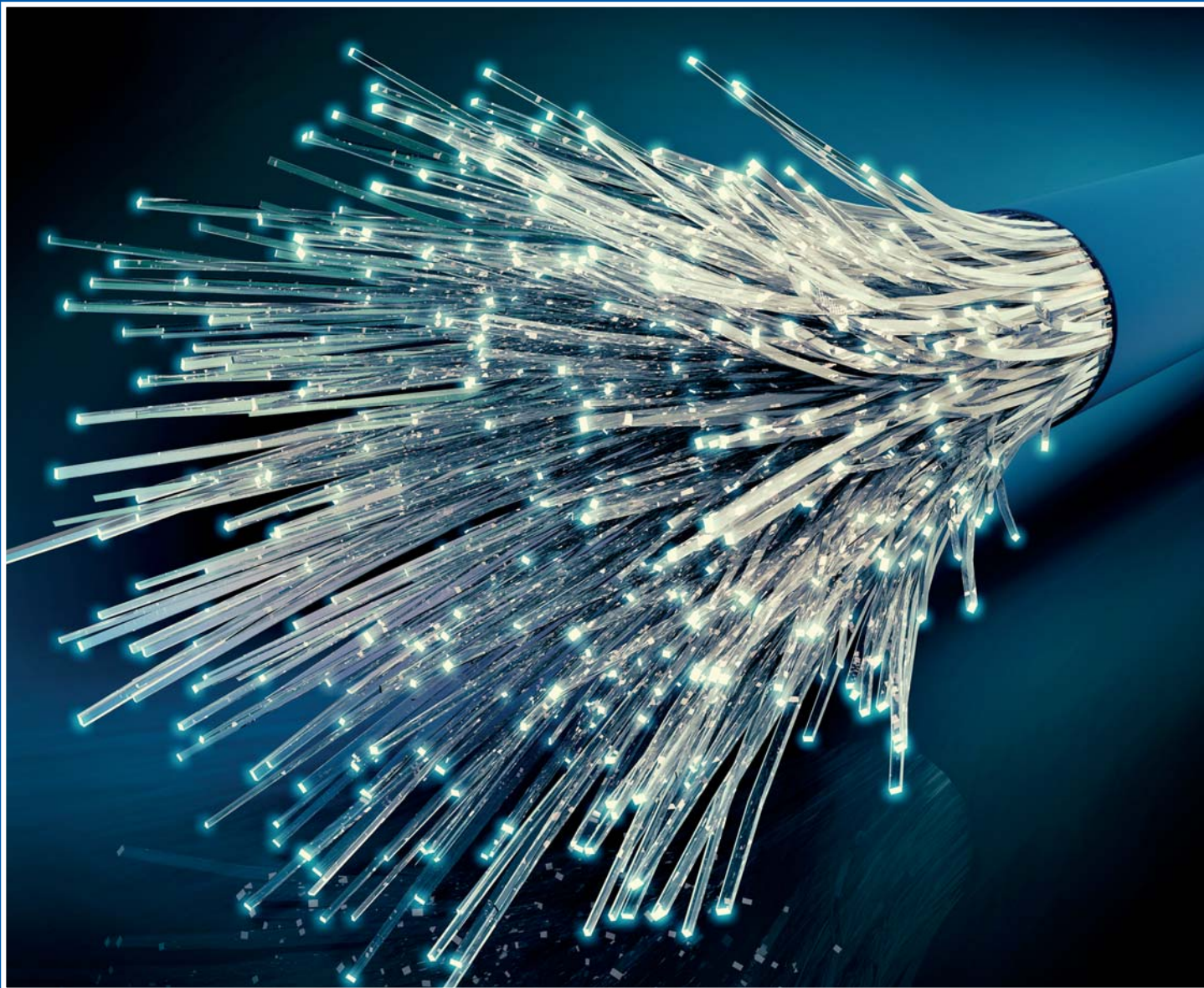


# Cable Network Transparency

## Fiber Optic Monitoring



*We develop solutions together:  
innovative, reliable, future-proof*

# The optical fiber - The backbone of modern communication



*Fiber optic expansion is moving forward - Network monitoring for operational security is therefore gaining in importance*

With the increasing amount of data caused by IP telephony, cloud services and engineering as well as normal IP data traffic, the requirements for stable and high transmission rates are growing. This is only possible with efficient and flexible fiber monitoring - from LANCIER Monitoring.

