# 使用Wireshark排除OTV解决方案故障

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# 简介

本文档演示了Wireshark(一种众所周知的免费软件数据包捕获和分析工具)在排除Cisco OTV解决 方案故障时的使用。

## 先决条件

## 要求

Cisco 建议您了解以下主题:

- Nexus系列交换机上的重叠传输虚拟化(OTV)
- •多协议标签交换(MPLS)第2层虚拟专用网络(VPN)基础知识
- Wireshark,免费的开源数据包分析器(<u>https://www.wireshark.org</u>)

## 使用的组件

本文档中的信息基于 Nexus 7000 系列交换机平台。

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原 始(默认)配置。如果您使用的是真实网络,请确保您已经了解所有命令的潜在影响。

## 问题说明

在排除VPN环境中的网络故障时,其中一项技术涉及捕获和分析封装的数据包。但是,在Cisco OTV网络环境中,此方法遇到了一定挑战。常用的数据包分析工具,如Wireshark、 a 免费和开源 数据包分析器, 可能无法正确解释OTV封装流量的内容。因此,通常需要费时的解决方法,例如从 OTV数据包中提取封装的数据,才能成功执行数据分析。

## OTV数据包格式

OTV封装将数据包的总MTU大小增加42字节。这是OTV边缘设备操作的结果,该设备从原始第2层 帧中删除CRC和802.1Q字段,并添加OTV填充码(还包含VLAN和重叠ID信息)和外部IP报头。



在MPLS L2VPN解决方案中,底层网络中的设备没有足够的信息来正确解码MPLS数据包负载。通 常,这不是问题,因为MPLS核心网络中的数据包转发是基于标签执行的,因此不需要深入分析底 层网络中的MPLS数据包的内容。

但是,如果为了进行故障排除和/或监控目的而需要对OTV数据包进行数据分析,则这会带来挑战。

数据包分析工具(如Wireshark)尝试通过应用常规MPLS数据包解析规则来解码MPLS报头后面的 数据包数据。但是,由于它可能没有有关控制字协商结果的信息,因此数据包分析工具会回退到默 认解析行为并将其应用于MPLS报头之后的数据包数据。

**注意:**在MPLS L2VPN解决方案(如MPLS上的任何传输(ATOM))中,伪线端点协商使用控制 字参数。控制字是位于伪线数据包中MPLS标签堆栈和第2层负载之间的可选4字节字段。控制 字传送通用信息和第2层负载特定信息。如果C位设置为1,则通告提供商边缘(PE)期望控制字 存在于正在发出信号的伪线上的每个伪线数据包中。如果C位设置为0,则不会显示任何控制 字。

因此,默认的Wireshark解析行为可能无法正确解释OTV数据包的内容,从而使OTV网络的故障排 除过程更加复杂。

### 拓扑

以下是简单OTV网络的网络图。Vlan 100和Vlan 200中的路由器分别在两个数据中心(数据中心1和 数据中心2)之间建立OSPF和EIGRP邻接关系。数据中心互联(DCI)在N7k交换机之间通过OTV隧 道实现,如图所示为AED1和AED2。



**注**意:Cisco OTV解决方案使用授权边缘设备(AED)角色的概念,该角色分配给网络设备,用 于封装和解封特定站点的OTV流量。

隧道解决方案中经常遇到的挑战是验证特定类型的重叠数据包(IGP、FHRP等)是否使其到达底层 网络中的特定点。OSPF和EIGRP重叠流量就是一个示例。

### 数据包捕获

在网络中执行数据包捕获有多种方法。一个选项是使用思科交换端口分析器(SPAN)功能,该功能可在Cisco Catalyst和Cisco Nexus交换平台上使用。

在故障排除过程中,可能需要执行多个点的数据包捕获。底层网络中的OTV加入接口和接口可用作 SPAN数据包捕获点。

## 解决方案

Wireshark默认解析引擎可能会误解OTV封装的重叠数据包的前几个字节,就像它们是Pseudowire Emulation Edge-to-Edge(PWE3)Control Word的一部分一样,MPLS L2VPN通常在MPLS分组交换网 络中使用。

