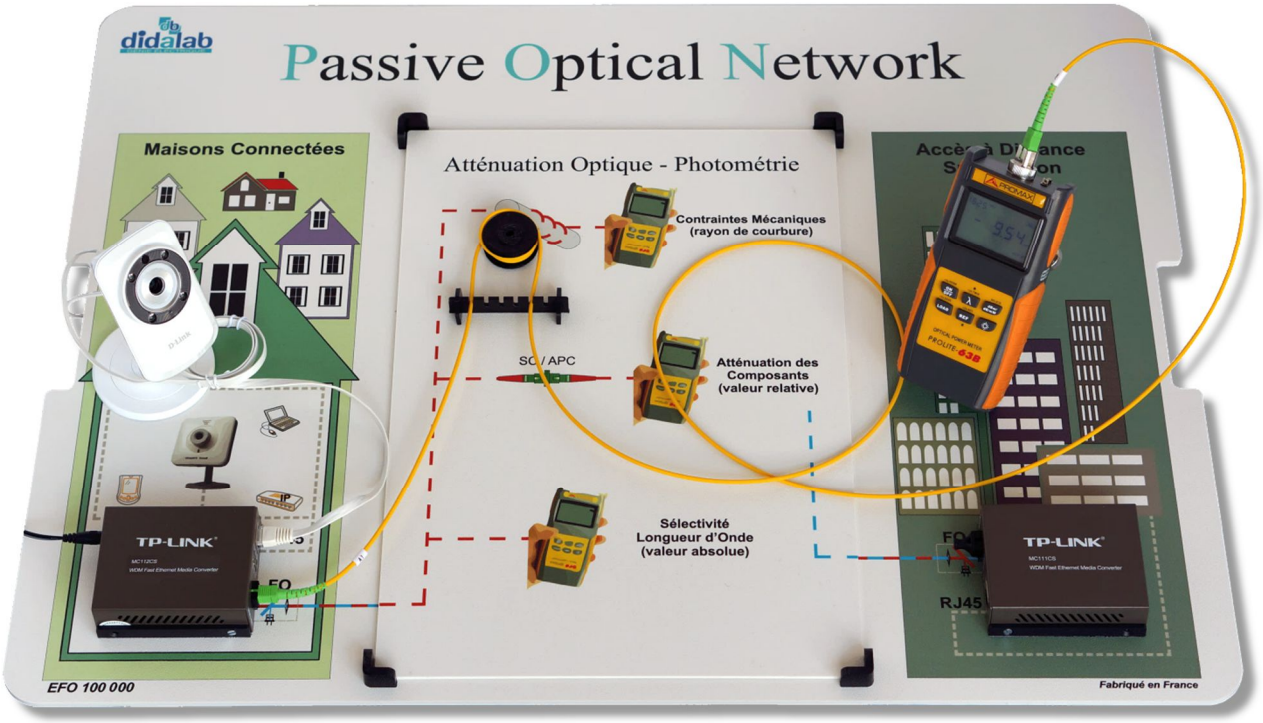


EFO 100

Implementation of a Passive Optical Network (PON)

The EFO100B pack is a whole **educational system** conceived for the progressive study of an **IP/OF – OF/IP** link and the implementation of a **P**assive **O**ptical **N**etwork in a practical works room.
This pack is compatible with our laboratories: **Did@VDI, Dida@VDI+ and Did@VDI++ (consult us)**.

Educational purpose

This pack is designed for:
- The implementation of a fiber link with connectors.
- The study and commissioning of a single-mode optical link.
- The telecommissioning of an emitter/receiver optical couple and an IP camera.
- The learning of fundamental knowledge in cleanliness, indispensable for the fiber manipulation.
- The calibration of a measuring instrument.
- The optical measurement as a function of the wavelength used by the system.

It is complete, economical and enables to put the student into real situation.

