实验三 子网划分和 NAT 配置

一． 实验目的

1.熟练配置静态多子网网络环境

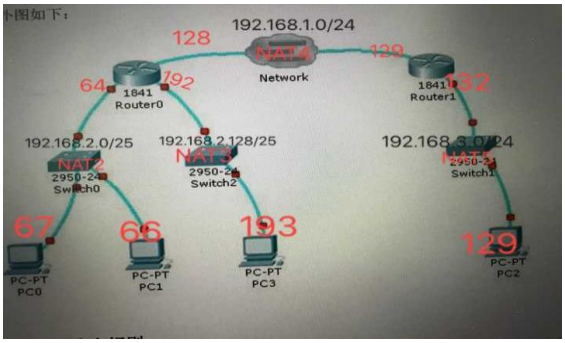
2.理解子网划分的概念

3.学会 NAT 组网方式

4.为之后的实验对组网的要求打下基础

二．网络拓扑配置

节点名	虚拟设备名	ip	netmask
Router0	Router0	ens33:192.168.2.64	255.255.255.128
		ens38:192.168.2.192	255.255.255.128
		ens39:192.168.1.128	255.255.255.0
Route1	Router1	ens33:192.168.1.129	255.255.255.0
		ens38:192.168.3.132	255.255.255.0
PC0	PC0	192.168.2.67	255.255.255.128
PC1	PC1	192.168.2.66	255.255.255.128
PC2	PC2	192.168.3.129	255.255.255.0
PC3	PC3	192.168.2.193	255.255.255.128



三． 路由规则配置

Route0:

sudo ip route add 192.168.3.0/24 via 192.168.1.129

sudo su

echo 1 > /proc/sys/net/ipv4/ip_forward

exit

Route1:

sudo ip route add 192.168.2.0/24 via 192.168.1.128

sudo su

echo 1 > /proc/sys/net/ipv4/ip_forward

exit

四． NAT 设置命令

Route0:

sudo iptables -t nat -A POSTROUTING -o ens39 -s 192.168.2.0/24 -j SNAT –to 192.168.1.128

五． 数据包截图:

（1）设置 NAT 前

PC0 PING PC2

Source	Destination	Protocol
192.168.3.129	192.168.2.67	ICMP
192.168.2.66	192.168.2.1	TCP
192.168.2.64	192.168.2.1	TCP
192.168.2.67	192.168.3.129	ICMP
192.168.3.129	192.168.2.67	ICMP

PC0 PING PC3

Source	Destination	Protocol
192.168.2.66	192.168.2.1	TCP
192.168.2.66	192.168.2.1	DNS
Vmware_65:67:54	Vmware_5d:92:da	ARP
Vmware_5d:92:da	Vmware_65:67:54	ARP
192.168.2.67	192.168.2.193	ICMP
192.168.2.193	192.168.2.67	ICMP

PC2 PING PC0

Source	Destination	Protocc
192.168.2.66	192.168.2.1	TCP
192.168.2.64	192.168.2.1	TCP
192.168.3.129	192.168.2.67	ICMP
192.168.2.67	192.168.3.129	ICMP

PC3 PING PC0

Source	Destination	Protocol
192.168.2.67	192.168.2.193	ICMP
192.168.2.66	192.168.2.1	TCP
192.168.2.193	192.168.2.67	ICMP
192.168.2.67	192.168.2.193	ICMP

PC2 PING PC3

Source	Destination	Protoco
192.168.1.128	192.168.1.1	TCP
192.168.3.129	192.168.2.193	ICMP
192.168.2.193	192.168.3.129	ICMP
192.168.3.129	192.168.2.193	ICMP
192.168.2.193	192.168.3.129	ICMP

PC3 PING PC2

Source	Destination	Protocc
192.168.2.193	192.168.3.129	ICMP
192.168.3.129	192.168.2.193	ICMP

(2)设置 NAT 后

PC0 PING PC2

Source	Destination	Protocol
192.168.1.129	192.168.1.1	TCP
192.168.1.128	192.168.3.129	ICMP
192.168.3.129	192.168.1.128	ICMP

PC0 PING PC3

Source	Destination	Protocol
192.168.2.67	192.168.2.1	DNS
192.168.2.67	192.168.2.193	ICMP
192.168.2.193	192.168.2.67	ICMP

PC3 PING PC2

Source	Destination	Protocol
192.168.1.128	192.168.3.129	ICMP
192.168.3.129	192.168.1.128	ICMP

