

Trunk – порты SW1 – SW2:

```
interface range GigabitEthernet0/0 – 3
switchport trunk encapsulation dot1q
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
interface range GigabitEthernet1/0 – 3
switchport trunk encapsulation dot1q
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
```

Trunk – порты SW3 – SW5:

```
interface range GigabitEthernet0/0 – 3
switchport trunk encapsulation dot1q
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
```

Access – порты SW3 – SW5:

```
interface GigabitEthernet1/0
switchport mode access
switchport access vlan 20
interface GigabitEthernet1/1
switchport mode access
switchport access vlan 333
```

ip-адреса pc1-pc6 соответственно 192.168.1.1 – 192.168.1.6

```
PC1 - PuTTY
PC1> ping 192.168.1.2

host (192.168.1.2) not reachable

PC1> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=11.541 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=5.718 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=10.279 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=3.844 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=7.720 ms

PC1> ping 192.168.1.4

host (192.168.1.4) not reachable

PC1> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=5.551 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=8.007 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=9.057 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=8.527 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=5.802 ms

PC1> ping 192.168.1.6

host (192.168.1.6) not reachable

PC1> 
```

Рисунок 1 – проверка подключения между ПК

Захват с Standard input [PC1 Ethernet0 to Layer2Switch-3 Ethernet4]						
Примените фильтр отображения... <Ctrl-/>						
No.	Time	Source	Destination	Protocol	Length	Info
136	202.090279	0c:3d:a3:d9:00:04	Nearest-Customer-Br...	STP	60	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 4 Port = 0x8005
137	204.197153	0c:3d:a3:d9:00:04	Nearest-Customer-Br...	STP	60	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 4 Port = 0x8005
138	205.247097	Private_66:68:00	Broadcast	ARP	64	Who has 192.168.1.5? Tell 192.168.1.1
139	205.254297	Private_66:68:04	Private_66:68:00	ARP	64	192.168.1.5 is at 00:50:79:66:68:04
→ 140	205.254529	192.168.1.1	192.168.1.5	ICMP	98	Echo (ping) request id=0x429b, seq=1/256, ttl=64 (reply in 141)
← 141	205.262358	192.168.1.5	192.168.1.1	ICMP	98	Echo (ping) reply id=0x429b, seq=1/256, ttl=64 (request in 140)
142	205.739801	0c:3d:a3:d9:00:04	0c:3d:a3:d9:00:04	LOOP	60	Reply
143	206.263459	192.168.1.1	192.168.1.5	ICMP	98	Echo (ping) request id=0x439b, seq=2/512, ttl=64 (reply in 144)
144	206.276174	192.168.1.5	192.168.1.1	ICMP	98	Echo (ping) reply id=0x439b, seq=2/512, ttl=64 (request in 143)
145	206.289235	0c:3d:a3:d9:00:04	Nearest-Customer-Br...	STP	60	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 4 Port = 0x8005
146	207.276363	192.168.1.1	192.168.1.5	ICMP	98	Echo (ping) request id=0x449b, seq=3/768, ttl=64 (reply in 147)
147	207.284030	192.168.1.5	192.168.1.1	ICMP	98	Echo (ping) reply id=0x449b, seq=3/768, ttl=64 (request in 146)
148	208.284857	192.168.1.1	192.168.1.5	ICMP	98	Echo (ping) request id=0x459b, seq=4/1024, ttl=64 (reply in 149)
149	208.300404	192.168.1.5	192.168.1.1	ICMP	98	Echo (ping) reply id=0x459b, seq=4/1024, ttl=64 (request in 148)
150	208.365247	0c:3d:a3:d9:00:04	Nearest-Customer-Br...	STP	60	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 4 Port = 0x8005
151	200.300703	102.168.1.1	102.168.1.5	TCP	60	Echo (ping) request id=0x460b, seq=5/1280, ttl=64 (reply in 152)
Frame 140: Packet, 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0						
Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: Private_66:68:04 (00:50:79:66:68:04)						
Destination: Private_66:68:04 (00:50:79:66:68:04)						
Source: Private_66:68:00 (00:50:79:66:68:00)						
Type: IPv4 (0x0800)						
[Stream index: 4]						
Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.5						
Internet Control Message Protocol						
0000	00 50 79 66 68 04 00 50	79 66 68 00 08 00 45 00	Pyfh...P yfh...E:			
0010	00 54 9b 42 00 00 40 01	5c 10 c0 a8 01 01 c0 a8	.T.B...@: \.....			
0020	01 05 00 00 dd 6f 42 9b	00 01 08 09 0a 0b 0c 0d	...oB.....			
0030	0e 0f 10 11 12 13 14 15	16 17 18 19 1a 1b 1c 1d			
0040	1e 1f 20 21 22 23 24 25	26 27 28 29 2a 2b 2c 2d	..! "%&'()*+,-			
0050	2e 2f 30 31 32 33 34 35	36 37 38 39 3a 3b 3c 3d	./012345 6789;,<=			
0060	3e 3f		>?			

