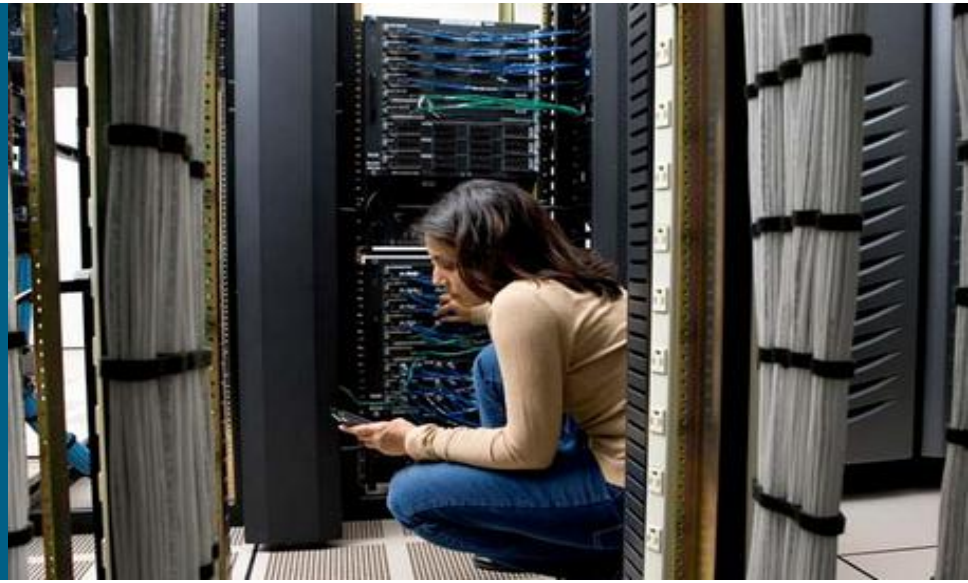
EIGRP (Enhanced Interior Gaeway Routing Protocol)
增强型内部网关路由协议



丐帮新任帮主 DCCIE（RS & Security）

学习内容

Part1 Network Foundation	OSI参考模型及封装与解封装	Ethernet 介绍及其布线	TCP/IP协议栈	IP子网划分 VLSM&Summary &CIDR	CISCO IOS设备管理
Part2 Router Protocol	路由选择原理及路由分类	静态路由及实验	RIP&RIPv2	EIGRP	OpenShortest PathFirst(OSPF)
Part3 SWITCH Network	交换机的工作原理	Vlan&VTP &Trunk	Spanning Tree Protocol(STP)	Ethernet Channel	HSRP&VRRP &GLBP
交换机安全	Wireless 无线	Part4 WAN Technology	Frame-Relay(FR)	Point-to-Point Pro PPP	NAT& ACL

