ADSER

CCDE SERVICE PROVIDER PRACTICE SCENARIO

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About the author

Mohammad Khalil is a 13 years' experience in service provider networks , Cisco courses trainer and holds two CCIE in routing & switching and Service Provider.

Technical Reviewer

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About this workbook

This workbook simulates a Cisco Certified Design Expert (CCDE) scenario that aim to test the technology knowledge from a high level perspective and evaluate the ability to optimize the given network topologies and choose the right features and exclude others based on outcomes of deployed technical features and the resulting behavior.

This workbook is a service provider scenario with remarkable number of questions that scan several technologies: routing protocols, MPLS VPNs, BGP, etc.

The number of questions that can be within a scenario from the lab exam is around 20 to 35 questions , the number of questions in this scenario is much more and was intended to cover more and more features , deployments and caveats.

The questions varies from multiple choice, filling comparison tables, choosing optimal design option based on the given information, etc.

The variation of questions order aims to increase the robustness of focus for readers.

The scenario is more into features from ability of deployment, adaptability and interaction.

Disclaimer

The opinions expressed in this publication are those of the author, they do not purport to reflect the opinions or views of Cisco Systems.

ADSER Background Information

ADSER is a Jordanian service provider which provides MPLS service to its customers due to the demand in providing VPN connectivity (banks, enterprises, etc.).

ADSER network mainly consists of 4 PoPs distributed over 4 major cities and dark fiber to interconnect in between these PoPs.

The main PoP which contains the Border Routers is located within the Capital city: Amman.

The rest of the PoPs are located in different cities to account for customer existence.

Currently, ADSER only provides MPLS L3VPN service to its customers due to the conviction by their network team that this service gives better control and visibility to the service provider.

The only PE-CE routing protocol allowed is BGP regardless of the number of customer nodes and received prefixes, as well, the choice was made due to previous bad experience with static routing which hardened the management for the customers.

The running IGP inside ADSER network is ISIS with flat Level-2 implementation as the previous network contained ATM switches and ISIS was the best to choose.

The current IP scheme used inside the network is 192.168.X.0/24 on all interconnection links inside the core and 10.10.X.0/24 on the customer's interconnection links. Loopback interfaces use the X.X.X.X for IPv4 addressing where X is the router # and this interface to be used as ID for any protocol to take place.

A variety of deployment for customers do exist from single-homed to dual-homed with Ethernet only as the physical media termination.

ADSER utilizes two routers as MPLS LSR which acts as well as route reflectors to the current MPLS core domain LERs but not to each other.

ADSER uses ASN:NN as the numbering convention for its MPLS L3VPN service defined VRFs.

One of the resigned network engineers connected a new PE router to another PE router in a cascaded fashion due to the lack of fiber connectivity in the city where it resides, but mistakenly configured the parent PE to be a route reflector to this new service PE (PE3).

Nothing has changed since it was connected as the served customer refused any downtime in its service.

Currently no Internet access is delivered to MPLS L3VPN customers.

ADSER deployed PIM Dense mode inside its network. The choice for PIM Dense mode was due to its usefulness in LAN environments and it is less sophisticated than PIM Sparse mode.

