Midterm/Exam review Looking over what I got wrong

Short answers

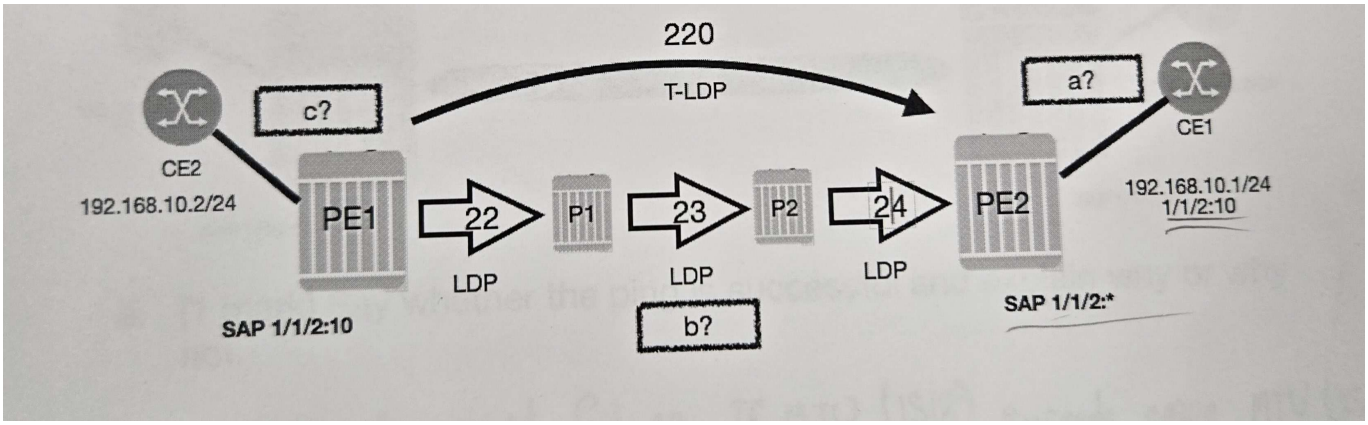
List 3 Types of MPLS routers and give the label operation performed

- iLER, performs push operations
- eLER, performs pop operations
- LSR, performs swap oeprations

How many service tunnels can a single MPLS transport tunnel carry?

There is no limit

Based on the following diagram:



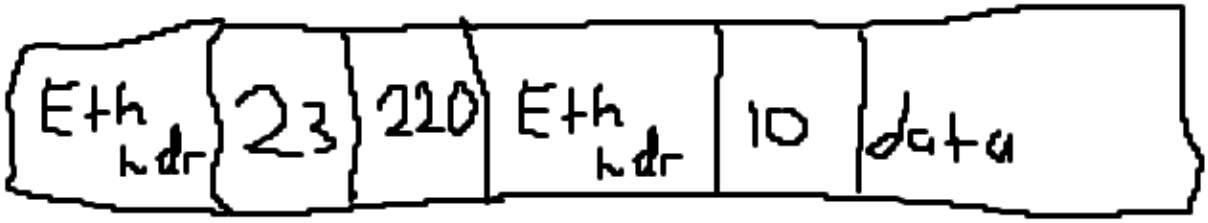
a. Frame transmitted from CE1 to SAP on PE2

b. Frame transmitted from P2 to P1

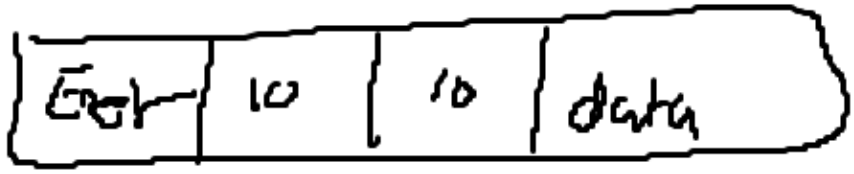
c. Frame transmitted from PE1 to CE2

a.

b



c



All interfaces on the PE and P routers in our lab topology are configured for LDP except the diagonal P links (R1 to R4 and R2 to R3). The route table for R1 shows the diagonal link as the next hop to R4. From which router or routers will R1 install an egress label in the LFIB for 10.10.10.4?

There would be no egress label because LDP isn't configured on the interface that links R1 to R4.

For each of the following RSVP-TE messages, say whether it flows downstream or upstream

1. Path - downstream
2. Resv - upstream
3. Path Tear - downstream
4. Resv Tear - upstream
5. Path Err - upstream
6. Resv Err - downstream

The error messages will always flow in the opposite direction of the creation and tears

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How does the head-end router determine where to send the Path message to signal an LSP-Path when there are no hops specified in the primary path?