*Fiber optic cable monitoring is essential, as protection*

- 1. against technical failure*
- 2. against theft*
- 3. against sabotage*

Environmental influences, such as humidity penetrating fiber optic cables, impair transmission quality. Ruptures due to ground movements, construction work or even theft or sabotage can lead to total failure.

*Modern monitoring of the transmission quality efficiently takes care of this and reports any change immediately.*

The transmission quality over the entire distance is determined on the basis of the attenuation or performance values of a reference fiber. The use of high-quality sensor technology ensures fast and accurate error detection.

With the use of OTDRs (Optical Time Domain Reflectometer), a precise fault location can be determined. Depending on the task, sensors and OTDRs matched to the existing transmission wavelength are used.

*The LANCIER Monitoring Fiber Optic Monitoring System offers to you:*

- permanent preventive monitoring for malfunction, fiber rupture or humidity intrusion
- fast response time when faults occur - there is no or only short downtime
- fault location during monitoring with reflectometer (OTDR),
- one display scheme for all networks
- additional monitoring of physical parameters, such as pressure, humidity, temperature etc.

*Technical details:*

- monitoring of active and dark fibres
- monitoring of optical performance
- monitoring of optical attenuation
- Signal contacts for further alarms

# Fault location in fiber optic networks

## The core of Fault Location at Optic Fibers is the OTDR

By incorporating an RTU (Remote Testing Unit) equipped with OTDR (Optical Time Domain Reflectometer) and optical switch, the LANCIER Monitoring fiber optic monitoring system obtains pinpoint fault location.

The integrated optical switch allows the RTU to monitor an almost unlimited number of fibers. The measurement of the individual fibers is performed sequentially.

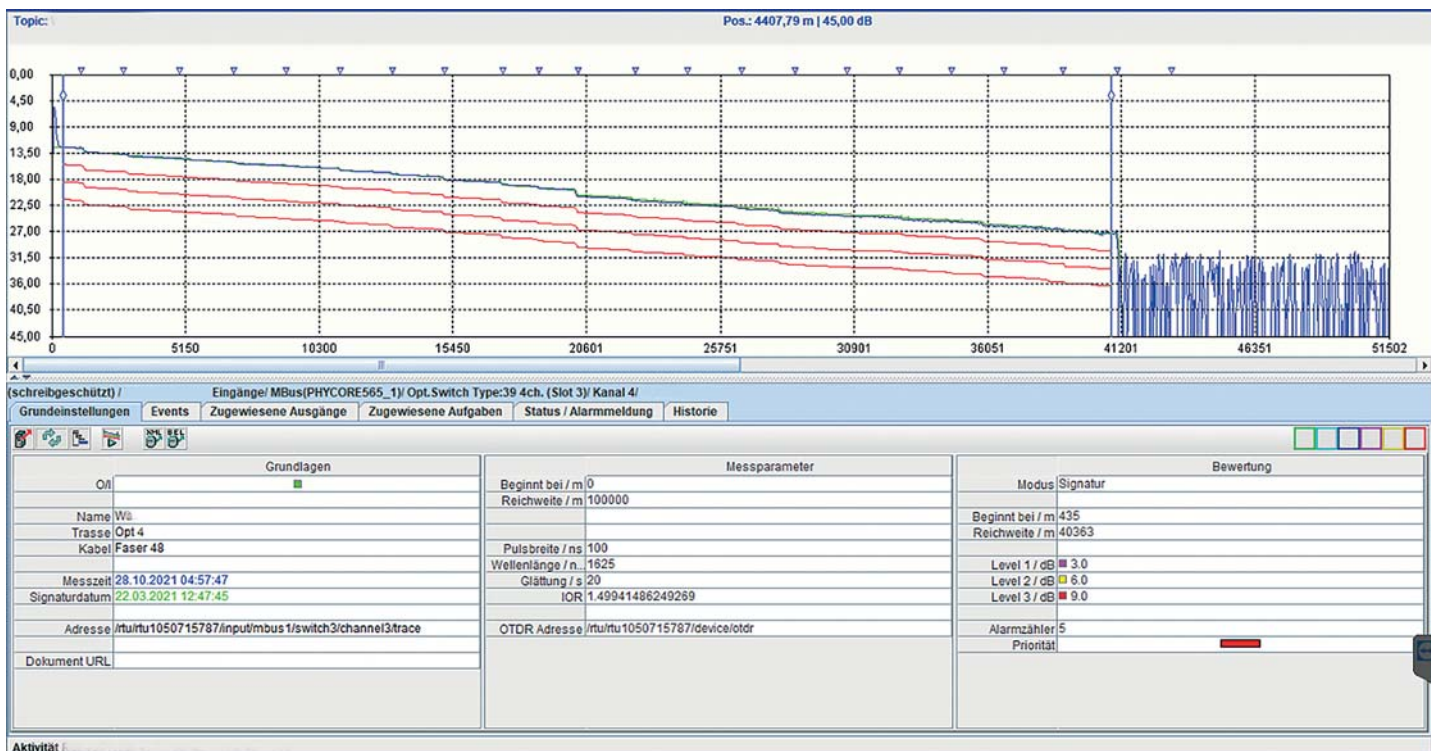
In order to be able to monitor active fibers in addition to passive ones, WDMs (wavelength division multiplexers) are optionally used.



