Reinventing the

NETWORK

The only constant is change.

Key Factors besides the Standard
To make G.fast a Successful Technology

G-Fast Summit 2014

Uwe Schmidtke, Adtran

21 MAY 2014

ADTRAN

Product Manager Dream

G.fast
Optic IF
Enclosure

We want to have it !!!

Agenda

1. Economics of FTTDP deployments

2. FTTDP deployment scenarios and Challenges

3. How to address the challenges
   - Sealed DSLAM / DPU
   - Self Install Concept and Reverse Powering

Economics of FTTDP

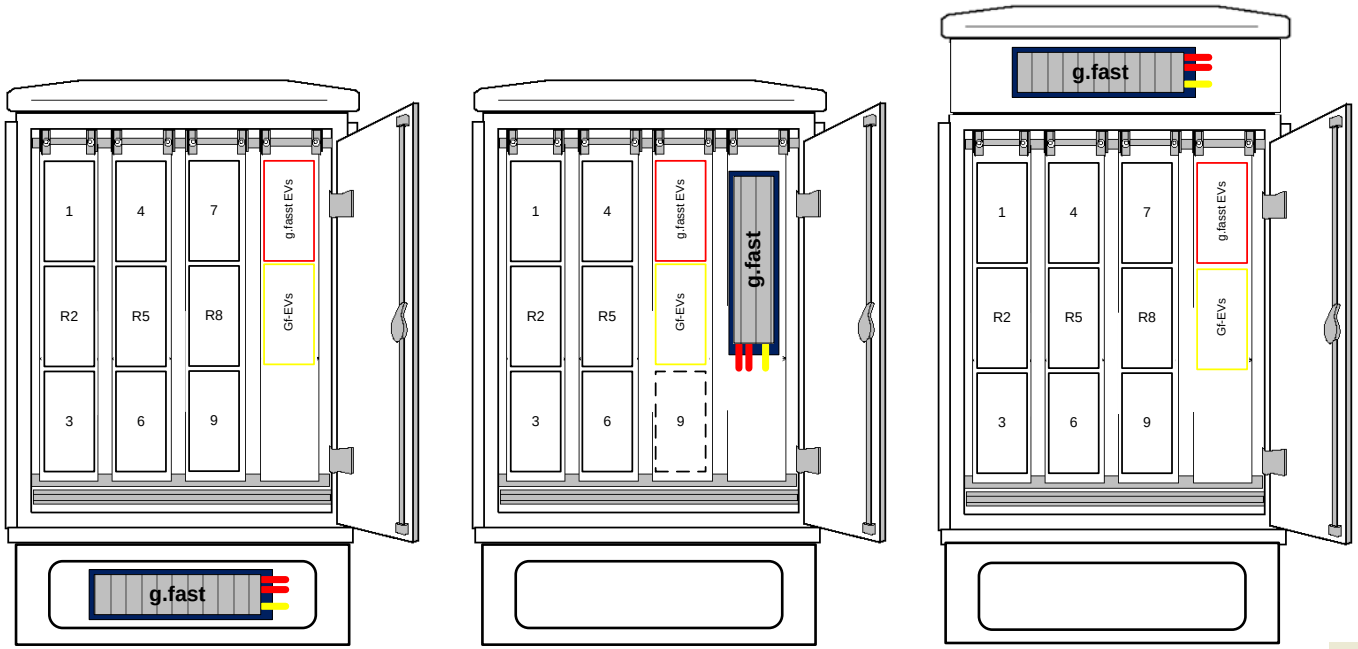
Economics of FTTDP

Because of the **high number of DP** with **few potential subscribers**,
the economics of FTTdp are very different from FTTN or FTTCab

- **Most cost effective solution** for DPUs
  supporting long-term operation without direct touch
- DP Installation must be very **low cost**
- Concepts for easy Installation
  - Install DP only and do not return for each customer
    "**zero-touch**" Customer turn-up process
  - **"Self-install"** at customer side

