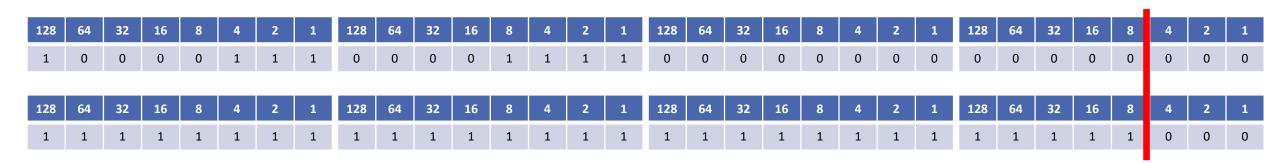
Subnetting Large Networks

Let's say we've been allocated Class B 135.15.0.0/16

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1



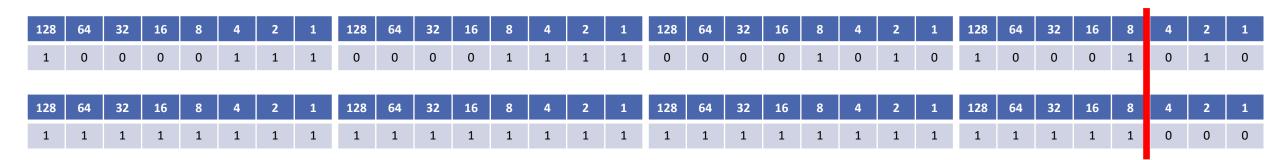
Example 1 – Class B on 4th Octet



- If we subnet this into /29 subnets, we have 3 bits for host addressing.
- This allows 6 hosts per network (2³ 2), the same as if we used /29 with a Class C address.
- Because we were allocated a Class B /16 address range, we have 13 bits for network addresses
- This allows 8192 subnets (2¹³)



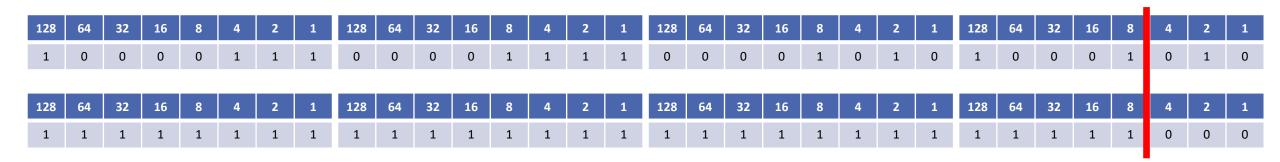
Example 1 – Class B on 4th Octet



- For the IP address 135.15.10.138/29, what is the network address, broadcast address, and range of valid IP addresses?
- Pause the video and provide the answer



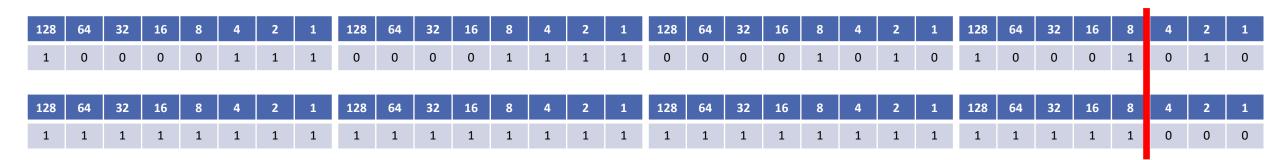
Example 1 – Class B on 4th Octet



- For the IP address 135.15.10.138/29, what is the network address, broadcast address, and range of valid IP addresses?
- The line is after the 8, so the network address goes up in multiples of 8
- Network address = 135.15.10.136
- Next network address = 135.15.10.144
- Broadcast address = 135.15.10.143
- Valid host addresses = 135.15.10.137 to 142



The Magic Number Method – Example 1



- For the IP address 135.15.10.138/29, what is the network address, broadcast address, and range of valid IP addresses?
- The subnet mask is 255.255.255.248
- Subtract the value in the subnetted octet from 256: 256 248 = 8
- The network address goes up in multiples of 8
- Network address = 135.15.10.136
- Next network address = 135.15.10.144
- Broadcast address = 135.15.10.143
- Valid host addresses = 135.15.10.137 to 142



