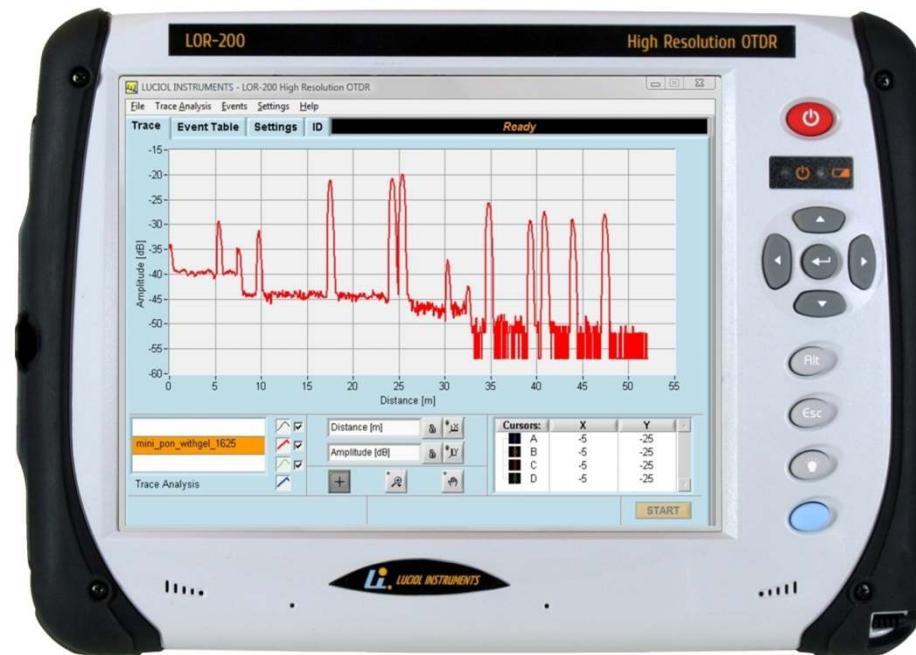


High Resolution OTDR for Optical Cable Characterization and Troubleshooting

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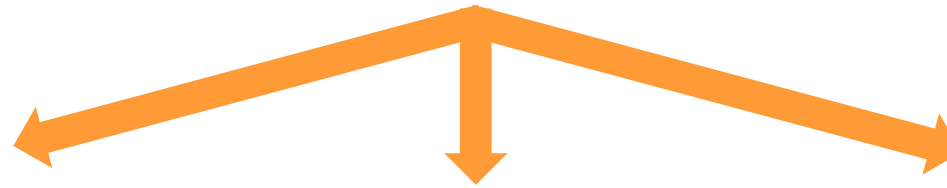
Presented at FOHEC,
Tuesday, May 18th, 2010

The ubiquitous optical fiber



Optical fibers can now be found everywhere!