EIGRP Features

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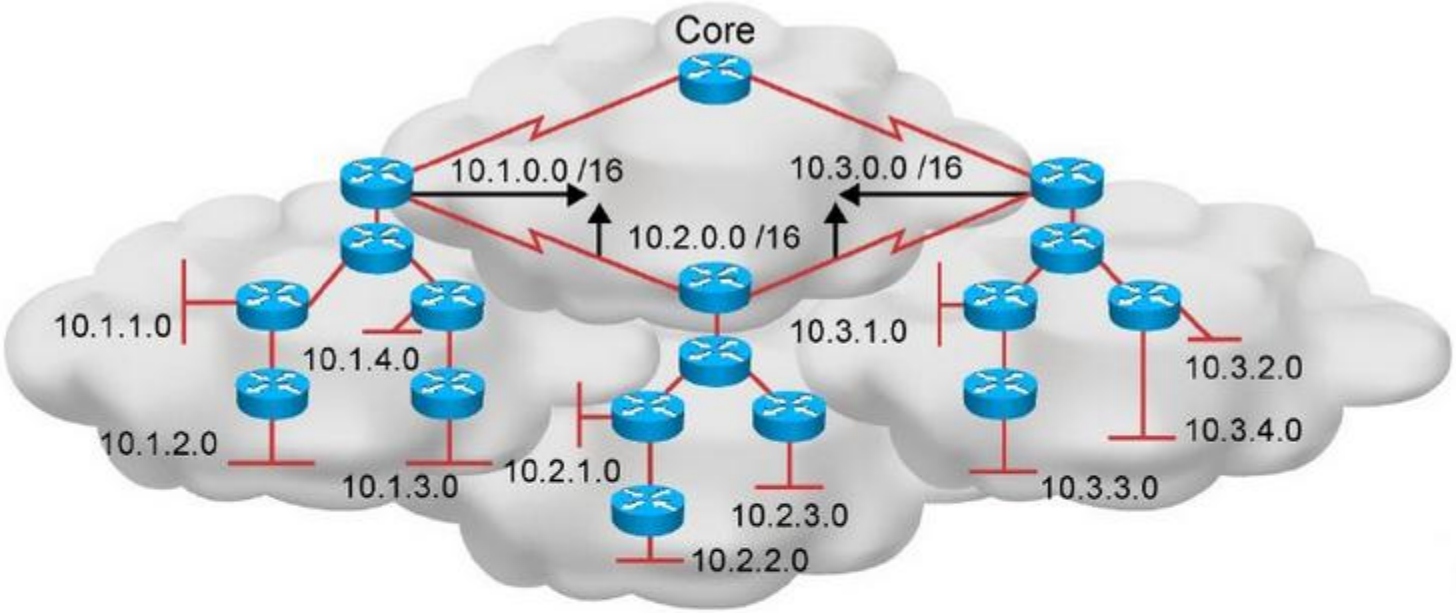
