

# WEBINAR VDSL-VECTURING

Stephan Eger

Bruno Jacobfeuerborn

Wolfgang Kopf



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# HOST



Stephan Eger

Senior Vice President Investor Relations

# EXPERTS



Bruno Jacobfeuerborn

Director Technology Telekom Deutschland  
and CTO DT Group



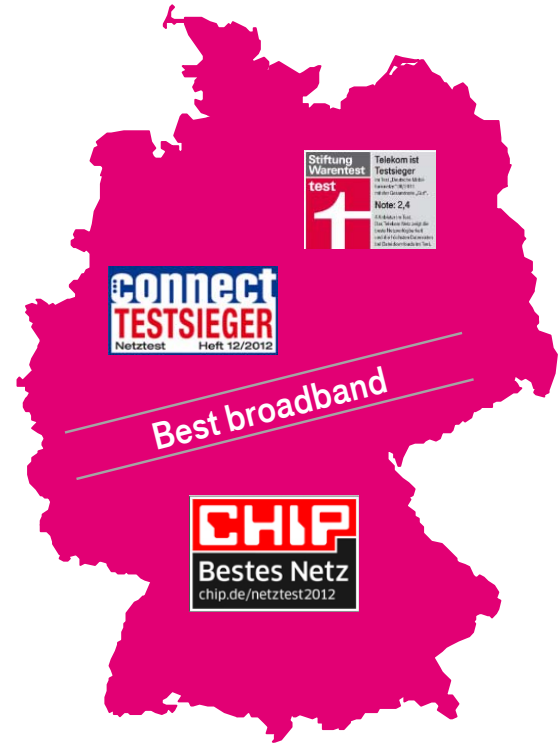
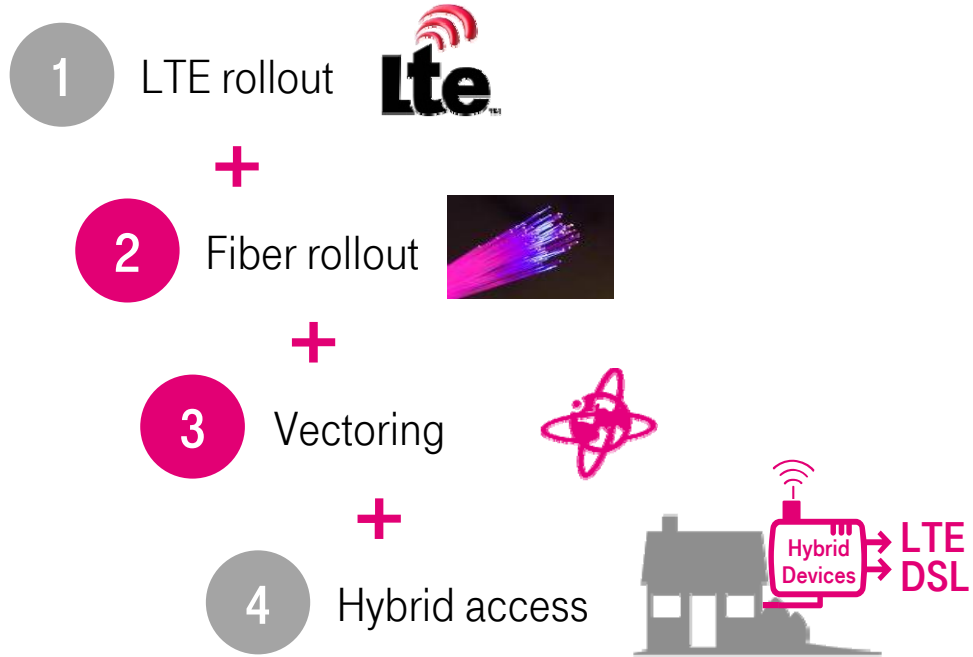
Wolfgang Kopf

Senior Vice President  
Public & Regulatory Affairs DT Group



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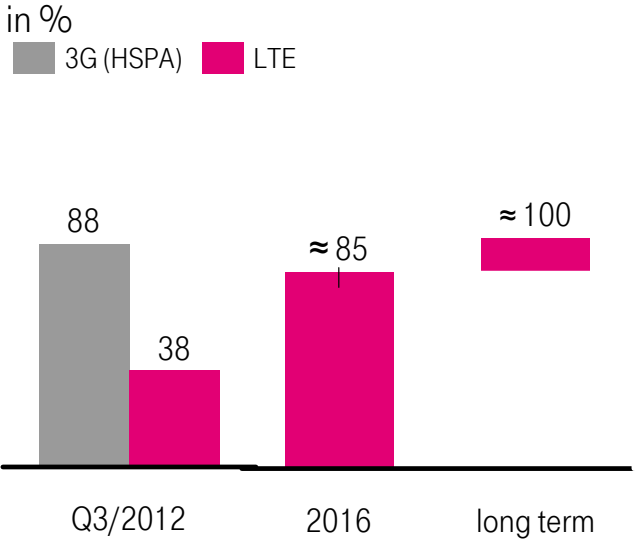
# INTEGRATED NETWORK STRATEGY (INS) SMART APPROACH ON OUR WAY TO FTTH