Follows the IGP path to the tail-end router

List the Ethernet port encapsulation types supported on the Nokia 7750 SR and describe each one

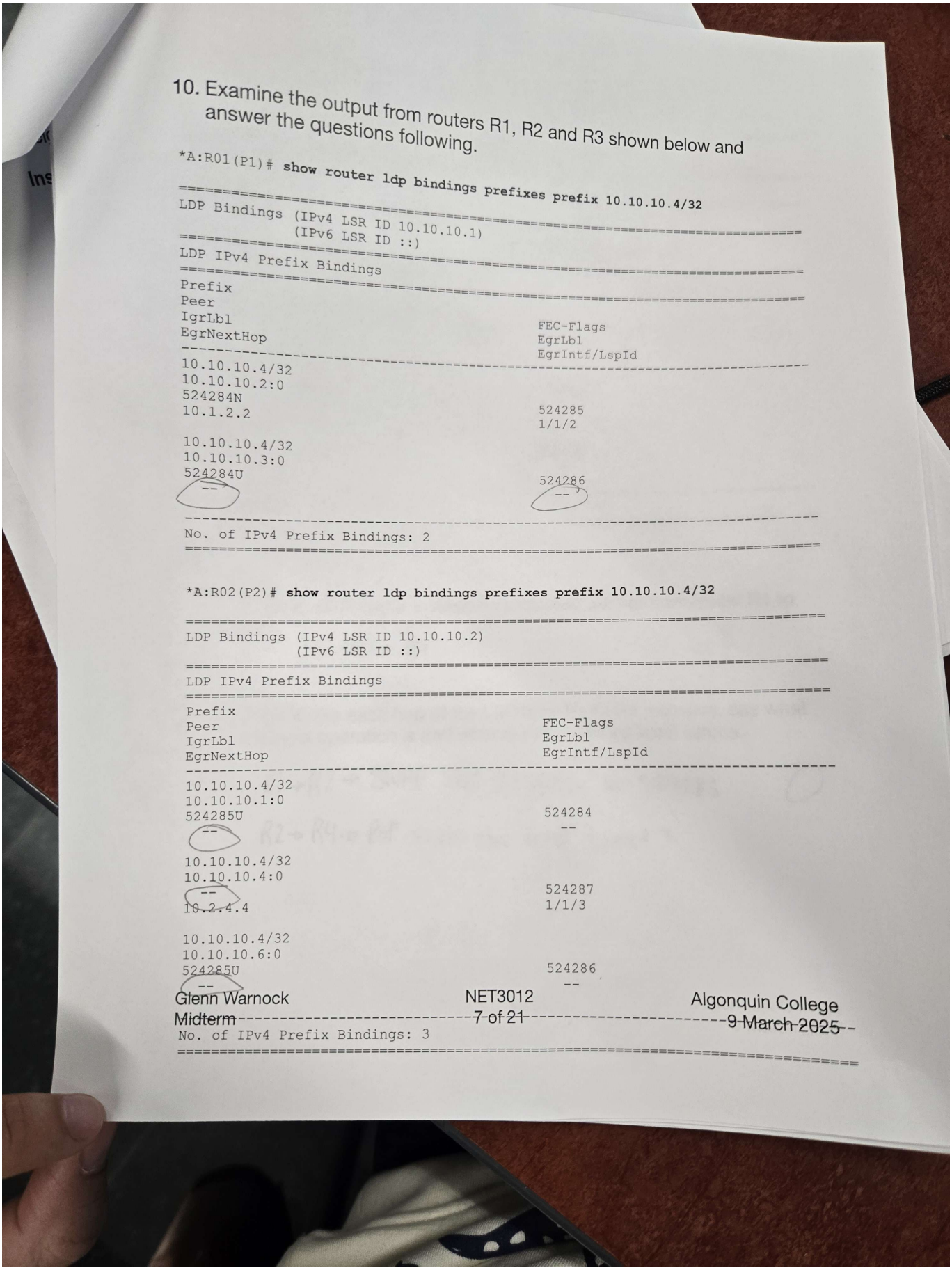
note: This question focuses on the PORTS so don't consider services

null: no VLAN tags

dot1q: one VLAN tag

QinQ: two VLAN tags

Examing the output from routers R1, R2 and R3 shown below and answer the questions following:



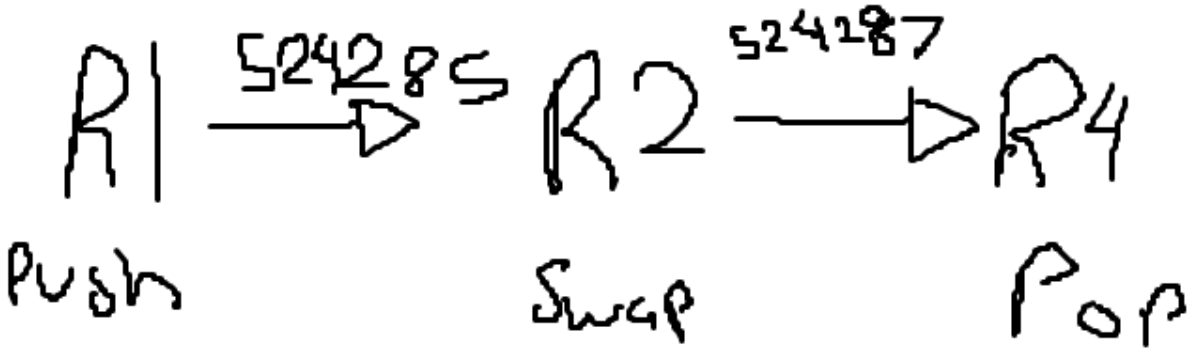
10. Examine the output from routers R1, R2 and R3 shown below and answer the questions following.

```
*A:R01(P1)# show router ldp bindings prefixes prefix 10.10.10.4/32

===============================================================================
LDP Bindings (IPv4 LSR ID 10.10.10.1)
             (IPv6 LSR ID ::)
===============================================================================
LDP IPv4 Prefix Bindings
===============================================================================
Prefix                                          FEC-Flags
Peer                                            EgrLbl
IgrLbl                                          EgrIntf/LspId
EgrNextHop
-------------------------------------------------------------------------------
10.10.10.4/32
10.10.10.2:0
524284N
10.1.2.2                                        524285
                                                1/1/2

10.10.10.4/32
10.10.10.3:0
524284U                                         524286
  --                                              --
-------------------------------------------------------------------------------
No. of IPv4 Prefix Bindings: 2
===============================================================================
```

```
*A:R02(P2)# show router ldp bindings prefixes prefix 10.10.10.4/32

===============================================================================
LDP Bindings (IPv4 LSR ID 10.10.10.2)
             (IPv6 LSR ID ::)
===============================================================================
LDP IPv4 Prefix Bindings
===============================================================================
Prefix                                          FEC-Flags
Peer                                            EgrLbl
IgrLbl                                          EgrIntf/LspId
EgrNextHop
-------------------------------------------------------------------------------
10.10.10.4/32
10.10.10.1:0
524285U                                         524284
  --                                              --

10.10.10.4/32
10.10.10.4:0
  --                                            524287
10.2.4.4                                        1/1/3

10.10.10.4/32
10.10.10.6:0
524285U                                         524286
  --                                              --
-------------------------------------------------------------------------------
No. of IPv4 Prefix Bindings: 3
===============================================================================
```

```
A:R03(P3)# show router ldp bindings prefixes prefix 10.10.10.4/32

===============================================================================
LDP Bindings (IPv4 LSR ID 10.10.10.3)
             (IPv6 LSR ID ::)
===============================================================================
LDP IPv4 Prefix Bindings
===============================================================================
Prefix                                          FEC-Flags
Peer                                            EgrLbl
IgrLbl                                          EgrIntf/LspId
EgrNextHop
-------------------------------------------------------------------------------
10.10.10.4/32
10.10.10.1:0
524285U                                         524284
  --                                              --

10.10.10.4/32
10.10.10.4:0
  --
10.3.4.4                                        524287
                                                1/1/2

10.10.10.4/32
10.10.10.7:0
524285U                                         524284
  --                                              --

-------------------------------------------------------------------------------
No. of IPv4 Prefix Bindings: 3
===============================================================================
```

b. For each hop of the LSP from R1 to R4 inclusive, say what the label operation is and what are the relevant label values



Examing the output from below. What changed in the configuration of R1 from the previous question to cause this change