Three ingredients are necessary for the adoption of fibers

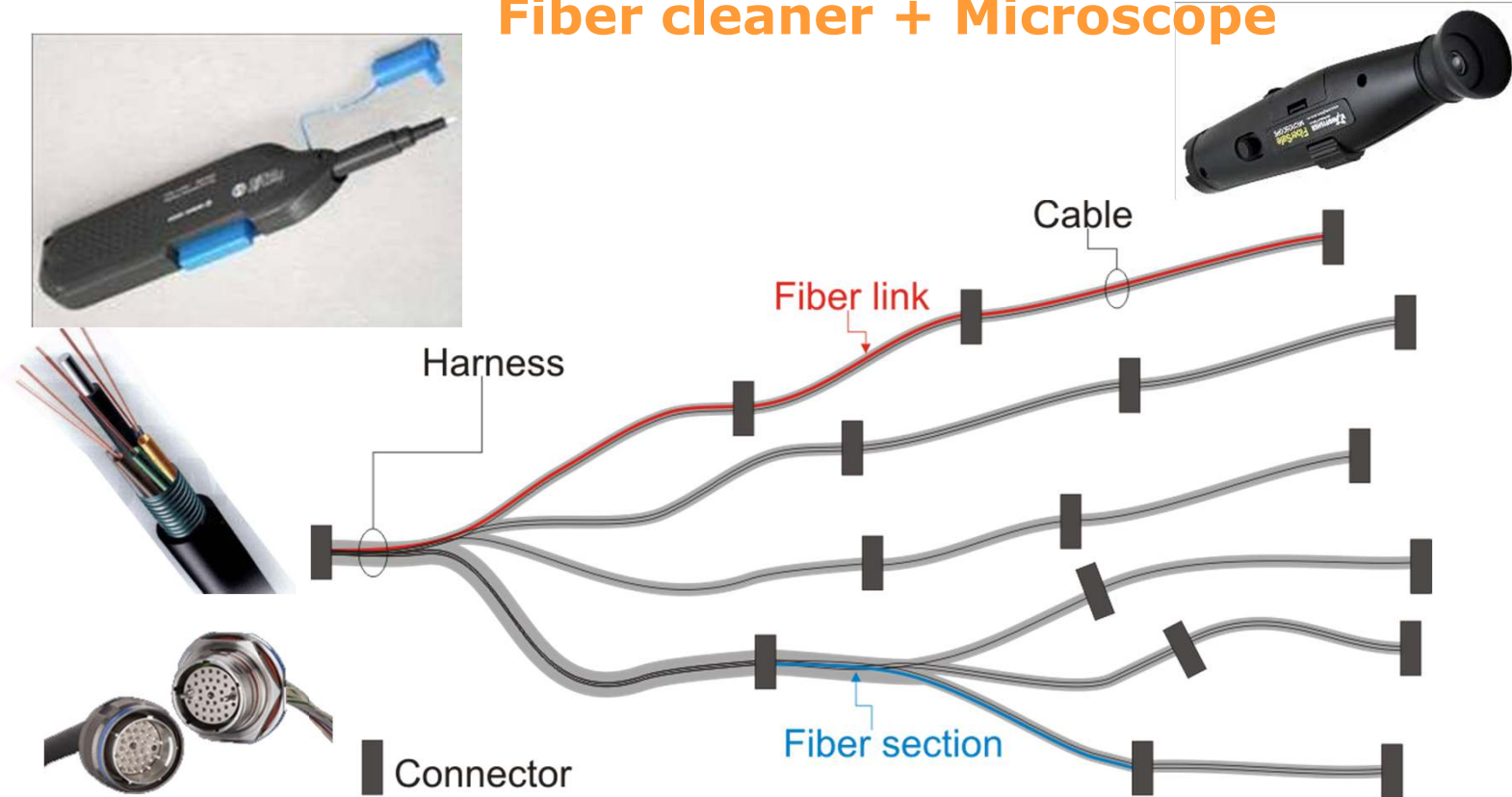


Manufacture	Test	Repair
Cables	Manufacture	Replace
Connectors	Installation	Splice
Transceivers	Maintenance	Field termination
...

