How to compute time to receive a packet

1) Get the data. You need latency, size, and bandwidth.

2) Convert everything to a common set of units.

3) Apply the formula.

 TTR = Latency + Size/Bandwidth

4) Append the units to the answer. The answer is NEVER “1.54”, but it might be “1.54 ms”.

5) Sanity check. Does that answer make sense?

Notes:

 a kilobyte is always 1,024 bytes!

 a kilo is 1,024 (2^10) or 1,000. Thousand

 a mega is 1,048,576 (2^20) or 1,000,000. Million

 a giga is 1,073,741,824 (2^30) or 1,000,000,000 Billion

 a ms is 0.001 seconds (it’s 1000 milliseconds per second)

**Sample problems to try**

1) Size = 1000 bytes, Latency = 1 second, bandwidth = 1,000 bytes per second

2) Size = 1K bytes, Latency = 0.5 ms, bandwidth = 10 megabits/second

3) Size = 17,000 bytes, Latency = 0.01 seconds, bandwidth = 42 megabits/second

**Example Problem**

1) Get data.

L = 0.5ms, S = 1,300 bytes, bandwidth = 10 megabits/second

2) Convert to common units. I pick bits and ms.

L = 0.5ms (Already in ms)

S = 1,300 bytes

S = 8 \* 1300 = 10,400 bits (8 bits per byte)

B = 10 megabits per second

B = 10,000,000 bits per second (each megabit is 1,000,000 bits)

B = 10,000 bits per ms (each ms is 0.001 seconds)

3) Apply formula

 TTR = Latency + Size/Bandwidth

 = 0.5ms = (10,400 bits / 10,000 bits per ms)

 = 0.5ms + 1.04 ms

 = 1.54 ms

4) Add units. So 1.54 milliseconds

5) Sanity check. Could be. Not crazy like 300 seconds or 0.00000000000000001 seconds.

**Example problem:**

1) get data

L = 20 ms, S = 10K bytes, B = 1 gigabit per second

2) Convert to a common set of units. I pick bits and ms.

L = 20ms (already in ms)

S = 10K bytes

S = 10 \* 1024 bytes = 10240 bytes (each K is 1024 bytes)

S = 8 \* 10240 bits = 81920 bit (each byte is 8 bits)

B = 1 gigabit per second

B = 1,000,000,000 bits/second (because each gigabit is 1,000,000,000 bits)

B = 1,000,000 bits/ms (ms is 0.001 seconds)

3) Apply formula

 TTR = L + Size/Bandwidth

 = 20 + 81920 / 1,000,000

 = 20 + 0.081920

 = 20.081920

4) Add units. 20.081920 ms

5) Sanity check. Could be. Not crazy like 300 seconds or 0.00000000000000001 seconds.