

# CCDElabs

## Your Gateway to Success Towards CCDE Labs

Phoenix Airways  
Scenario 3  
Real Labs  
v3.0

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14. If there is any update, one will receive the update automatically on their registered email-id.

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## Guidelines

Before starting, please read the below guidelines:

1. In this module you will be creating, analyzing, validating and optimizing a high-level network design. All relevant resources needed to successfully complete this module are provided within this module. No device access is provided.
2. The menu bar on the same screen can be used to navigate to:
  - **Exam content:** Here you will find the exam questions. This module is scenario based and contains approximately 25-30 web-based items. No device access is provided.
  - **Resources:** Here you will find provided resources. An initial set of resources is provided at the start of the module. Additional resources are provided as you progress. Resources are cumulative and remain available throughout the remainder of the module. It is recommended to read all the provided resources prior to answering a question.
  - **Guidelines:** If you want to review these guidelines again during your, you can find them here.
  - **Help:** Here you will find more information about the exam environment, module navigation and functionalities.
  - **End Exam Section:** Clicking this button will end this exam section.
3. Backwards navigation is disabled; once you proceed to the next question, you will not be able to return to the previous question.
4. Question point values will not be visible. More complex items might have partial scoring opportunities.
5. Both level feedback can be provided at question level. Feedback will be processed, but Cisco will not reach out to you to discuss any feedback provided. Any time spent on providing feedback will not be compensated.
6. Access to selected Cisco online documentation, including Cisco Validation Design documents, is available from your desktop. However, the availability of this documentation is outside the CCIE/CCDE Team competence.
7. If you suspect an issue with your exam environment, contact the lab proctor as soon as possible.
8. You have 2 hours to complete this module. If you finish early, you may start with the next module, but any unused time will not be carried over to the next module.

## Introduction:

### Question Navigation:

- Please respond to each question before you continue to the next question
- When you have completed a question, click NEXT on the button right of the screen to move to the next question
- You will not be permitted to return to a question after you have clicked NEXT.

### Documents:

- Scenario documentation is presented at the beginning of each section. You can access these documents by clicking the documents button at the top of your screen.
- Additional scenario documentation appears throughout each section. You are notified via a notification screen when new documents become available. When a new document becomes available, a graphical icon appears on the Documents button and next to the new document inside the document window.
- To highlight text within the documents, select the text that you want to highlight, click the Highlight button at the top of your screen and change the highlight color. You can also remove highlighting. The highlighting persists as you progress through question within this section you can highlight all documents; for example, graphics cannot be highlighted.

### Exam Display:

- The exam is intentionally designed to use only half of the screen to display questions. This allows you to view supporting document while you answer the questions.
- Documents can be resized by using the resize handle in the lower right corner of the window.
- You can increase or decrease font size for the text from the drop-down menu on the top right of the screen. You can change Normal Font, Small font to medium font or large font. If you use medium or large font, you might need to use scroll bars to view the entire screen. In addition, a few exam components, such as some interactive items, remain at their original size to ensure that the content displays properly.

**Task Time:**

- You have four hours to complete two sections of the exam in the morning and four hours to complete two sections in the afternoon. The exam timer display on the top of your right site.
- A Section Specific progress bar is also displayed at the top right to help you manage your time within each specific section of the exam. The progress bar represented the percentage of material that is completed the specific section. It restarts when you begin another section of the exam.
- Please use the timer and progress bar to ensure good time management during the exam.

**Notes:**

- You are provided with an electronic notepad to use to take notes during this section of the exam. Click Notes at the top of screen to access the notepad.
- You can copy, paste, Undo and redo notes that you make within the electronic notepad. However, you cannot highlight material on the notes pages or copy and paste from question or documents pages.
- Your notes persist as you progress through the questions in this section.

**Comments:**

- During the exam, use the comments button at the top of screen to record specific comments on any question.
- Click Save to store a comment, or click Cancel to discard a comment.
- Comments are reviewed and considered during exam maintenance and are used improve the exam. Cisco will not contact you about comments.
- The amount of time that you use to enter comments is considered to be part of the total time that you allowed for completing the exam, In other words, the exam clock will not stop while you enter comments.

