

Bits per second to packets per second converter

Written by Alexei Spirin

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Hi there! How is it going? Sometimes, when we talk about device performance we are talking in terms of packets per second (pps) and bits per second (bps). But in latter case it's not quite correct to say "this device can do one hundred megabits per second" because router/switch/whatever performance is greatly depends on packet size and if you want to mention device performance in a more accurate and professional way you would say "this device can do one hundred megabits per second at 64 bytes packet size"

Often vendors such as our favorite Cisco specify device performance as packets per second, so we don't need to bother about packet size mentioning because pps is rather a characteristic of device's (processor, bus, ASICs) computing power. Packets per second more or less still the same with different packets size. But it is not very convenient to deal with pps in a real life because we have to know "real" device performance in our network. So we have to do two things:

1) Determine the average packet size which is specific for our network. For example traffic profile for our network could be 30% ftp-data (large packet at 1500 bytes) and 70% VoIP-data (a lot of small packets at 64 bytes) so our average packet size is about 800 bytes.

2) Calculate with simple formula how much there will be Megabits per second (Mbps) if our average packet size is 800 bytes and device performance is, lets say, 100 kpps (one hundred thousand of packets per second)

The second step is not a big deal for a real professional, but we live in 21st century, aren't we? Unfortunately I didn't found any bps to pps converter/calculator anywhere online so I decided to make it myself (though I'm not a programmer).

Although converter is mathematically correct (I hope ;) I'm not sure it's fair to use it as an "exact throughput" reference. As I said before device performance is greatly depends on packet size, but this dependency is not quit linear one.

For example as pretty old [cisco document](#) says FWSM performance at 64-byte packet size and 2.84Mpps is about 1.3Gbps. If we would recalculate 2.84Mpps with 1500 bytes per packet we should get about 30Gbps throughput which is not true. FWSM throughput is about 5.5Gbps at 1400 bytes packet length. So, clearly some additional inspections made for a greater payload.

The hand-made not state of the art quick and dirty [bits per second to packets per second converter](#) can be found at CCIEVault Tools page. Feel free to advice me on any improvements I can make on this tool.

P.S. There is one more thing I need to say. There are at least three well know packet size: the least one - 64 bytes (toughest case for device, usually referred with router/switch performance), the biggest one 1500 bytes (sometimes 1400 bytes) usually referred with firewall/VPN performance and the so-called "real" one - [IMIX](#) at 427 bytes, which represents an average

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packet size somewhere in the Internet (but I saw values in between 300-900 bytes)

UPD: Well, there is some discussion going on in comments for some time already about whether 1Kilobit is 1000 or 1024 bits. Well, I have to say that I spent some time trying to find out a *true and ultimate* answer. I found none. Most people (network professionals) I asked answered with 1024. The smartest of them (and those who aren't lazy enough to visit wikipedia) answered with 1000. Does that mean that smart guys are closer to the truth? Doubt it :). Because I'm looking not for a smart answer, but for a practical one. And the answer is inside network software and hardware. And who said that those programmers who write code for routers and switches are smart (check [this](#) and search for *kilobit*)? :P :D So the only way to find it out is to check how bits are converted to kilobits by the network devices. Any ideas?

Till then I have 1Kbps == 1024bits in my formula. If you aren't agree just use bits in calculation, than convert to Kbps and Mbps the way you like :)