Need suitable testing tools

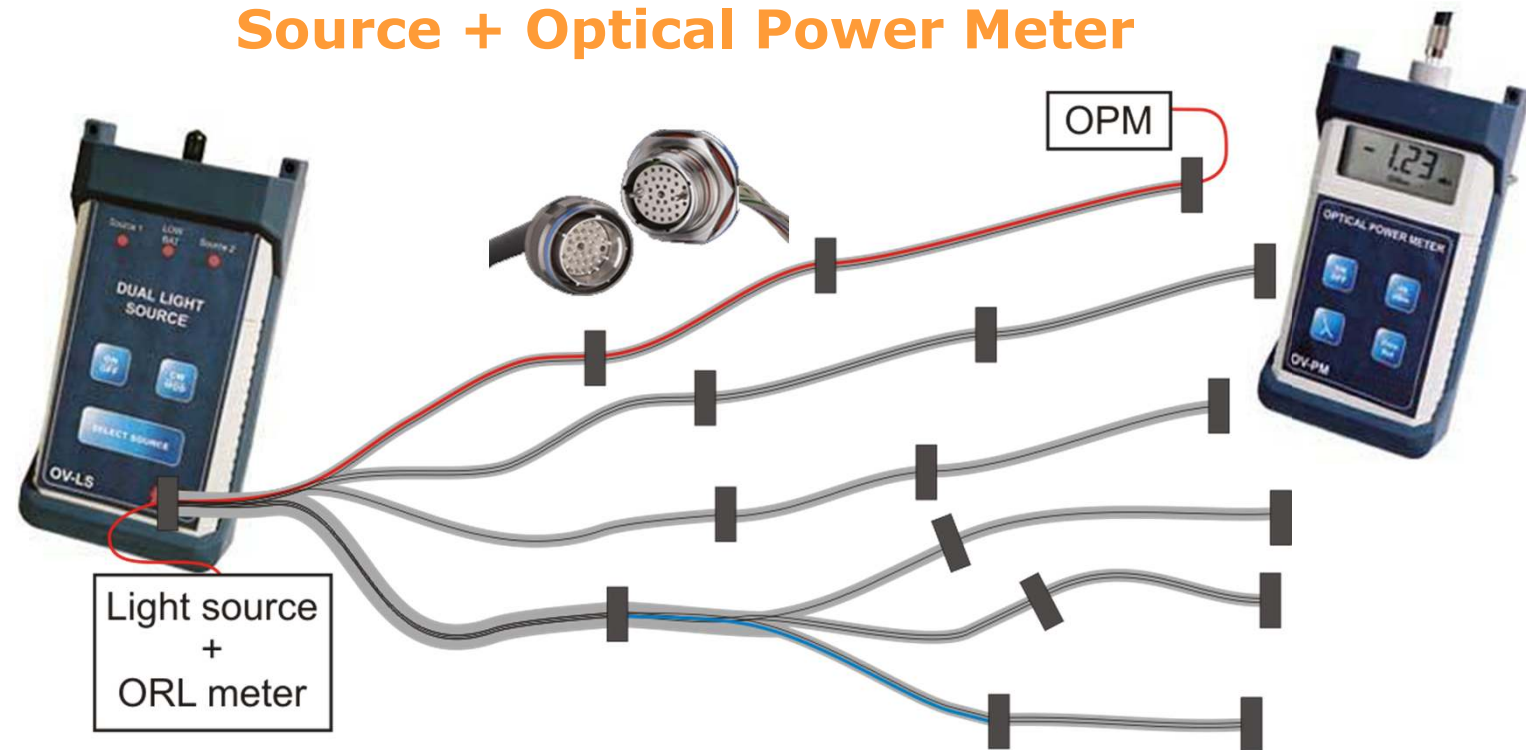
Inspection tools:

Fiber cleaner + Microscope



Building blocks: cables or harnesses assembled into networks
Optical units: fiber sections, assembled into fiber links

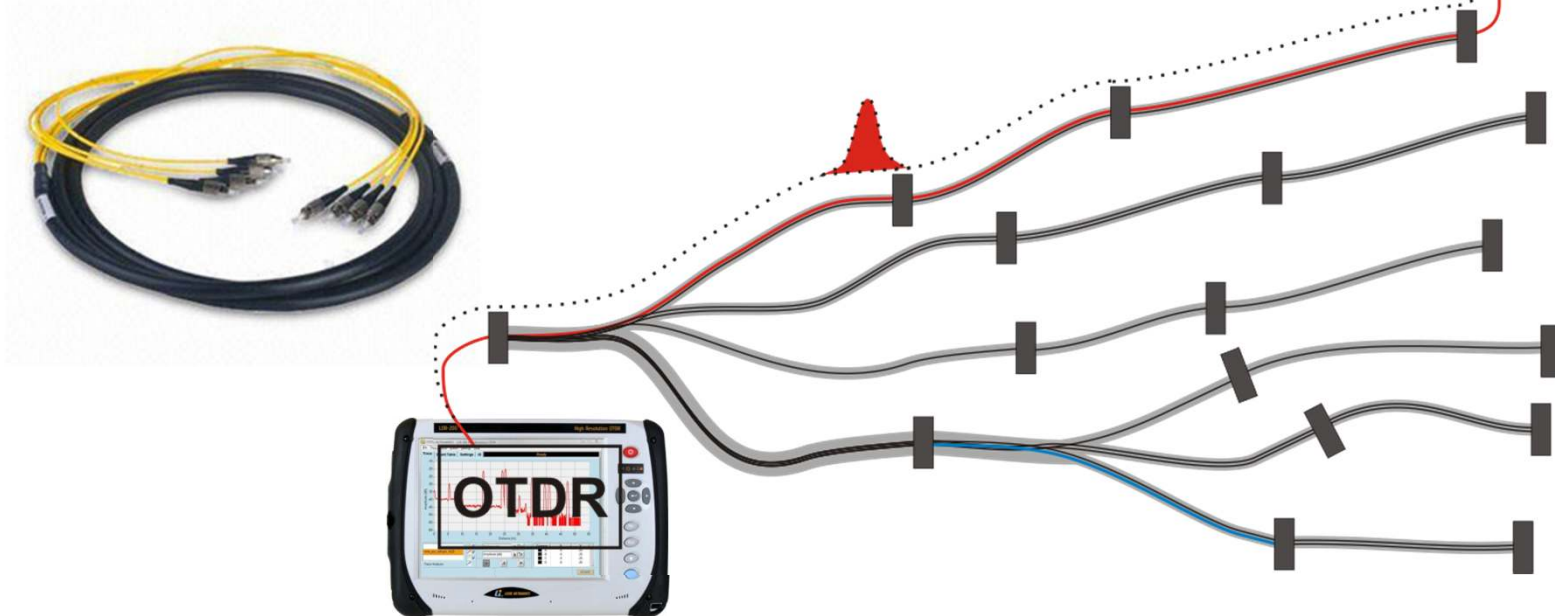
Global measurement tools: Source + Optical Power Meter