RTU equipped with OTDR and optical switch

The Unified Monitoring System (UMS) periodically reads out the traces determined by the OTDR, evaluates them and reports significant changes.

In doing so, it displays the exact location of the change that occurred on the fiber section. In conjunction with a GIS database, the UMS can determine the exact geographical position of the fault location.

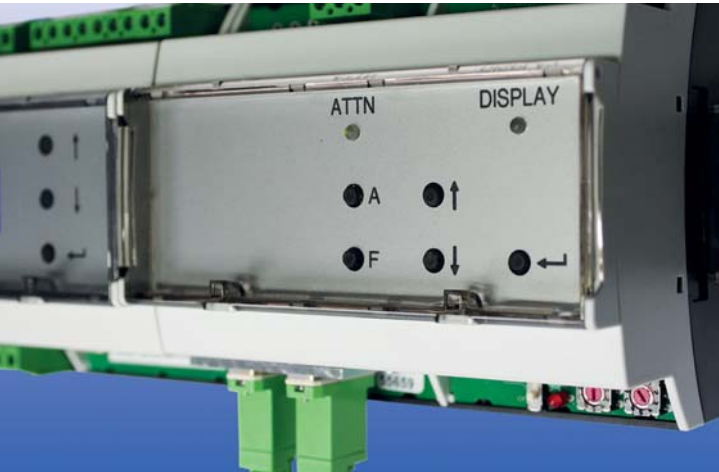


# Fiber Optic Monitoring

## Monitoring provides additional security: the RM module system

The LANCIER Monitoring Rail-Module-Bus is a modular and robust sensor system. Several measuring modules are mounted on a DIN rail and are directly connected to one another by means

of plug-in contacts. The supply voltage, data analysis and control panel as well as their transmission to the remote measuring stations are carried out via the RM-Basic module.



## Monitoring of optical fiber attenuation

The **RM-Fiber module** is a stand-alone measurement and monitoring device for dark and active optical fibers. It contains a laser diode and a power meter and determines:

- kinks and tears even with unused fibers
- humidity intrusion - in conjunction with the AquaSensor (only at 1625 nm, see page 6)
- security gaps due to tapping = data espionage by bending couplers (only at 1625 nm)

