

DEUTSCHE TELEKOM

SUPER VECTORING @ FTTC

The Hague, June 2015

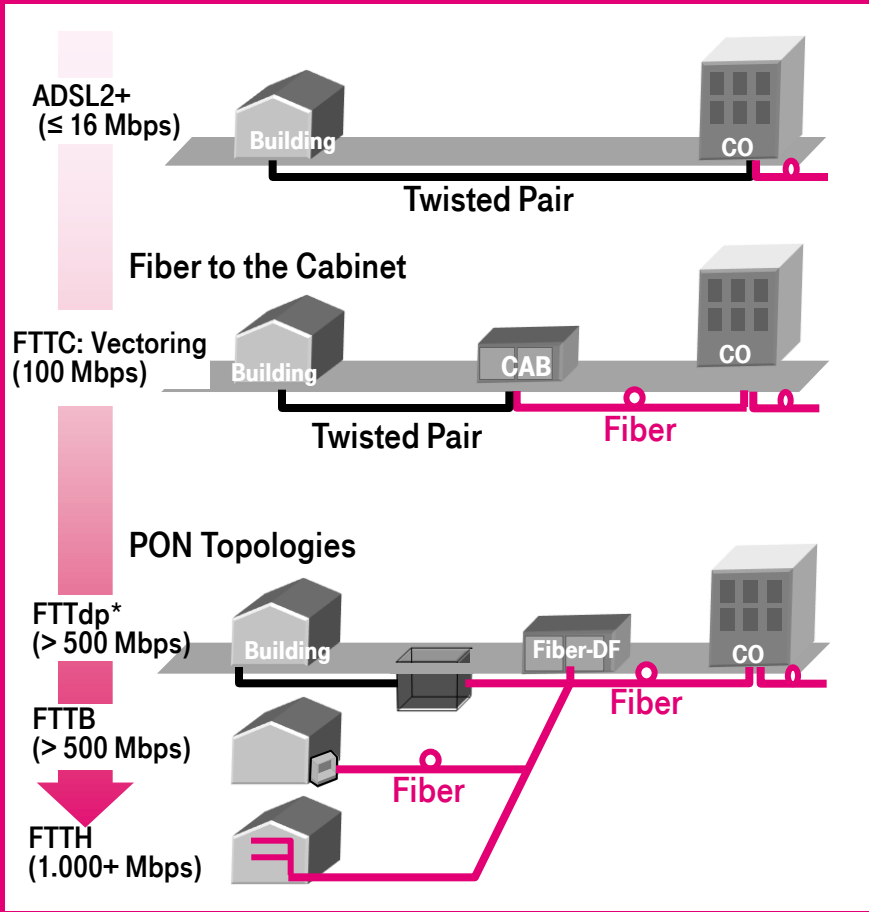


LIFE IS FOR SHARING.

FIXED ACCESS NETWORK STRATEGY

LONG TERM GOAL: FTTH.

Access Network Evolution



Economical Optimum

FTTC VDSL/Vectoring: now

- ca. 80% of households over 50 Mbit/s depending on regulatory adjustments
- Migration VDSL2 → VDSL2 Vectoring

FTTH now

- where economically reasonable

FTTB with G.fast

- G.fast addresses short loops < 250 m with acknowledged potential for longer loops
- Enabler for GPON based FTTH
- FTTdp cost effectiveness in DT network is not given

