**Network Routing Protocols: A Comprehensive Guide 🌐**

**1. Routing Information Protocol (RIP)**

**RIP is a distance-vector routing protocol that uses hop count as its primary metric to determine the best path. It's a fundamental IGP (Interior Gateway Protocol), typically used in smaller, simpler networks. Your project with PC0 and PC1 demonstrates a basic RIP setup.**

**PC and Router IP Addresses**

* **PC0: IP address 192.168.1.10, Default Gateway 192.168.1.1**
* **PC1: IP address 192.168.2.10, Default Gateway 192.168.2.1**

**Configuration Commands**

**The commands below show how you configured the network interfaces and enabled RIP on each router. The version 2 command enables a more modern, classless version of RIP, which supports Variable-Length Subnet Masking (VLSM). The no auto-summary command is crucial for preventing automatic summarization of networks at classful boundaries, ensuring accurate routing.**

* **Router0:**
* **enable**
* **configure terminal**
* **interface FastEthernet 0/0**
* **ip address 192.168.1.1 255.255.255.0**
* **no shutdown**
* **exit**
* **interface Serial 2/0**
* **ip address 10.0.0.1 255.255.255.0**
* **no shutdown**
* **exit**
* **router rip**
* **version 2**
* **network 192.168.1.0**
* **network 10.0.0.0**
* **no auto-summary**
* **exit**
* **Router1:**
* **enable**
* **configure terminal**
* **interface FastEthernet 0/0**
* **ip address 192.168.2.1 255.255.255.0**
* **no shutdown**
* **exit**
* **interface Serial 2/0**
* **ip address 10.0.0.2 255.255.255.0**
* **clock rate 64000**
* **no shutdown**
* **exit**
* **router rip**
* **version 2**
* **network 192.168.2.0**
* **network 10.0.0.0**
* **no auto-summary**
* **exit**

**2. Enhanced Interior Gateway Routing Protocol (EIGRP)**

**EIGRP is a Cisco proprietary protocol that combines the best features of distance-vector and link-state protocols, making it a hybrid routing protocol. It uses a composite metric based on bandwidth, delay, reliability, and load, providing more intelligent path selection than RIP. Your EIGRP project involves PC2 and PC3.**

**PC and Router IP Addresses**

* **PC2: IP address 192.168.10.10, Default Gateway 192.168.10.1**
* **PC3: IP address 192.168.20.10, Default Gateway 192.168.20.1**

**Configuration Commands**

**The router eigrp 100 command starts the EIGRP process using Autonomous System number 100. All routers participating in the same EIGRP domain must share this number. The no auto-summary command here, similar to RIP, prevents issues with discontinuous networks.**

* **Router2:**
* **enable**
* **configure terminal**
* **interface FastEthernet 0/0**
* **ip address 192.168.10.1 255.255.255.0**
* **no shutdown**
* **exit**
* **interface Serial 2/0**
* **ip address 10.0.0.1 255.255.255.0**
* **clock rate 64000**
* **no shutdown**
* **exit**
* **router eigrp 100**
* **network 192.168.10.0**
* **network 10.0.0.0**
* **no auto-summary**
* **exit**
* **Router3:**
* **enable**
* **configure terminal**
* **interface FastEthernet 0/0**
* **ip address 192.168.20.1 255.255.255.0**
* **no shutdown**
* **exit**
* **interface Serial 2/0**
* **ip address 10.0.0.2 255.255.255.0**
* **no shutdown**
* **exit**
* **router eigrp 100**
* **network 192.168.20.0**
* **network 10.0.0.0**
* **no auto-summary**
* **exit**

**3. Open Shortest Path First (OSPF)**

**OSPF is a widely-used link-state routing protocol. It maintains a complete topology map of the network and uses Dijkstra's algorithm to calculate the shortest path to all destinations. This makes it highly scalable and efficient for large, complex networks. Your project with PC4 and PC5 demonstrates a multi-network OSPF configuration within a single area.**

**PC and Router IP Addresses**

* **PC4: IP address 192.168.30.10, Default Gateway 192.168.30.1**
* **PC5: IP address 192.168.40.10, Default Gateway 192.168.40.1**

**Configuration Commands**

**The router ospf 1 command starts the OSPF process, with '1' being the process ID. The network command in OSPF uses a wildcard mask (e.g., 0.0.0.255) to identify the networks to be advertised. All interfaces within the same area (in this case, area 0) are part of the same OSPF domain.**

* **Router4:**
* **enable**
* **configure terminal**
* **interface FastEthernet 0/0**
* **ip address 192.168.30.1 255.255.255.0**
* **no shutdown**
* **exit**
* **interface Serial 2/0**
* **ip address 192.168.100.1 255.255.255.0**
* **clock rate 64000**
* **no shutdown**
* **exit**
* **router ospf 1**
* **network 192.168.30.0 0.0.0.255 area 0**
* **exit**
* **Router5:**
* **enable**
* **configure terminal**
* **interface FastEthernet 0/0**
* **ip address 192.168.40.1 255.255.255.0**
* **no shutdown**
* **exit**
* **interface Serial 2/0**
* **ip address 192.168.100.2 255.255.255.0**
* **no shutdown**
* **exit**
* **router ospf 1**
* **network 192.168.40.0 0.0.0.255 area 0**
* **network 192.168.100.0 0.0.0.255 area 0**

**exit**