PC3 PING PC0

Source	Destination	Protocol
192.168.2.67	192.168.2.1	TCP
192.168.2.64	192.168.2.1	TCP
192.168.2.66	192.168.2.1	TCP
192.168.2.193	192.168.2.67	ICMP
192.168.2.67	192.168.2.193	ICMP

PC2 PING PC3

Source	Destination	Protocol
192.168.2.193	192.168.3.129	ICMP
192.168.1.129	192.168.1.1	TCP
192.168.3.129	192.168.2.193	ICMP
192.168.2.193	192.168.3.129	ICMP

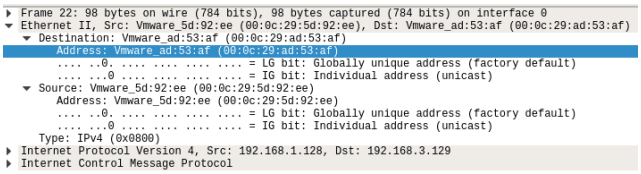
PC2 PING PC0

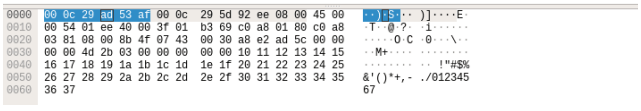
Source	Destination	Protoco
Vmware_c0:00:02	Vmware_a4:92:60	ARP
Vmware_a4:92:60	Vmware_c0:00:02	ARP
192.168.2.67	192.168.2.1	DNS
192.168.2.67	192.168.2.1	TCP
192.168.3.129	192.168.2.67	ICMP
192.168.2.67	192.168.3.129	ICMP

六． 协议报文分析

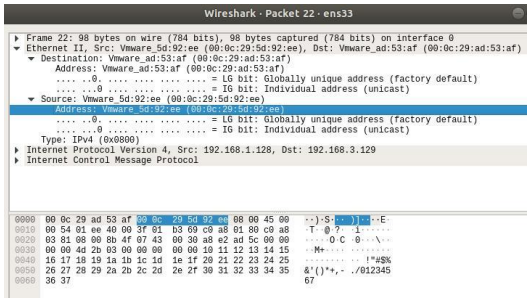
Nat 设置前的报文分析和实验一相同，现对 nat 设置后 pc0 ping pc2 的 icmp request 包进行字段分析