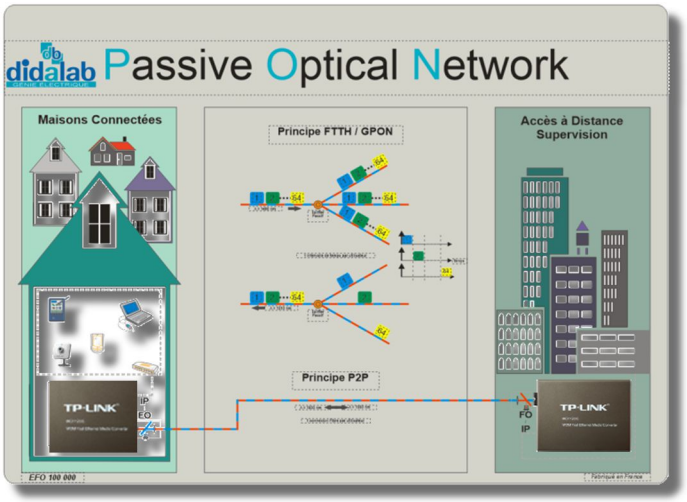
Studied topics

- ✓ Manipulation and cleaning of the telecom single-mode optical connectors.
- ✓ Calibration of the power meter.
- ✓ Absolute power ratio (dBm) and relative power ratio (dB).
- ✓ Research of the sensitivity threshold of the receiver with the adjustable attenuator.
- ✓ Measurement of the maximum authorized loss.
- ✓ Study of a WDM bidirectional link.

Targeted training

- **Vocational training in electricity/electronics, digital telecommunications**
- **Higher technician school**
- **Institute of technology**
- **Electrical Engineering / Telecommunications / Network school**

EFO 100 000: Pedagogical *scenarii* module « Passive Optical Network »

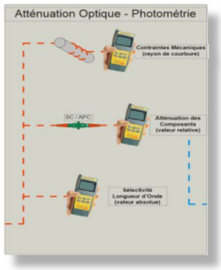


The EFO100000 includes:

▪ **1 basis** enabling to contextualize an **I**nternet **P**rotocol through **O**ptical **F**iber (**IP/OF**) between a connected home and a remote supervision access. A silkscreen printing illustrates the **F**iber **T**o **T**he **H**ome link through *G*igabits **P**assive **O**ptical **N**etwork (**FTTH** /*GPON*) as well as a **P**oint-to-**P**oint link (**P2P**).

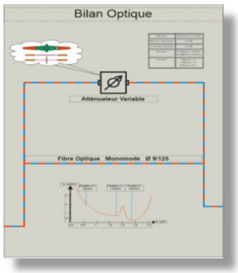
▪ **3 silkscreen boards** – to put in the center of the basis – which illustrate the 3 main *scenarii* for the suggested practical works:

Optical attenuation – Photometry



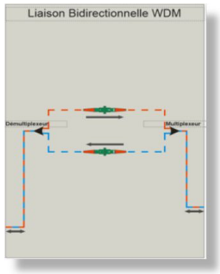
- ✓ Absolute/Relative attenuation.
- ✓ Influence of the radius of curvature.
- ✓ Characterization of the optical fiber.

Link budget



- ✓ Characterization of the fiber.
- ✓ Determination of the wavelengths.
- ✓ Emulation of a transmission channel.
- ✓ Determination of the maximum distance.
- ✓ Induced losses.

WDM bidirectional link



- ✓ Implementation of an optical fiber multiplexing/demultiplexing.
- ✓ Consequences upon TCP/IP and UDP transmissions.

Conversion: IP/OF – OF/IP

EFO101000: IP / OF converter

Wavelength:

- ➢ T_X = 1550 nm
- ➢ R_X = 1310 nm

EFO102000: IP / OF converter

Wavelength:

- ➢ T_X = 1310 nm
- ➢ R_X = 1550 nm

Measurement

EFO1030000: Photometry
Optical power meter for single-mode and multimode fiber.
Power supply: mains or battery.
6 calibrated wavelengths: 850, 1300, 1310, 1490, 1550, 1650 nm.
Measurement of the absolute power ratio (dBm) and relative power ratio (dB).
SC/APC connector.
USB connector for measurements transferring.