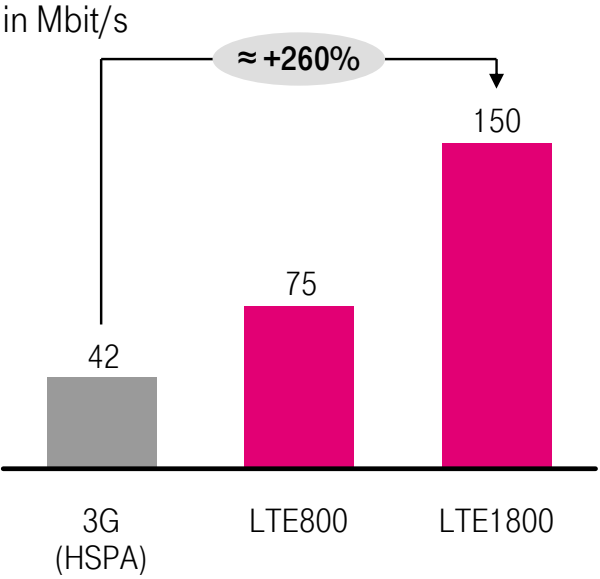
# 1 INS: CAPEX EFFICIENT AND RAPID ROLLOUT OF BEST-IN-CLASS LTE NETWORK

LTE

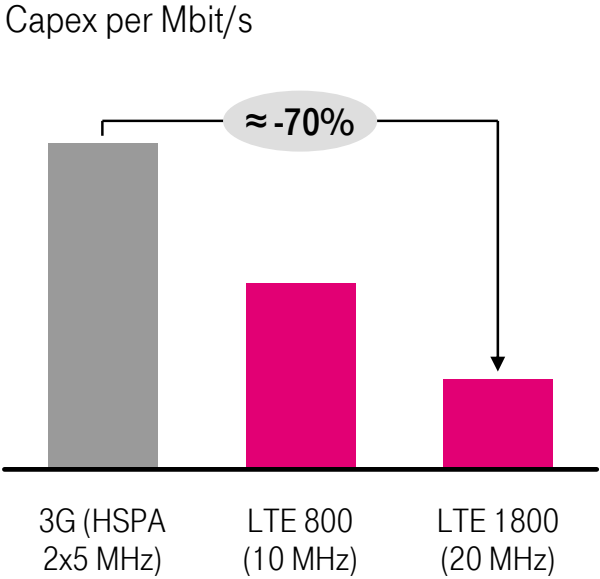
LTE rollout plan - Outdoor pop coverage



Peak performance



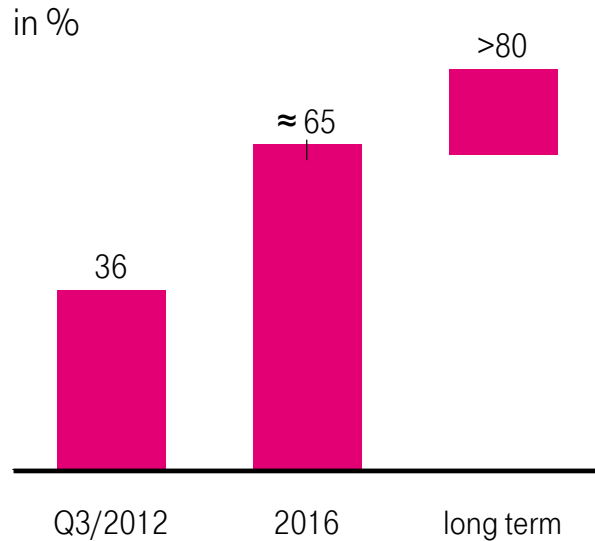
Higher capex efficiency



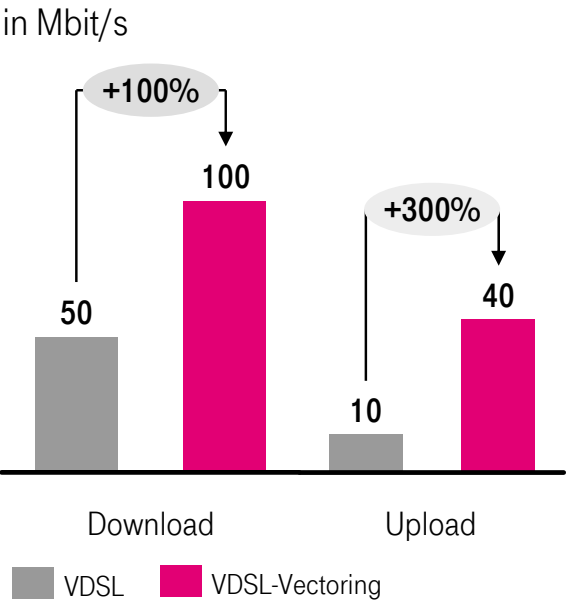
# ②③ INS: FIBER UPGRADE OF FIXED NETWORK IS A SMART “NO REGRET MOVE” TO FTTH

Fiber

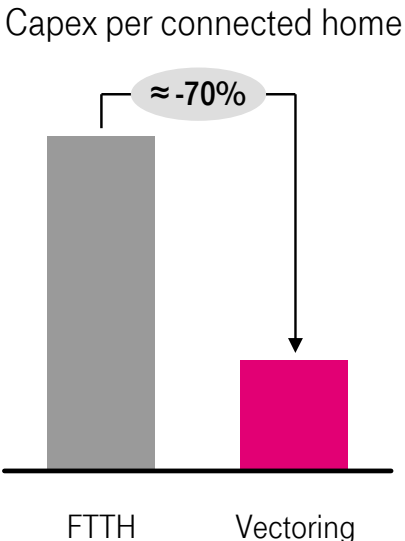
Fiber rollout plan – Coverage