Limitations:

- Need 2 points of access (need to unplug the end)
- Only global analysis (link or section level)
- Time consuming for multi-sections
- ⚠ Need to open multi-fiber connectors (re-check all cables?)

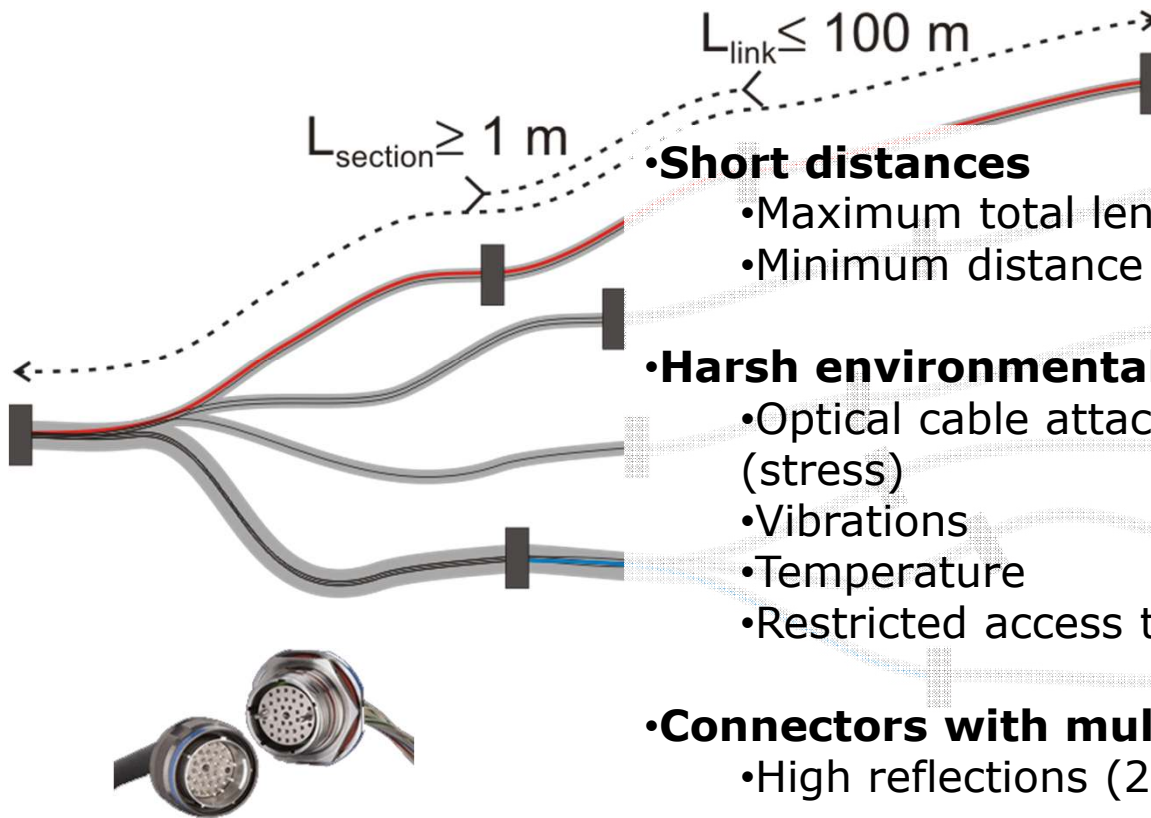
Local measurement tool: Optical Reflectometer



Advantages:

- Single ended measurement
- Characterizes whole fiber links
- Local analysis; see all events along the link, IL and RL of connectors, fiber bends, breaks...
- Can even see inside the Device Under Test (camera, IFE rack...)