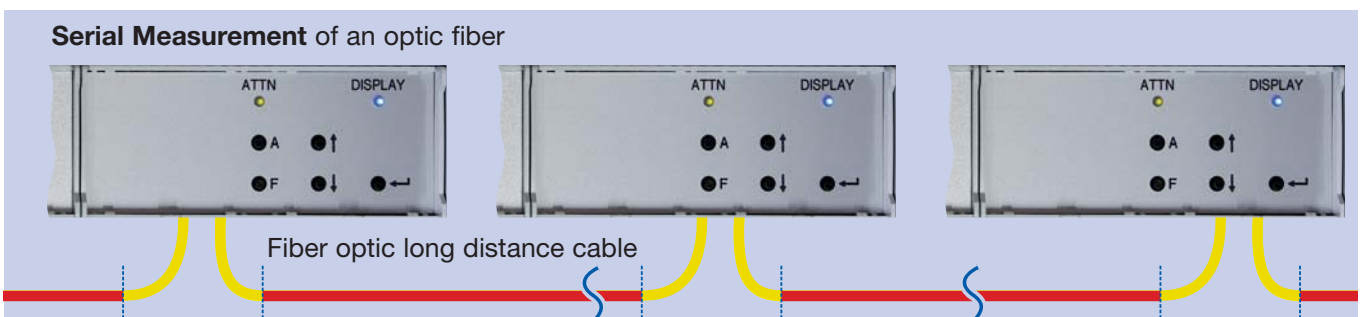
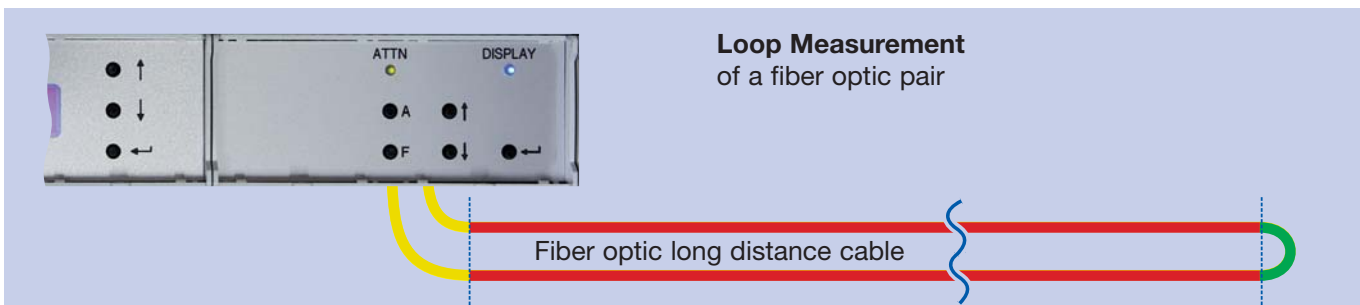
## Measuring section structure

The RM-Fiber module uses a spare optical fiber as a measurement loop which is being measured continuously. The monitoring of a fiber between two stations is provided by the use of two RM-Fiber modules. One is acting as a transmitter while the other acts as a receiver.

pad and the basic module's display. All settings are saved in an internal EEPROM memory to prevent losses.

The thresholds for the attenuation values can be programmed with no restriction using an integrated key-