Vectoring performance upgrade<sup>1</sup>



Higher coverage with lower capex

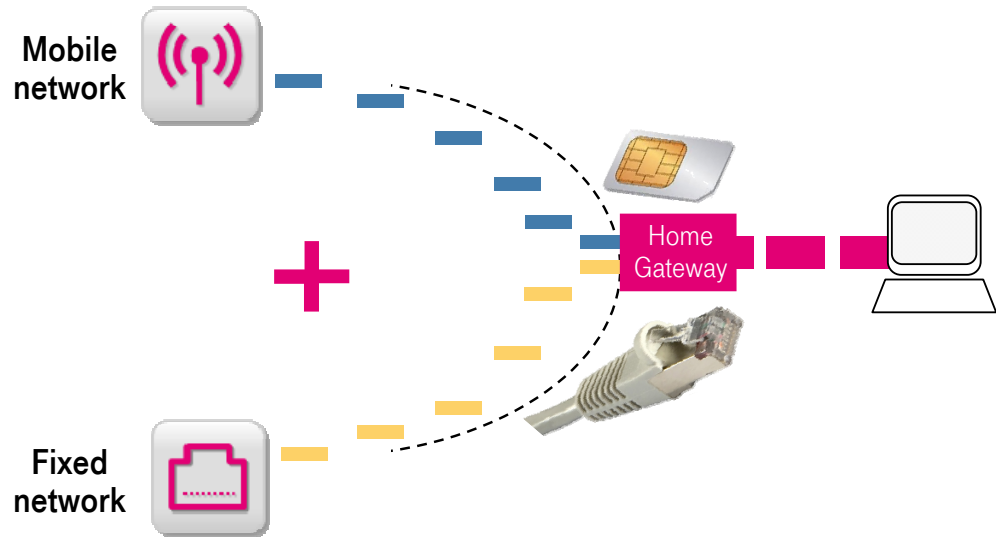


1) with short distribution cable length

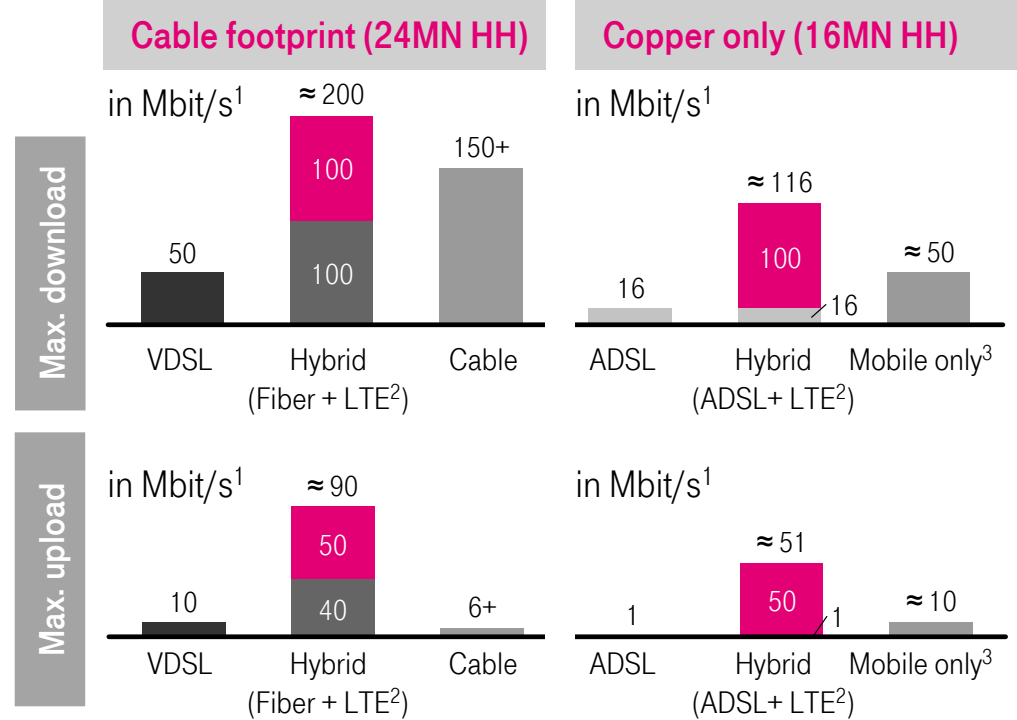
# 4 INS: HYBRID REVOLUTION THROUGH COMBINATION OF FIXED AND MOBILE FOR SUPERIOR SPEED EXPERIENCE

Hybrid

Superior offering for customers...



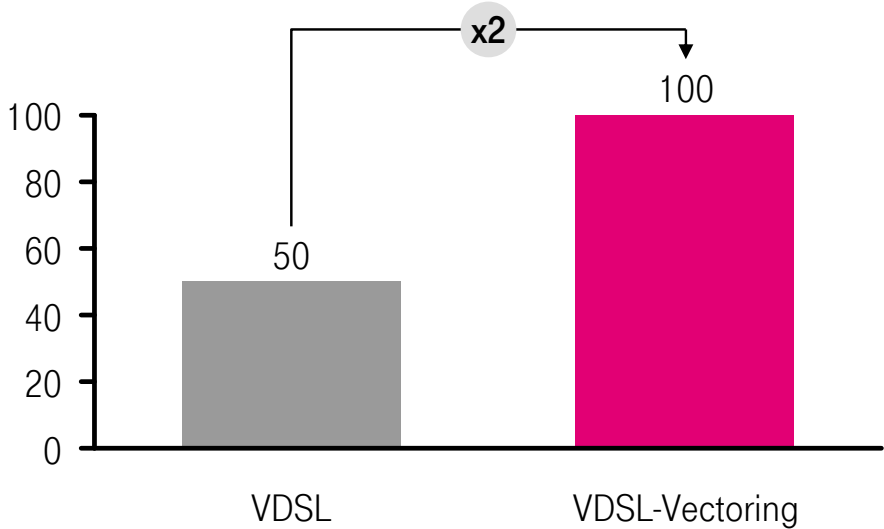
1) broadband speed communication for consumer 2) LTE 1800Mhz 3) Vodafone LTE Zuhause