注意:MPLS伪线仿真边到边(PWE3)控制字在本文档的其余部分称为控制字。

为了确保Wireshark数据包分析工具正确解释OTV封装数据包的内容,需要手动调整数据包解码过程 。

注意:OTV报头中使用的MPLS标签等于重叠VLAN编号+ 32。

### 解码VLAN 100中的数据包

作为解码过程的第一步,只显示承载OTV扩展VLAN 100内容的OTV封装数据包。使用的过滤器是 mpls.label == 132,表示VLAN 100。

# **注意:**要显示通过OTV扩展的特定VLAN的OTV封装数据包,请使用以下Wireshark显示过滤器:mpls.label == <<vlan number extended over OTV> + 32>

<u>File E</u> d	dit <u>V</u> iew <u>G</u> o <u>C</u> apture <u>A</u>	nalyze <u>S</u> tatistics Telepho	n <u>y W</u> ireless <u>T</u> ools <u>H</u> elp	0								
	( 🔲 🖉 🕲 📙 🛅 🗙 🖾   9, 👳 🕾 🗑 🕭 🚍 🔳 9, 9, 9, 9, 19											
mpis.l	mpls.label == 132											
vo.	Time Vlan	Source	Destination	Protocol	Length Info							
	1 0.00000	3e:43:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP ISO Network Layer (unofficial?) Group, SSAP IBM Net Management Command							
	2 2.229052	3e:46:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP 0x4c Individual, SSAP 0xca Response							
	3 7.837599	3e:43:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP ISO Network Layer (unofficial?) Group, SSAP HP Extended LLC Command							
	4 12.230180	3e:46:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP 0x4c Individual, SSAP 0xce Response							
	5 17.737592	3e:43:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP ISO Network Layer (unofficial?) Group, SSAP Remote Program Load Command							
	6 21.739701	3e:46:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP 0x4c Individual, SSAP 0xd2 Response							
	7 25.657623	2e:43:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP 0x36 Individual, SSAP NULL LSAP Command							
	8 29.259663	3e.46:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP 0x4c Individual, SSAP 0xd6 Response							
	9 35.077480	3e:43:08:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP 0x36 Individual, SSAP SNA Path Control Command							
	10 36.899616	3e:46:00:00:45:c0	VcommsCo_87:89:40	LLC	124 I, N(R)=0, N(S)=0; DSAP 0x4c Individual, SSAP 0xda Response							
	11 45 040020	20.12.02.02.12.15.00	VcommeCo 87.89.49		171 N/D)-Q N/S)-Q. DSAD QUE TOdividual SSAD GARMAN							
> Ethe > Inte > Gene > Mult 0 PW E S V IEEE	<pre>&gt; Ethernet II, Src: Cisco_40:3e:43 (50:7:80:41:3e:43), Dst: Cisco_40:3e:42 (50:87:80:40:3e:42) &gt; Internet Protocol Version 4, Src: 172.16.0.144 Vit: 172.16.0.45 &gt; Generic Routing Encapsulation (0x8848 - unknown) &gt; MultiProtocol Label Switching Header, Label: 132 unknown &gt; MultiProtocol Label Switching Header, 132 unknown &gt; MultiProtocol Label Swi</pre>											
> D > S > L	<pre>&gt; Destination: VcommsCo_87:89:40 (00:05:50:87:89:40) &gt; Source: 3e:43:08:00:45:c0 (3e:43:08:00:45:c0) &gt; Length: 68</pre>											
> D > S > C Y Data	Logica:Link Control > DSAP: Unknown (0x35) > SSAP: IBM Net Management (0xf4) > Control field: I, N(R)=0, N(S)=0 (0x0000) Data (60 bytes)											
D [	Data: 01593ea764000001e00000050201003064000001000000000 [Length: 60]											

显示OTV封装的Vlan 100数据包,通过OTV扩展

默认情况下,Wireshark将MPLS L2VPN数据包内容的前四个字节解释为控制字。这需要对OTV封装的数据包进行纠正。为此,请右键单击任何数据包的MPLS标签字段,然后选择"解码为......"(*Decode As...*)选项.

