



Lecture (08) Internetwork Layer (2)

By:
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Agenda

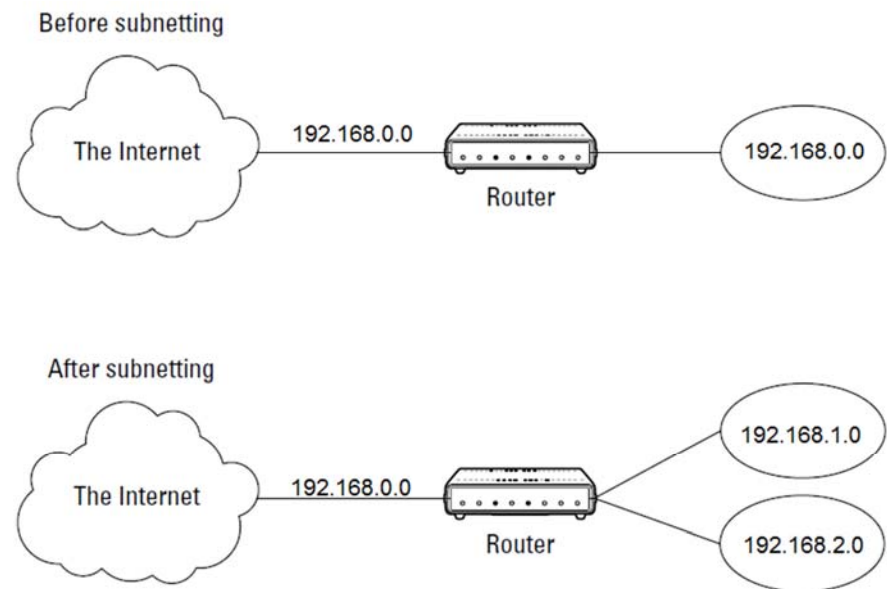
- Sub-netting
- Subnet masks

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Subnetting

- A *subnet* is a network that falls within a Class A, B, or C network.
- Subnets are created by using one or more of the Class A, B, or C host bits to extend the network ID.
- Thus, instead of the standard 8-, 16-, or 24-bit network ID, subnets can have network IDs of any length.
- Following Figure shows an example of a network before and after subnetting has been applied.
- In the unsubnetted network, the network has been assigned the Class B address 192.168.0.0.
- All the devices on this network must share the same broadcast domain.

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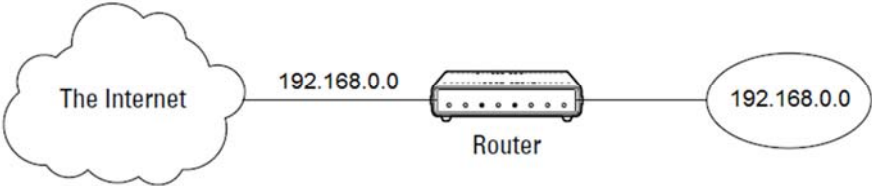
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Subnet masks

- In the second network, the first four bits of the host ID are used to divide the network into two small networks, identified as subnets 16 and 32.
- To the outside world (that is, on the other side of the router), these two networks still appear to be a single network identified as 192.168.0.0.
- For example, the outside world considers the device at 192.168.1.2 to belong to the 192.168.0.0 network.
- As a result, a packet sent to this device will be delivered to the router at 192.168.0.0.
- The router then considers the subnet portion of the host ID to decide whether to route the packet to subnet 1 or subnet 2.

- For subnetting to work, the router must be told which portion of the host ID should be used for the subnet network ID.
- That is accomplished by using another 32-bit number, known as a *subnet mask*.
- Those IP address bits that represent the network ID are represented by a 1 in the mask, and those bits that represent the host ID appear as a 0 in the mask.