** FTTdp concept is no standard topology in the German copper access network.*

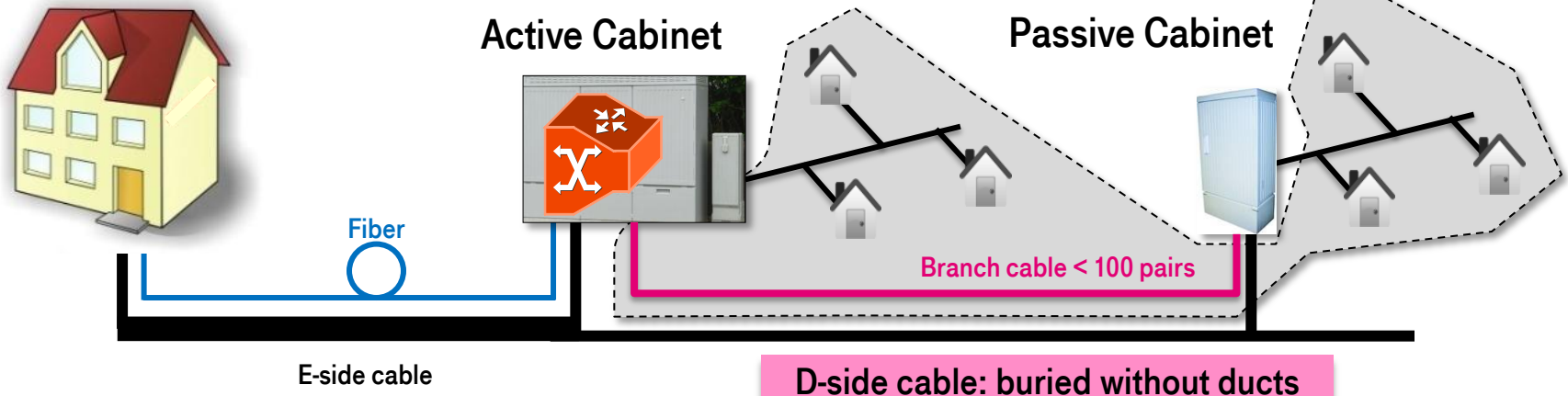
ACCESS NETWORK STRUCTURE - FTTC

FTTC Topology Today

- Active Cabinets = Fiber + Access Node (MSAN/DSLAM)
- Passive Cabinets served via branch cables from Strategic Outdoor Locations (SOL)
- Typical cabinet size: 120 ... 150 customers
→ 300+ customers per Access Node