> Frame 1: 124 bytes on wire (992 bits), 124 bytes captured (992 bits)											
Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: Cisco_40:3e:42 (50:87:89:40:3e:42)											
Internet Protocol Version 4, Src: 172.16.0.14, Dst: 172.16.0.45											
Generic Routing Encapsulation (0x8848 - unknown)											
MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254											
0000 0000 0000 1000 0100 = MPLS Label: 132	0000 0000 1000 0100 = MPLS Label: 132										
= MPLS Experimental Bits	Expand Subtrees	Shift+Right									
= MPLS Bottom Of Label S	Expand All	Ctrl+Right									
1111 1110 = MPLS TTL: 254	Collanse All	Ctrl+Left									
✓ PW Ethernet Control Word	Collapse All	Cuiften									
Sequence Number: 24064	Apply as Column										
✓ IEEE 802.3 Ethernet	112										
<pre>&gt; Destination: VcommsCo_87:89:40 (00:05:50:87:89:40)</pre>	Apply as Filter	· · · ·									
<pre>&gt; Source: 3e:43:08:00:45:c0 (3e:43:08:00:45:c0)</pre>	Prepare a Filter	• • •									
> Length: 68	Conversion Filter										
✓ Logical-Link Control	Conversation Filter	,									
> DSAP: Unknown (0x35)	Colorize with Filter	•									
> SSAP: IBM Net Management (0xf4)	Follow	· · ·									
<pre>&gt; Control field: I, N(R)=0, N(S)=0 (0x0000)</pre>											
✓ Data (60 bytes)	Сору	•									
Data: 01593ea764000001e0000005020100306400000100000000	Show Packet Bytes										
[Length: 60]	Export Packet Bytes	Ctrl+H									
	Export rucket bytesin										
	Wiki Protocol Page										
	Filter Field Reference										
	Desta and Desferre and										
	Protocol Preferences										
	Decode As										
	Go to Linked Packet										
	Show Linked Packet in New Window										

右键点击MPLS标签字段,然后选择解码为……选项

## 下一步是告诉Wireshark,封装的内容没有控制字。

🚄 Wireshark · Decode As					?	×						
Field	Value	Туре	Default	Current								
MPLS protocol 👻	132 ~	Integer, base 10	(none)	(none)		-						
				(none)		^						
				CESOPSIN Basic (no RTP)								
			- C	Ethernet PW (no CW)								
				Element PW (with CW)		- 1						
				Generic PW (with CW)								
				HDLC PW with PPP payload (no CW)								
				HDLC PW, FR port mode (no CW)		~						
+ – Pa												
				OK Save Cancel	Help							