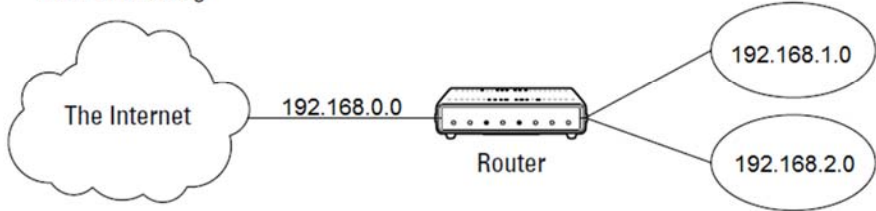
Before subnetting



- Subnet mask here

11111111	11111111	00000000	00000000
255	255	0	0

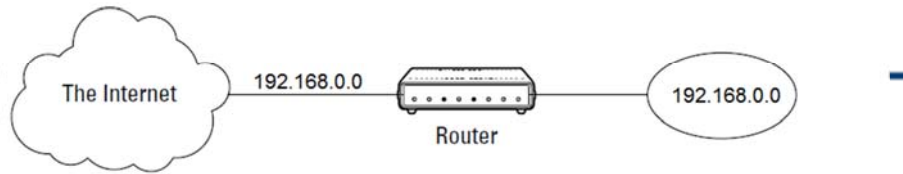
After subnetting



Router	11111111	11111111	11111100	00000000
	255	255	252	0

PCs	11111111	11111111	11111100	00000000
	255	255	252	0

Before subnetting

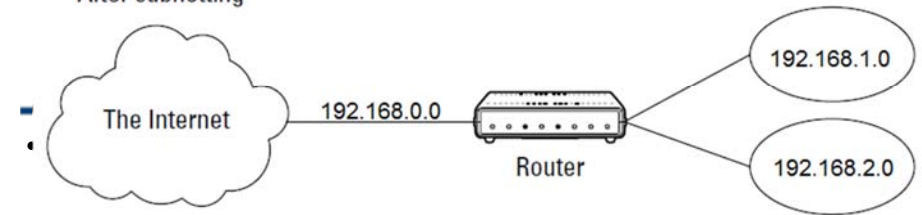


Router	IP	192	168	0	1
		11000000	10101000	00000000	00000001
	Subnet Mask	11111111	11111111	00000000	00000000
		255	255	0	0
	Network IP	192	168	0	0

PC1	IP	192	168	0	2
		11000000	10101000	00000000	00000010
	Subnet Mask	11111111	11111111	00000000	00000000
		255	255	0	0
	Network IP	192	168	0	0

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After subnetting



Router	IP	192	168	0	1
		11000000	10101000	00000000	00000001
	Subnet Mask	11111111	11111111	11111100	00000000
		255	255	252	0
	Network IP	192	168	0	0

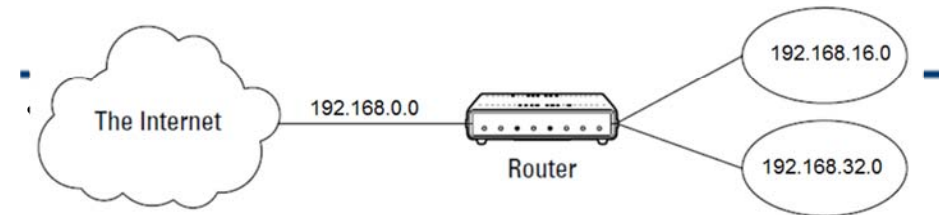
PC1	IP	192	168	1	1
		11000000	10101000	00000001	00000001
	Subnet Mask	11111111	11111111	11111100	00000000
		255	255	252	0
	Network IP	192	168	0	0

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PC2	IP	192	168	2	1
		11000000	10101000	00000010	00000001
	Subnet Mask	11111111	11111111	11111100	00000000
		255	255	252	0
	Network IP	192	168	0	0

Example 01

Class B

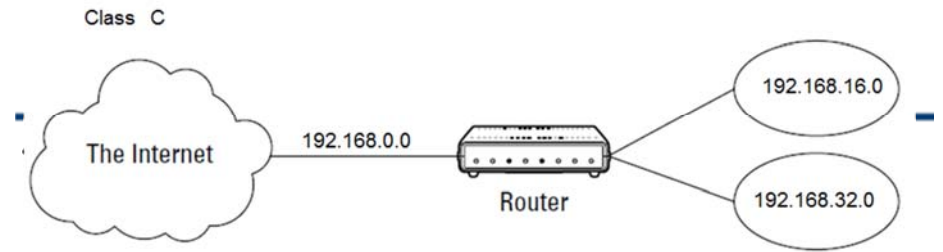


Router	IP	192	168	0	1
		11000000	10101000	00000000	00000001
	Subnet Mask	11111111	11111111	00000000	00000000
		255	255	0	0
	Network IP	192	168	0	0

