

# **MTBF**

*White Paper*

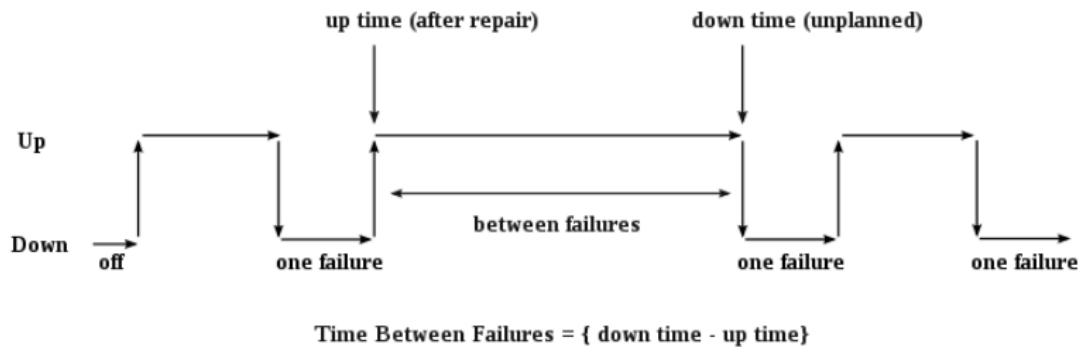
**February 20, 2009**

*Version 1.0*

## MTBF

### Overview

MTBF, stands for mean time between failures, is the average time between failures of hardware modules. It is the average time a manufacturer estimates before a failure occurs in a hardware module.



For each observation, downtime is the instantaneous time it went down, which is after the moment it went up, uptime. The difference (downtime - uptime) is the amount of time between these two events.

MTBF value prediction is an important element in the development of products. Reliability engineers or design engineers often utilize Reliability Software to calculate products' MTBF according to various methods/standards. The intent is to focus design efforts on the weak links in the design.

### MTBF prediction

Apacer's MTBF prediction adopts and complies with Bellcore analysis method 1. Assuming device failure rate can be generated by the sum of failure rates in each component, then a steady state failure rate can be expressed as below equation.

$$\lambda_{SS} = \pi_E \sum_{i=1}^m (Ni \lambda_{SSi})$$

$m$ : number of component types

$\lambda_{SS}$ : device failure rate at steady state

$Ni$ : quantity of  $i$  type component

$\lambda_{SSi}$ : failure rate for  $i$  type component at steady state

$\pi_E$ : device environment factor

### **Procedure of MTBF calculation**

1. Collect characteristic information of the product.
2. Prepare bill of material (BOM) and component specifications.
3. Analyze BOM and produce component parameters.
4. Determine calculation equation for every component.
5. Calculate failure rates of each component.
6. Generate product failure rate and MTBF.

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## Revision History

Revision	Date	Description	Remark
1.0	February 20, 2009	Official release	

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