Wear-Leveling Mechanism-1

- **Flash written/erase cycles:**
  Generally the NAND type flash memory Guarantees 100000 written/erase cycles on each physical written/erase sector. Physical sector: Means the real sector on NAND flash device.

- **Logical sector:**
  The accessed unit by operating system (WINDOWS series, Linux…….etc). A logical sector size is 512byte.

- **A NAND type flash device without wear leveling algorithm might always program each logical sector to the same physical sector.**

- **For example: A 256MB NAND flash device writing 16Kbyte/sec data into the same physical sector on flash device. The life cycle (without wear leveling) will be as below:**

$$\text{Flash Disk Lifetime (Theory)} = \frac{100{,}000*0.95}{60*60*24} = 1.099 \text{ days}$$

Wear-Leveling Mechanism-2

- To avoid this happened our controller provide wear leveling function that will ensure the data being evenly writing onto flash device.
- Example : A 256MB flash device writing 16KB data onto flash device the formula as below: (With wear leveling).

$$\text{Flash Disk Lifetime (Theory)} = \frac{(256MB-0MB)*1024*100K*0.95}{(16KB/sec)*60*60*24} = 18{,}014 \text{ days}$$

- # The "0.95": After the flash being format the capacity might lower than the certain capacity.
- 1MB=1024KB
- # "60*60*24": 86400 writing times per day. 1 time /sec

- #"0MB": The size of your OS & AP. In this case we set it as "0"

- #"16KB/sec": The data size that writing onto flash device per second.
  If the data less than 16KB we recommend you still calculate it with 16KB.

- #"100,000": The limitation of flash memory's erase cycles.
- P.S. The above formula is an ideal condition, due each NAND flash device erase cycles may vary so the reality Flash Disk lifetime (Theory) need to times 0.7.
- Expected Flash Disk lifetime = Flash Disk lifetime (Theory) * 0.7