FTTDP deployment Scenarios and Challenges

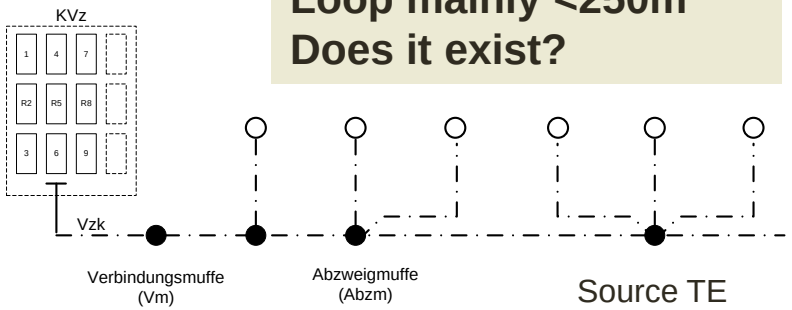
Deployment in existing cabinets (FTTC)



Product Challenges:

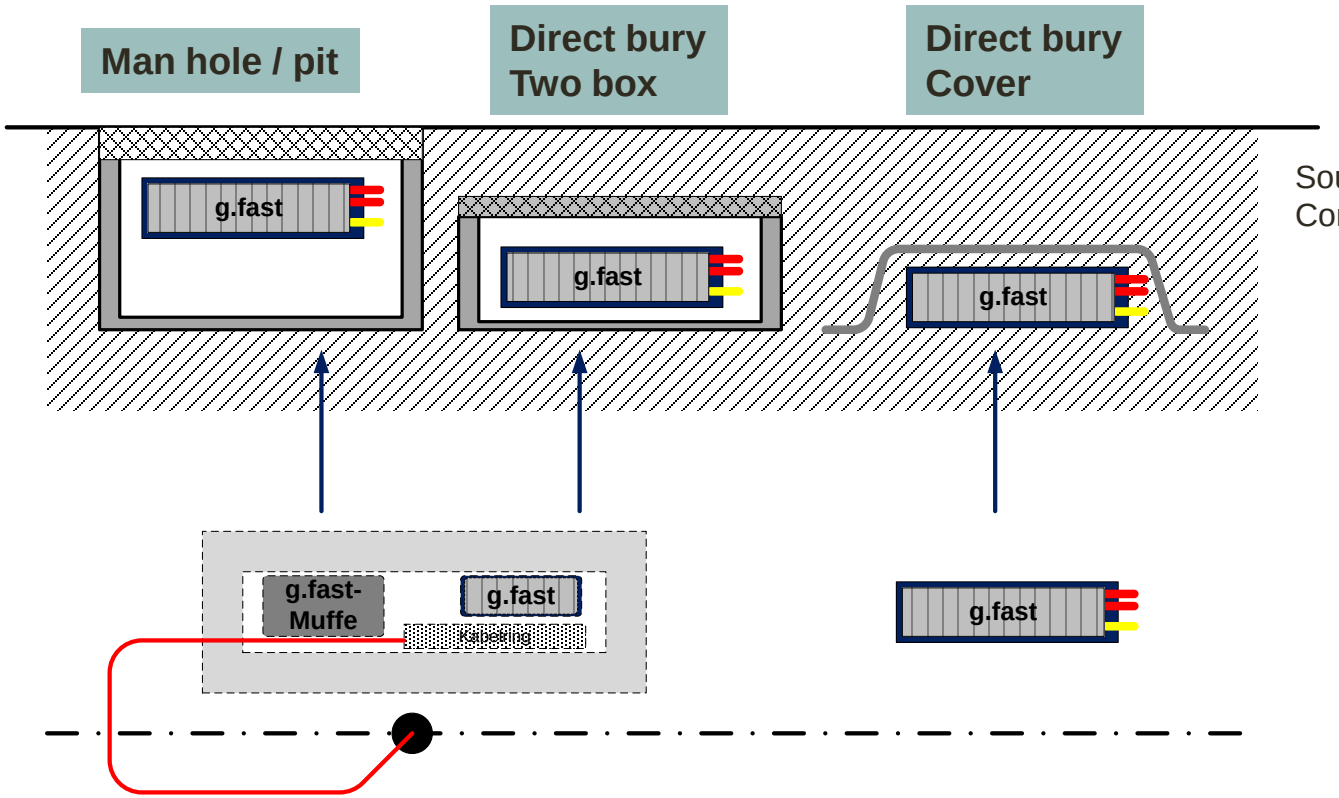
- Some loop length exceed G.fast area – dual mode VDSL2/Vect and G.fast?
- Innovative designs for passive cooling and low power dissipation
- Little Space – dimensions
- Different cable and deployment variants