Рисунок 2 – нетегированный icmp-пакет между PC1 и SW3

Захват с Standard input [Layer2Switch-1 Ethernet2 to Layer2Switch-3 Ethernet0]

ФайлПравкаВидЗапускЗахватАнализСтатистикаТелефонияБеспроводная связьИнструментыСправка

vlan.id == 20

No.	Time	Source	Destination	Protocol	Length	Info
300	227.075531	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003
303	229.149194	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003
305	231.237310	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003
307	233.309593	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003
→ 308	235.246847	192.168.1.1	192.168.1.5	ICMP	102	Echo (ping) request id=0x689b, seq=1/256, ttl=64 (reply in 309)
← 309	235.250838	192.168.1.5	192.168.1.1	ICMP	102	Echo (ping) reply id=0x689b, seq=1/256, ttl=64 (request in 308)
311	235.387333	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003
312	236.252263	192.168.1.1	192.168.1.5	ICMP	102	Echo (ping) request id=0x699b, seq=2/512, ttl=64 (reply in 313)
313	236.268304	192.168.1.5	192.168.1.1	ICMP	102	Echo (ping) reply id=0x699b, seq=2/512, ttl=64 (request in 312)
316	237.270272	192.168.1.1	192.168.1.5	ICMP	102	Echo (ping) request id=0x6a9b, seq=3/768, ttl=64 (reply in 317)
317	237.281169	192.168.1.5	192.168.1.1	ICMP	102	Echo (ping) reply id=0x6a9b, seq=3/768, ttl=64 (request in 316)
320	237.497821	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003
321	238.283105	192.168.1.1	192.168.1.5	ICMP	102	Echo (ping) request id=0x6b9b, seq=4/1024, ttl=64 (reply in 322)
322	238.289369	192.168.1.5	192.168.1.1	ICMP	102	Echo (ping) reply id=0x6b9b, seq=4/1024, ttl=64 (request in 321)
323	239.291444	192.168.1.1	192.168.1.5	ICMP	102	Echo (ping) request id=0x6c9b, seq=5/1280, ttl=64 (reply in 324)
324	239.307308	192.168.1.5	192.168.1.1	ICMP	102	Echo (ping) reply id=0x6c9b, seq=5/1280, ttl=64 (request in 323)

> Frame 308: Packet, 102 bytes on wire (816 bits), 102 bytes captured (816 bits) on 0

> Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: Private_66:68:04

> Destination: Private_66:68:04 (00:50:79:66:68:04)

> Source: Private_66:68:00 (00:50:79:66:68:00)

Type: 802.1Q Virtual LAN (0x8100)

[Stream index: 6]

> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 20

0000 = Priority: Best Effort (default) (0)

...0 = DEI: Ineligible

.... 0000 0001 0100 = ID: 20

Type: IPv4 (0x0800)

> Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.5

> Internet Control Message Protocol

0000 00 50 79 66 68 04 00 50 79 66 68 00 81 00 00 14 ..Pyfh..P yfh...

0010 00 08 45 00 00 54 9b 68 00 00 40 01 5b ea c0 a8 ..E...T.h...@:[...

0020 01 01 c0 a8 01 05 08 00 b7 6f 68 9b 00 01 08 09oh.....

