From IEEE 754 to decimal equivalent

In this example, given a number in the IEEE 754 format, we will see how we get the decimal equivalent

IEEE representation:
0000 0100 0000 0100 1001 0000 1001 0110

The IEEE 754 single precision representation includes

(a) 1 sign bit (MSB)
(b) 8 bits for the exponent. We use excess -127 here. That is, you ADD 127 to your exponent and store as a pure (unsigned) binary. When the number is re-created for use later, 127 will be subtracted from the exponent.
(c) 23 bits for the mantissa (i.e., the fractional part)

This is to enable us to represent numbers in the format $(-1)^s \times c \times b^q$
Where 's' is the sign bit, 'c' is the significand and 'q' is the exponent

Returning to our example,

(a) MSB is 0 -> sign bit => The number is positive
(b) The next 8 bits are 00001000 -> exponent => 8 – 127 = -119 (Note that -119 + 127 is +8)
(c) The next 23 bits are 000 0100 1001 0000 1001 0110 -> mantissa

Final result is
(-1)^(0) * 1.(mantissa) * 2^(exponent)
1.00001001001000010010110 * 2^(-119)

Note every digit to the right of the point represents a negative power of 2
Mantissa = 00001001001000010010110 = 2^-5 + 2^-8 + 2^-11 + 2^-16 + 2^-19 + 2^-21 + 2^-22
= 0.03566241264343261718 75

Final result is
(1 + 0.0356624126434326171875) * 2 ^ (-119) = 1.5582916 * 10 (-36)

So the representation above is for the number **1.5582916 * 10 (-36)**