Loop mainly <250m
Does it exist?



Source TE Connectivity

FTTDP Underground deployment



Challenges:

- **Hard environmental conditions → Sealed Enclosure with passive Cooling**
- **Remote or reverse powering options**
- **Very expensive or second enclosure for direct bury**

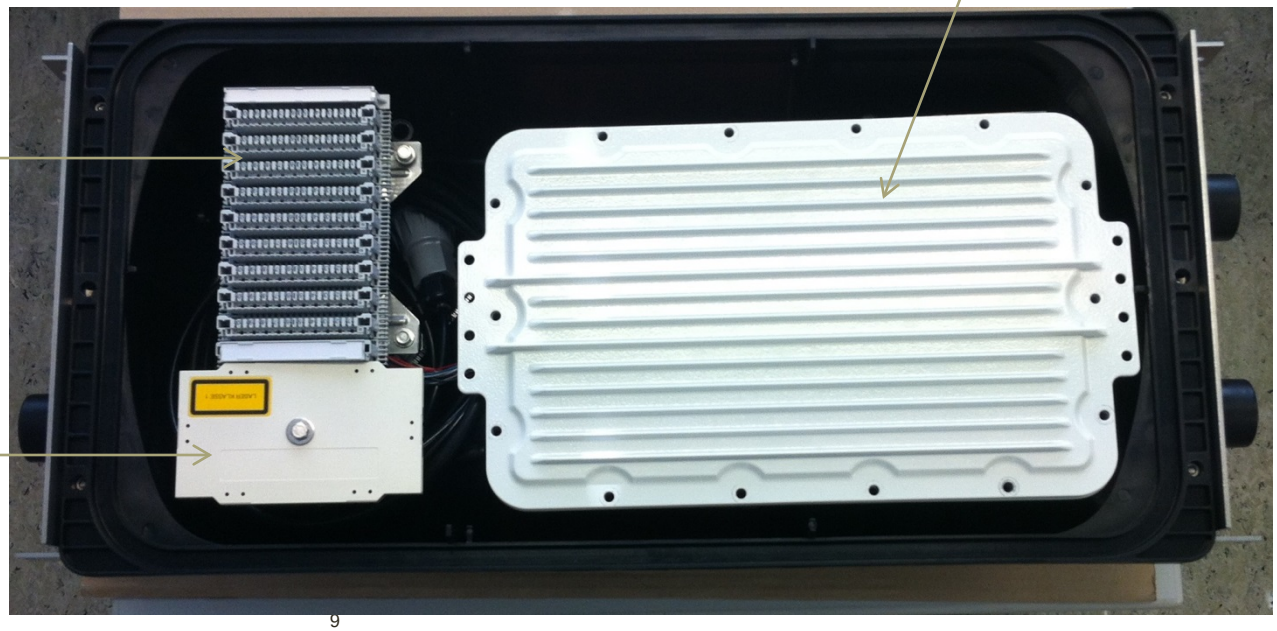
G.fast enclosure solution for direct- bury study