选择"无CW"选项

## 通过单击"确定"按钮提交此更改后,Wireshark分析工具将正确显示OTV封装数据包的内容。

Image: Internet Protocol       Version	<u>F</u> ile <u>E</u>	dit <u>V</u> iew <u>G</u> o	<u>C</u> apture <u>A</u> n	alyze <u>S</u> tatistics	Telephon <u>y W</u> ireless <u>T</u> ools	<u>H</u> elp						
Impls.label == 132         No.       Time       Vian       Source       Destination       Protocol       Length       Info         1       0.000000       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         2       2.229652       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         3       7.837599       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         4       12.230180       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         5       17.737592       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         6       21.739701       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         8       29.259663       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         9       35.077480       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         9       35.077480       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         9       35.077480       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         9       35.077480       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet <td></td> <td>🖉 💿 📘 🛅</td> <td>🗙 🖾 🔍</td> <td>🗢 🔿 🗟 🖗</td> <td>🌡 📃 🗏 Q, Q, 🌉</td> <td></td> <td></td>		🖉 💿 📘 🛅	🗙 🖾 🔍	🗢 🔿 🗟 🖗	🌡 📃 🗏 Q, Q, 🌉							
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5       17.737592       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         6       21.739701       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         7       25.657623       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         8       29.259663       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         9       35.077480       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         9       35.077480       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         10       36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11       45.640920       104.9.4.1       224.0.0.5       OSPF       124 Hello Packet         11.45       64.04.2       224.0.0.5       OSPF       124 Hello Packet         11.45       64.04.2       224.0.0.5       OSPF       124 Hello Packet         20       14.64.04.02       104.4.1       224.0.0.5       OSPF       124 Hello Packet         11.45       64.04.2       224.0.0.5       OSPF       124 Hello Packet         20       Frame 1:       124.94.05       OSPF       124 Hello Packet <t< td=""><td></td><td>4 12.230</td><td>180</td><td>100.0.0.2</td><td>224.0.0.5</td><td>OSPF</td><td>124 Hello Packet</td></t<>		4 12.230	180	100.0.0.2	224.0.0.5	OSPF	124 Hello Packet					
6 21.739701       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         7 25.657623       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         8 29.259663       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         9 35.077480       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         10 36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         10 36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 45_040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 45_040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         12 4 Hello Packet       103.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         10 36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet       124 Hello Packet         14 5_040020       100.0.2       224.0.0.5       OSPF       124 Hello Packet         14 5_040020       100.0.2       224.0.0.5       OSPF       124 Hello Packet         14 5_040020       100.8.12       127.16.0.14, Dst: 172.16.0.45       124 Hello Packet         110 trenere protocol Label		5 17.737	7592	100.0.0.1	224.0.0.5	OSPF	124 Hello Packet					
7 25.657623       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         8 29.259663       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         9 35.077480       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         10 36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         10 36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 45 040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 45 040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         124 Hello Packet       103.6.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         14 4 Hello Packet       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         124 Hello Packet       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         124 Hello Packet       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         124 Hello Packet       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         114 Hello Packet       114 Hello Packet       124.0.0.5       124 Hello Packet       124 Hello Packet         1111 Holl		6 21.739	701	100.0.0.2	224.0.0.5	OSPF	124 Hello Packet					
8 29.259663       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         9 35.077480       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         10 36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 A5 040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 A5 040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 A5 040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 A5 040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 A5 040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         204 A 0.5       OSPF       124 Hello Packet       124 Hello Packet         11 A5 040020       100.0.2       224.0.0.5       OSPF       124 Hello Packet         204 A 0.5       OSPF       124 Hello Packet       124 Hello Packet         21 Hernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: Cisco_40:3e:42 (50:87:89:40:3e:42)       Internet Protocol Label Switching Header, Label: 132          21 Hernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: IPV4mcast_05 (01:00:5e:00:00:05)       Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5         224		7 25.657	623	100.0.0.1	224.0.0.5	OSPF	124 Hello Packet					