12. Examine the output shown below and answer the questions following.

```
*A:R01(P1)# show router mpls lsp "toR4" path detail
===============================================================================
MPLS LSP toR4 Path  (Detail)
===============================================================================
Legend :
    @ - Detour Available                    # - Detour In Use
    b - Bandwidth Protected                 n - Node Protected
    s - Soft Preemption
    S - Strict                              L - Loose
    A - ABR                                 + - Inherited
===============================================================================
-------------------------------------------------------------------------------
LSP toR4
Path path-x
-------------------------------------------------------------------------------
LSP Name     : toR4
From         : 10.10.10.1
To           : 10.10.10.4
Admin State  : Up                          Oper State        : Up
Path Name    : path-x
Path LSP ID  : 28676                       Path Type         : Primary
Path Admin   : Up                          Path Oper         : Up
Out Interface: 1/1/3                       Out Label         : 524280
Path Up Time : 0d 00:00:16                 Path Down Time    : 0d 00:00:00
Retry Limit  : 0                           Retry Timer       : 30 sec
Retry Attempt: 0                           Next Retry In     : 0 sec

*** output removed ***

Include Groups   :                         Oper IncludeGroups:
None                                           None
Exclude Groups   :                         Oper ExcludeGroups:
None                                           None

Adaptive         : Enabled                 Oper Metric       : 16777215
Preference       : n/a
Path Trans       : 3                       CSPF Queries      : 0
Degraded         : False
Failure Code     : noError
Failure Node : n/a
Explicit Hops    :
                   10.1.3.3(L)
Actual Hops      :
    10.1.3.1(10.10.10.1)                       Record Label        : N/A
 -> 10.1.3.3(10.10.10.3)                       Record Label        : 524281
 -> 10.3.4.4(10.10.10.4)                       Record Label        : 524280
Resignal Eligible: False
Last Resignal    : n/a                     CSPF Metric       : 0
===============================================================================
*A:R01(P1)#
```

b. what are the label operations and label values at each hop?