# VDSL-VECTORING BANDWIDTH INCREASES SIGNIFICANTLY COMPARED TO VDSL...

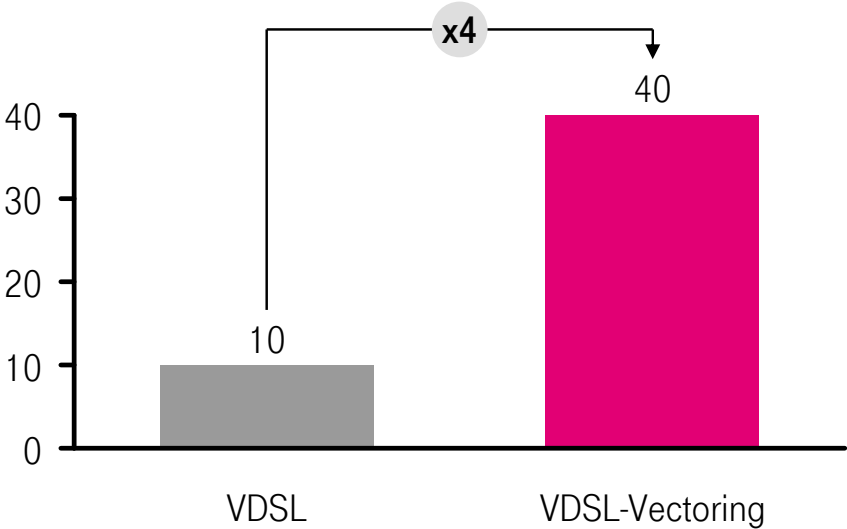
Downlink data rates<sup>1</sup>

in Mbit/s



Uplink data rates<sup>1</sup>

in Mbit/s



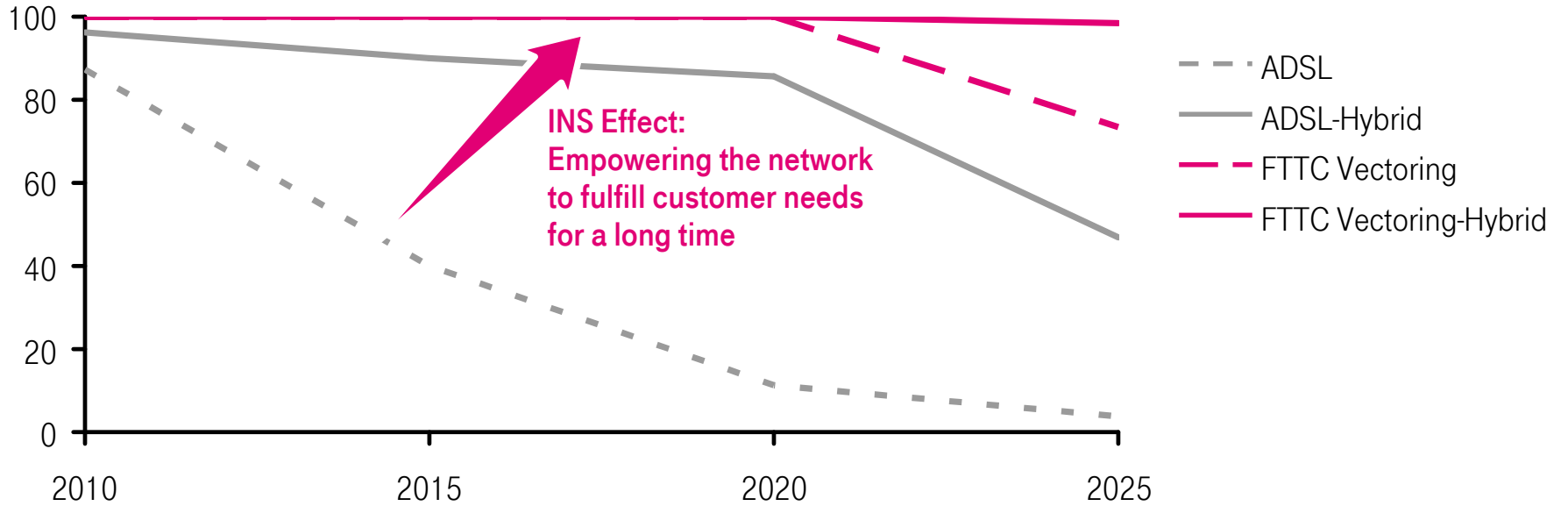
1) Real life performance depending on copper cable length



