

# Single Port Insertion Time

Considering System Aspects  
for IEEE 802.3af Standard Power over MDI  
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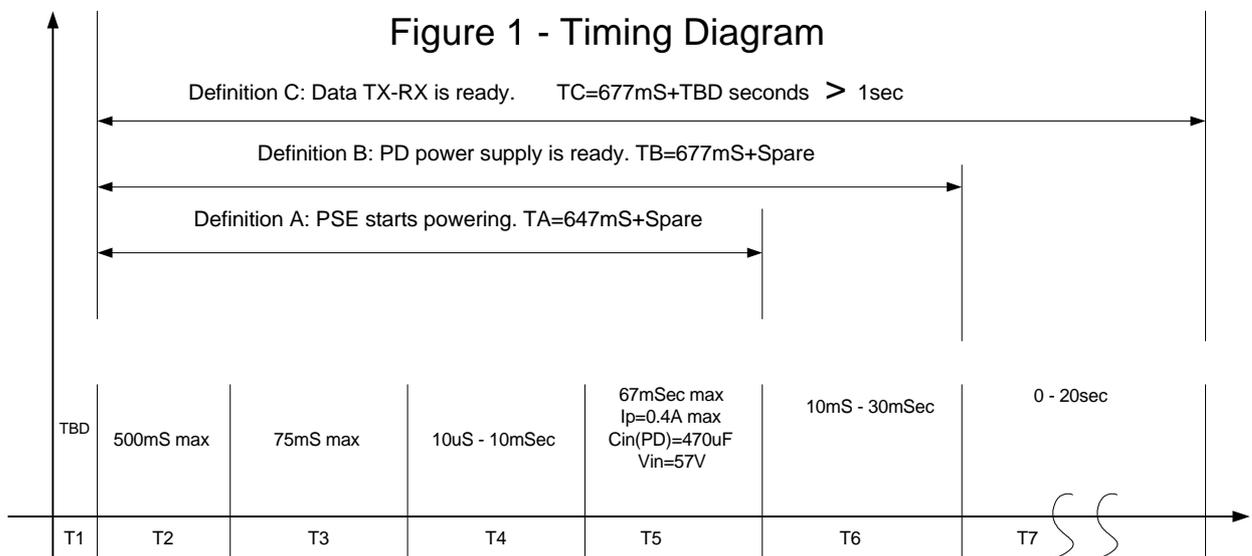
The attached document includes number of system aspects concerning timing information that is required in order to verify whether a single port insertion time can be specified to be 1sec max.

The information that we have received from the participants of May 2001 interim meeting was that a 1sec insertion time is desirable by the potential PD user and by the system design engineer.

The following assumptions are made in the following paragraph:

1. The Switch/Mid-Span is on and ready to support PD's.
2. The requirements are defined to a single port.
3. Effects of multi-port system on a single port are ignored.

Figure 1 illustrates the timing diagram tracking the time that the PD is inserted into the port until the PD is fully operational. In addition 3 possible definitions for single port insertion time are shown.



T1 = The time that the PD is inserted to port and the PSE initialize detection procedure  
T2 = Detection time  
T3 = Classification time  
T4 = PSE turn on time  
T5 = PD input capacitor Ramp time  
T6 = PD power supply startup time  
T7 = Data TX RX ready

## Comparison of the Above Definitions

Single port insertion time, or in short, insertion time may be defined by at least 3 options as can be seen from Figure 1.

### Definition A:

We measure the time from T1 to T5. During T5, we know that PSE port begins powering and all previous tasks have been completed successfully. It will take 647mS + TBD margin, which allows the total 1sec requirements to be met.

### Definition B:

We measure the time from T1 to T6. During T6, we know that the PD power supply is ready and its output voltage is within the operating range. T5 is the PD input cap ramping time. One potential problem might be raised with T5 if we want to allow the inrush current limit in the PD to utilize very low startup current. In this case, T5 can be very large for a very large capacitor and a very low inrush current setting. For example: For 100mA inrush current and 1000uF, the time needed to ramp up 44V is 440mS which makes the target of total time of 1sec marginal.

### Definition C:

Here the total time includes the initialization time of the hardware being fed by the PD power supply. T7 can be several seconds, making the 1sec target not practical to achieve.

## Conclusion:

A 1sec maximum for single port insertion seems to be within a sufficient margin for meeting other time dependent functions in the system if we choose Definition A.

In other words, we can specify single port insertion time as follows:  
For a system(Switch, Midspan) that is already operated, it is required that within 1 sec max from the time that a PD was connected to a port, the voltage at the port output or at the PD input will be between 44V to 57V.

(Assuming that the time required for a simple visual indication at the PD is negligible)