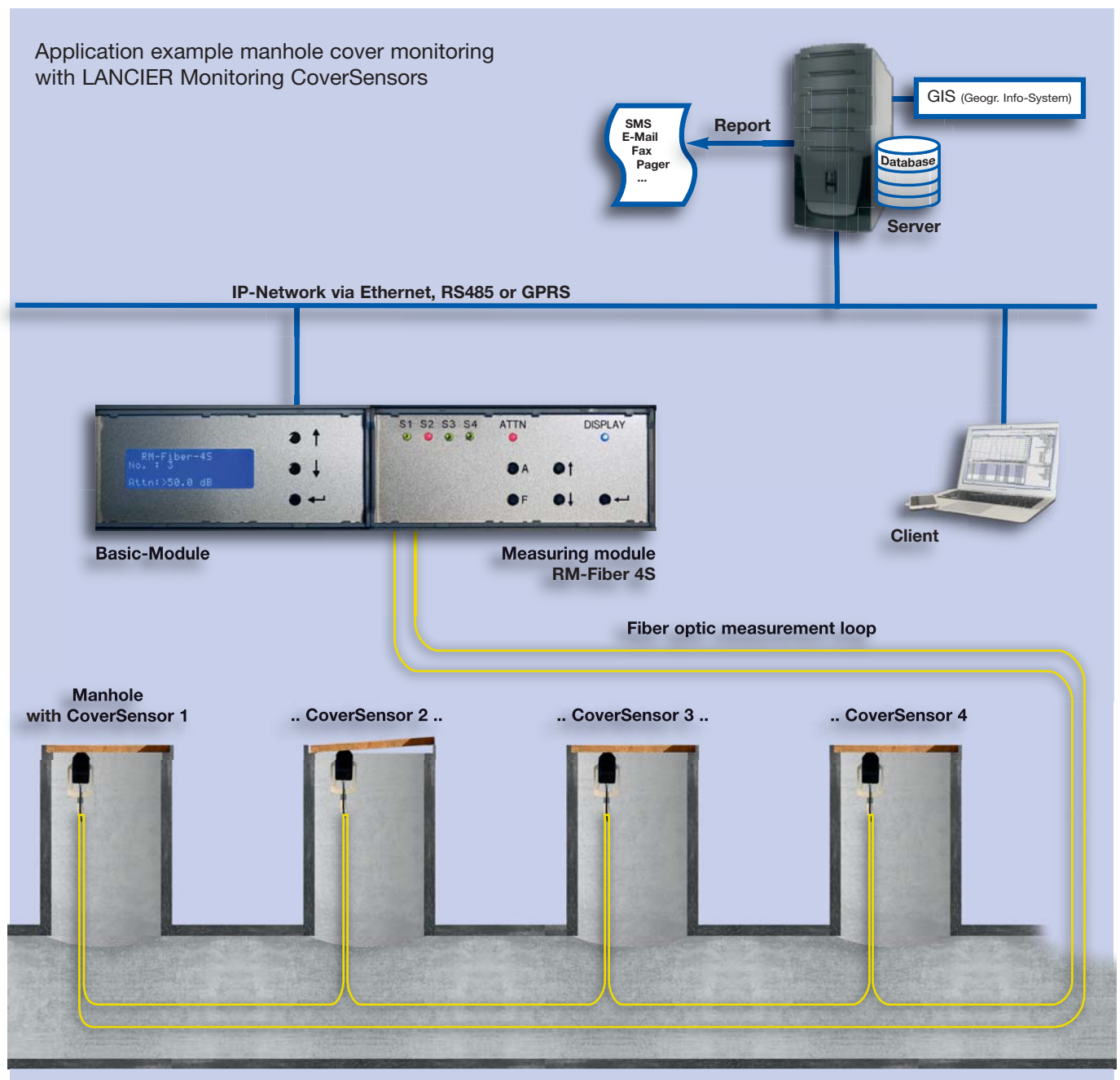
For the remote alarm system the RM-Fiber module possesses built-in dry output contacts. Additionally it can be connected to the LANCIER Tx-Bus, a Can-Bus or a telecontrol system via Modbus.



## Monitoring of optical attenuation switches

The RM-Fiber 4S optical attenuation sensor can be used to monitor up to 4 optical attenuation switches in series on a single optical fiber (eg. LANCIER Monitoring cover sensors for manhole cover monitoring).

The optical attenuation switches do not require a power supply.



# Humidity threatens Optic Fibers

## The AquaSensor is the remedy

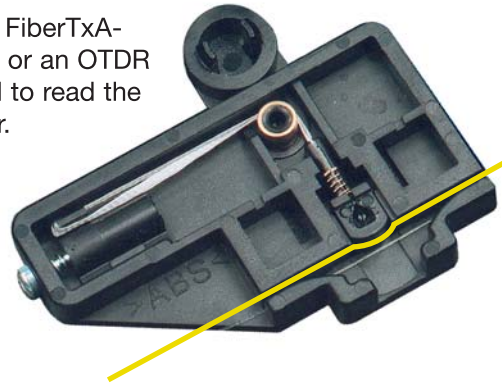
Water penetrating into splicing boxes, e.g. through damage of the sleeve, imperfect sealing or a defective cable sheath, embrittles the fiber optic cable and causes microcracks. In the long term, this leads to deterioration of the fiber properties or even to an unexpected total loss of signal transmission.

The reliably working LANCIER AquaSensor early-warning system helps to obviate these consequences. If the AquaSensor comes into contact with humidity, the fiber is bent in a controlled way to generate a measurable increase of attenuation.

These changes can be shown as graphic representation using the LANCIER Monitoring System.

The LANCIER AquaSensor can be inserted into all current splice holders, and no metallic conductor is required for signalling.

