U1 Graded Exercise 1

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At the center of the network, there are 3 routers which have to be connected. Remember that a router's function is to connect 2 or more networks together. So, to connect the routers, we need to create 3 networks; one between each router and its neighbor.

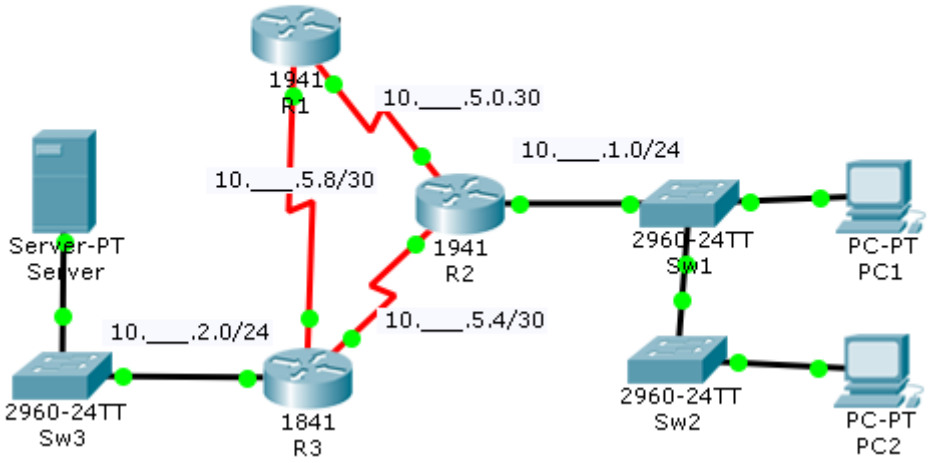

Figure 1: Network

Subnetting

Initially, I was confused why we were using the subnet mask of 255.255.255.252 until I realized that this is a /30 mask in **CIDR** notation. I prefer CIDR notation because it makes the math easier.

- What is a subnet mask anyways?

  A subnet mask is a way to determine the **Network Address** for any given host address. If we use the mathematical & operation on a host IP with the subnet mask, we get that host's network address. Since each interface on a router is assigned to a certain network, it knows which interface to route traffic over based on the destination address *AND*ed with the mask.

	Octet 1	Octet 2	Octet 3	Octet 4	Decimal
IP	00001010	00100111	00000101	00000001	10.39.5.1
Mask	11111111	11111111	11111111	11111100	255.255.255.252

	Octet 1	Octet 2	Octet 3	Octet 4	Decimal
Network	00001010	00100111	00000101	00000000	10.39.5.0

	Octet 1	Octet 2	Octet 3	Octet 4	Decimal
IP	00001010	00100111	00000101	00000101	10.39.5.5
Mask	11111111	11111111	11111111	11111100	255.255.255.252
Network	00001010	00100111	00000101	00000100	10.39.5.4

	Octet 1	Octet 2	Octet 3	Octet 4	Decimal
IP	00001010	00100111	00000101	00001010	10.39.5.10
Mask	11111111	11111111	11111111	11111100	255.255.255.252
Network	00001010	00100111	00000101	00001000	10.39.5.8

1. Maximum subnet mask is 32
2. Subtract our 30 subnet mask
3. 2 bits are left over.
4. 2 bits gives us 2^2 or 4 IP addresses
5. There are 4 addresses per subnet
6. Subtract 2 from 4
   - 1 for Network Address
   - 1 for Broadcast Address
7. We are left with only 2 **host** addresses per subnet
8. Assign one of these host addresses to each router on the network.

Network	Hosts	Broadcast
10.39.5.0	10.39.5.1 - 10.39.5.2	10.39.5.4
10.39.5.4	10.39.5.5 - 10.39.5.6	10.39.5.7
10.39.5.8	10.39.5.9 - 10.39.5.10	10.39.5.11