0030 0a 0b 0c 0d 0e 0f 10 11 12 13 14 15 16 17 18 19

0040 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25 26 27 28 29 ! "\$%&'()

0050 2a 2b 2c 2d 2e 2f 30 31 32 33 34 35 36 37 38 39 *+,-./01 23456789

0060 3a 3b 3c 3d 3e 3f ;:<=>?

Рисунок 3 – тегированный icmp-пакет во vlan 20

Захват с Standard input [Layer2Switch-3 Ethernet5 to PC2 Ethernet0]

ФайлПравкаВидЗапускЗахватАнализСтатистикаТелефонияБеспроводная связьИнструментыСправка

Примените фильтр отображения ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
427	568.767626	0c:3d:a3:d9:00:05	Nearest-Customer-Br...	STP	60	Conf. Root = 4096/333/0c:75:67:09:00:00 Cost = 4 Port = 0x8006
428	570.851684	0c:3d:a3:d9:00:05	Nearest-Customer-Br...	STP	60	Conf. Root = 4096/333/0c:75:67:09:00:00 Cost = 4 Port = 0x8006
429	572.978383	0c:3d:a3:d9:00:05	Nearest-Customer-Br...	STP	60	Conf. Root = 4096/333/0c:75:67:09:00:00 Cost = 4 Port = 0x8006
430	573.477963	Private_66:68:01	Broadcast	ARP	64	Who has 192.168.1.4? Tell 192.168.1.2
431	573.483806	Private_66:68:03	Private_66:68:01	ARP	64	192.168.1.4 is at 00:50:79:66:68:03
→ 432	573.484221	192.168.1.2	192.168.1.4	ICMP	98	Echo (ping) request id=0xbfc9, seq=1/256, ttl=64 (reply in 433)
← 433	573.493374	192.168.1.4	192.168.1.2	ICMP	98	Echo (ping) reply id=0xbfc9, seq=1/256, ttl=64 (request in 432)
434	573.886842	0c:3d:a3:d9:00:05	0c:3d:a3:d9:00:05	LOOP	60	Reply
435	574.493869	192.168.1.2	192.168.1.4	ICMP	98	Echo (ping) request id=0xc09c, seq=2/512, ttl=64 (reply in 436)
436	574.503937	192.168.1.4	192.168.1.2	ICMP	98	Echo (ping) reply id=0xc09c, seq=2/512, ttl=64 (request in 435)
437	575.069576	0c:3d:a3:d9:00:05	Nearest-Customer-Br...	STP	60	Conf. Root = 4096/333/0c:75:67:09:00:00 Cost = 4 Port = 0x8006
438	575.504454	192.168.1.2	192.168.1.4	ICMP	98	Echo (ping) request id=0xc19c, seq=3/768, ttl=64 (reply in 439)
439	575.506944	192.168.1.4	192.168.1.2	ICMP	98	Echo (ping) reply id=0xc19c, seq=3/768, ttl=64 (request in 438)
440	576.507710	192.168.1.2	192.168.1.4	ICMP	98	Echo (ping) request id=0xc29c, seq=4/1024, ttl=64 (reply in 443)
441	576.512292	0c:3d:a3:d9:00:05	CDP/VTP/DTP/PagP/UD...	DTP	60	Dynamic Trunk Protocol
442	576.513312	0c:3d:a3:d9:00:05	CDP/VTP/DTP/PagP/UD...	DTP	60	Dynamic Trunk Protocol

> Frame 432: Packet, 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on 0

> Ethernet II, Src: Private_66:68:01 (00:50:79:66:68:01), Dst: Private_66:68:03

> Destination: Private_66:68:03 (00:50:79:66:68:03)

> Source: Private_66:68:01 (00:50:79:66:68:01)

Type: IPv4 (0x0800)

[Stream index: 16]

> Internet Protocol Version 4, Src: 192.168.1.2, Dst: 192.168.1.4

> Internet Control Message Protocol

0000 00 50 79 66 68 03 00 50 79 66 68 01 08 00 45 00 Pyfh..P yfh...E

0010 00 54 9c bf 00 00 4b 01 5a 93 c0 a1 02 c0 a8 T...@: Z.....

0020 01 04 08 00 60 6e bf 0c 00 01 08 09 0a 0b c0 a8 ...n.....