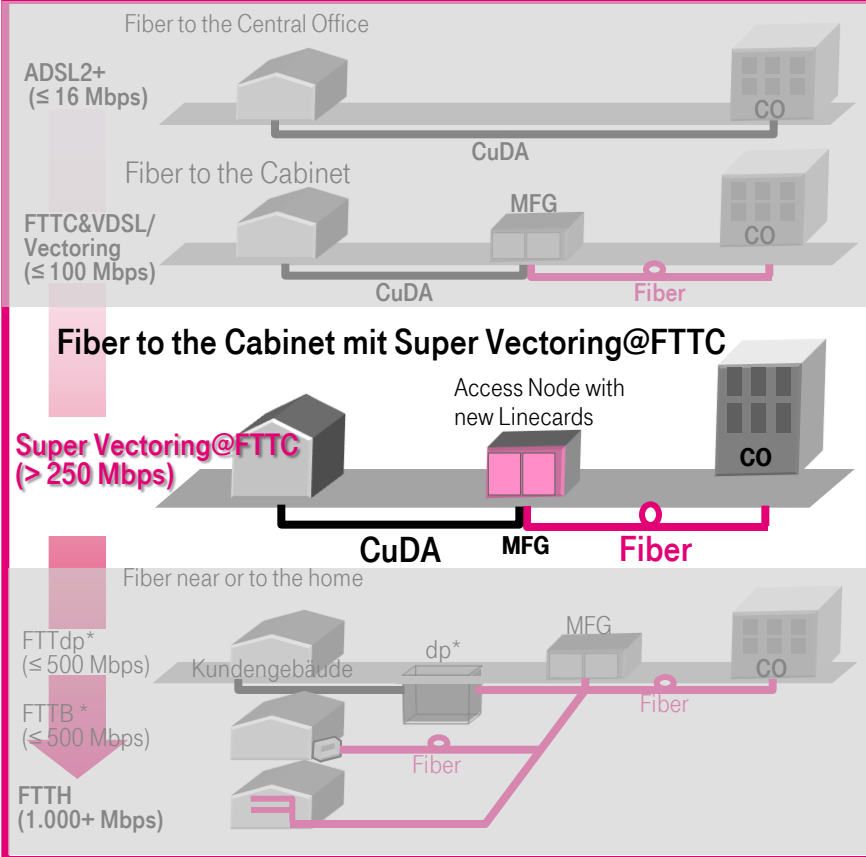


Central Office



SUPER VECTORING@FTTC OFFERS ENHANCED SERVICES WITHIN FTTC DEPLOYMENTS

Super Vectoring@FTTC



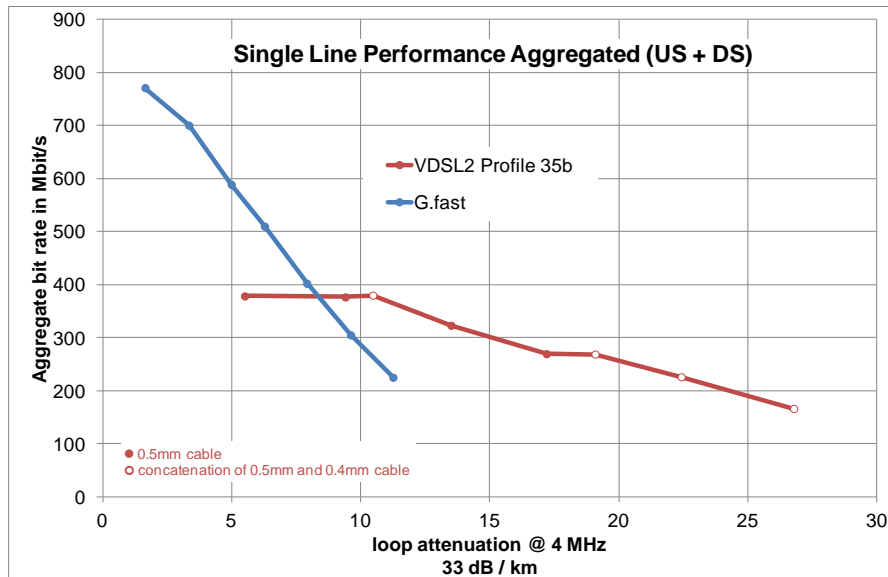
Characterization

- **>250 Mbps** Downstream from Vectoring enabled cabinets
- Increased Coverage for 100 Mbit/s
- Future proof FTTC services
- Protection of FTTC investments
- Simple extension of existing Access Nodes
- Full coexistence to Vectored VDSL2
- Full Interoperability to VDSL2

Super Vectoring suits perfectly between Vectoring and G.fast.

FTTC – A RATE - REACH ANALYSIS

Super Vectoring tops G.fast on long loops



Source: Alcatel-Lucent, measured on cable as model BBF TR-285I-02YS(ST)H 10x2x0.5 STVI Bd, G.fast 20 MHz – 106 MHz

Services

- Super Vectoring (Annex Q) > 250 Mbps
- enhanced coverage for longer loops (100 Mbps) is required as well
- Higher rates for shorter loops are just nice to have
- Service rates for Super Vectoring shall enable multiple 4k TV streams