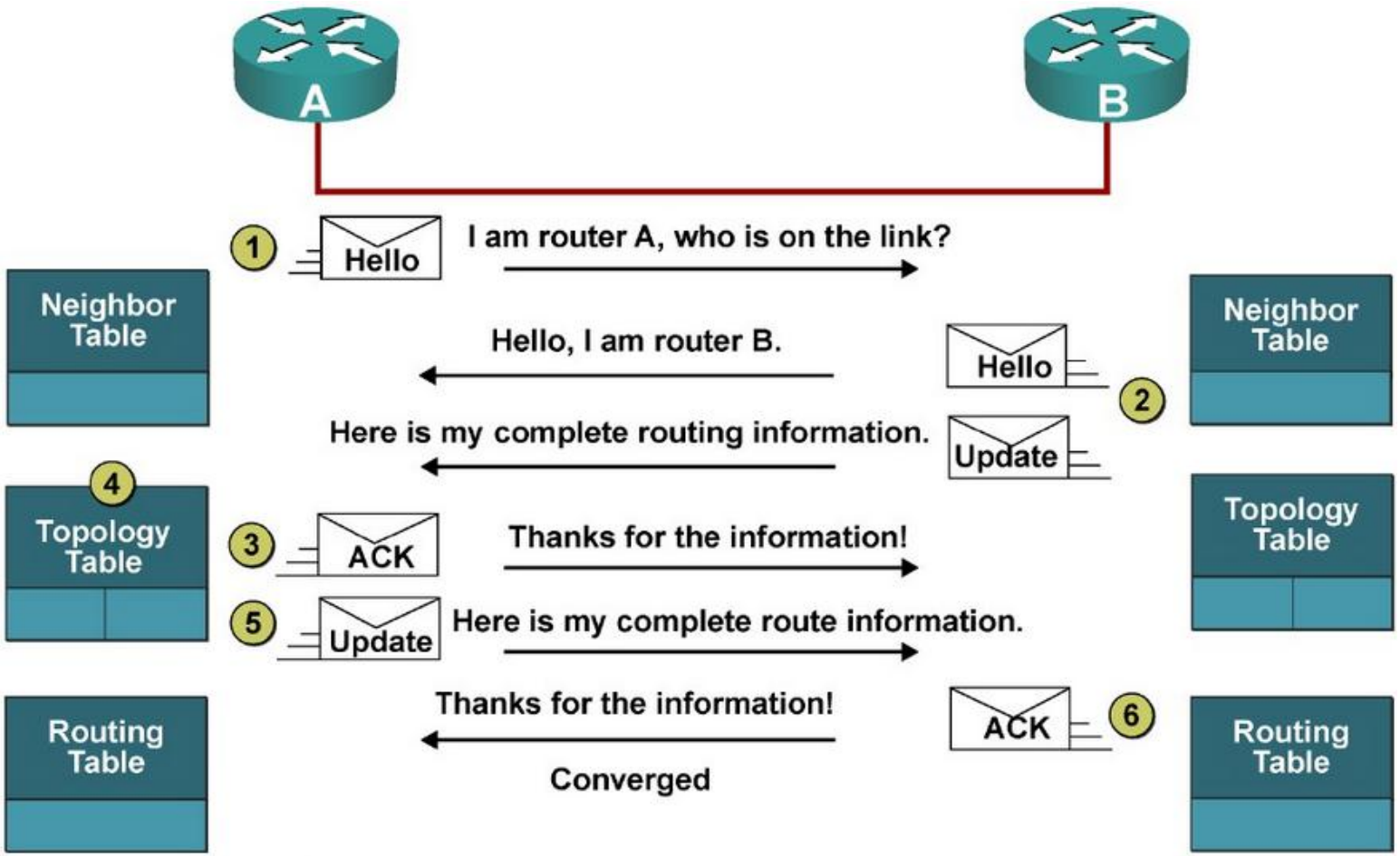
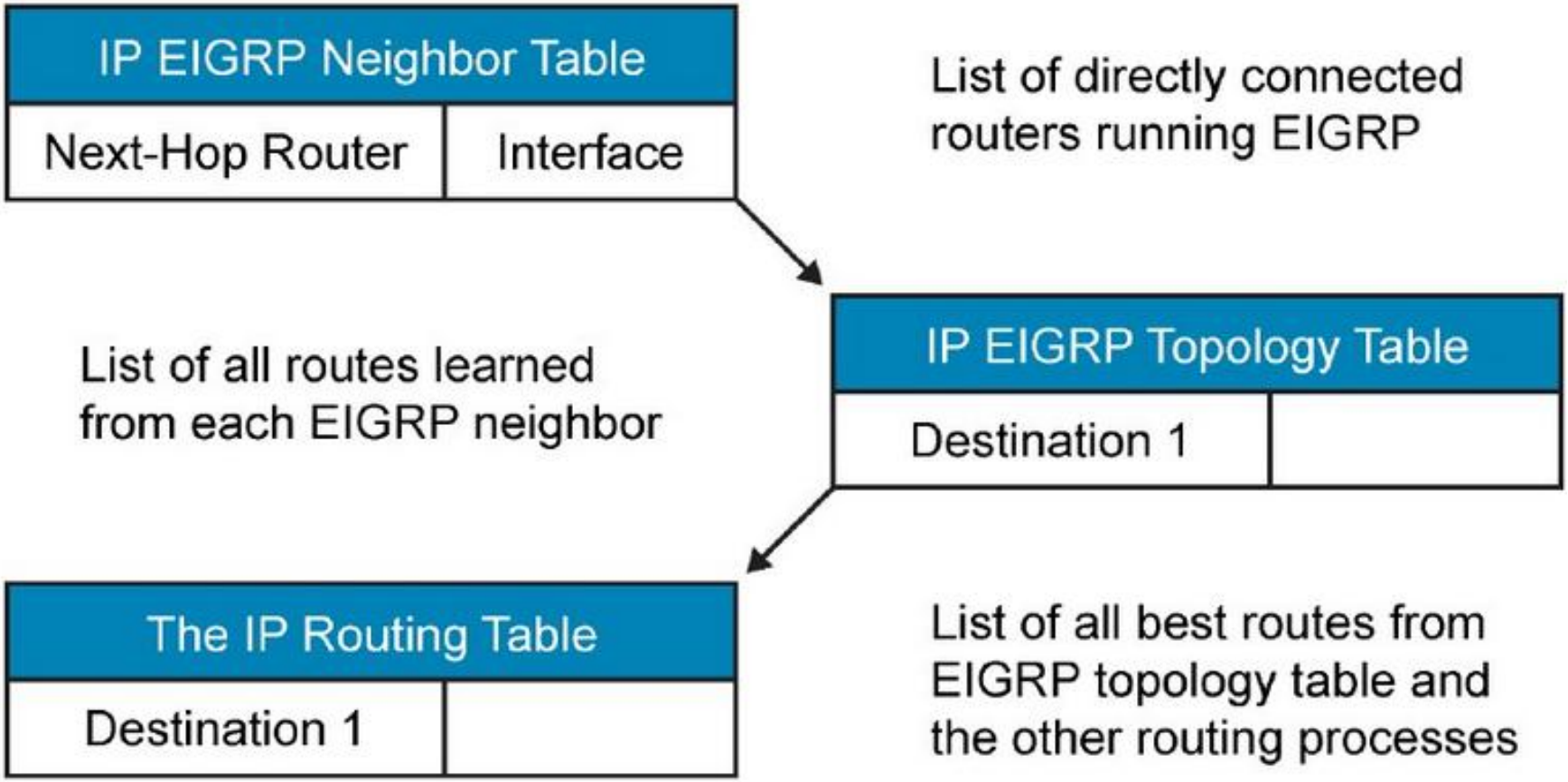