0030 0e 0f 10 11 12 13 14 15 16 17 18 19 1a 1b 1c 1d

0040 1e 1f 20 21 22 23 24 25 26 27 28 29 2a 2b 2c 2d .. !"%&'()*+,-.

0050 2e 2f 30 31 32 33 34 35 36 37 38 39 3a 3b 3c 3d ./012345 6789;,<=

0060 3e 3f >

Рисунок 4 – нетегированный icmp-пакет между PC2 и SW4

Захват с Standard input [Layer2Switch-1 Ethernet2 to Layer2Switch-3 Ethernet0]							
Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка							
Примените фильтр отображения ... <Ctrl-/>							
No.	Time	Source	Destination	Protocol	Length	Info	
792	572.987415	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/333/0c:75:67:09:00:00 Cost = 0 Port = 0x8003	
793	572.918888	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003	
794	574.991594	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/333/0c:75:67:09:00:00 Cost = 0 Port = 0x8003	
795	574.995522	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003	
796	577.117329	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/333/0c:75:67:09:00:00 Cost = 0 Port = 0x8003	
797	577.119241	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003	
798	577.618956	Private_66:68:01	Broadcast	ARP	64	Who has 192.168.1.4? Tell 192.168.1.2	
799	577.623763	Private_66:68:03	Private_66:68:01	ARP	64	192.168.1.4 is at 00:50:79:66:68:03	
800	577.626285	192.168.1.2	192.168.1.4	ICMP	98	Echo (ping) request id=0xbf9c, seq=1/256, ttl=64 (reply in 801)	
801	577.633445	192.168.1.4	192.168.1.2	ICMP	98	Echo (ping) reply id=0xbf9c, seq=1/256, ttl=64 (request in 800)	
802	578.024539	0c:3d:a3:d9:00:00	0c:3d:a3:d9:00:00	LOOP	60	Reply	
803	578.634497	192.168.1.2	192.168.1.4	ICMP	98	Echo (ping) request id=0xc09c, seq=2/512, ttl=64 (reply in 804)	
804	578.643281	192.168.1.4	192.168.1.2	ICMP	98	Echo (ping) reply id=0xc09c, seq=2/512, ttl=64 (request in 803)	
805	579.208979	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/333/0c:75:67:09:00:00 Cost = 0 Port = 0x8003	
806	579.211024	0c:75:67:09:00:02	PVST+	STP	68	Conf. Root = 4096/20/0c:75:67:09:00:00 Cost = 0 Port = 0x8003	
807	579.645171	192.168.1.2	192.168.1.4	TCP	98	Echo (ping) request id=0x10c, seq=3/768, ttl=64 (reply in 808)	
<div>> Frame 800: Packet, 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on 0</div> <div>Ethernet II, Src: Private_66:68:01 (00:50:79:66:68:01), Dst: Private_66:68:03</div> <div>> Destination: Private_66:68:03 (00:50:79:66:68:03)</div> <div>> Source: Private_66:68:01 (00:50:79:66:68:01)</div> <div>Type: IPv4 (0x0800)</div> <div>Stream index: 20</div> <div>> Internet Protocol Version 4, Src: 192.168.1.2, Dst: 192.168.1.4</div> <div>> Internet Control Message Protocol</div>							
					0000	00 50 79 66 68 03 00 50 79 66 68 01 08 00 45 00	Pyfh..P yfh..E
					0010	00 54 9c bf 00 00 40 01 5a 93 c0 a8 01 02 c0 a8	T...@. Z.....
					0020	01 04 08 00 60 6e bf 9c 00 01 08 09 0a 0b 0c 0dn.....
					0030	0e 0f 10 11 12 13 14 15 16 17 18 19 1a 1b 1c 1d
					0040	1e 1f 20 21 22 23 24 25 26 27 28 29 2a 2b 2c 2d	.. !#\$%&'()*+,-
					0050	2e 2f 30 31 32 33 34 35 36 37 38 39 3a 3b 3c 3d	./012345 6789;<=
					0060	3e 3f	>?

Рисунок 5 – нетегированный icmp-пакет во vlan 300

Пакеты, находящиеся во vlan 300, не тегуются, так как vlan 300 определена как native/