# VECTORIZING AND HYBRID PROLONGATE THE COPPER LIFECYCLE UP TO 10 YEARS

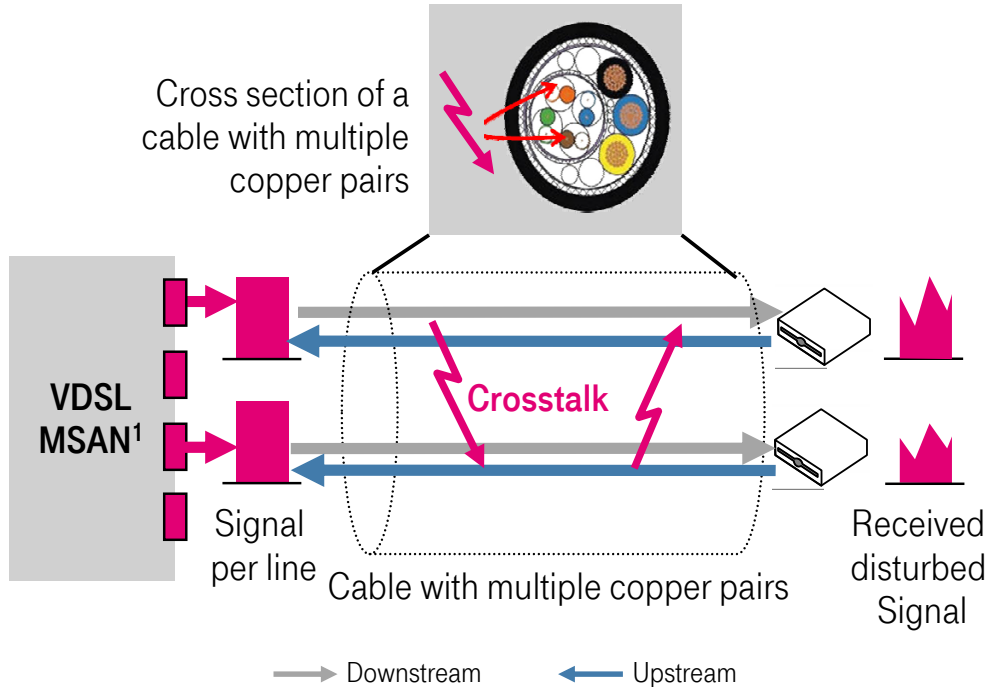
INS fully covers customer use cases for the next decade

% of households satisfied by DT's bandwidth plans



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# MUTUAL INTERFERENCE BETWEEN ADJACENT COPPER PAIRS IN A CABLE IS THE MAJOR LIMITATION OF VDSL



1) Real life performance depending on copper cable length

## What is the matter with crosstalk?

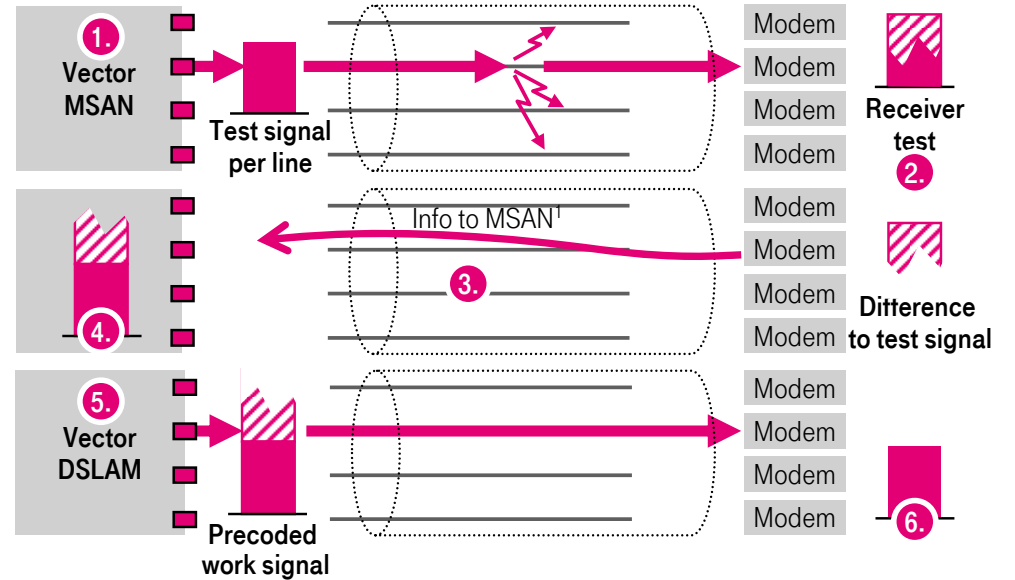
- Crosstalk: Electric signal on each copper pair creates “noise”
- Noise disturbs signal transmission of neighboring pairs
- The wider the band of frequencies used the more crosstalk: VDSL with factor 8x over ADSL2+
- Result: Bandwidth on each pair is reduced by crosstalk effects of others

# VDSL-VECTORING EQUIPMENT OPTIMIZES SIGNALS BY INTERACTING WITH CONNECTED MODEMS

Noise cancellation for you and me...



Noise cancellation for copper lines...