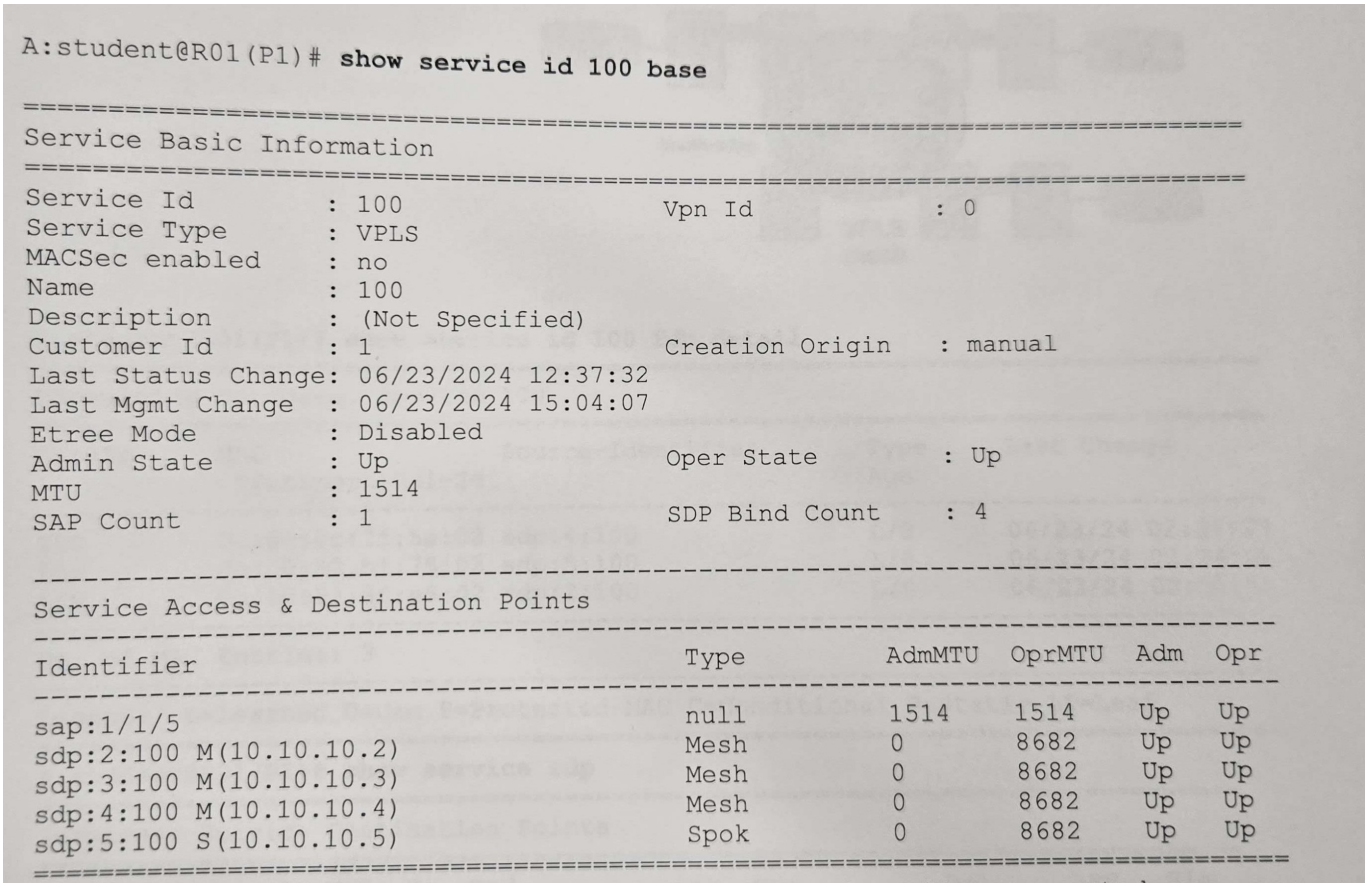
10.1.3.1 --> 10.1.3.3: PUSH --> 52481

10.1.3.3 --> 10.3.4.4: SWAP --> 524281 --> 524280

Label is POPPED at R4

This only got me 0.5, pop was missing for full marks

In the VPLS on R1 shown below, a broadcast frame is received from R5 (10.10.10.5). Describe how the frame is flooded by R1



```
A:student@R01(P1)# show service id 100 base

===============================================================================
Service Basic Information
===============================================================================
Service Id        : 100                 Vpn Id            : 0
Service Type      : VPLS
MACSec enabled    : no
Name              : 100
Description       : (Not Specified)
Customer Id       : 1                   Creation Origin   : manual
Last Status Change: 06/23/2024 12:37:32
Last Mgmt Change  : 06/23/2024 15:04:07
Etree Mode        : Disabled
Admin State       : Up                  Oper State        : Up
MTU               : 1514
SAP Count         : 1                   SDP Bind Count    : 4

-------------------------------------------------------------------------------
Service Access & Destination Points
-------------------------------------------------------------------------------
Identifier                              Type         AdmMTU  OprMTU  Adm   Opr
-------------------------------------------------------------------------------
sap:1/1/5                               null         1514    1514    Up    Up
sdp:2:100 M(10.10.10.2)                 Mesh         0       8682    Up    Up
sdp:3:100 M(10.10.10.3)                 Mesh         0       8682    Up    Up
sdp:4:100 M(10.10.10.4)                 Mesh         0       8682    Up    Up
sdp:5:100 S(10.10.10.5)                 Spok         0       8682    Up    Up
===============================================================================
```

The frame gets flooded to all SAPS and Mesh SDPs

Multiple choice

2. Which statement is correct regarding the definition of a P roter in an MPLS network providing VPN services?

```
a. P routers are service-aware
b. P routers are typically LERs
c. P routers perform label PUSH and POP operations
d. P routers perform label SWAP operations
```

Correct answer: d

6. A Nokia 7750 SR enabled with LDP has multiple equal cost paths to a given FEC. After ECMP is enabled on the router, which of the following statements will be FALSE?

```
a. Number of entries in teh LIB will increase
b. Number of entries in the FIB will increase
c. The router will have multiple LSP tunnels for the given FEC
d. The rotuer will generate a single label for the given FEC
```

Correct answer: a

8. What are the minimum two elements required to configure an RSVP TE LSP

```
a. A SAP and spoke-sdp or mesh-sip
b. A primary path and the address of the tail-end router
c. A primary and a secondary path
d. an IGP and adminstratively enabling RSVP
```

Correct answer: b

10. An MPLS router is signalled a label of 3 for a FEC by its downstream router. What does the router do when it receives a data packet for this FEC from an upstream router? Choose the best answer:

```
a. Performs a label SWAP and trasmits the data packet with a label of 3
b. PUSHes a label of 3 and transmits the data packet
c. silently discards the packet
d. Sends the packet to teh CPM for OAM operations
e. it POPs the outer label and forwards the data packet to the downstream router
```

Correct answer: e

11. Which of the following is an advantage of LDP over RSVP-TE as an MPLS label signalling protocol

```
a. LDP requires fewer router resources than RSVP-TE
b. LDP supports the signalling of LSPs that follow a path other than the one
provided by the IGP
c. LDP supports the signalling of one or more secondary LSP-Paths that can be used
as a backup if the primary goes down
d. LDP supports the use of constraint-based routing the calculate diverse paths
for its LSPs
```