Avoid special enclosure for direct bury environment

516G MDU G.fast

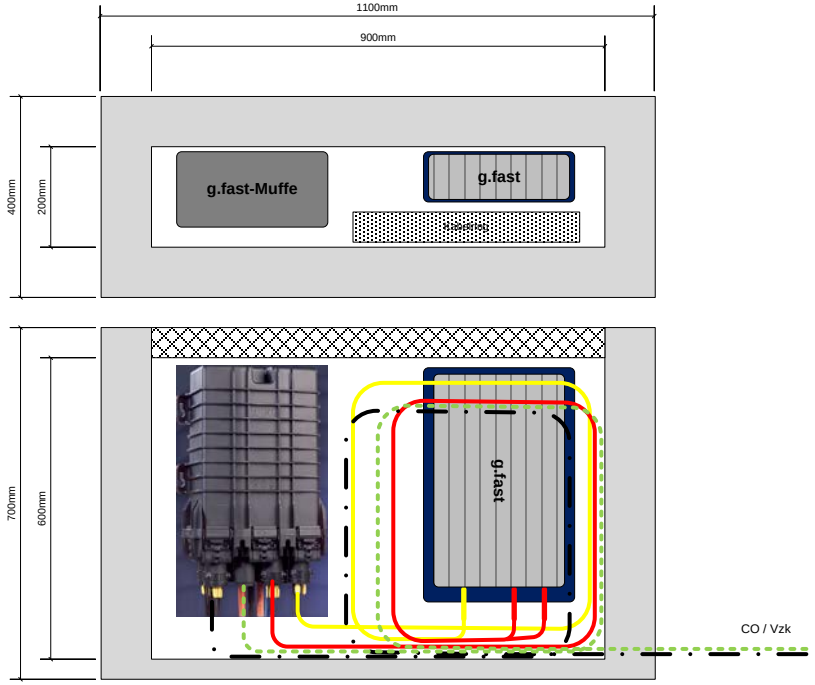
MDF

Splicebox / ODF

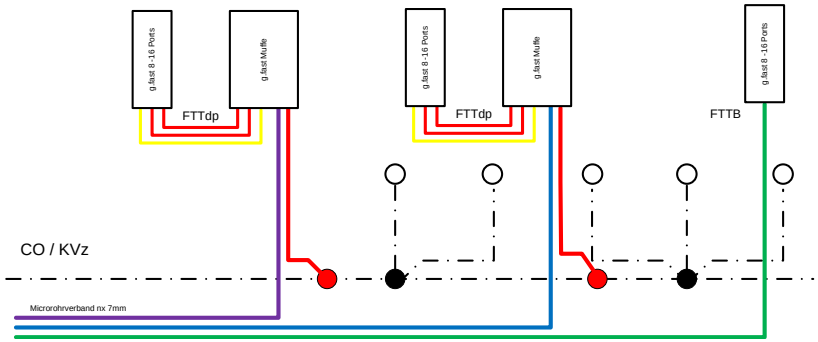


G.fast manhole deployment

Two box solution for manholes



Connection point outside the manhole

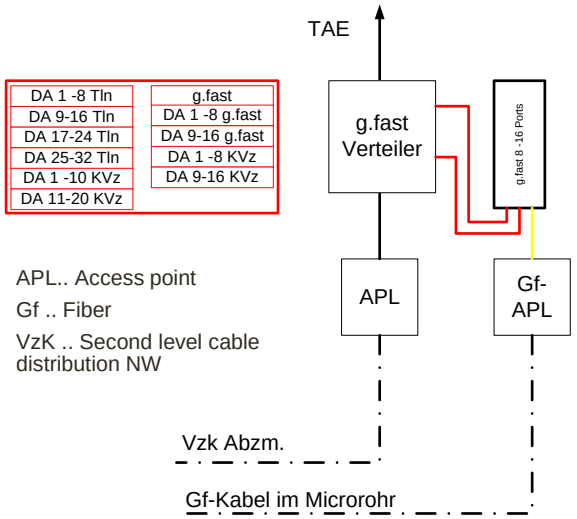


Product challenges:

- **Environmental conditions: temperature, water**
  →Sealed Enclosure with passive cooling
- **Space/ Installation: low weight and footprint**
- **Remote or reverse powering options**

Inhouse deployment (FTTB)

Use case for >7 apartments per building



Source TE Connectivity

Product challenges:

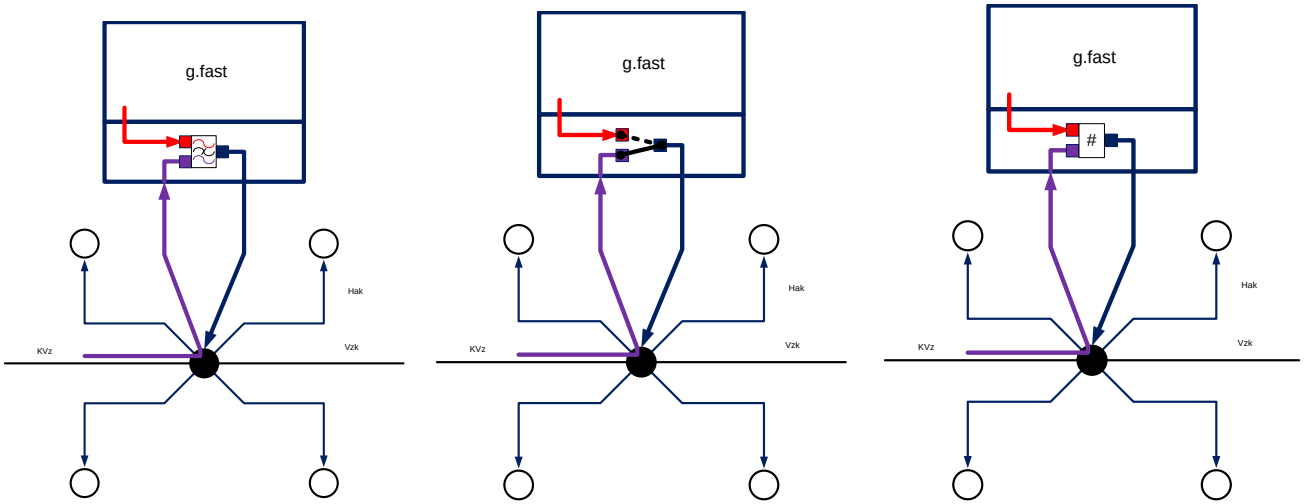
- **Low Noise: passive cooling**
- **Space/ Installation: low weight and footprint**
- **Local, Remote or Reverse powering options (building owner dependency)**

Subscriber connection variants

G.fast **Splitter** – different Frequency (band pass) for services from CO and G.fast Box (additional attenuation)

Relays – switching per port between services

Switch matrix – N:M matrix (N.. G.fast port, M.. Cable pair)
and switching on service port possible



Sealed DSLAM / DPU

Adtran Experience in Sealed DSLAM for FTTDP

- 4th generation sealed DSLAM design
  - 11 years experience in sealed DSLAM deployments
  - Over **100,000** units >**3,000,000** Operational Ports
  -  Finland -40DegC to  Saudi Arabia to +70DegC

1st Gen 1124 (ADSL)

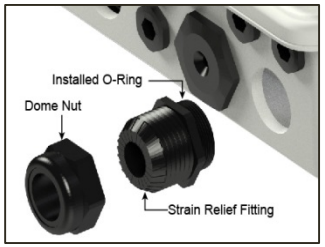
2nd Gen 1148 (ADSL2+)

3rd Gen Solutions (ADSL2+/VDSL2)

4th Gen Solutions (VDSL2 w/ vectoring)

G.fast MDU/ DPUs

- ADTRAN uses specialized polymers for cable connectors to provide water-tight seals that allow the long-term operation in fully submerged environments.