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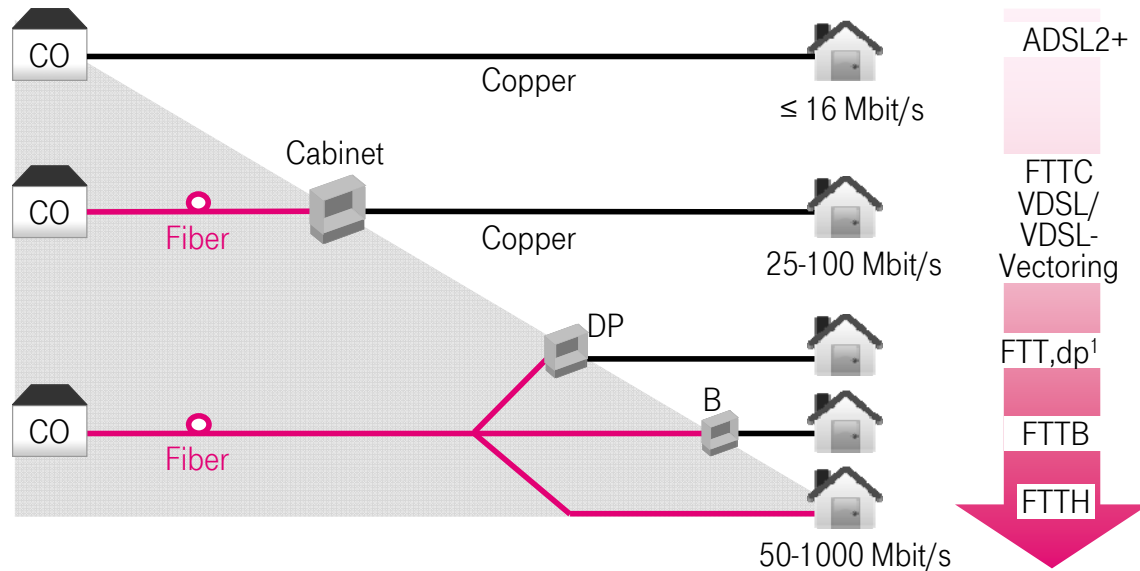
# BASED ON FTTC, VDSL-VECTORING IS AN IMPORTANT STEP TO BRING FIBER TOWARDS THE CUSTOMER...

## Gradual fiber rollout

Fiber to the Central Office - ADSL2+  
"Classic"

Fiber to the Cabinet - VDSL/VDSL-  
Vectoring (Rollout focus of INS)

Fiber near or to the home

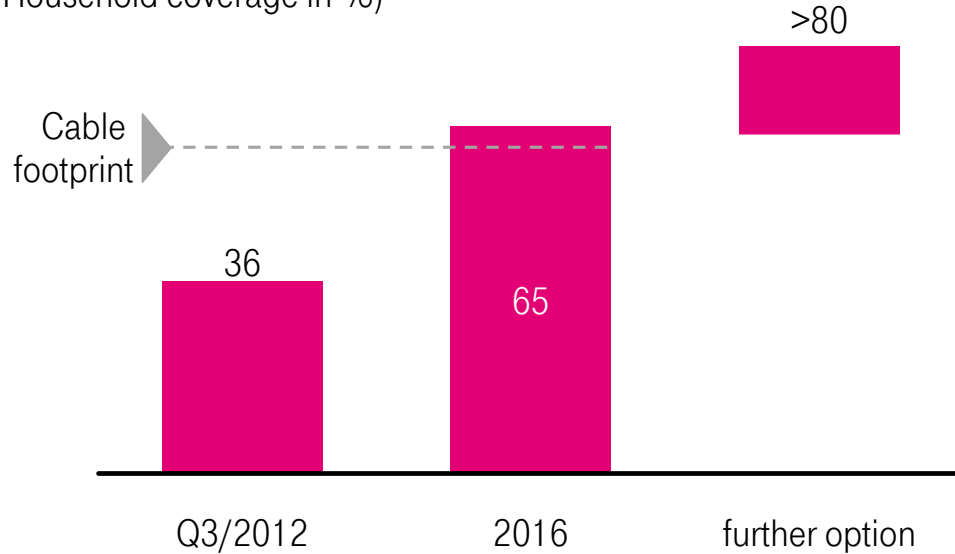


1) „Distribution Point“ currently not part of the Telekom access network

# ADVANTAGES OF THE FTTC/VECTORIZING ROLLOUT FOR DEUTSCHE TELEKOM

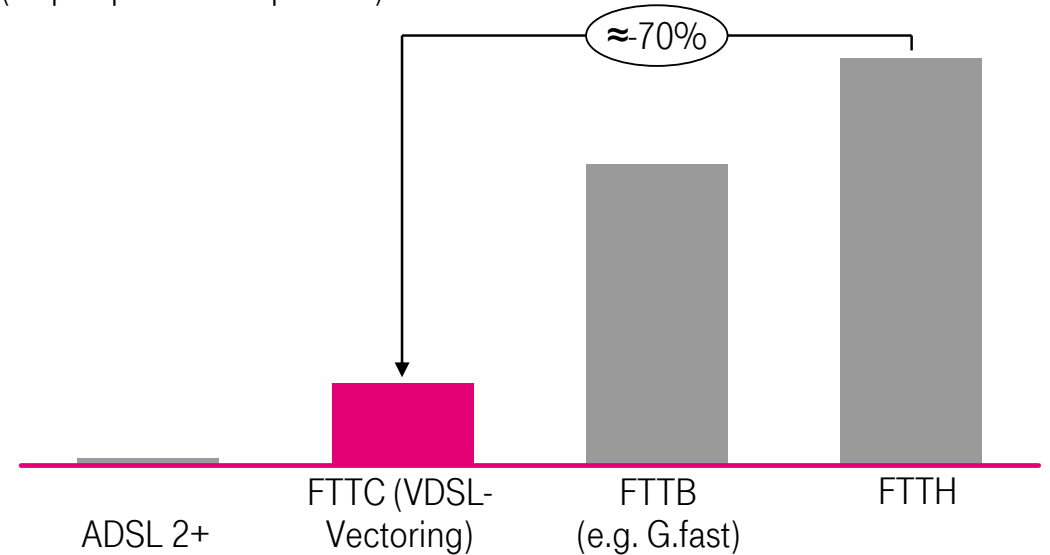
## Time to market: Rapid expansion of broadband coverage...