Correct answer: a

12. When an operatre uses the *show router ldp bindings* command, which construct is viewed?

```
a. RIB
b. FIB
c. LIB
d. LFIB
```

Correct answer: c

14. Which of the following describes the purpose of ADSPEC in signalling an RSVP-TE LSP

```
a. ADSPEC allows the primary LSP-Path to follow a route other than the best IGP
route
b. ADSPEC causes the routers to record the MTU at each hop in order to calculate
the maximum path MTU of the LSP-Path
c. ADSPEC causes the head-end router to signal a secondary LSP-Path to be used as
a backup if the primary fails
d. ADSPEC allows the LSP to be advertised by the IGP routing protocol so that it
can be used for BGP shortcuts
```

Correct answer: b

16. Which of the following best describes a VPLS from the customer's perspective

```
a. The service provider network appears as a single MPLS switch between customer
locations
b. The service provider network appears as an Ethernet leased line between
customer locations
c. The service provider network appears as an Ethernet switch between customer
locations
d. The service provider network appears as an IP router between customer locations
```

Correct answer: c

17. Which of the following statements regarding MTUs for an epipe service is FALSE?

```
a. SAP MTUs must be greater than or equal to the service MTU
b. SDP path MTU must be greater than or equal to the service MTU
c. The SDP path MTU must be greater than or equal to the MTU of every network port
used by the epipe
d. Epipe services configured on the same PE can have different service MTUs
e. None of the above is false
```