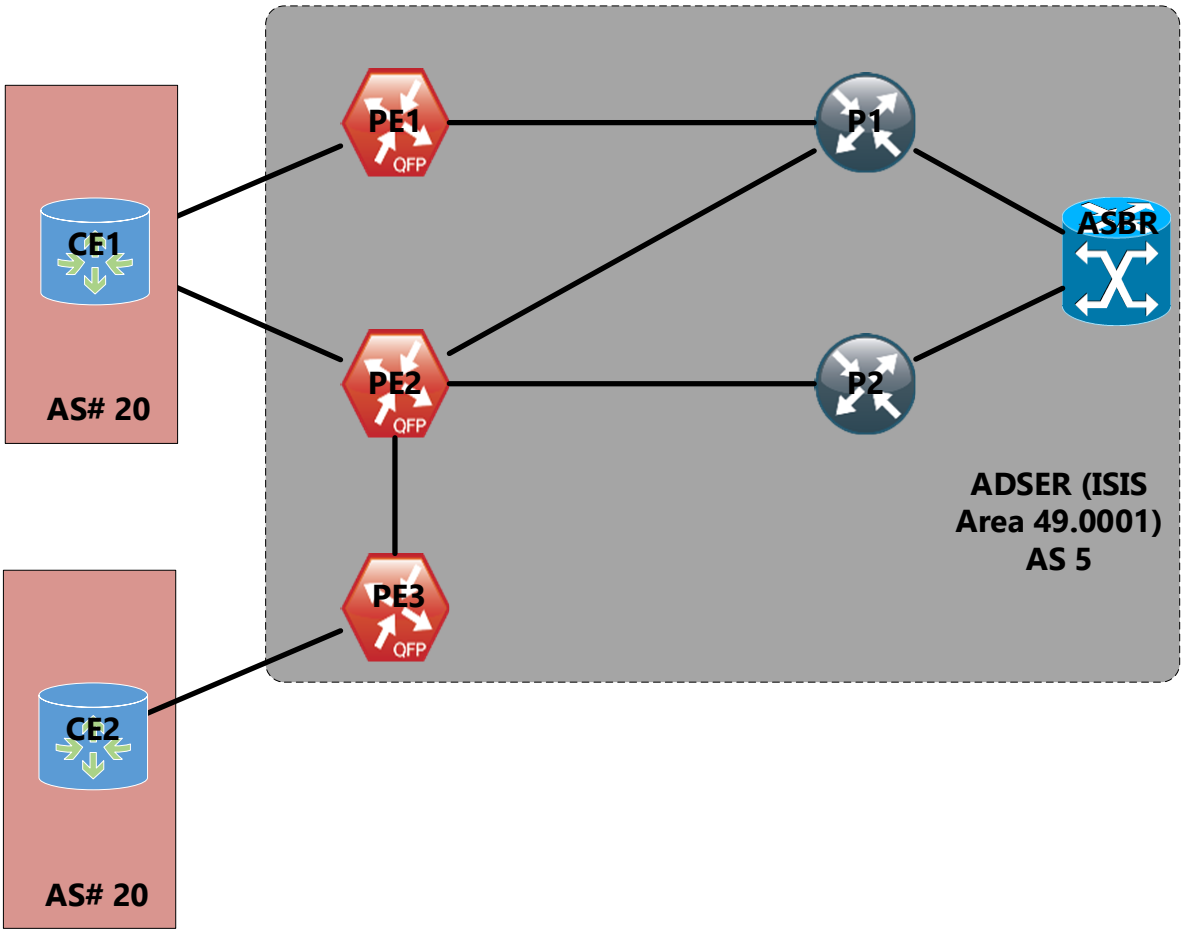

Figure: ADSER Network Diagram

BigSER Background Information

BigSER is another MPLS service provider that is located in Jordan as well with the main PoP co-exist in the same city but in a different region.

BigSER as well currently provides MPLS L3VPN services with the intention to provide L2VPN services in the coming future.

Below is a figure that illustrates the distribution of both providers PoPs among Jordan geographic map.