9 35.077480       100.0.0.1       224.0.0.5       OSPF       124 Hello Packet         10 36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 45 040020       100.0.0.2       224.0.0.5       OSDF       124 Hello Packet         11 45 040020       100.0.0.2       224.0.0.5       OSDF       124 Hello Packet         11 45 040020       100.0.0.2       224.0.0.5       OSDF       124 Hello Packet         11 45 040020       100.0.0.2       224.0.0.5       OSDF       124 Hello Packet         11 45 040020       100.0.0.2       224.0.0.5       OSDF       124 Hello Packet         11 45 040020       100.0.0.1       224.0.0.5       OSDF       124 Hello Packet         11 45 040020       100.0.0.1       224.0.0.5       OSDF       124 Hello Packet         11 45 040020       100.0.130       124 bytes captured (992 bits)       124 Hello Packet         11 ternet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: Cisco_40:3e:42 (50:87:89:40:3e:42)       1111 110 = MPLS TTI: 254         0000 0000 0000 1000 0100       1111 1110 = MPLS TTI: 254       1111 1110 = MPLS TTI: 254         Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: IPv4mcast_05 (01:00:5e:00:00:05)       1111 1110 = MPLS TTI: 254         Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:		8 29.259	663	100.0.0.2	224.0.0.5	OSPF	124 Hello Packet					
10 36.899616       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         11 45 040020       100.0.0.2       224.0.0.5       OSPF       124 Hello Packet         > Frame 1: 124 bytes on wire (992 bits), 124 bytes captured (992 bits)       05DE       124 Hello Packet         > Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: Cisco_40:3e:42 (50:87:89:40:3e:42)       10000 0000 Version 4, Src: 172.16.0.14, Dst: 172.16.0.45         > Generic Routing Encapsulation (0x8848 - unknown)       *       *         * MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254       0000 0000 1000 0100 = MPLS Label: 132         • MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254       1111 1110 = MPLS Experimental Bits: 6         • • • • • • • • • • • • • • • • • • •		9 35.077	480	100.0.0.1	224.0.0.5	OSPF	124 Hello Packet					
11 45 040020       100 0 0 1       224 0 0 5       000E       124 Hello Parket         > Frame 1: 124 bytes on wire (992 bits), 124 bytes captured (992 bits)       124 Hello Parket         > Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: Cisco_40:3e:42 (50:87:89:40:3e:42)         > Internet Protocol Version 4, Src: 172.16.0.14, Dst: 172.16.0.45         > Generic Routing Encapsulation (0x8848 - unknown)         * MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254         0000 0000 0000 1000 0100 = MPLS Label: 132		10 36.899	616	100.0.0.2	224.0.0.5	OSPF	124 Hello Packet					
<pre>&gt; Frame 1: 124 bytes on wire (992 bits), 124 bytes captured (992 bits) &gt; Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: Cisco_40:3e:42 (50:87:89:40:3e:42) &gt; Internet Protocol Version 4, Src: 172.16.0.14, Dst: 172.16.0.45 &gt; Generic Routing Encapsulation (0x8848 - unknown) &gt; MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254</pre>		11 / 5 0/0	020	100 0 0 1	224 0 0 5	OSDE	124 Hello Dacket					
<pre>&gt; Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: Cisco_40:3e:42 (50:87:89:40:3e:42) &gt; Internet Protocol Version 4, Src: 172.16.0.14, Dst: 172.16.0.45 &gt; Generic Routing Encapsulation (0x8848 - unknown) * MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254</pre>	> Fnar	me 1: 124 bytes	s on wire (	992 bits), 124	bytes captured (992 bits)							
<pre>&gt; Internet Protocol Version 4, Src: 172.16.0.14, Dst: 172.16.0.45 &gt; Generic Routing Encapsulation (0x8848 - unknown) &gt; MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254</pre>	> Ethe	ernet II, Src:	Cisco_40:3	e:43 (50:87:89	:40:3e:43), Dst: Cisco_40:	3e:42 (50:87:89:	40:3e:42)					
<pre>&gt; Generic Routing Encapsulation (0x8848 - unknown) &gt; MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254 0000 0000 0000 1000 0100 = MPLS Label: 132  110 = MPLS Experimental Bits: 6  110 = MPLS Bottom Of Label Stack: 1  1111 1110 = MPLS TTL: 254 &gt; Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: IPv4mcast_05 (01:00:5e:00:00:05) &gt; Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5 &gt; Open Shortest Path First</pre>	> Inte	ernet Protocol	Version 4,	Src: 172.16.0	.14, Dst: 172.16.0.45							
<pre>     MultiProtocol Label Switching Header, Label: 132, Exp: 6, S: 1, TTL: 254     0000 0000 0000 1000 0100 = MPLS Label: 132     110 = MPLS Experimental Bits: 6     1111 1110 = MPLS Bottom Of Label Stack: 1     1111 1110 = MPLS TTL: 254     Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: IPv4mcast_05 (01:00:5e:00:00:05)     Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5     Open Shortest Path First  </pre>	> Gene	eric Routing Er	ncapsulatio	n (0x8848 - un	known)							
<pre>0000 0000 0000 1000 0100 = MPLS Label: 132  110 = MPLS Experimental Bits: 6  110 = MPLS Bottom Of Label Stack: 1  1111 1110 = MPLS TTI: 254 Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: IPv4mcast_05 (01:00:5e:00:00:05) Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5 Open Shortest Path First</pre>	✓ Mult	tiProtocol Labe	el Switchin	g Header, Labe	l: 132, Exp: 6, S: 1, TTL:	254						
<pre> 110 = MPLS Experimental Bits: 6 110 = MPLS Bottom Of Label Stack: 1 1111 1110 = MPIS TTI: 254 &gt; Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: IPv4mcast_05 (01:00:5e:00:00:05) &gt; Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5 &gt; Open Shortest Path First &gt; Comparison of the second seco</pre>	6	0000 0000 0000	1000 0100		= MPLS Label: 132							
<pre> = MPLS Bottom Of Label Stack: 1</pre>	· ·	110 = MPLS Experimental Bits: 6										
<pre>&gt; Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: IPv4mcast_05 (01:00:5e:00:00:05) &gt; Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5 </pre> Open Shortest Path First	· ·											
<pre>Ethernet II, Src: Cisco_40:3e:43 (50:87:89:40:3e:43), Dst: IPv4mcast_05 (01:00:5e:00:00:05) Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5 Open Shortest Path First </pre>		1111 1110 = MPIS TTI: 254										
<pre>&gt; Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5 &gt; Open Shortest Path First &gt; open Shortest Path First</pre>	Ethe	ernet II, Src:	Cisco_40:3	e:43 (50:87:89	:40:3e:43), Dst: IPv4mcast	_05 (01:00:5e:00	:00:05)					
Open Shortest Path First	Inte	Internet Protocol Version 4, Src: 100.0.0.1, Dst: 224.0.0.5										
	Open Shortest Path First											
> OSPF Header	> 0	OSPF Header										
> OSPF Hello Packet	> (	OSPF Hello Pack	ket									