- Advanced distance vector
- Rapid convergence
- 100% loop-free classless routing
- Easy configuration
- Incremental/Partial updates
- Load balancing across equal- and unequal-cost pathways
- Flexible network design
- Multicast and unicast instead of broadcast address
- Support for VLSM and discontiguous subnets
- Manual summarization at any point in the internetwork
- Support for multiple network layer protocols

EIGRP收敛过程



EIGRP三张表

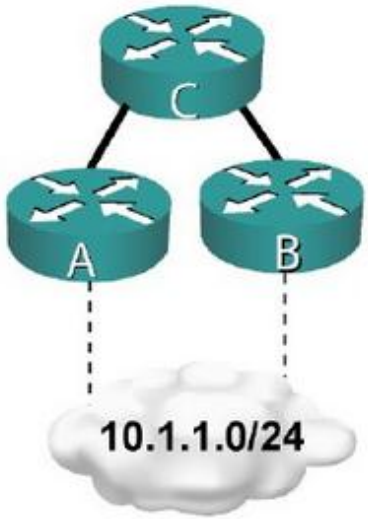


EIGRP路径计算

IP EIGRP Neighbor Table	
Next-Hop Router	Interface
Router A Router B	Ethernet 0 Ethernet 1

IP EIGRP Topology Table			
Network	Feasible Distance (EIGRP Metric)	Advertised Distance	EIGRP Neighbor
10.1.1.0 /24 10.1.1.0 /24	2000 2500	1000 1500	Router A (E0) Router B (E1)

IP Routing Table			
Network	Metric (Feasible Distance)	Outbound Interface	Next Hop (EIGRP Neighbor)
10.1.1.0 /24	2000	Ethernet 0	Router A



EIGRP metric计算

The criteria that EIGRP uses by default to calculate its metric:

- Bandwidth
- Delay
- **Metric =(10^7/Bandwidth+ Delay/10)×256**

The optional criteria that EIGRP can be configured to use when calculating its metric(不建议,会导致频繁地计算拓扑表):

- Reliability
- Load

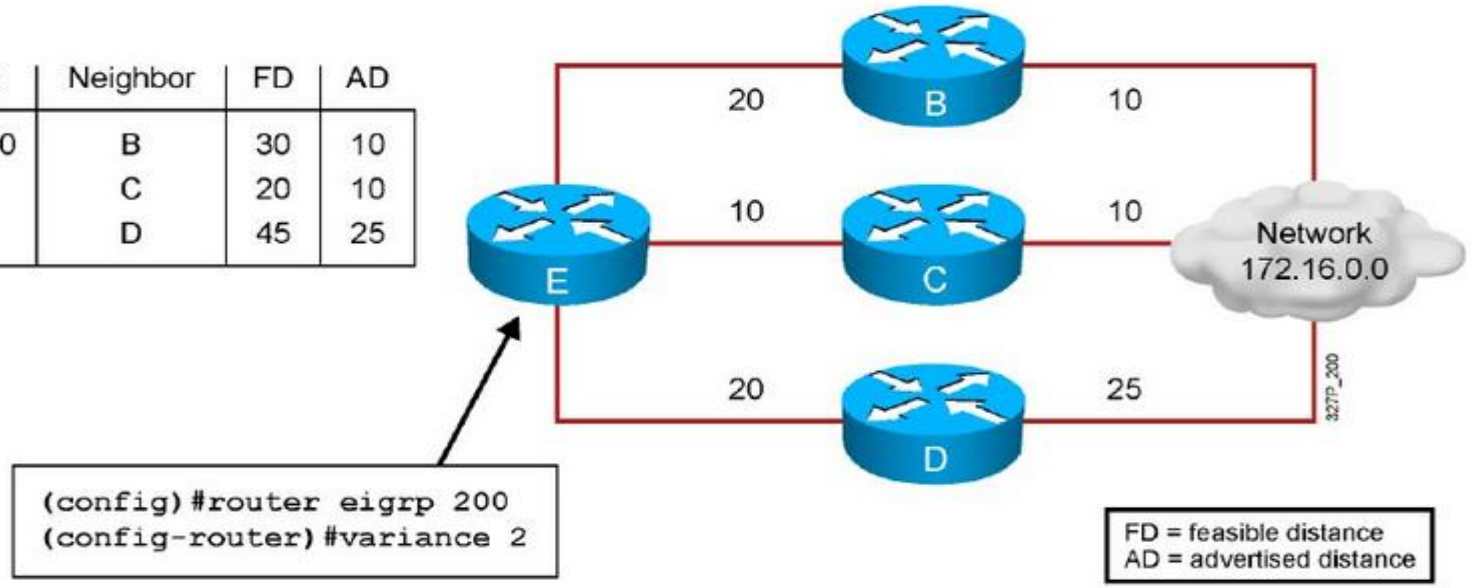
Note: Although MTU is exchanged in EIGRP packets between neighbor routers, MTU is not factored into the EIGRP metric calculation.

