboard their ships.

On the morning of December 2, 2025 a major power surge occurred which resulted in a plethora of electronic equipment failure affecting deck 17. During the incident, all networking equipment on deck 17 went offline and subsequent testing revealed that all networking equipment sustained permanent damage and will have to be replaced. Piling on the misery, deck 17 is perhaps the most important deck for the ship's networking infrastructure as besides housing guest rooms and a number of other facilities, it also hosts the ship's central routers and servers.

The company will fly your team out to the ship with the required replacements. The networking team lead has assigned your sub-team to lead the restoration efforts for critical networking infrastructure on deck 17. Before proceeding with the actual work, you need to come up with a prototype design and get approval from the team lead.

The ship maintains an intranet which offers various services to the ship's guests and crew members and facilitates important internal communication between different wings of the ship.



There are a total of 22 premium guest suites on deck 17. Each suite has one fixed wall-mounted service tablet for ordering room service. Model each tablet as a PC in your prototype design.

The Coastal Kitchen restaurant is one of the most exclusive eateries onboard the ship. It has only six tables and each table has a table-mounted wired device (modelled as a PC) with digital menus. The IP addresses for these devices should not change as the restaurant staff track orders from the front-desk workstation of the restaurant using the IP addresses. They do this using the last octet of their IPv4 addresses where each last octet represents the table number (1-6) (for example, for table 1 the IP address should be XXX.XXX.XXX.1, for table 2 it should be XXX.XXX.XXX.2 and so on). The digital menus should be accessible from the table-mounted devices only using the URL royalcaribbean.coastalkitchen.food. The restaurant hosts the necessary servers on premises and the servers are not accessible elsewhere on the ship.

There are three other establishments on deck 17, the Lime and Coconut juice bar, the Cloud 17 pool and the Sports court. Each of these three venues have a front-desk with a work station.

Finally, every deck including deck 17 has a room for the deck manager. Each deck manager's room has a workstation, a database server (modelled as a PC) that is accessible ship-wide for storing room service orders and a deck router.

In addition to the deck router, the central router was also located in deck 17's deck manager's room. This router connects to all individual deck routers in all of the twenty other decks. Moreover, the central router is also connected to the ship's crew email server, DNS server and a central web server all of which were located on deck 17.

The networking team lead has also asked you to add redundancy so that if the central router in deck 17

goes down in the future, there's an alternate route for communication between other decks. You should connect and configure another central router with all the same connections and configurations. This should act as a secondary route for all decks.

Your junior engineer has jotted down a few more requirements after communicating with deck managers and other sub-teams:

- Select subnet masks such that the resulting pool of IP addresses is just enough to cover the expected number of devices. Care should be taken to not use more IP addresses than strictly required.
- Unless required for some other functionality, end-devices should have their IP addresses dynamically assigned by a DHCP server. The nearest router should act as a DHCP server for end-devices.
- The routes between deck routers and the central routers should be statically configured. All other routes may use dynamic routing with RIPv2.
- All servers should have static IP addresses.
- It is not necessary to include equipment from any other deck.
    - Configure the central router for deck 17 only for now.
- The total number of routers and switches should be minimized.

Deliverables

1. Network Topology Diagram
2. VLSM Tree
3. Configuration commands for all routers
4. IP address table
5. Cisco Packet Tracer file with all necessary configurations.
6. Work Distribution