## 解码VLAN 200中的数据包

以上步骤适用于通过OTV扩展的任何vlan。例如,使用Wireshark过滤器仅显示vlan 200的数据包 ,我们在分析工具中得到以下输出。

File	File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help										
	🛋 📃 🖉 🔍 🤚 🖾 🗙 🖆 I 9. 🗇 🕾 🕾 🖗 🚽 🚍 📃 9. 9. 9. 9. 19.										
	mpls.label == 232										
No.	Time Vlan	Source	Destination	Protocol	Length Info						
	1 0.000000	3e:46:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3e	Group, SSAP Øxae C	ommand			
	2 2.346992	3e:43:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3c	Group, SSAP 0x70 C	ommand			
	3 4.603176	3e:46:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3e	Group, SSAP Øxae R	lesponse			
	4 6.981213	3e:43:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3c	Group, SSAP 0x70 R	lesponse			
	5 9.373389	3e:46:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3e	Group, SSAP 0xb0 C	ommand			
	6 11.330387	3e:43:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3c	Group, SSAP 0x72 C	ommand			
	7 13.715773	3e:46:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3e	Group, SSAP 0xb0 R	lesponse			
	8 16.102792	3e:43:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3c	Group, SSAP 0x72 R	lesponse			
	9 18.185963	3e:46:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3e	Group, SSAP 0xb2 C	Command			
	10 20.554788	3e:43:08:00:45:c0	Remotek_87:89:40	LLC	116 I, N(R)=0	, N(S)=0; DSAP 0x3c	Group, SSAP 0x74 C	Command			
	11 23 051203	30.16.08.00.15.00	Demotek 87.80.10	117	116 T N/P)-0	N/S)-A. DSAD AVRA	Group SSAD Avh? D	lecnonce			
> F > E > I > G ~ M	rame 1: 116 bytes on wire ( thernet II, Src: Cisco_40:3 internet Protocol Version 4, ieneric Routing Encapsulatio ultiProtocol Label Switchin 0000 0000 0000 1110 1000	928 bits), 116 bytes c e:46 (50:87:89:40:3e:4 Src: 172.16.0.45, Dst n (0x8848 - unknown) g Header, Label: 32, 	aptured (928 bits) 6), Dst: Cisco_40:3e:4 :: 172.16.0.14 Exp. 0, C: 1, TTL: 254 Label: 232	2 (50:87:89:40:	3e:42)						
	•••••	110 = HPLC	Exponential Bits: 6	1							
	••••• •••• •••• ••••	= MPLS	BOTTOM UT LADEL STACK:	1							
~ .	U Stheast Castal Used	IIII III0 = MPLS	1111: 254								
* P	Sequence Numbers 24064										
~ 1	Sequence Number: 24064										
- T -	Destination: Demotek 97.9	0.40 (00.05.50.97.90.4	(A)								
	Source: 3e:46:08:00:45:c0	(20.46.08.00.45.00)									
	Longth: 60	(32.40.08.00.43.00)									
v i	ogical-Link Control										
	DSAR: Unknown (0x3f)										
	> SSAP: Unknown (WS3T)										
~ 0	ata (52 hytes)	(())=0 (0x0000)									
-	Data: 0158d0efc8000002e00	0000-02055208000000000	0000000								
	[83-]										
显	显示OTV上扩展的VLAN 200的数据包										