Viewing

EFO108000: IP camera
HD IP Camera, new generation. It enables video streaming towards mobile phones and videophones. PoE, WIFI, microphone, embedded loudspeaker.

Video compression format: H, 264, MJPEG, JPEG.
SIP account.

Accessories

EFO104000

Variable attenuator
with SC/APC connector

EFO105000

Multiplexer
1300/1550 with
SC/APC connector

EFO106000 – Accessories set

- 10 SC/APC crossings: single-mode simplex
- 5 SC/APC- SC/APC leads: simplex single-mode cladding 2,8mm LSZH yellow 2m-length

EFO107000

Connector cleaner

Complementary packs – Fiber Optics

Fusion splicing

EFO200B – Compact optical fiber fusion splicer

Educational purpose

- ✓ Skills acquisition for the fiber preparation and fusion splicing connection.
- ✓ Essential and widely used tools by the connection technicians.
- ✓ Automatic fiber alignment.

Studied topics

- ✓ Fiber manipulation and preparation.
- ✓ Cleaning, stripping and cleaving.
- ✓ Fusion, fiber protection.
- ✓ Loss estimation.

Measurement

EFO300B – Reflectometer kit « OTDR »

EFO300000: Reflectometer « OTDR »
EFO301000: Starter coil 150-m starter with SC/PC connector

Studied topics

- ✓ Characterization of an optical fiber, measurement of the signal reflection.
- ✓ Analysis of all fiber phenomena (connectors, splicing, stresses, etc…).

Mechanical splicing

EFO400B – Mechanical splicing kit including:

EFO401000: Tool box for mechanical splicing with stripper, cleaver tools, red laser, cleaning kit.
EFO402000: Transparent mechanical splice kit (50 pieces).
EFO001000: Optical fiber, 900-µm optical cladding, with SC/APC connector, L=10 m.

Educational purpose

Mastering fiber optics:

- ✓ A handling step (preparation, connection, cleanliness…).
- ✓ Technical understanding.
- ✓ Manipulation skills acquisition.

Studied topics

- ✓ Fiber manipulation and preparation.
- ✓ Cleaning, stripping and cleaving.
- ✓ Mechanical splice setting: transparent, reusable for fiber connections.
- ✓ Use of the red laser to find mechanical stresses and laser alignment aid.

Standard configuration:

EFO 100 B – *Basic package* Implementation of a « Passive Optical Network » including:

Reference	Description	Qty
EFO100000	1 pedagogical *scenarii* module **« Passive Optical Network »** (1 silkscreen printed basis). 3 application boards for 3 *scenarii* (Optical attenuation/Photometry, Link budget, WDM bidirectional link)	1
EFO101000	IP/OF converter, wavelengths: Tx1550, Rx1310.	1
EFO102000	IP/OF converter, wavelengths:Tx1310,Rx1550.	1
EFO103000	Optical power meter.	1
EFO104000	Adjustable optical attenuator.	1
EFO105000	1300/1550 Multiplexer with SC/APC connectors.	2
EFO106000	Set of: 5x SC/APC-SC/APC cords, simplex single mode, LSZH yellow 2.8-mm jacket, 2-m length. 10x SC/APC crossings.	1
EFO107000	Connector cleaner.	1
EFO108000	IP camera.	1
EFO100021	Practical works.	1
EGD000029	Carrying case.	1

Indispensable accessory:

EFO002000: laser protection glasses, OD value > 4 on the range 1000/1600 nm

Packing:

Dimensions: Gross (case) 800 x 600 x 235 mm, Net (board) 750 x 550 mm
Weight: Gross 13 Kg Net 8 Kg (approximate)

Updated: 15/09/02

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