Click the Introduction button on the top of the next screen to access this introductory information, when you are ready to begin this section of the test. Click Next.

## Welcome to Phoenix Airways!

In this module of the exam, assume that you are a network designer hired to provide design advice for phoenix Airways. Ensure that you read and consider all information provide to you through documents, drawings, emails and other relevant information.

Good luck!

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## Company Background

### Company Profile

Phoenix Airways is one of the leading aviation companies in Middle East with 23,000 employees Phoenix Airways has its head office in Dubai and is serves 80 Destination in 45 countries.

Phoenix Airways announced its infrastructure operations, security and application management services in 2016. Phoenix Airways is now searching strategically aligned organization to partner with to deliver these services in more efficient, effective and agile manner and operating model.

In summary Phoenix Airways wants the help of external service provider (s) to realize the cost optimization, improve flexibility, scalability, standardization and transparency and to harmonize the global service delivery for infrastructure operations, security and application management services.

## Aspiration and Targets

### Cost reduction

Reduce service costs by acquiring services we can afford while meeting minimum requirement for business operations with service contracts that can scale based on business objectives.

### Flexibility

Implement delivery and operating modes to support the services that allow greater flexibility in sourcing and reduce the dependency on vendors.

### Alignment to and agile delivery model

Ensure that services and operating model facilitate the introduction and maturing of automation capabilities.

### Speed to market of delivery

Ensure that we have services and delivery model to facilitates a pace of delivery in-line with business and market challenges.

### User satisfaction

Provide services and self-services to empower the user community to manage provisioning, deprovisioning and support of their consumed services in line with current consumer capabilities and service models.

## Hybrid cloud

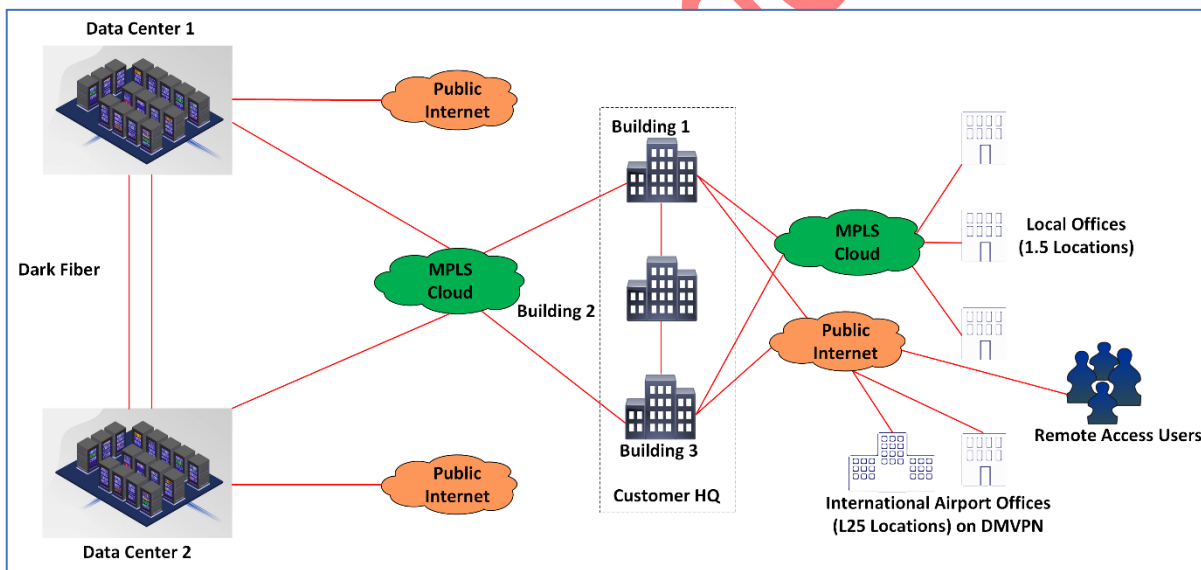
Adopt a hybrid cloud approach for infrastructure, applications and data. Over the past five years we have increasingly consumed SaaS, PaaS, And Inas Services, which have tipped the scales of a predominant on-premises and private cloud solutions to hybrid cloud. The hybrid cloud is necessary to balance industry services offering, scalability (up and down), costs, and innovation.

