FIBER OPTIC FIELD GUIDE

How to read an OTDR trace

An OTDR trace looks like a jagged line sloping down a graph. Once you know what the axes mean and how to spot the four things that show up on it, you can read a span in seconds. Here's the plain version.

Johnstone Technical Services · https://johnstonetechs.com/guides/read-otdr-trace

What the graph is showing

An OTDR fires pulses of light down the fiber and measures the light that scatters back. It plots that on two axes:

- Left to right = distance down the fiber, from the OTDR at 0 to the far end.
- Bottom to top = returned power in dB. Higher on the graph means more light coming back.

A healthy fiber shows a straight line sloping gently down from left to right. That downward slope is the fiber's natural attenuation: the longer the light travels, the less comes back. Everything interesting is a break in that smooth slope.

The four things you'll see

Almost everything on a trace is one of these:

1. A gradual downward slope (the fiber itself)

The steady diagonal line is the bare fiber. Its steepness is the attenuation in dB/km. A steeper-than-normal slope over a stretch can mean a stressed or bad section of cable.

2. A small step down (a splice)

A fusion splice shows as a small drop in the line with no spike. It loses a little light but doesn't reflect much. Good splices are tiny steps; a big step down is a high-loss splice worth investigating.

3. A spike up, then a step down (a connector)

A connector (or any glass-to-glass gap, like a mechanical splice) reflects light, so it shows a sharp spike up, then the line resumes lower. The spike height is the reflectance; the drop across it is the connector loss. A tall spike means a dirty or bad connector.

4. A big drop to the noise floor (the end of the fiber)

The fiber end is where the line falls off a cliff into the noise at the bottom. An open connector or a clean break shows a reflective spike there; a shattered or bent end may just drop with no spike.

Free in your browser: OTDR trace analyzer, splice matrix builder, fiber analysis, link loss calculator, and more at johnstonetechs.com.
Informational guidance; verify critical measurements against certified test equipment.

What it looks like on a real span

Here's the free OTDR Trace Viewer reading a real 78 km span at 1550 + 1625 nm. The A and B markers are dragged across the run to measure a section (62.449 km, 8.208 dB here), and the readout gives the headline result for the whole fiber.

The event table breaks the same span into every event it found. You can see the types right in it: the launch, the splices, a connector at 1.007 km, and the fiber sections between them, each with its per-wavelength loss and reflectance.

Dead zones: why the start looks blind

Right after a strong reflection (like the connector at the OTDR), the receiver is briefly overwhelmed and can't measure. That stretch is the dead zone, typically one to a few meters. It's why an OTDR struggles with very short links and why techs use a launch cable: it moves the dead zone off the fiber under test so the first real connector is visible.

Reading loss the right way: markers, not eyeballs

To measure the loss of a section, you place two markers (usually called A and B) on either side of it and read the dB difference. The OTDR (or a viewer) does the math. Loss across a single event, attenuation per km over a stretch, and total end-to-end loss are all just marker placements.

One thing that trips people up: pulse width. A long pulse sees far but blurs close events together; a short pulse resolves close events but doesn't reach as far. If two events look merged on a long-pulse shot, re-check them on a short-pulse (low ns) shot before calling it.

Read your own trace now

The fastest way to learn this is on a real trace. Open the free OTDR Trace Viewer, drop a .sor file in, and you'll see the waveform with every event marked, plus a table listing each one with its distance, loss, and reflectance. Drag the A/B markers to measure any section yourself. (New to the files? See how to open a .sor file.)