Specific issues



•Short distances

- Maximum total length ≈ 100 m
- Minimum distance between connectors ≈ 1 m

•Harsh environmental conditions

- Optical cable attached to a moving structure (stress)
- Vibrations
- Temperature
- Restricted access to cable

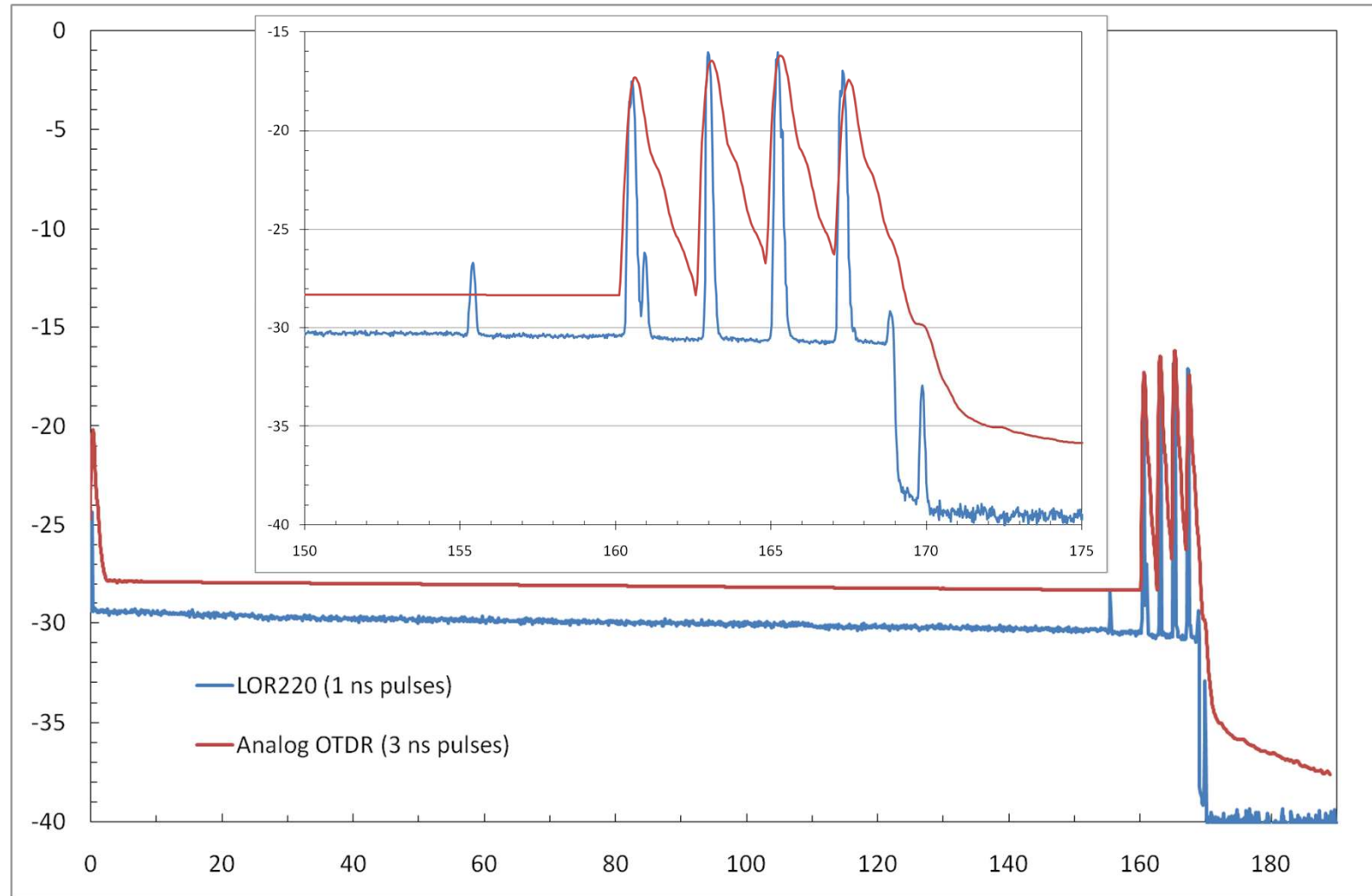
•Connectors with multiple fibers

- High reflections (20 dB ORL or even less...)