EIGRP负载均衡

- By default, EIGRP does equal-metric load balancing:
  - By default, up to 4 routes with a metric equal to the minimum metric are installed in the routing table.
- There can be up to 16 entries in the routing table for the same destination:
  - The number of entries is configurable with the **maximum-paths** command.
  - **Maximum-paths [1-16]** . If Maximum-paths = 1, means EIGRP Load Balancing is disnable
- Allows the router to load-balance across routes with a metric smaller than the *multiplier* value times the minimum metric route to that destination.

EIGRP非等价负载均衡

Network	Neighbor	FD	AD
172.16.0.0	B	30	10
	C	20	10
	D	45	25



- Router E chooses router C to route to network 172.16.0.0 because it has the lowest feasible distance of 20.
- With a variance of 2, router E also chooses router B to route to network 172.16.0.0 (20 + 10 = 30) < [2 * (FD) = 40].
- Router D is not considered to route to network 172.16.0.0 (because 25 > 20).

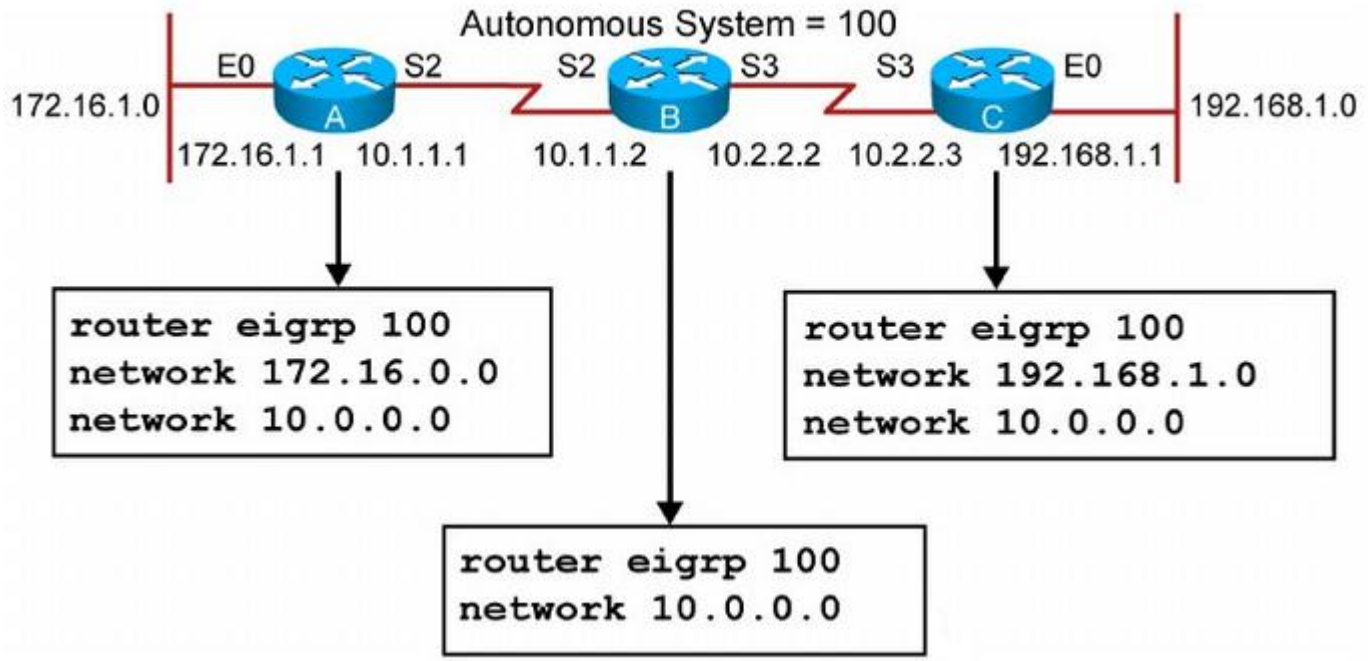
EIGRP 认证

- EIGRP supports MD5 authentication.
- 对收到的每个路由选择更新的源进行身份验证。
- 直连的每个邻居必须配置相同的密码。

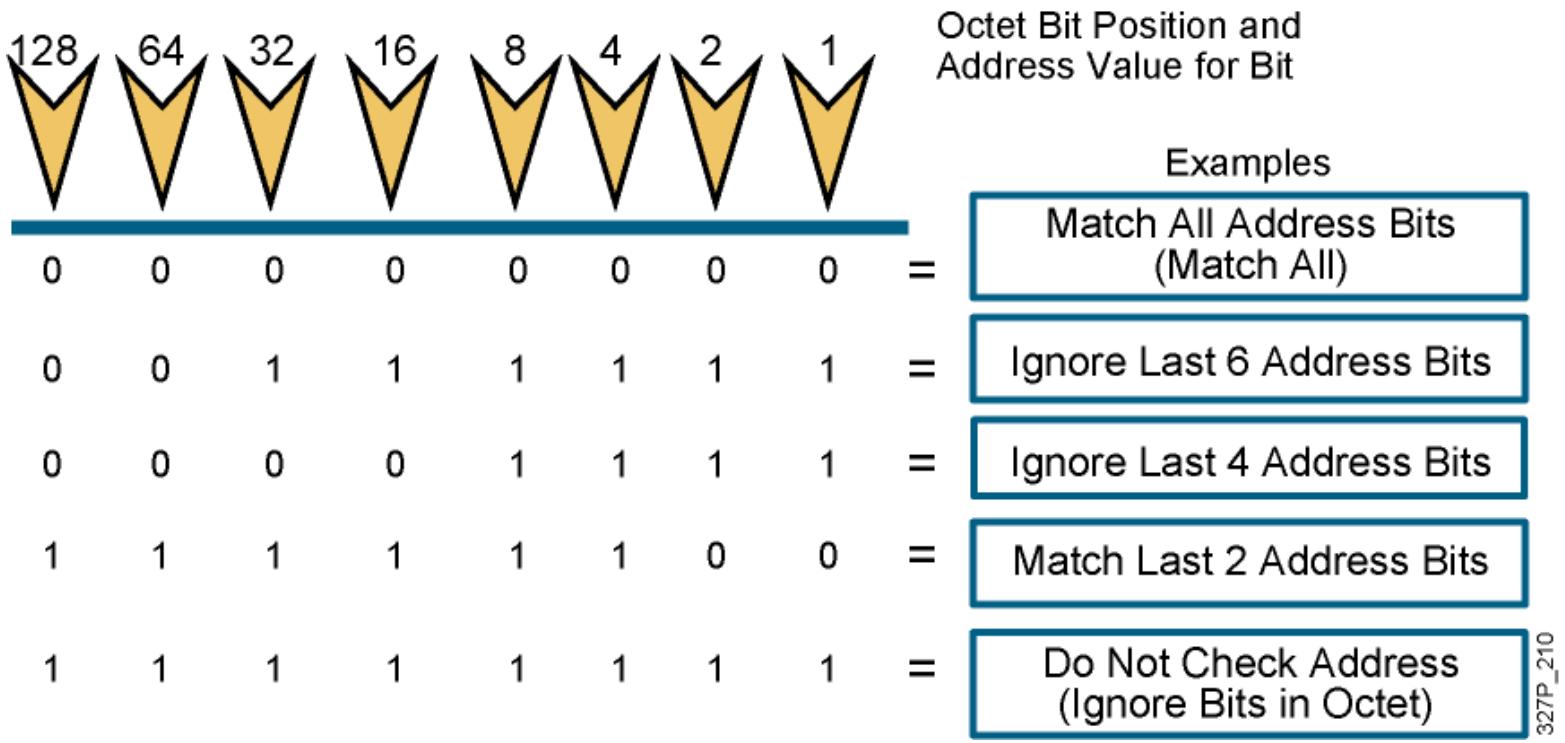
使用名字创建一个密钥链；
创建key-id来表示不同的密钥；
创建密钥；
(可选) 设置密钥验证的寿命(存活)时间；
在接口上启用MD5身份验证；
指定接口在身份验证时使用哪一个密钥链。

EIGRP基本配置


```
RouterX(config)# router eigrp autonomous-system
RouterX(config-router)# network network-number
```