Sealed DSLAM/ DPU for FTTDP Deployment challenges

Heat reflective Paint for direct sunlight heat load

Rated for permanent submersion - *tested 30 days at 7m depth*

Physical Strength for impact damage

Reverse Powering

Reverse Power Feed for FTTdp

- Must meet safety regulations
- Must be able to power up entire DPU with single customer
  - Delivered power varies with loop length

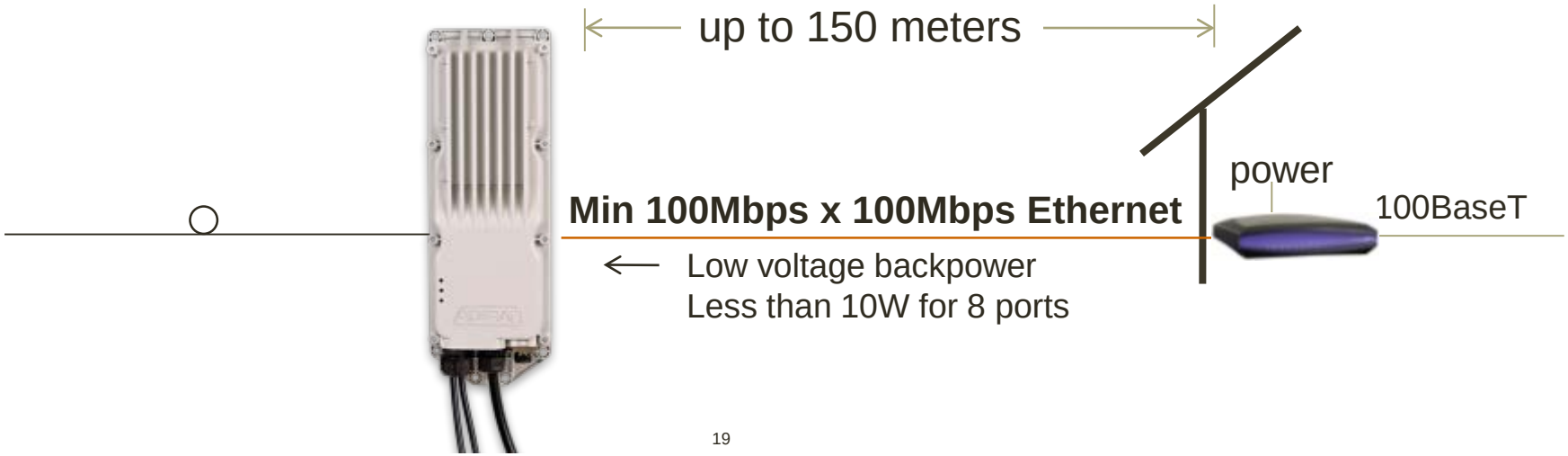
  → power consumption must scale with lines which are on
  (Discontinuous Operation, low power consumption for central parts)
- "Fairness" in powering between subscribers
- DP management lost when all subscribers "off"
- POTS (addressed by Adtran solution)
  - Voice transmission with (and between) multiple off-hook phones shall be maintained
  - Service must be compatible with a customer's existing telephones
  - A telephone connected directly to the line without a dongle must not be damaged
  - POTS, reverse power, and G.fast must coexist on single pair

Self Install and Reverse Powering

Self-Install

- Customer self-install means that the service provider installs network equipment at the DP and never goes to the home;
- the customer then installs the equipment in the home without even a screwdriver,
- and reverse powering, G.fast, and POTS all coexist on the home phone network. Dongles per phone as is done today for ADSL is allowed.

Adtran already demonstrated Reverse powering in 2010
Ultra Broadband Ethernet (UBE) short range 100 Mbps symmetric and reverse powered, sealed Node



An Investment

An ADTRAN product is an investment,
not just today's trend.