PC1 in sub network 1	IP	192	168	16	1
		11000000	10101000	00010000	00000001
	Subnet Mask	11111111	11111111	00000000	00000000
		255	255	0	0
	Network IP	192	168	0	0

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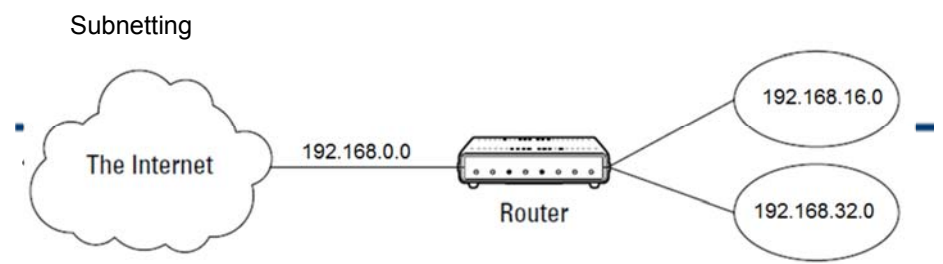
•PC2 PC1 in sub network 2	IP	192	168	32	1
		11000000	10101000	00100000	00000001
	Subnet Mask	11111111	11111111	00000000	00000000
		255	255	0	0
Network IP	192	168	0	0	



Router	IP	192	168	0	1
		11000000	10101000	00000000	00000001
	Subnet Mask	11111111	11111111	11111111	00000000
		255	255	255	0
Network IP	192	168	0	0	

PC1	IP	192	168	16	1
		11000000	10101000	00010000	00000001
	Subnet Mask	11111111	11111111	11111111	00000000
		255	255	255	0
Network IP	192	168	16	0	

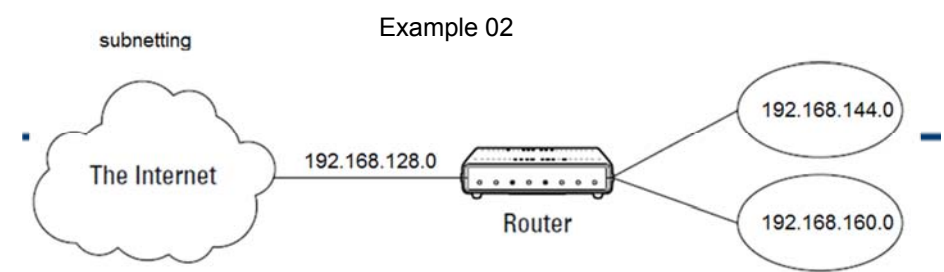
•PC2	IP	192	168	32	1
		11000000	10101000	00100000	00000001
	Subnet Mask	11111111	11111111	11111111	00000000
		255	255	255	0
Network IP	192	168	32	0	



Router	IP	192	168	0	1
		11000000	10101000	00000000	00000001
	Subnet Mask	11111111	11111111	11000000	00000000
		255	255	192	0
Network IP	192	168	0	0	

PC1	IP	192	168	16	1
		11000000	10101000	00010000	00000001
	Subnet Mask	11111111	11111111	11000000	00000000
		255	255	192	0
Network IP	192	168	0	0	

•PC2	IP	192	168	32	1
		11000000	10101000	00100000	00000001
	Subnet Mask	11111111	11111111	11000000	00000000
		255	255	192	0
Network IP	192	168	0	0	



Router	IP	192	168	128	1
		11000000	10101000	10000000	00000001
	Subnet Mask	11111111	11111111	11000000	00000000
		255	255	192	0
Network IP	192	168	128	0	

PC1 on sub network 1	IP	192	168	144	1
		11000000	10101000	10010000	00000001
	Subnet Mask	11111111	11111111	11000000	00000000
		255	255	192	0
Network IP	192	168	128	0	

PC2 on sub network 2	IP	192	168	160	1
		11000000	10101000	10100000	00000001
	Subnet Mask	11111111	11111111	11000000	00000000
		255	255	192	0
Network IP	192	168	128	0	