反掩码



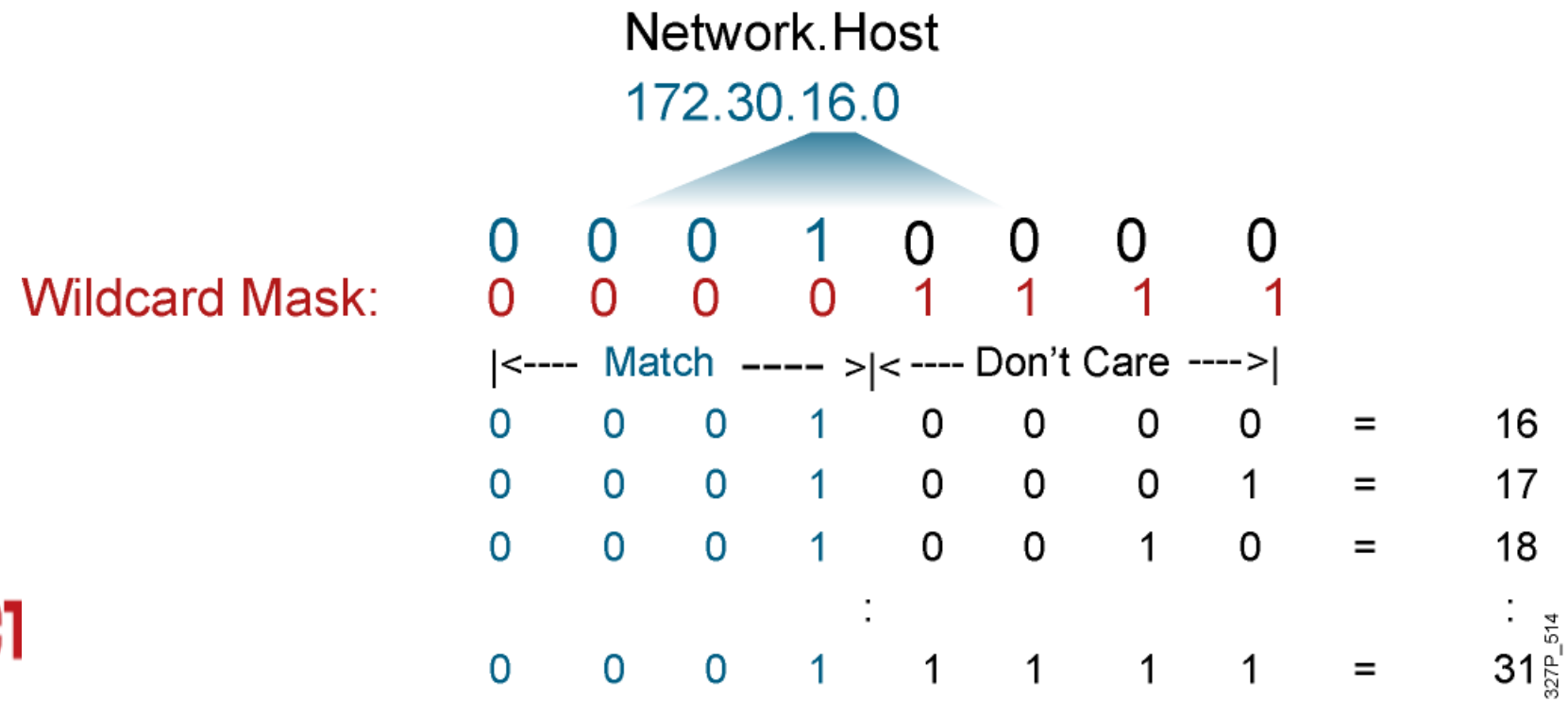
0 means to match the value of the corresponding address bit

1 means to ignore the value of the corresponding address bit

反掩码匹配IP子网

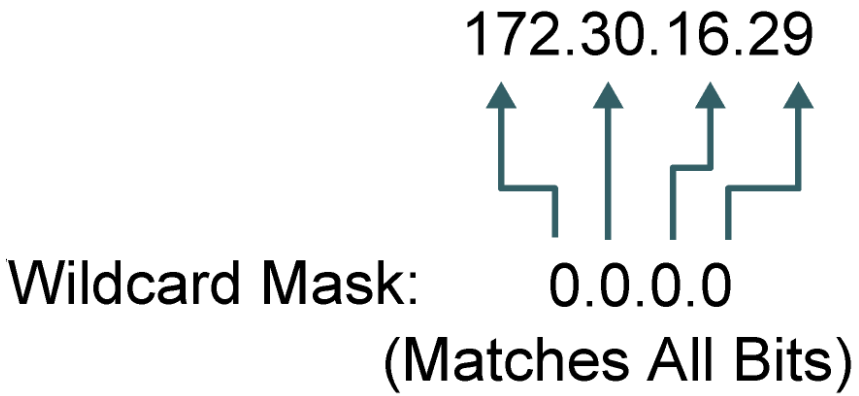
Match for IP subnets 172.30.16.0/24 to 172.30.31.0/24.