(Household coverage in %)



## ...at affordable costs

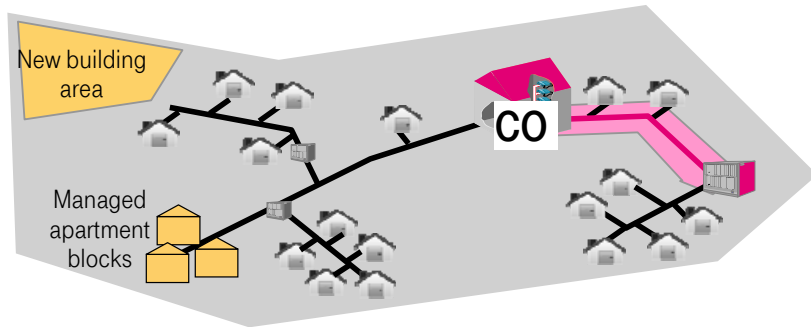
(Capex per homes passed)



# LEVERAGING POTENTIAL SYNERGIES WITH OTHER ACCESS NETWORK ROLLOUT PROJECTS

Illustrative

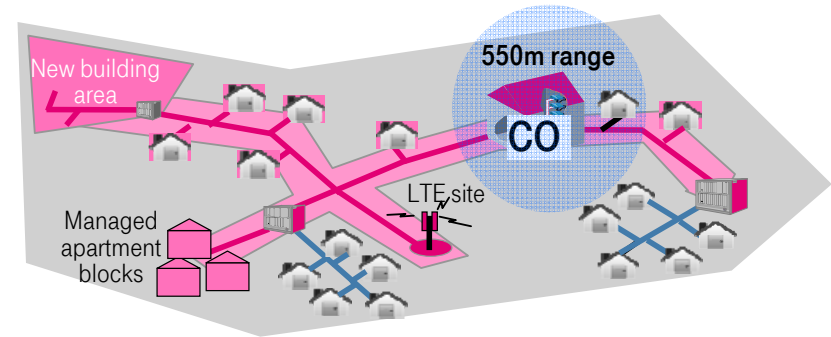
## Access network today




- ADSL provisioning from CO site via copper (copper in main & distribution cable)
- Limited FTTC footprint with VDSL2 technology

— Copper     Passive Cabinet

## Target structure after VDSL-Vectoring rollout



- VDSL-Vectoring provisioning from cabinet site (Fiber in main, copper in distribution cable)
- Synergistic fiber connection of bypassing commercial & new building areas, apartment blocks, LTE sites etc
- Opportunistic FTTH rollout & TV Grundversorgung rollout

— Fiber    — VDSL-Vectoring enabled copper     Active Cabinet

# CURRENT REGULATORY ACCESS REGIME

## Competitor's xDSL access points today

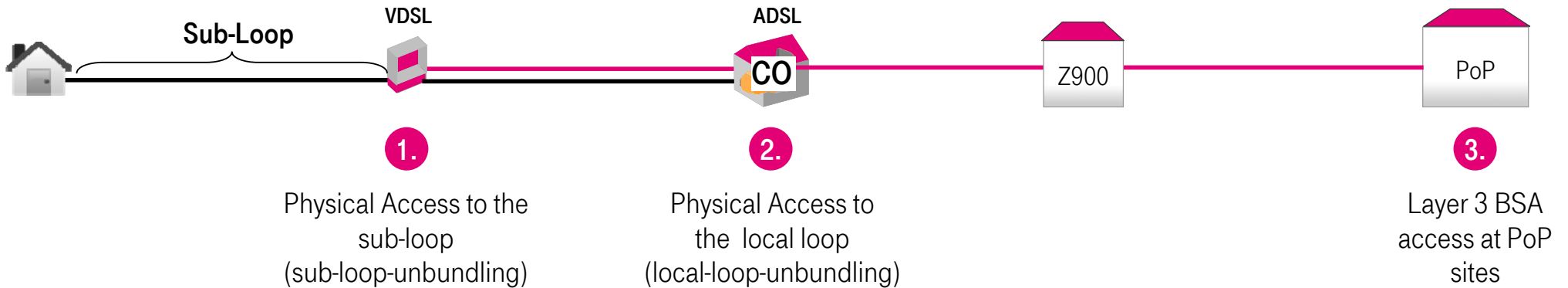
Household/APL

Cabinet

Central Office

Regional Hub  
(900 site)

Central Hub  
(73 site)