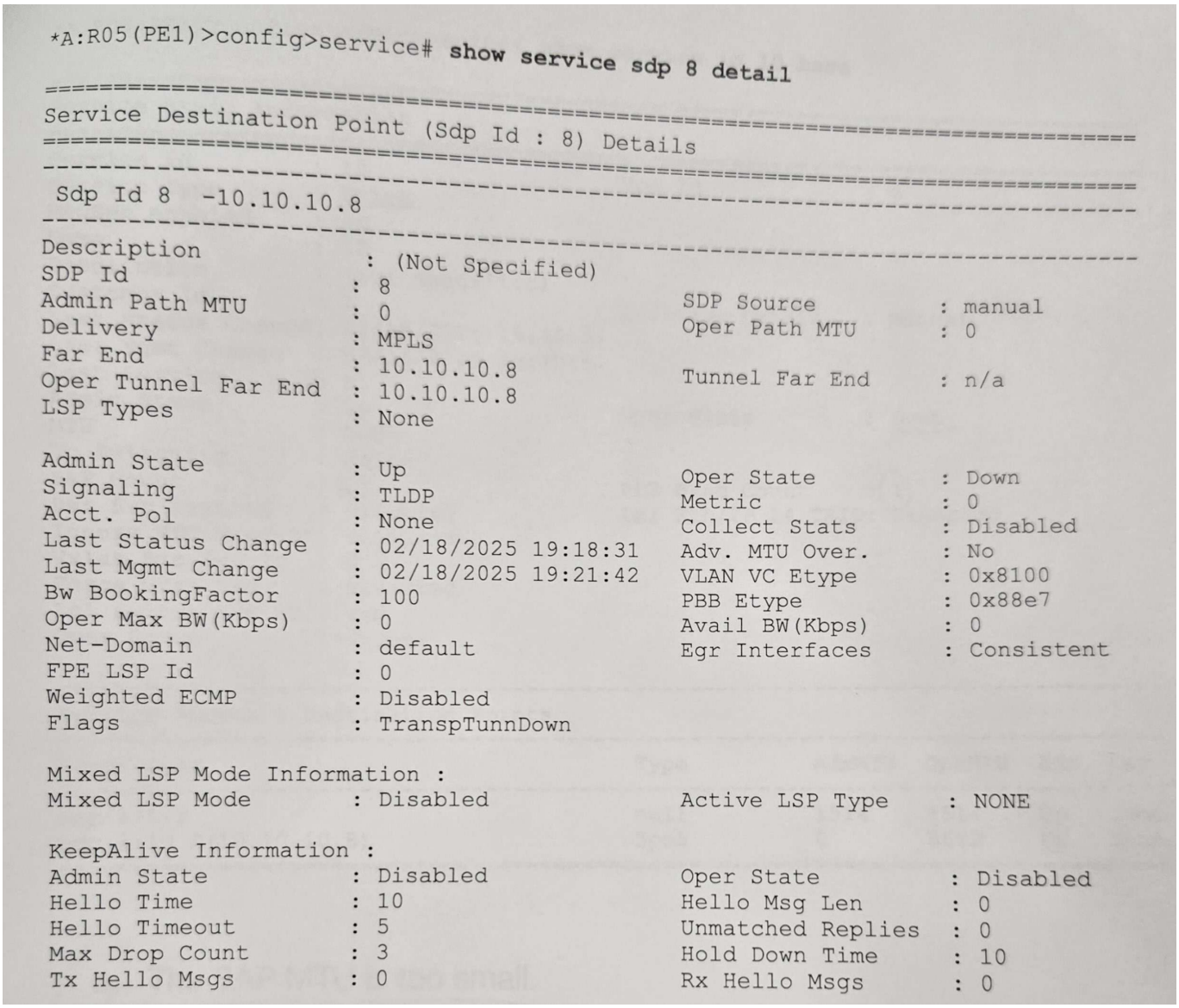
Correct answer: c

18. An epipe SAP on a PE router receives a frame carrying an IP packet from a CE router that is too large for the service. What action does the PE router take?

```
a. silently discards the frame
b. discards the frame and sends a notification to the CE router
c. fragments the frame as long as the do-not-fragment bit is not set
d. truncates the frame to fit the service MTU
```

Correct answer: a

19. SDP 8 on router R5 is down as shown below. Why?

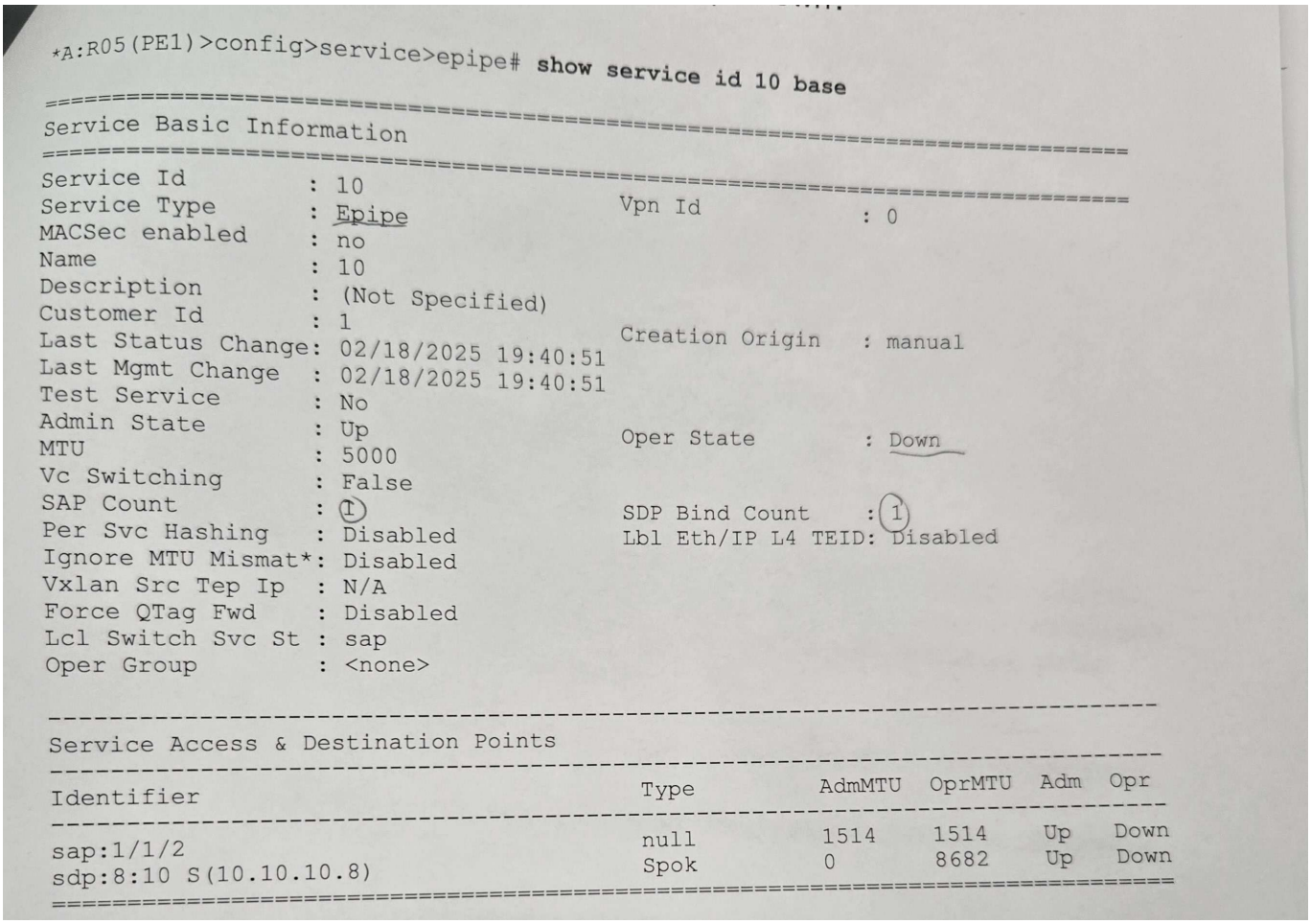


```
*A:R05(PE1)>config>service# show service sdp 8 detail

===============================================================================
Service Destination Point (Sdp Id : 8) Details
===============================================================================
-------------------------------------------------------------------------------
 Sdp Id 8  -10.10.10.8
-------------------------------------------------------------------------------
Description           : (Not Specified)
SDP Id                : 8
Admin Path MTU        : 0                    SDP Source          : manual
Delivery              : MPLS                 Oper Path MTU       : 0
Far End               : 10.10.10.8           Tunnel Far End      : n/a
Oper Tunnel Far End   : 10.10.10.8
LSP Types             : None

Admin State           : Up                   Oper State          : Down
Signaling             : TLDP                 Metric              : 0
Acct. Pol             : None                 Collect Stats       : Disabled
Last Status Change    : 02/18/2025 19:18:31  Adv. MTU Over.      : No
Last Mgmt Change      : 02/18/2025 19:21:42  VLAN VC Etype       : 0x8100
Bw BookingFactor      : 100                  PBB Etype           : 0x88e7
Oper Max BW(Kbps)     : 0                    Avail BW(Kbps)      : 0
Net-Domain            : default              Egr Interfaces      : Consistent
FPE LSP Id            : 0
Weighted ECMP         : Disabled
Flags                 : TranspTunnDown

Mixed LSP Mode Information :
Mixed LSP Mode        : Disabled             Active LSP Type     : NONE

KeepAlive Information :
Admin State           : Disabled             Oper State          : Disabled
Hello Time            : 10                   Hello Msg Len       : 0
Hello Timeout         : 5                    Unmatched Replies   : 0
Max Drop Count        : 3                    Hold Down Time      : 10
Tx Hello Msgs         : 0                    Rx Hello Msgs       : 0
```

