Application Note
Understanding OTDR Deadzones

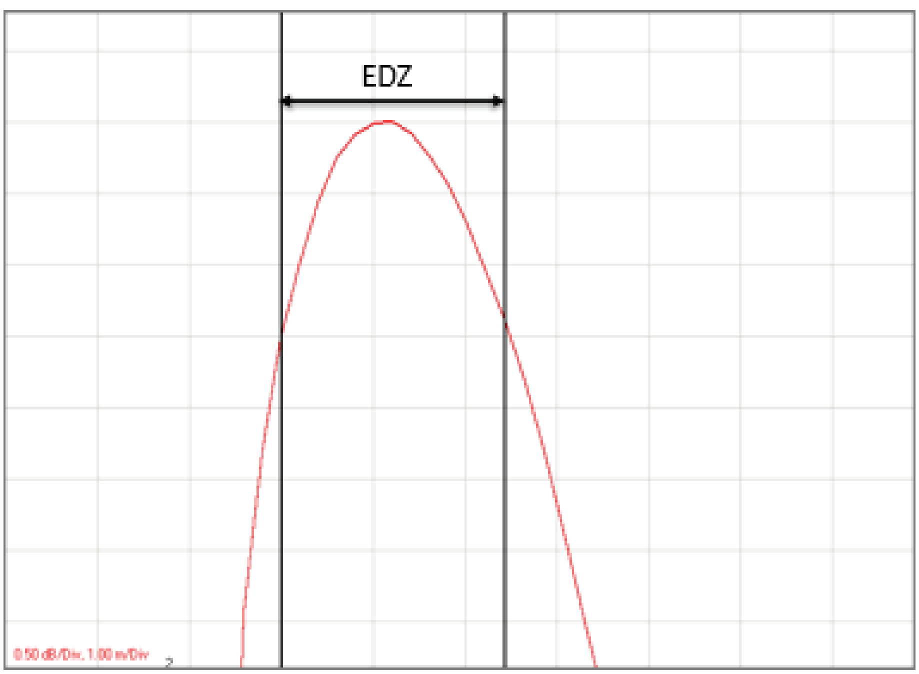
OTDR deadzones are due to:

- The probe pulse determines the deadzone. As the pulse width is set wider the deadzone gets longer.
- The nature of the reflectivity of the internal components of the OTDR.
- Crosstalk from the laser to the detector through the splitter.
- The deadzone is the result of light hitting the detector diode and temporarily blinding the detector from seeing any other reflections after the incident energy. The more intense the light energy the longer it will take for the detector to recover, which will cause a longer deadzone.
- Contaminated connectors are inherently reflective and will cause a reflection. The deadzone caused by this reflection will be proportional to the intensity of the reflection. Proper cleaning and inspection of connectors and bulkheads is imperative.

OTDR’s have an event deadzone and an attenuation deadzone.

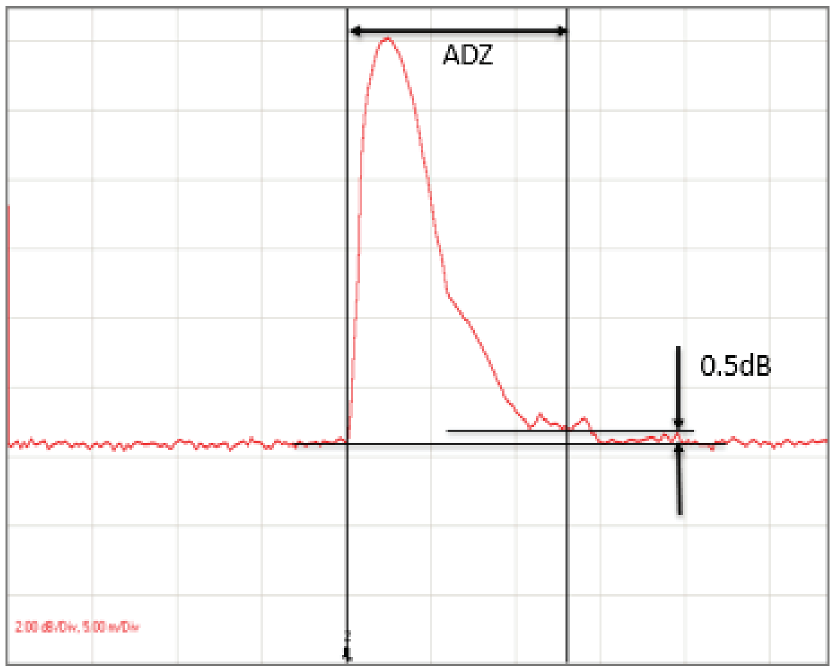
Event Deadzone

- Quoted at the narrowest pulse width.
- The ability of the OTDR to resolve between two reflective events (contaminated or damaged connectors).
- Measured at 1.5dB from the peak of the -45dB pulse.