Example 2A – Class A on 4th Octet

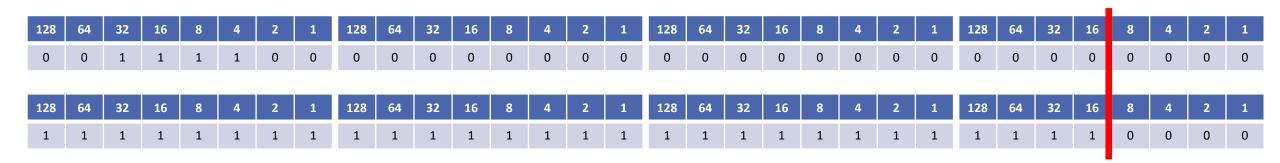
For this example we're allocated Class A 60.0.0.0/8

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- If we apply the subnet mask 255.255.255.240, how many subnets do we have and how many hosts per subnet?
- Pause the video and calculate the answer



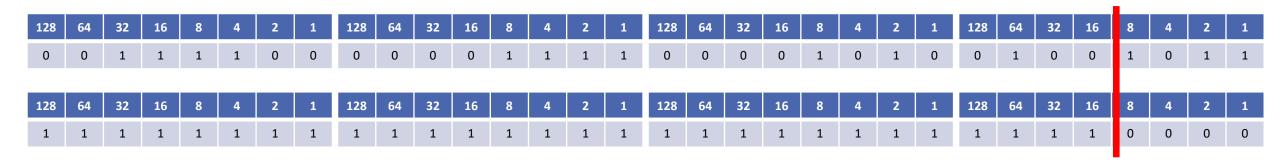
Example 2A – Class A on 4th Octet



- 255.255.255.240 subnet mask is /28
- 14 hosts per network (2⁴ 2)
- Because we were allocated a Class A /8 address range, we have 20 bits for network addresses
- This allows 1,048,576 subnets (2²⁰)



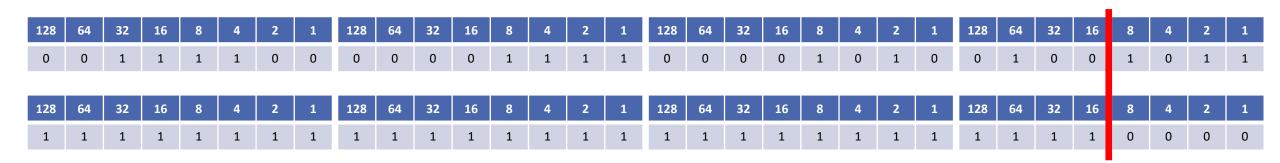
Example 2B – Class A on 4th Octet



- For the IP address 60.15.10.75/28, what is the network address, broadcast address, and range of valid IP addresses?
- Pause the video and provide the answer



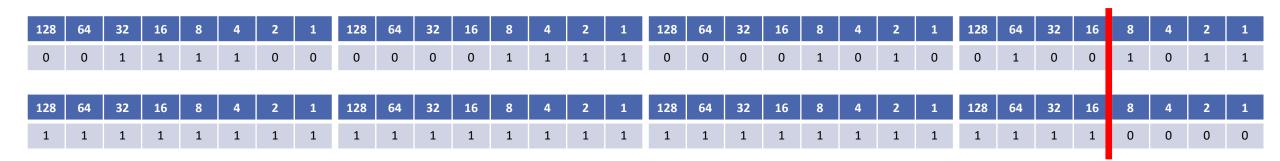
Example 2B – Class A on 4th Octet



- For the IP address 60.15.10.75/28, what is the network address, broadcast address, and range of valid IP addresses?
- The line is after the 16, so the network address goes up in multiples of 16
- Network address = 60.15.10.64
- Next network address = 60.15.10.80
- Broadcast address = 60.15.10.79
- Valid host addresses = 60.15.10.65 to 78



The Magic Number Method – Example 2B



- For the IP address 60.15.10.75/28, what is the network address, broadcast address, and range of valid IP addresses?
- The subnet mask is 255.255.255.240
- Subtract the value in the subnetted octect from 256: 256 240 = 16
- The network address goes up in multiples of 16
- Network address = 60.15.10.64
- Next network address = 60.15.10.80
- Broadcast address = 60.15.10.79
- Valid host addresses = 60.15.10.65 to 78

