



## Destination Multicast MAC Address Calculation

When a multicast frame is sent onto a LAN, the destination MAC address is derived for the multicast group destination address.

The lower 23 bits of the multicast destination IP address replace the lower 23 bits of the reserved MAC 0100.5E00.0000 (in this address, the eight bit is a 1 and this represents a multicast address).

Here is an example of how it is calculated using the multicast group 236.157.54.31 ...

Multicast Group Destination IP Address	Decimal			236	157	54	31
	Hex			EC	9D	36	1F
	Binary			11101100	10011101	00110110	00011111
Reserved Multicast MAC Address	Hex	01	00	5E	00	00	00
	Binary	00000001	00000000	01011110	00000000	00000000	00000000
Destination Multicast MAC Address	Binary	00000001	00000000	01011110	00011101	00110110	00011111
	Hex	01	00	5E	1D	36	1F

The resulting MAC is 0100.5E1D.361F.

This is will over lap with 32 other Class D multicast destination addresses... by why?

If the exercise is repeated using 238.29.54.31 we can see why....



Multicast Group Destination IP Address	Decimal			238	29	54	31
	Hex			EE	1D	36	1F
	Binary			11101110	00011101	00110110	00011111
Reserved Multicast MAC Address	Hex	01	00	5E	00	00	00
	Binary	00000001	00000000	01011110	00000000	00000000	00000000
Destination Multicast MAC Address	Binary	00000001	00000000	01011110	00011101	00110110	00011111
	Hex	01	00	5E	1D	36	1F

This too results in destination Multicast MAC of 0100.5E1D.361F.

By looking at the binary we can see what unique parts of the address will be overwritten

$$236.157.54.31 = \mathbf{11101100} \mathbf{10011101} \mathbf{0110110} \mathbf{00011111}_2$$

$$238.29.54.31 = \mathbf{11101110} \mathbf{00011101} \mathbf{00110110} \mathbf{00011111}_2$$

Both address start with **1110** since they are multicast (class D). So this is not unique.

The lower 23 bits (**0011101 00110110 00011111**) are not overwritten. So there is no loss in uniqueness here.

**The 24<sup>th</sup> to the 28<sup>th</sup> bits** are unique... however they are all zeroized when converting to the destination MAC address. So this is where the loss in uniqueness occurs.

There are  $2^5 = 32$  possible combinations of ones and zeros that can be entered into here. Any of these 32 different addresses will all map to the same Destination Multicast MAC address.

This is acceptable as the odds of an overlap occurring, and any overhead that results are minimal.