实验介绍

实验环境与安装

本次实验的环境为**Ubuntu 20.04**，完成本实验需要下载`quagga`和`mininet`作为本实验的运行环境。

Mininet的安装

Mininet是一个强大的虚拟化网络仿真工具，它可以创建一个包含主机，交换机，控制器和链路的 虚拟网络，其交换机支持OpenFlow，具备高度灵活的自定义软件定义网络。

安装编译

```
git clone https://github.com/mininet/mininet.git
cd mininet/util
./install.sh -3n
```

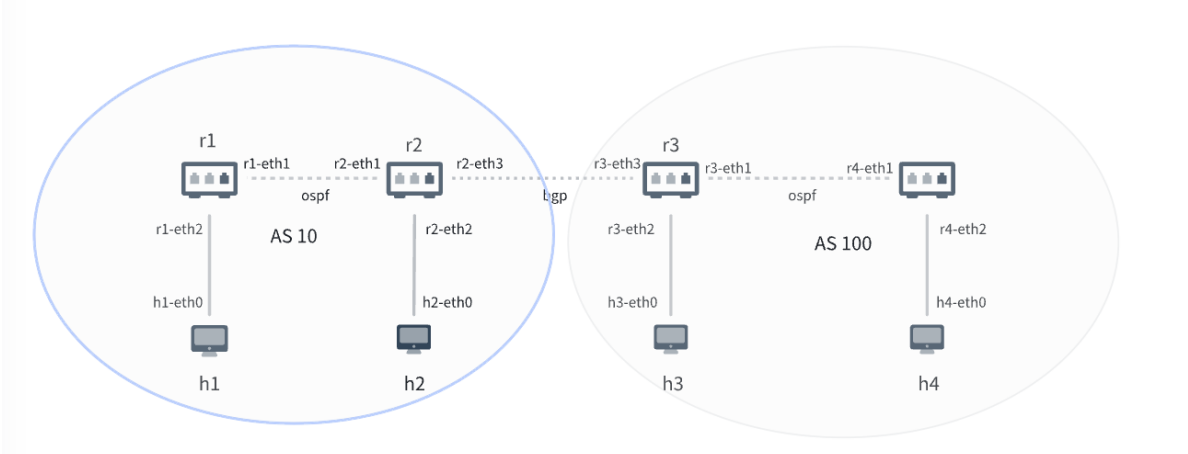
Quagga的安装

Quagga是一种开源的路由软件套件，用于实现各种网络协议的路由器功能。它能够运行OSPF（开放最短路径优先）、BGP（边界网关协议）、RIP（路由信息协议）等多种路由协议，使计算机可以在网络中动态地找到最佳路径进行数据传输。Quagga的设计目的是为了提供一个灵活、可扩展的路由器软件解决方案，适用于各种网络环境和需求。

安装

```
sudo apt install quagga=1.2.4-4ubuntu0.4
```

实验的网络拓扑图



Routers	ASN	Network	lo	eth1	eth2	eth3
r1	10	10.0.0.0/8	10.10.0.1	10.255.0.1/30	10.1.0.10/24	NA
r2	10	10.0.0.0/8	10.10.0.2	10.255.0.2/30	10.2.0.20/24	10.0.0.1/30
r3	100	100.0.0.0/8	100.0.0.1	100.255.0.1/30	100.3.0.30/24	10.0.0.2/30
r4	100	100.0.0.0/8	100.0.0.2	100.255.0.2/30	100.4.0.40/24	NA

HOSTS	ASN	eth0
h1	10	10.1.0.100/24
h2	10	10.2.0.100/24
h3	100	100.3.0.100/24
h4	100	100.4.0.100/24

实验结果

```
zbm@zbm:~/code/python$ sudo python3 testBGP.py
[sudo] zbm 的密码:
*** Creating network
*** Adding hosts:
h1 h2 h3 h4
*** Adding switches:
r1 r2 r3 r4
*** Adding links:
(r1, h1) (r1, r2) (r2, h2) (r2, r3) (r3, h3) (r3, r4) (r4, h4)
*** Configuring hosts
h1 h2 h3 h4
*** Starting controller

*** Starting 4 switches
r1 r2 r3 r4
Starting zebra and ospf on r1
Starting zebra, ospf and bgp on r2
Starting zebra, ospf and bgp on r3
Starting zebra and ospf on r4
Network started
Starting zebra and ospf on r1
Starting zebra, ospf and bgp on r2
Starting zebra, ospf and bgp on r3
Starting zebra and ospf on r4
*** Starting CLI:
mininet> pingall
*** Ping: testing ping reachability
h1 -> X X X
h2 -> X h3 X
h3 -> X h2 X
h4 -> X X ^C
Interrupt
stopping h4
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4
h2 -> h1 h3 h4
h3 -> h1 h2 h4
h4 -> h1 h2 h3
*** Results: 0% dropped (12/12 received)
```