一旦Wireshark被指示不将MPLS数据包的前几个字节解释为PW控制字,解码过程就可以成功完成

o

File	Edit	View	Go	Capture	Analyze	Statistics	Telephony	Wireless	Tools	Help				
		•	010	🗙 🖸	۹ 🗢 🖻	2 👔	& ☴ ☰	⊕,⊝,⊜	2 🏛					
mpls.label == 232														
No.	~	т	ïme	V	an Source	2	De	estination		1	Protocol	ſ	Length	Info
		10	.0000	900	200.	0.0.2	2	24.0.0.10	9		EIGRP		116	Hello
2 2.346992				200.	0.0.1	23	24.0.0.10	3		EIGRP		116	Hello	
		34	.6031	.76	200.	0.0.2	2	24.0.0.10	9		EIGRP		116	Hello
		46	.9812	213	200.	0.0.1	23	24.0.0.10	3		EIGRP		116	Hello
		59	.3733	389	200.	0.0.2	2	24.0.0.10	3		EIGRP		116	Hello
		61	1.330	387	200.	0.0.1	2	24.0.0.10	9		EIGRP		116	Hello
		71	3.715	5773	200.	0.0.2	23	24.0.0.10	3		EIGRP		116	Hello
		81	6.102	2792	200.	0.0.1	23	24.0.0.10	3		EIGRP		116	Hello
9 18.185963					200.	0.0.2	23	24.0.0.10	3		EIGRP		116	Hello
		10 2	0.554	788	200.	0.0.1	23	24.0.0.10	3		EIGRP		116	Hello
		11.2	3 051	203	200	993	2'	<u>04 0 0 10</u>	2		ETGDD		116	Hello
>	Frame 1	: 116	byte:	s on wir	re (928 bi	ts), 116	5 bytes capt	ured (92	8 bits)	)				
>	Etherne	t II,	Src:	Cisco_4	40:3e:46 (	50:87:89	0:40:3e:46),	Dst: Ci	sco_40:	:3e:42	(50:87:	:89:40:3e	:42)	
>	Interne	t Prot	tocol	Version	14, Src:	172.16.0	0.45, Dst: 1	72.16.0.	14					
>	Generic	Rout	ing E	ncapsula	ntion (0x8	848 - un	nknown)							
×	MultiPr	otoco	l Labe	el Switc	hing Head	er, Labe	el: 232, Exp	: 6, S:	1, TTL:	: 254				
	0000 0000 0000 1110 1000 = MPLS Label: 232													
	110 = MPLS Experimental Bits: 6													
-					1	111 1110	) = MPLS TTL	: 254						
2	Etherne	t II,	Src:	Cisco_4	0:3e:46 (	50:87:89	0:40:3e:46),	Dst: IP	v4mcast	t_0a (0	1:00:50	::00:00:0	a)	
2	Interne	t Prot	tocol	Version	14, Src:	200.0.0.	.2, Dst: 224	.0.0.10						
>	Cisco E	IGRP												

WIreshark将VIan 200流量正确显示为EIGRP数据包

## 使用Editcap删除OTV报头

通常,Wireshark安装附带一个名为Editcap的命令行数据包编辑*工具*。此工具可永久消除捕获数据 包的OTV开销。这样,在Wireshark图形用户界面(GUI)中可以轻松显示和分析捕获的数据包,而无 需手动调整Wireshark的解析行为。

### 在Windows平台上运行Editcap

在Windows操作系统上,editcap.exe默认安装在c:\Program Files\Wireshark>目录中。

使用—C标志运行此工具以删除OTV开销并将结果保存到.pcap文件。

c:\Users\cisco\Desktop> "c:\Program Files\Wireshark\editcap.exe" -C 42 otv-underlay-capture.pcap otv-underlay-capture-no-header.pcap

c:\Users\cisco\Desktop>

#### 在Mac OS平台上运行Editcap

在Mac OS操作系统上,editcap位于/usr/local/bin文件夹中。

通过从捕获的数据包中删除OTV报头,编辑工具,丢失作为MPLS报头一部分编码的VLAN信息,而 MPLS报头又是OTV填充码的一部分。如果仅需要分析特定Vlan的流量,请记住在使用*Editcap*工具 删除OTV报头之前,使用"mpls.label == <<vlan number extended over OTV> + 32>" Wireshark GUI过滤器。

# 结论

对Cisco OTV解决方案进行故障排除需要从控制平面操作和数据平面封装角度充分了解该技术。 Wireshark等免费软件数据包分析工具可以有效地应用知识,在OTV数据包分析中证明非常强大。除 了各种数据包显示选项外,典型的Wireshark安装还提供了数据包编辑工具,可简化数据包分析。这 样,故障排除就可以专注于与特定故障排除会话最相关的数据包内容部分。