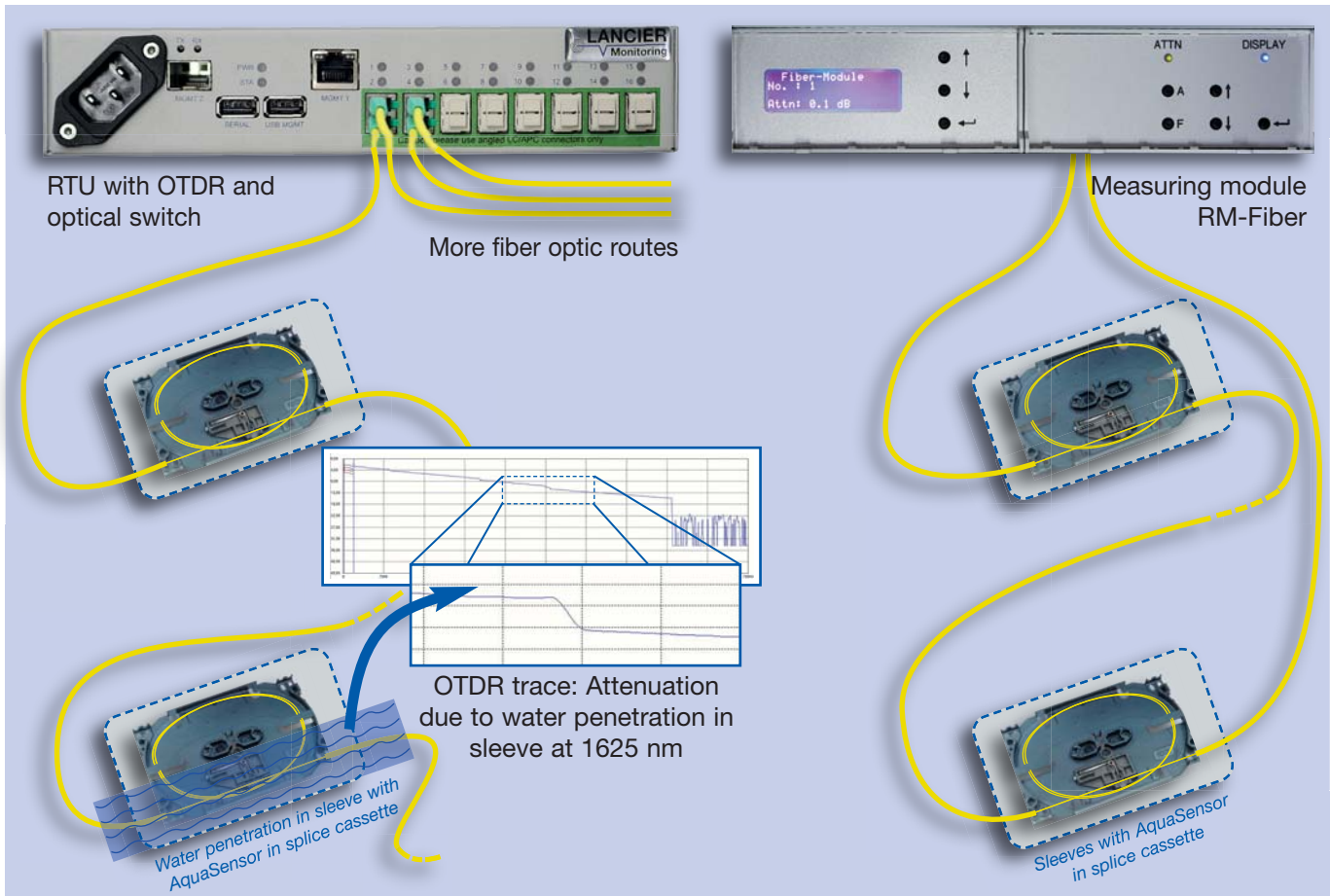
A LANCIER FiberTxA-Mk2 sensor or an OTDR are required to read the AquaSensor.



## Two options for fiber optic monitoring with automatic alarming

**1.** An **RTU** (Remote Testing Unit) with **OTDR** and optical switch can monitor multiple fiber optic sections, each with multiple AquaSensors (joints) in series, and thus precisely locate the fault location or identify the faulty joint.

**2.** Optical attenuation sensors **RM-Fiber** or **FiberTxA-Mk2** (not shown) can be used to monitor fiber optic sections with several AquaSensors (sleeves) in series. A fault location determination is carried out by means of OTDR handheld meter.