## Safe and secure

The airline industry is highly dependent on technology for services and operations. Technology services must ensure that the highest level of security and controls are aligned to the Phoenix regional and industry security and control framework, policies and strategies. Security services and controls must be seamless and simple for the services consumer to use.

## Current Network Overview

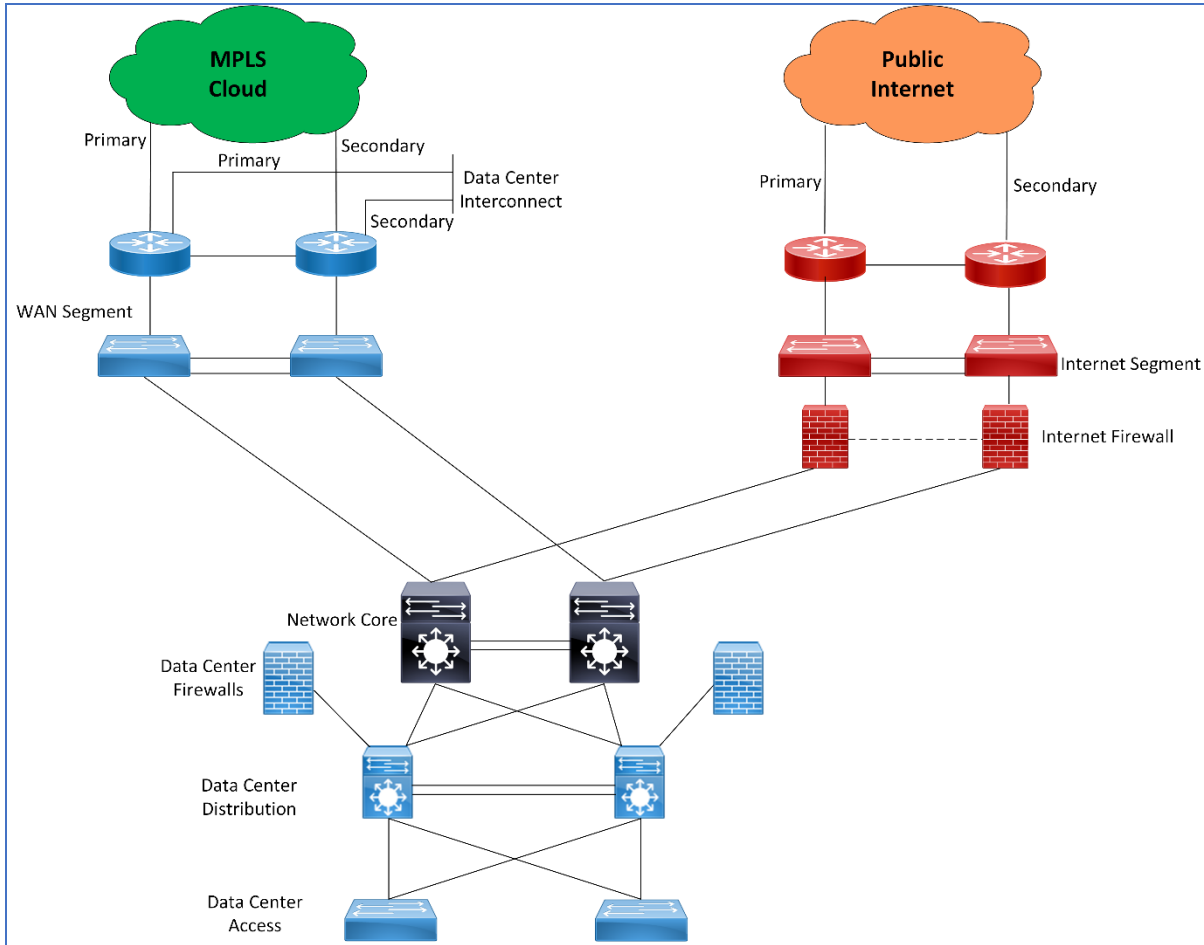
The overall network is represented here:



- 2x Active Data center: The customer has two data locations, which are connected using dual data center interconnected links using dark fiber. Each data center network identical in design and both hosts the application. The data center is connected to each other using a MPLS cloud from services provider and each has its own internet connection to publish the application outside.
- Customer headquarters: The customer headquarters (HQ) network consist of three buildings that collectively host about 5000 users. Building 1 and 3 are redundant to each other in terms of WAN and internet connectivity. Each building has its own core and user access network but share the perimeter network infrastructure.
- Local offices: 15 local offices in the Middle East are connected via MPLS from a service provider and they use the HQ network as the transits to reach the data centers. These offices have no redundancy.
- International Airport Offices: These are 125 offices globally, which are connected via DMVPN over public internet land in the HQ network and use it as a transit to reach the data center. The international Airport Offices have two internet connections. The second connection is being used as a backup link. The average bandwidth provided by internet connection is 35 Mbps on each connection.
- Remote Access User: The remote VPN infrastructure in the HQ network allows remote workers access the resources from data center.
- The company currently running a custom application called the Phoenix -Ops App. It is a TCP-based app that has on adverse performance affect during congestion because of tail drops. The application requires a network convergence of less than 2 seconds.
- The company is also running a database application called Passenger-Track App.
- Both of the application are business-critical applications.

### Data Center Topology

The overall data center topology is represented here:

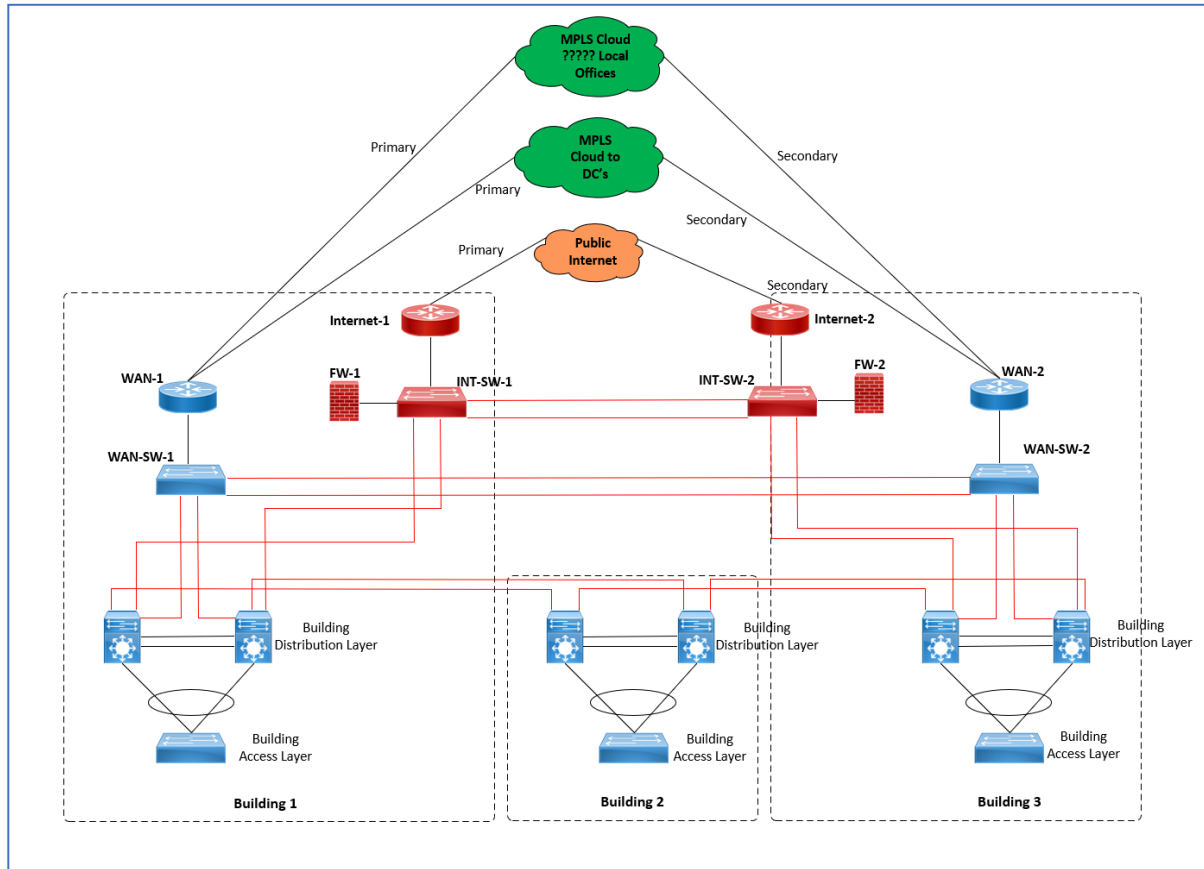


- Redundant WAN routers are used to connect MPLS to the customer HQ and the same routers are used for data center interconnectivity.
- Redundant internet routers are used to provide the transportation for the published applications.
- Internet security is limited to the redundant firewall at the data center.
- Data center distribution, access, and the firewall provide the server form network.
- Network core interconnects vary segments in the data center.



### Customer HQ Topology

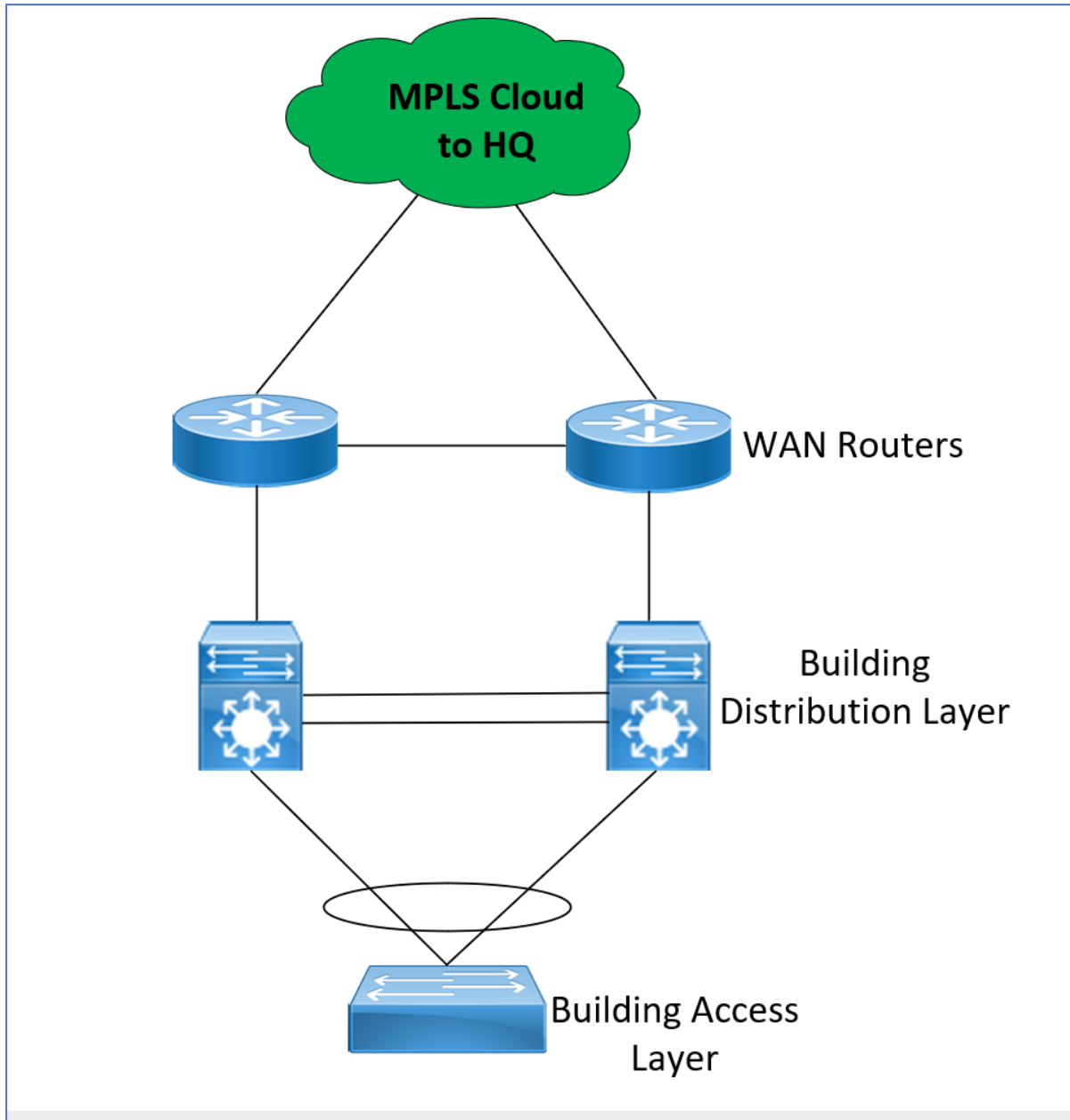
The overall customer HQ topology is represented here:



- Phoenix Airways HQ has three building.
- Each building has its own distribution and access switches. The distribution switches are clustered and access switches must use a port channel to the distribution switch to avoid spanning tree.
- There is a dark fiber-based, customer-owned connectivity between building 1 and 3 via building 2.
- The WAN and internet perimeter network is physically distributed between building 1 and 3 but logically combined and act as active standby as shown in the diagram.
- The WAN routers are used to connect with the MPLS cloud toward the data center and to the local offices in the Middle East.
- The Internet routers are used as the DMVPN hub for the international offices.
- Internet firewalls are used for the perimeter protection and as the remote-access VPN hub
- The internet link at the HQ is used for centralized internet access from the local offices and for remote user VPN access/site-to-site VPNs.

### Local Offices

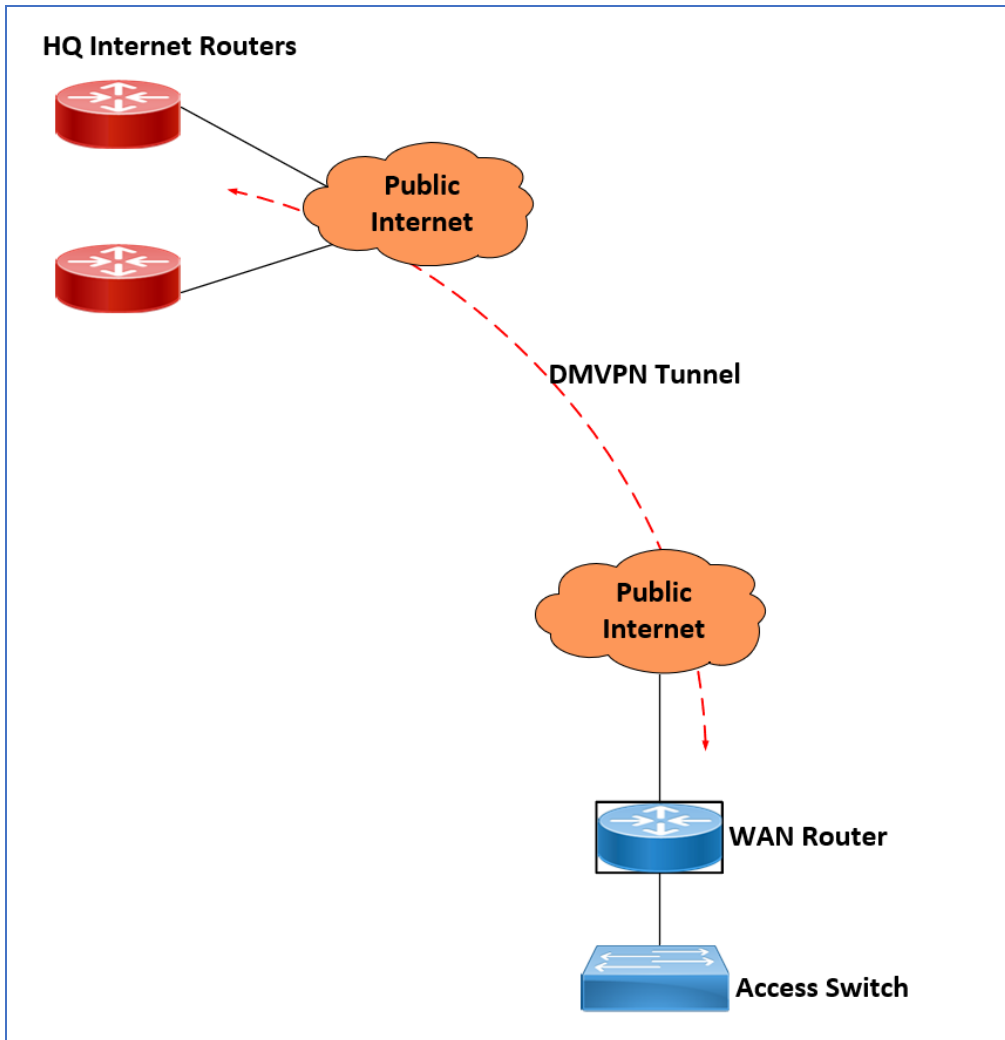
The overall local office topology is represented here:



- Two tier topologies with clustered collapsed distribution switches.
- Redundant WAN routers to connect with the HQ MPLS cloud.
- Centralized internet via the HQ network.
- 15 locations across the Middle East

## Remote Offices

The overall remote office topology is represented here:



- 125 remote locations across the globe.
- Running on DMVP over internet.
- Simple topology with access switch and a router.
- Voice traffic has quality issues over DMVPN.

## Project #1: Improving IP telephony quality

### Project Description

Users at the International Airport Office user reports poor quality of the IP telephony over the network. The network operations team determined that most of the issues are related to the questionable internet connectivity and the lack of QoS over the DMVPN network. Intermediate network issues are not being identified due to poor visibility and insights in the current DMVPN environment. Although IP telephony connectivity is extremely important, quality cannot be improved at the expense of security and integrity.

After an extensive testing exercise, it was determined that an RTT time of <75ms with a jitter of <30ms is needed to achieve good quality voice and video calling. Voice and video traffic was consuming an average of 8Mbps of bandwidth with a peak of 11Mbps on each site. Other data traffic was consuming an average of 20Mbps per site.

The other major requirement is to steer traffic between sites. This steering must accommodate classification based on deep packet inspection techniques, which is cumbersome or impossible to achieve using DMVPN and routing protocol metric alone.

The upper management is concerned about spending on redundant MPLS link of 15 offices locations located on Middle East. An audit was conducted and it found that current SLA of the MPLS link is 45ms RTT. Management asked the head of IT to find the solution to reduce the cost of the redundant link without affecting the availability of the office location.

The company also wants to add more sites in Europe and the Asia Pacific regions in the near future. Due to lack of local IT resources in these regions remote site connectivity must be provisioned from HQ.

Acquiring MPLS links for all international sites is an option, but comes with high price tag and should be avoided if possible.



**Question 1:**

Which WAN technology or VPN type meets the project requirement?

- A. Software -Defend Access
- B. Flex VPN
- C. GETVPN (ticked)
- D. Software-Defend Wide Area Network

**Answer:**

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**From: Peter D'Souza (Network Operation Manager)**

**To: William Maslow, Jack Hoult, Jonathan Paul**

**Date: 17th September 2021**

**Subject: Quality of Service**

Hello Everyone,

Now that the wireless POCs are going smoothly, could one of you start looking at how to optimize network for the application that were running.

I asked the system and application team to analyze the current business application and the network traffic requirements. They have come back with these requirements:

- Each business-critical application must be assigned 15 percent of the interface bandwidth.
- The Phoenix Operation App must be handled with the same intelligence that ensure that it does not suffer from starvation, as the application is sensitive to network congestion.
- Web traffic towards internet should have guarantee bandwidth available.
- FTP traffic towards internet must be limited in how much bandwidth it can consume.
- The IP telephony call manager is planning to provide better quality on the calls to the users by prioritizing voice traffic. It is currently in plans to accept a call only if sufficient resources are available end-to-end. The network infrastructure must be able to support it.
- The internet connections must honor the bandwidth as agreed with the ISP.

Peter

**Question 28:**

Match the QoS type with the application requirements. Each QoS type can have more than one application requirement (Choose all that apply)

QoS Type						
Application	Policing	Low-latency queuing	WRED	Bandwidth reservation	RSVP	Shaping
Passenger track	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Call manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FTP traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Phoenix Ops App	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Answer:**

**YOU HAVE REACHED THE END OF THIS SECTION**

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