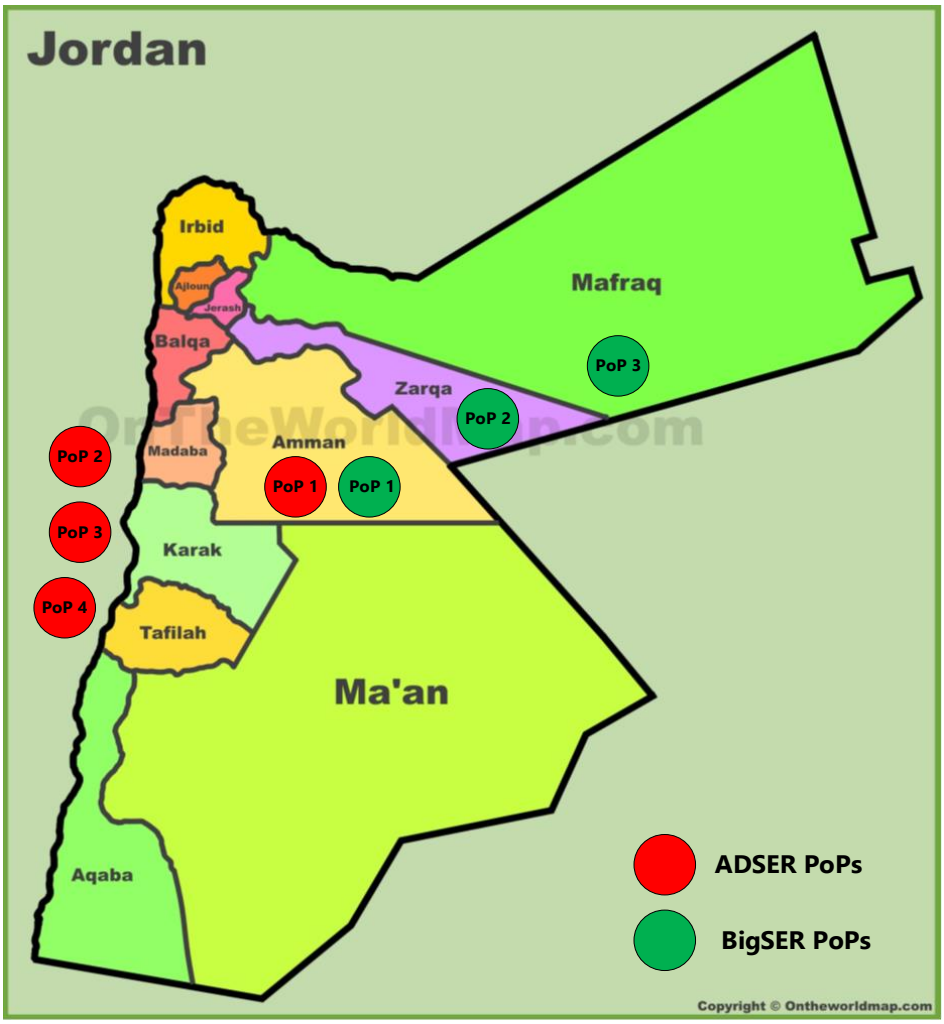

Figure: ADSER & BigSER Geo map

They also utilize P routers for route reflection role in the network for the serving PEs and they also use the same ASN:NN convention.

OSPF flat area 0 is in place for interconnection links and loopbacks prefixes advertisement.

The current IP scheme used inside the network is 192.168.X.0/24 on all interconnection links inside the core and 10.10.X.0/24 on the customer's interconnection links. Loopback interfaces use the X.X.X.X for IPv4 addressing where X is the router # and this interface to be used as ID for any protocol to take place.

BigSER deployed two ASBRs to handle Internet traffic with iBGP session in between for redundancy purposes.

Currently both ASBRs are connected to a single uplink provider single-homed to one router.

BigSER tried to purchase another circuit from another provider but due to financial issues they could not accomplish.

As well, the only available circuit from one of the ASBRs is FastEthernet in contrast to the second one which is GigEthernet.

BigSER deployed PIM Sparse mode due to its join behavior rather than the flood and prune behavior as the case with PIM Dense mode.