- **Address and wildcard mask:**
  - **172.30.16.0 0.0.15.255**

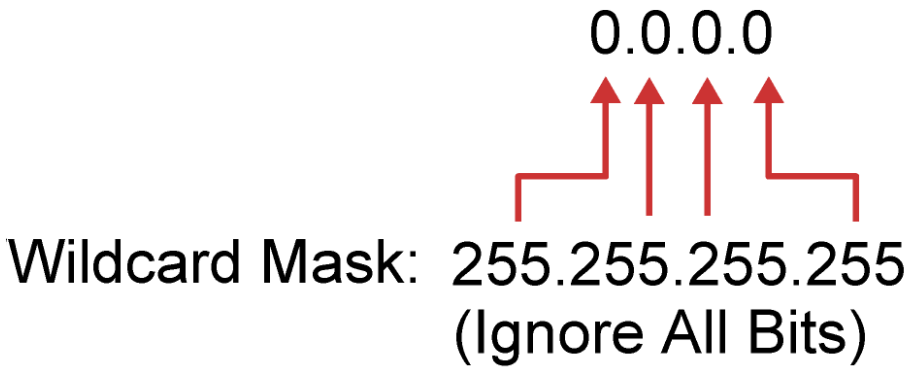


反掩码缩写

- **172.30.16.29 0.0.0.0 matches all of the address bits**
- **Abbreviate this wildcard mask using the IP address preceded by the keyword** host **(host 172.30.16.29)**



- 0.0.0.0 255.255.255.255 ignores all address bits
- Abbreviate expression with the keyword **any**



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EIGRP配置实例

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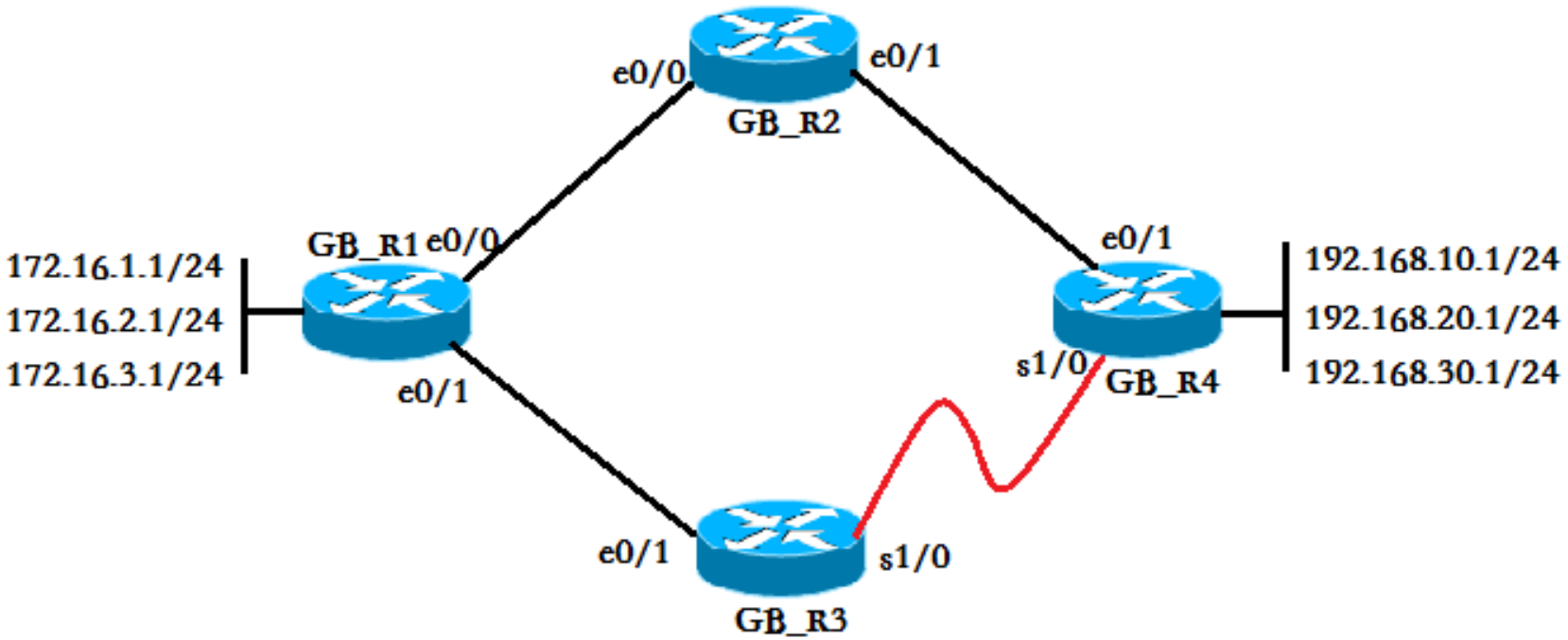

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EIGRP验证配置


```
Router#show ip eigrp neighbors
```

```
RouterX# show ip eigrp topology [all]
```

```
Router#show ip route eigrp
```

```
Router#show ip protocols
```

```
RouterX# show ip eigrp neighbors [detail]
```