ENERGY STAR Program Requirements For Small Network Equipment

Sample Calculations

Example Calculations of P_{AVG_MAX} in Eligibility Criteria

Note: W = watts in the all examples below.

Product 1: Integrated Access Device (IAD) with a DOCSIS 3.0 Cable WAN connection and the following LAN connections:

1. Four Gigabit Ethernet ports
2. Dual-band simultaneous wireless access point using three receive streams of 5GHz 802.11ac and two receive streams of 2.4GHz 802.11n

Base Cable IAD allowance (P_{BASE})	6.1W
Four Gigabit Ethernet ports	1.2W (4 x 0.3W)
Base Wi-Fi capability	0.7W
3 receive streams of 5Ghz 802.11ac	3.9W (3 x 1.3W)
2 receive streams of 2.4GHz 802.11n	0.4W (2 x 0.2W)
Total (P_{AVG_MAX})	**12.3W**

Product 2: Eight port Gigabit Ethernet Switch with Energy Efficient Ethernet (EEE) capability on all ports:

Base Switch allowance (PBASE)	0.6W
Eight EEE capable Gigabit Ethernet ports	4.0W [8 x (0.3W+0.2W)]
Total (P_{AVG_MAX})	**4.6W**

Product 3: IAD with a VDSL WAN connection and the following LAN connections:

1. Four EEE capable Gigabit Ethernet ports
2. Dual-band simultaneous wireless access point using three receive streams of 5Ghz 802.11n and two receive streams of 2.4Ghz 802.11n

Base VDSL IAD allowance (PBASE)	7.5W
Four EEE capable Gigabit Ethernet Ports	2.0W [4 x (0.3W+0.2W)]
Five receive streams of 802.11n	1.0W (5 x 0.2W)
Total (P_{AVG_MAX})	**10.5W**

Additional Explanation and Examples of Section 7.1.A of the Test Method

Supporting Material:

Equation 1

$$DataRate = Z \times 10^{Y} \quad \text{(in bits per second)}$$

Where:

- *Z is 1, 2, or 5, and*
- *Y is an integer. Adjust as required to achieve the desired data rate*

Table 1: Test Rate Selection

Direction	Rate (Mb/s)								
Downlink or Symmetric link	1.0	2.0	5.0	10	20	50	100	200	500
Uplink	0.5	1.0	2.0	5.0	10	20	50	100	200

Explanation of Equation 1: Equation 1 is a limiting equation for ensuring the data rate chosen is less than the maximum data rate throughput the UUT can support while also being a similar data rate to other similar UUTs which may have slightly different maximum throughputs. Had EPA chosen a straight percentage, that would have resulted in rewarding the lower performing UUT when comparing similar, but not identical devices. For example:

> If EPA required testing at 50% of the maximum throughput supported, a 50 Mbps router would have been tested at 25 Mbps while a similar 40 Mbps router would have been tested at 20 Mbps, which would give the 40 Mbps router a distinct advantage in testing if the products are same general class of device as seen by the consumer.

Using standard values also avoids having to determine maximum throughput with precision. Table 8 is provided as a convenience to show common values that result from Equation 1.

Example Calculations:

Example 1: Ethernet switch with theoretical maximum downlink throughput of 100 Mbps (which in this example achieves 95 Mbps in a lab setting). The tester can either:

1. Chose the next lowest downlink rate from Table 8 which is 50 Mbps, or;
2. Use Equation 1 to calculate the highest date rate possible that does not exceed 95 Mbps as follows:

   Data rate = $5*10^7$ where z = 5 and y = 7

Example 2: Router with a tested maximum downlink throughput of 1.4 Gbps. The tester should:

1. Use Equation 1 to calculate the highest data rate possible that does not exceed 1.4Gbps as follows:

   Data rate = $1*10^9$ where z = 1 and Y = 9