目标 mac 地址为 00：0c:29:ad:53:af

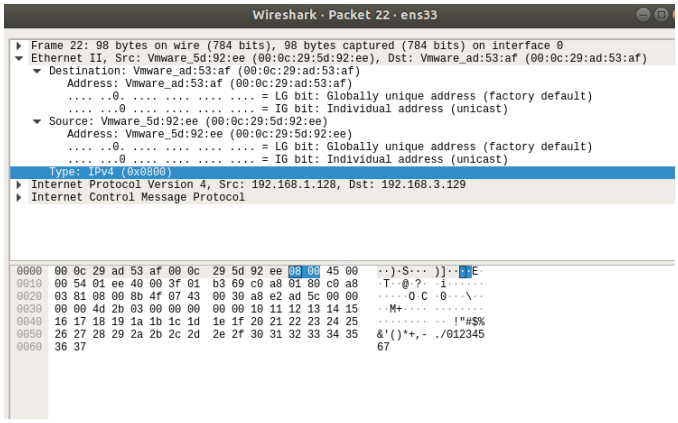




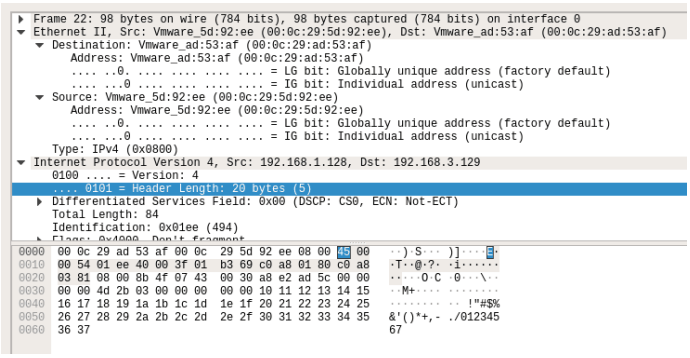
源 mac 地址：00：0c:29:5d:92:ee



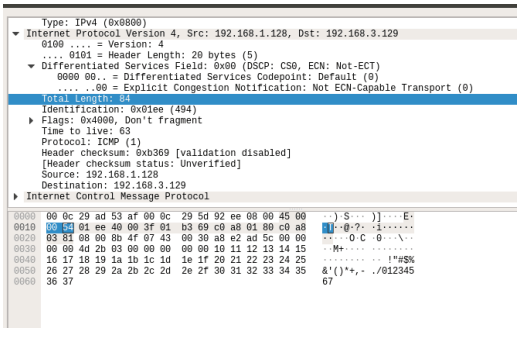
类型 ipv4



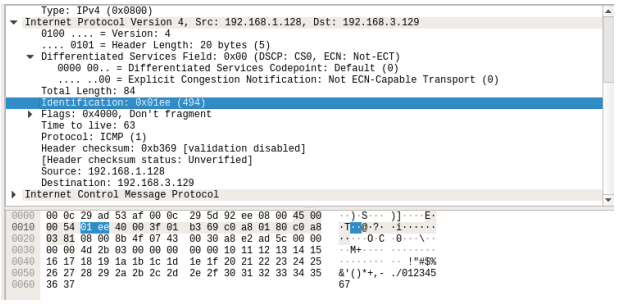
Ip 版本 4，头长 20bytes



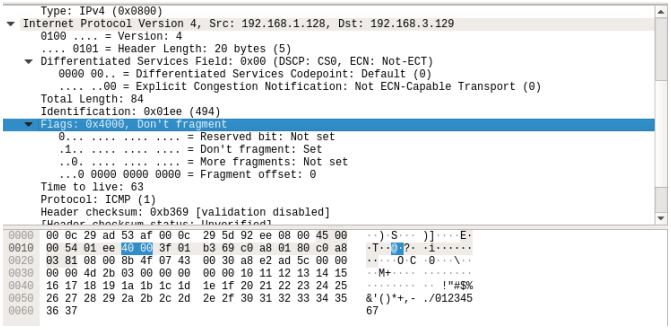
Ip 包总长 84bytes



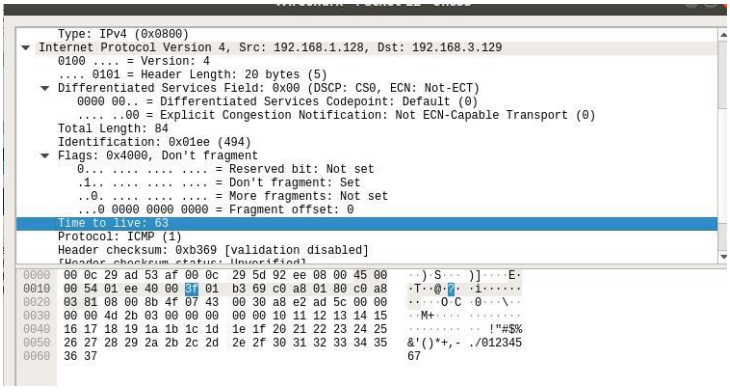
验证码 494



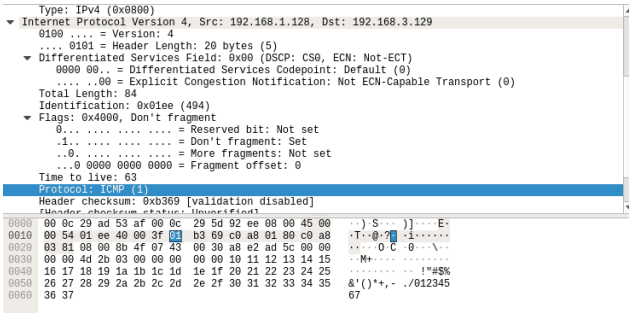
不分块