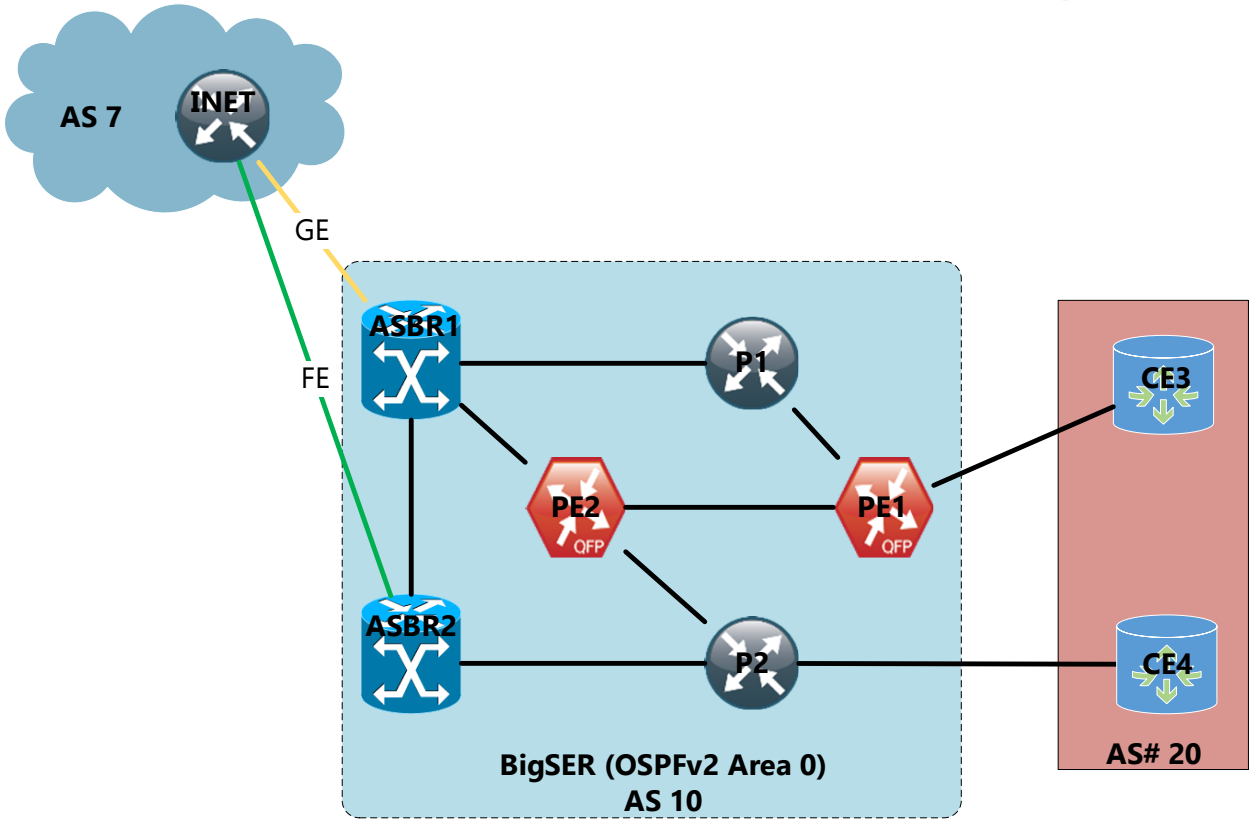

Figure: BigSER Network Diagram

MediaCORP Background Information

MediaCORP is a media broadcast station who is willing to connect their geographically distributed branches together.

Due to the sites separation, branches to be served are distributed between ADSER and BigSER which will force the two providers to cooperate to achieve and fulfil the needed for the new customer.

As the competition was high in between the two service providers in the market, lack of proper communication took place and the project timeline almost started.

As MediaCORP is concerned about their business to be smoothly implemented, they suggested to hire a freelancer network designer and optimizer who will propose the right model to follow.

This suggestion was met by approval from both service providers who are willing to get benefit from the expert to highlight some issues they are facing and develop some technologies they are considering to deploy as both providers have intermediate experienced engineers.