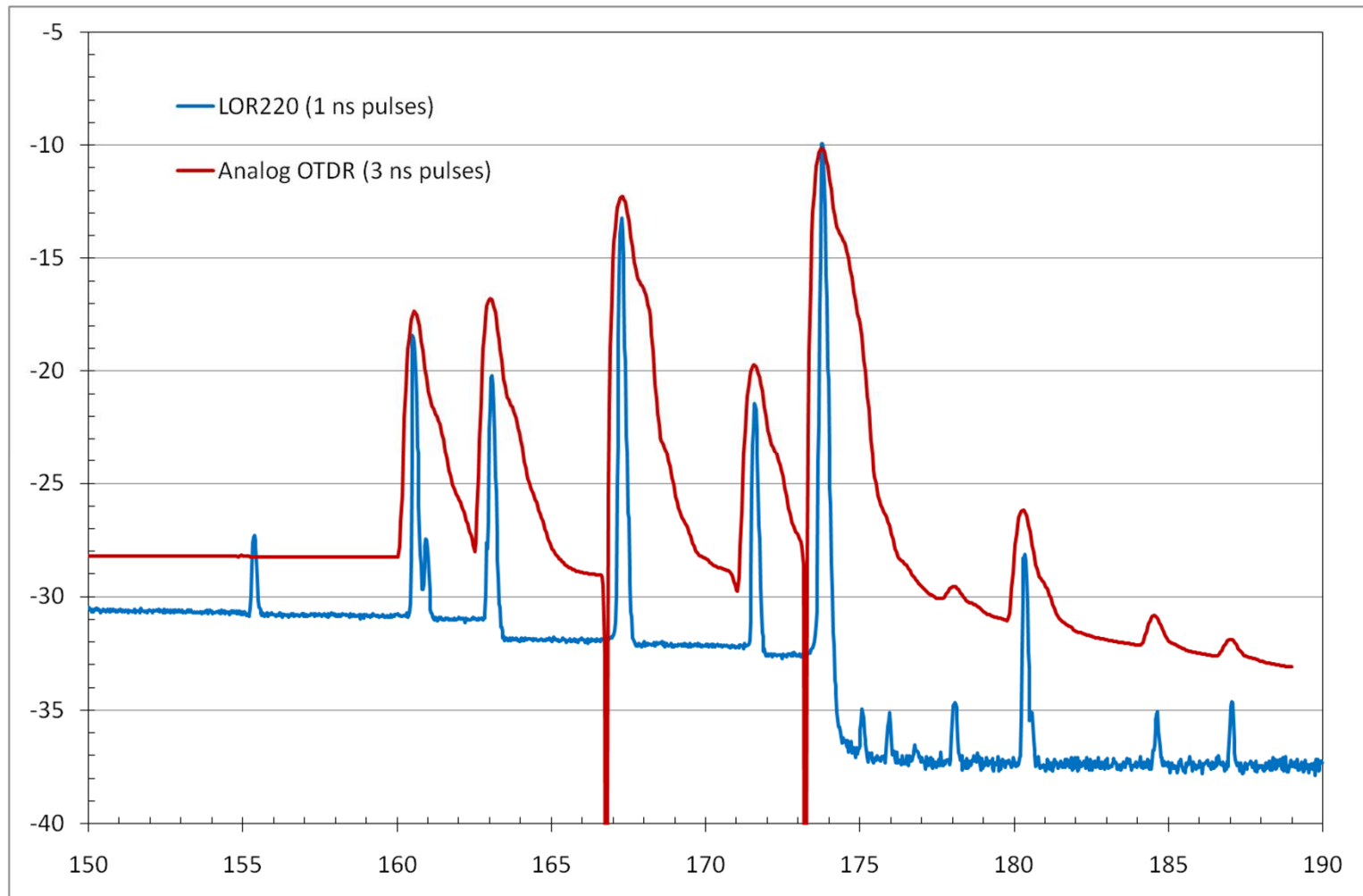
Need:

- High resolution OTDR
- Portable/Integrated system
- High Dynamic Range on ORL

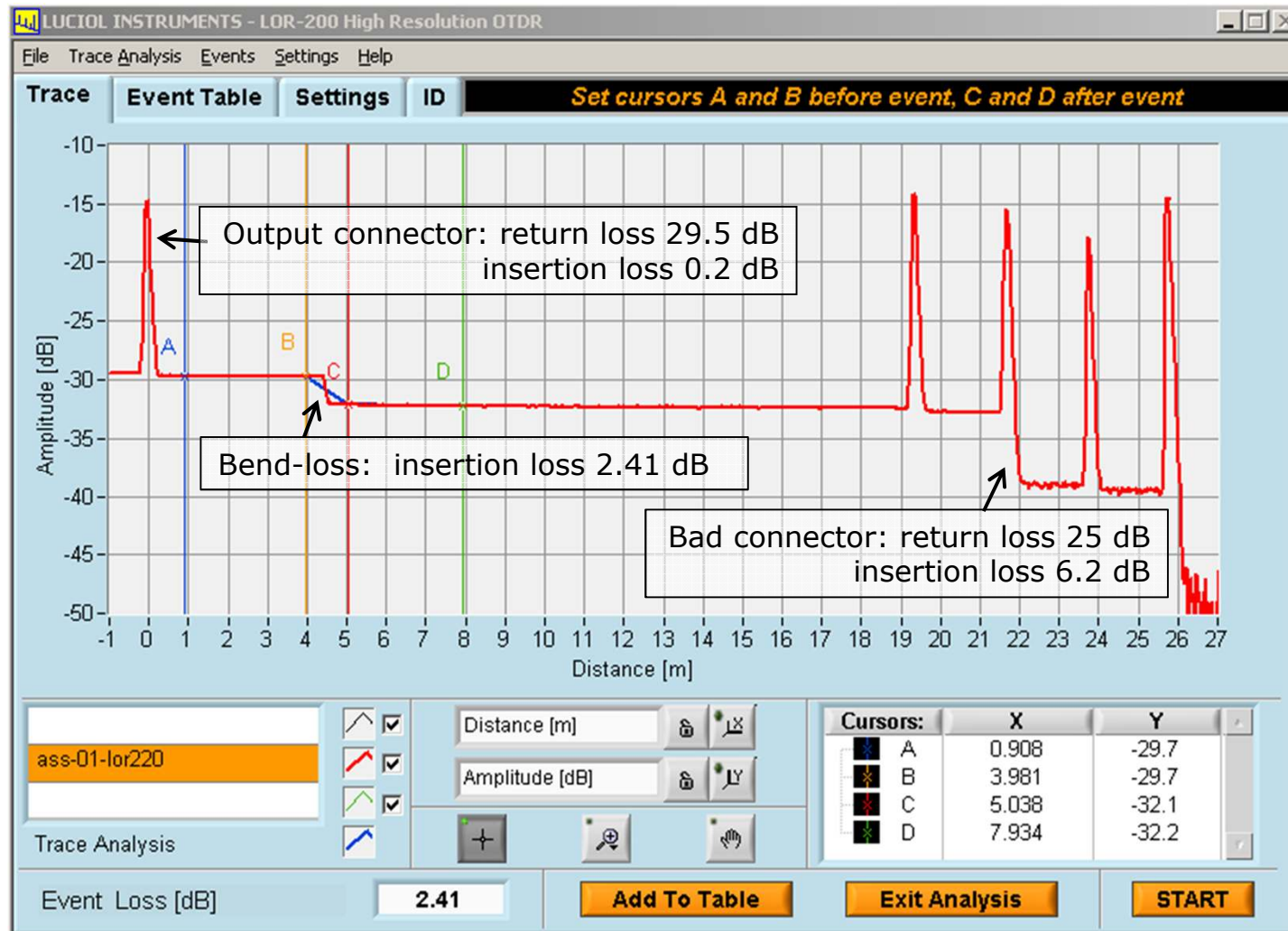
Need high resolution to separate events



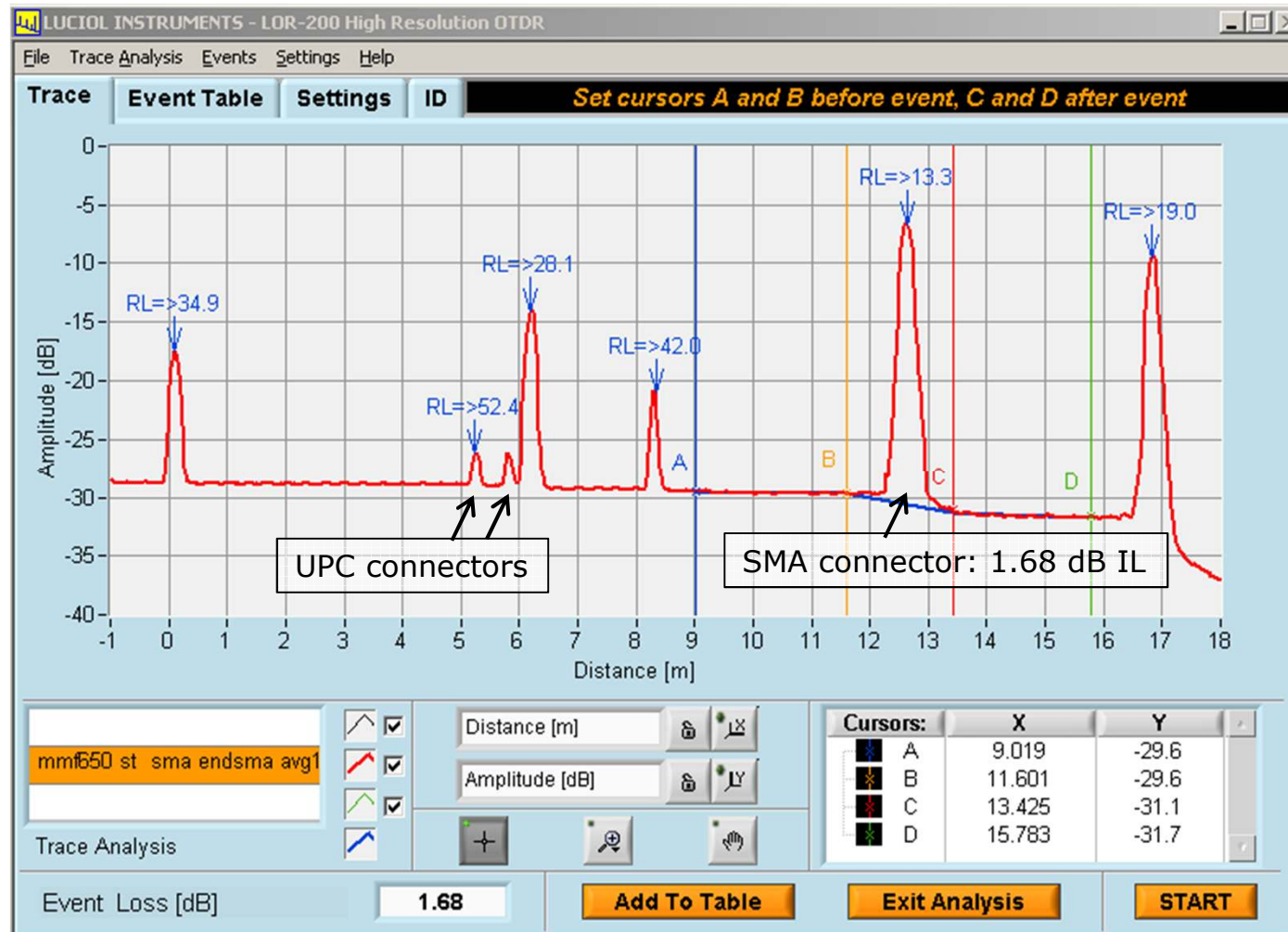
Need also high dynamic range on RL in order to measure after strong reflections



Test of a fiber assembly with bend-loss and a bad connector



Measure IL and RL even for SMA connectors: Fiber assembly with UPC, PC and SMA connectors



Conclusion... the message

Optical fiber is a relatively new medium for harsh environment applications;
However, use of this medium is expanding rapidly

→ Need to adapt the metrology

Reflectometry is very well suited to optical fiber characterization/testing/troubleshooting...

...but, conventional techniques have only limited applications

→ **Need OTDR with specific characteristics:**

- High resolution
- High RL dynamic range

(...visit our booth to see a demonstration!)