a. An RSVP-TE LSP or LDP is not configured in the SDP
b. There is no SDP to this router configured on 10.10.10.8
c. There is no epipe to this router configured on 10.10.10.8
d. The epipe configured on 10.10.10.8 is using the wrong VC-ID

Correct answer: a

20. Consider the output below. Why is the epipe down?



```
*A:R05(PE1)>config>service>epipe# show service id 10 base
===============================================================================
Service Basic Information
===============================================================================
Service Id        : 10                    Vpn Id            : 0
Service Type      : Epipe
MACSec enabled    : no
Name              : 10
Description       : (Not Specified)
Customer Id       : 1                     Creation Origin   : manual
Last Status Change: 02/18/2025 19:40:51
Last Mgmt Change  : 02/18/2025 19:40:51
Test Service      : No
Admin State       : Up                    Oper State        : Down
MTU               : 5000
Vc Switching      : False
SAP Count         : 1                     SDP Bind Count    : 1
Per Svc Hashing   : Disabled              Lbl Eth/IP L4 TEID: Disabled
Ignore MTU Mismat*: Disabled
Vxlan Src Tep Ip  : N/A
Force QTag Fwd    : Disabled
Lcl Switch Svc St : sap
Oper Group        : <none>

-------------------------------------------------------------------------------
Service Access & Destination Points
-------------------------------------------------------------------------------
Identifier                                Type         AdmMTU  OprMTU  Adm   Opr
-------------------------------------------------------------------------------
sap:1/1/2                                 null         1514    1514    Up    Down
sdp:8:10 S(10.10.10.8)                    Spok         0       8682    Up    Down
===============================================================================
```

a. The SAP MTU is too small
b. The spoke-sdp MTU is too small
c. Port 1/1/2 is shutdown
d. The epipe is administratively shutdown on this router
e. The epipe is administratively shutdown on the far-end router

Correct answer: a