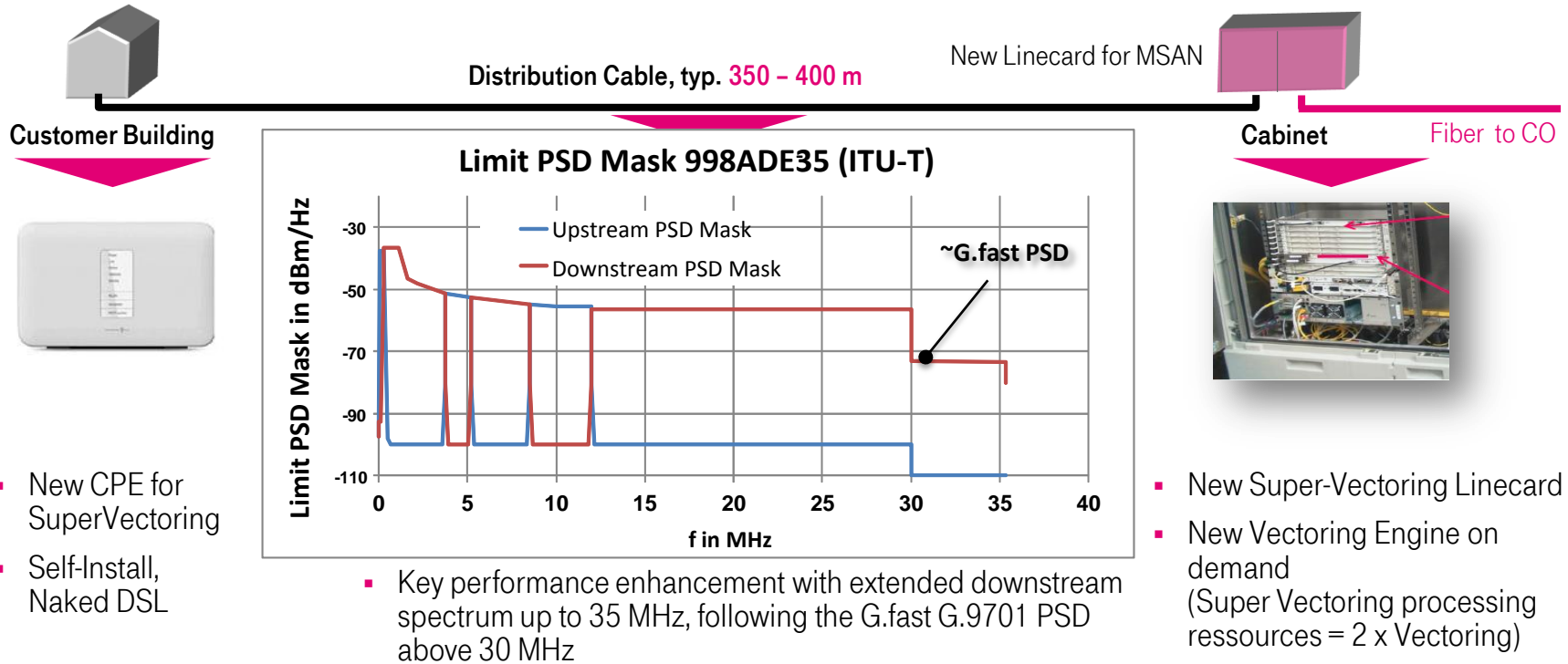


Germany: G.fast fits FTTB perfectly, but has limited value for FTTC deployments.
G.fast long reach Performance and node size are crucial.

SUPERVECTING@FTTC – TECHNICAL KEY FACTS

PROFILES AND BAND PLAN ARE DECIDED

SuperVectoring uses up to 35 MHz spectrum

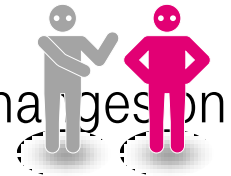


SUPER VECTORING = VDSL2 ANNEX Q IN ITU-T Q4

VDSL2 Annex Q in ITU-T and ETSI



- Annex Q is based on existing ITU-T VDSL2 recommendation
- Changes to VDSL2 standard are kept as small as possible, no changes on major core functions
- February 15: Agreements for
 - VDSL2 Annex Q: Profile 35b
 - 1st set of Profile and bandplan up to 35 MHz
 - initial working text for Annex Q
- April/May 15: Liaison based cooperation with ETSI
 - consolidation of European VDSL2 Annex B PSD and Band Plan options



CONCLUSIONS

Summary

- Super Vectoring aka VDSL2 35b is the perfect solution to technically and economically optimize our current FTTC Vectoring rollout
- Standardization for VDSL2 Annex Q is within reach
- G.fast FTTB is a new enabler for the long term strategy FTTH
- If you let us – We'll come back at UFBB next year to share our experiences!



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