Attenuation Deadzone

- Quoted at the narrowest pulse width.
- The ability of the OTDR to measure a non-reflective event (bad fusion splice) after a reflective event (contaminated or damaged connectors).
- Measured at 0.5dB from the noise floor of the -45dB pulse



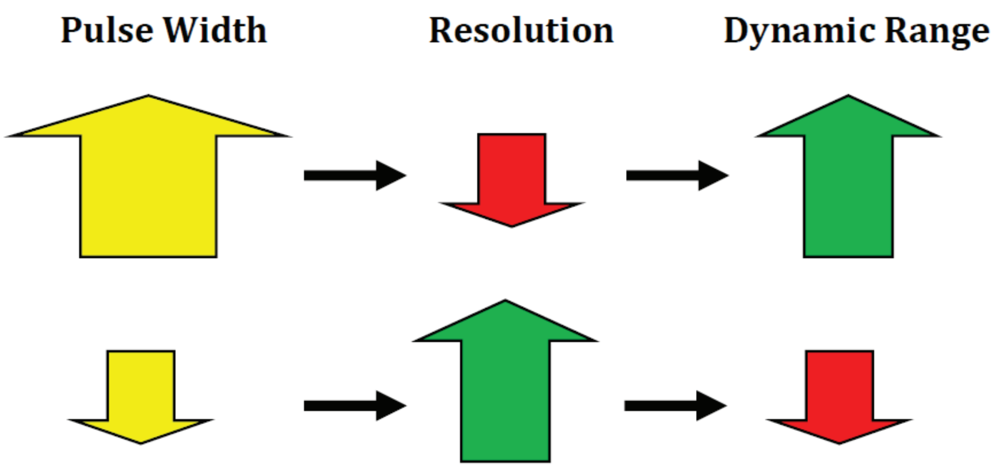
Deadzone Measurement Standards

- IEC specification states that the deadzones are to be measured with a pulse intensity of -45dB.
- Some manufacturers state that the pulse intensity is a non-saturating pulse rather than the -45dB standard. This will allow the detector to be able to recover faster because the detector diode was exposed to less light energy, thus yield a shorter deadzone specification.
- When less light hits the detector diode, less current flows and the diode is able to recover faster.

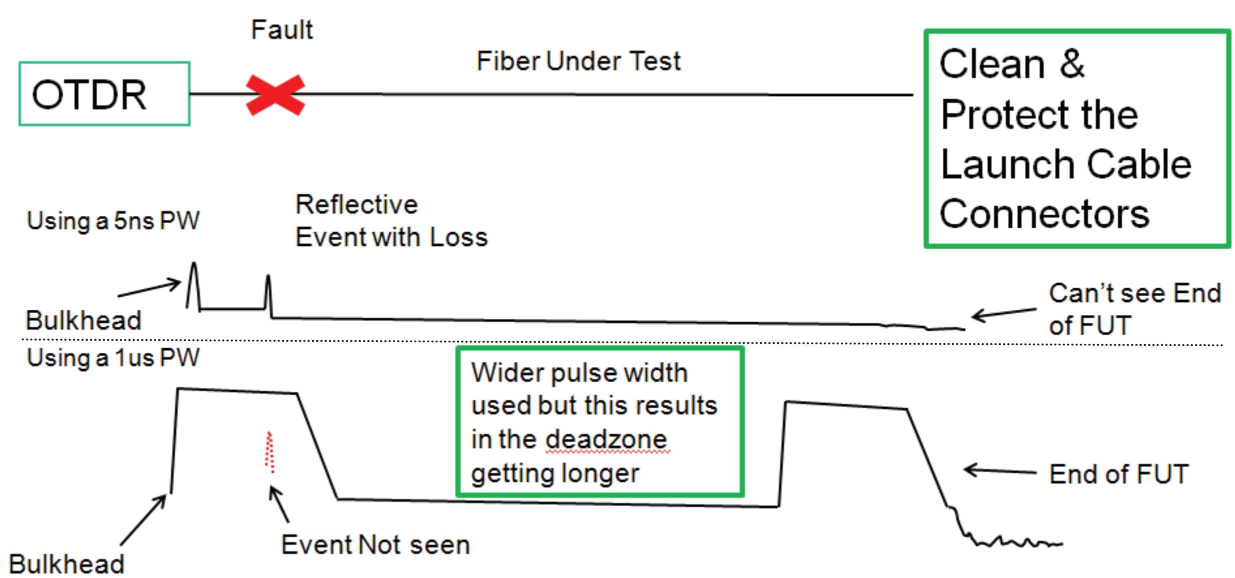
Remember: Very seldom is the OTDR used at the smallest pulse width!

Effects of Pulse Width Adjustments

- Increasing the pulse width increases the dynamic range of the OTDR, which means that there is more optical power injected into the fiber under test and allows the probe pulse to travel longer distances and through higher loss components. The resolution of the OTDR is reduced with wider pulse widths.
- A shorter pulse width improves the resolution but decreases the dynamic range which limits the maximum distance that the OTDR can measure.



Measurements with a short Pulse Width and a Long Pulse Width



Here you can see that with a 5ns pulse width the fault can be easily measured but the end of the fiber can't be seen. If a wider pulse width is used (1us) the fault can no longer be measured. This is because the event deadzone has become too long and the bulkhead and fault are now represented as one pulse.

Launch Cables

- Using a launch cable minimizes the effect of the OTDR deadzone.
- Refer to the application note **“Use of the LC-500 Launch Cables”.**

Summary

- The OTDR deadzones are quoted at the shortest pulse width and when measuring a standard -45dB reflector.
- The event deadzone is a measure of how well the OTDR can resolve between two reflective events.
- The attenuation deadzone is a measure of how well the OTDR can measure a non-reflective event after a reflective event.
- Make sure to clean and inspect all connections to minimize deadzones.
- Use a launch cable to minimize the effects of the OTDR deadzone.

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