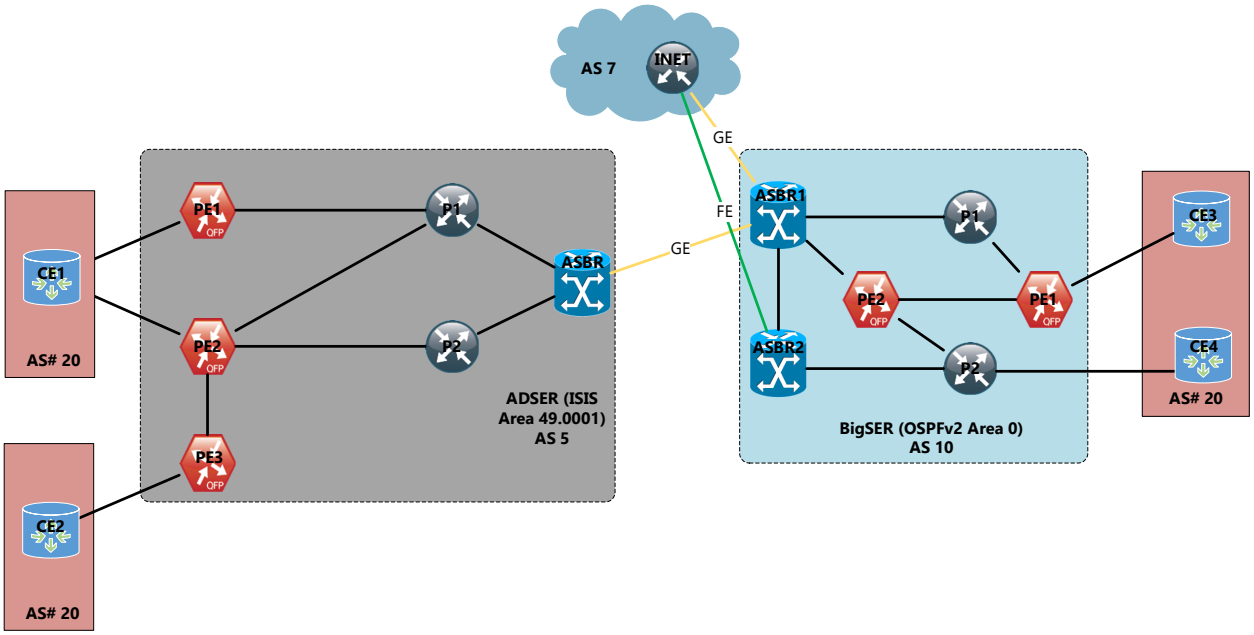

Figure: ADSER & BigSER Interconnection

E-Mail #1:

From: *network@mediacorp.com*
To: *KHALIL@godesign.com*
CC: *core@adser.com;core@bigser.com*
Subject: *Consultancy Services*

Dear KHALIL
Hope this mail finds you well

We are glad to inform you that your esteemed firm has been awarded the consultancy services for our network including all the applications and services running in it.

As well, with the agreement of our service providers, they are happy to have your experience spread among from the core walking down to the access layer.

In addition, some new services are running in the minds of their network engineers and they are willing to discuss it with you.

You are free to ask any piece of information you need in order to start the optimization process.

We expect from you after your analysis to provide us with:

- *Weaknesses points in both service providers*
- *Features/technologies that could enhance network performance*
- *Ability to hold new services*

Taking into account that both companies at the current time have limited budget as well as limited experience in certain areas of technologies.
After we are done with the service providers which will hold our traffic, you will be prompted to start with our applications and we will provide you with the needed at that time.

Thanks
Dani Shaw, CTO
MediaCORP

E-Mail #2:

From: *KHALIL@godesign.com*
To: *network@mediacorp.com*
CC: *core@adser.com;core@bigser.com*
Subject: *Re: Consultancy Services*

Dear Dani

Thanks for the generous chance you have provided and I will be looking forward to start the design and enhancement process.

BR,
KHALIL, Design Consultant
GoDesign

Q1) Based on the provided network topology and the associated information, what are the main issues with the current BGP design inside ADSER network? (Choose two)

a) Modularity
b) SPoF (Single Point of Failure)
c) Convergence
d) Scalability

Q2) In your opinion, what is the issue that could arise from having a PE connecting to another PE which is acting as a RR and already a pair of RRs already in place?

a) Management burden
b) Failure recovery
c) Scalability
d) Normal situation, nothing to worry about

E-Mail #3:

From: *core@adser.com*
To: *KHALIL@godesign.com*
Subject: *Single Point of Failures*

Dear KHALIL

We are glad you are here to assist us in some annoying caveats taking place in our infrastructure What is the most issue causing headache to us is the single point of failure either for nodes or interconnection links.
Can you please help us isolate this as we are trying to maintain a stable service to our customers?
And before I forget, MediaCORP is the customer illustrated in the network diagram we provided to you and we have it's headquarter dual-homed to one of our PEs.

Thanks

Core Network Team
ADSER

Q3) Based on the mail sent from ADSER core team, what is the parameter they are looking for?

a) Adaptability
b) Reliability
c) Expandability
d) Serviceability