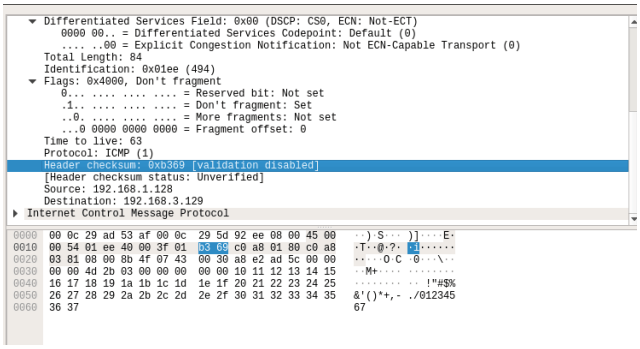
生存期 63



协议为 icmp 协议

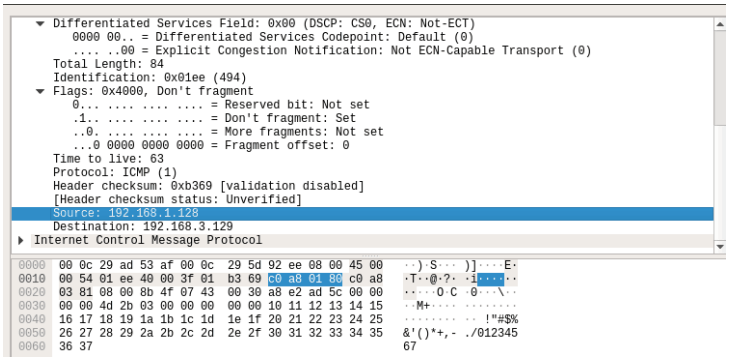


校验和为 0xb369

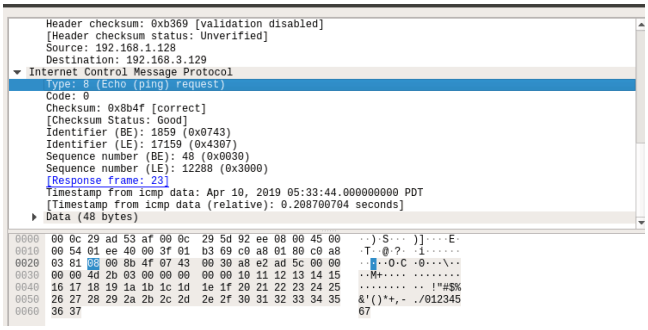


源 ip:192.168.1.128(nat 转换后的 ip)

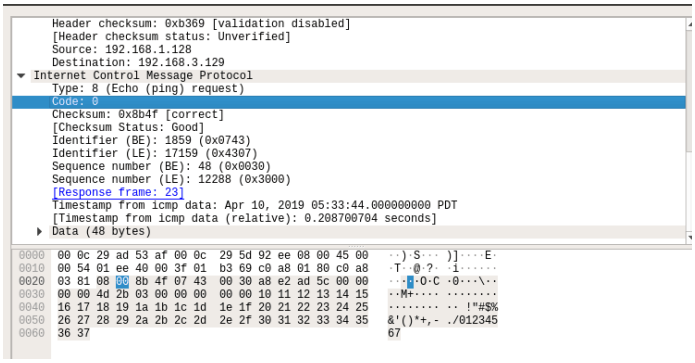
目的 ip：192.168.3.129



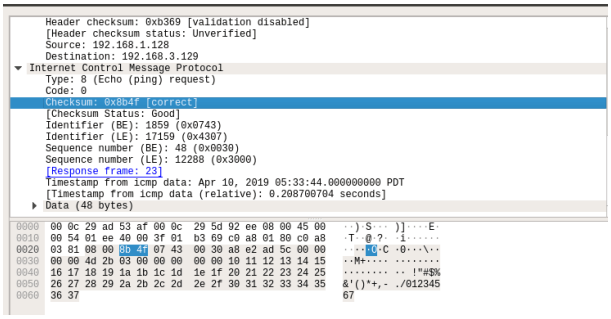
Icmp 类型为 request



编码为 0

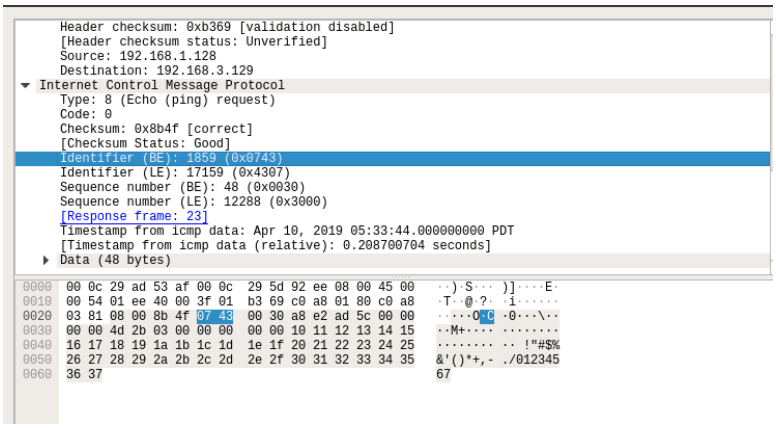


校验和为 0x8b4f



验证码为 BE:0X0743 LE:0X4307

序列号为 BE:0X0030 LE:0X3000



数据段为 0x4d2b03···3637