# PON - Passive Optical Network

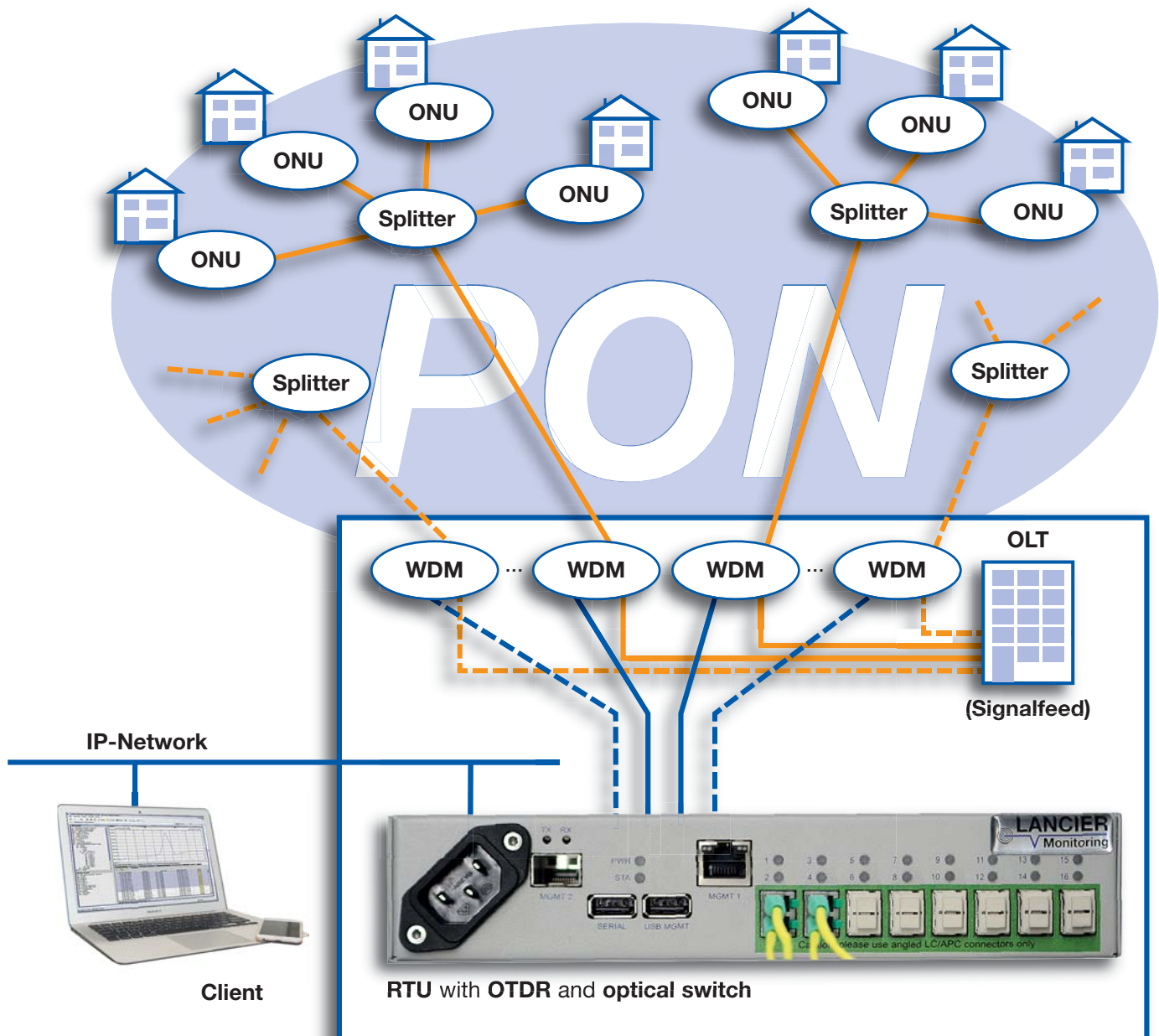
## *Economic and convenient surveillance*

In order to cope with the increasing demand of bandwidth due to new applications like triple-play more and more network providers choose to facilitate PON (Passive Optical Network) technology. This "Point-to-multiple-point" (P2MP) topology supplies up to 128 subscribers with broadband access through a single fiber.

To achieve this a passive splitter is used to distribute the downstream signal sent from the central office (exchange) to the subscribers. At the user site only the dedicated signal for the particular subscriber is decoded and supplied. In the opposite direction it is common to use time or wavelength multiplex methods to avoid collisions of the transmitted data.

## *The LANCIER monitoring system for PON provides effective*

- Cable monitoring all the way to the subscriber
- Exact fault localization between OLT and splitter
- Time and cost saving through instant alarming and localization



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