— Copper

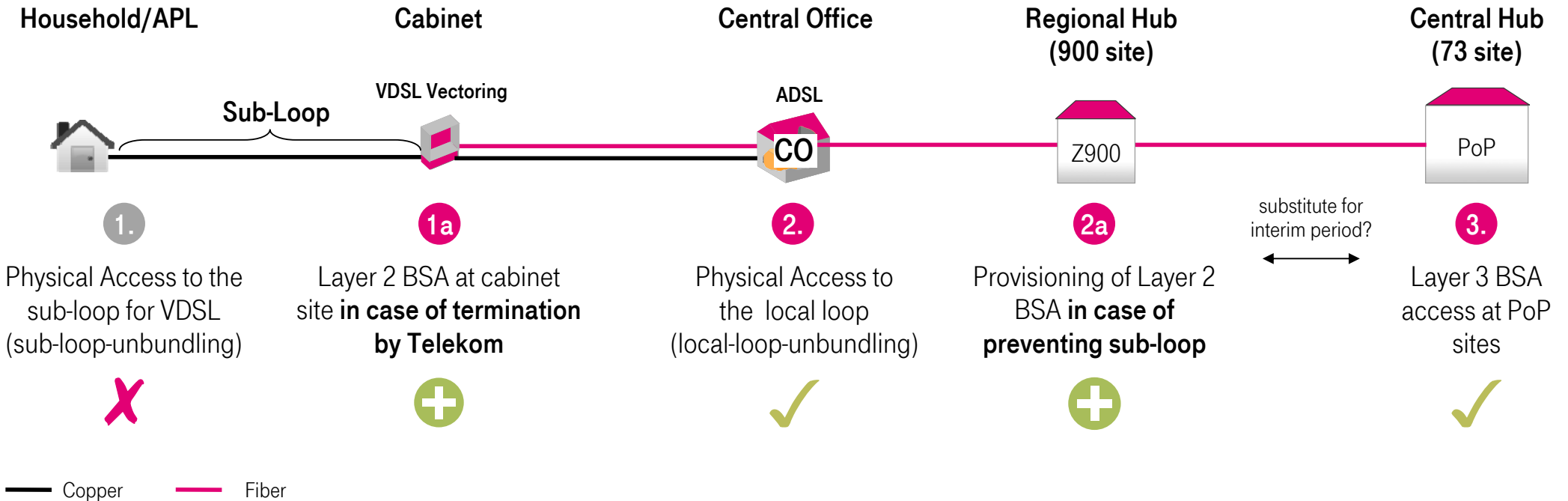
— Fiber



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# BNETZA PROPOSAL FOR VECTORING: OVERVIEW

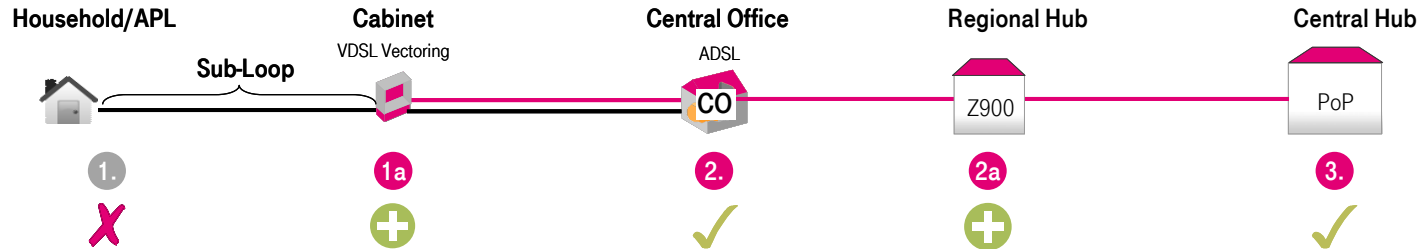
## Competitor's access options in VDSL Vectoring areas





# BNETZA PROPOSAL: AREAS WITH 2ND INFRASTRUCTURE

## Access options for Vectoring



### 1a Right of termination (only for Telekom)

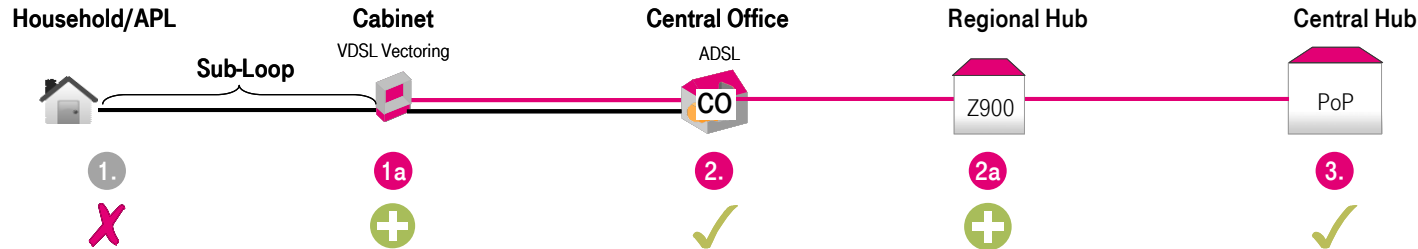
- Requires L2 BSA at/close to street cabinet
- Termination of **already existing competitor street cabinets** if carrier refuses to upgrade to Vectoring (not before 2017)
- Termination of **newly established street cabinets** with 12 months notice if:
  - ✓  $\geq 75\%$  of buildings in street cabinet area are connected to parallel infrastructure (cable/fiber operator)
  - ✓ Telekom has rolled out more street cabinets than competitors
  - ✓ Availability of L2-BSA at street cabinet at the same price as sub-loop (= EUR 6.79)

### 2a Preventing sub-loop

- Prerequisite for preventing access to sup-loop: "Suitable" **L2 BSA**
- Pricing: No provisions (ex-post regulation) yet
- In discussion:
  - L2 BSA will be available in 2016
  - Will L3 BSA as an **interim solution** be accepted?

# BNETZA PROPOSAL: AREAS WITHOUT 2ND INFRASTRUCTURE

## Access options for Vectoring

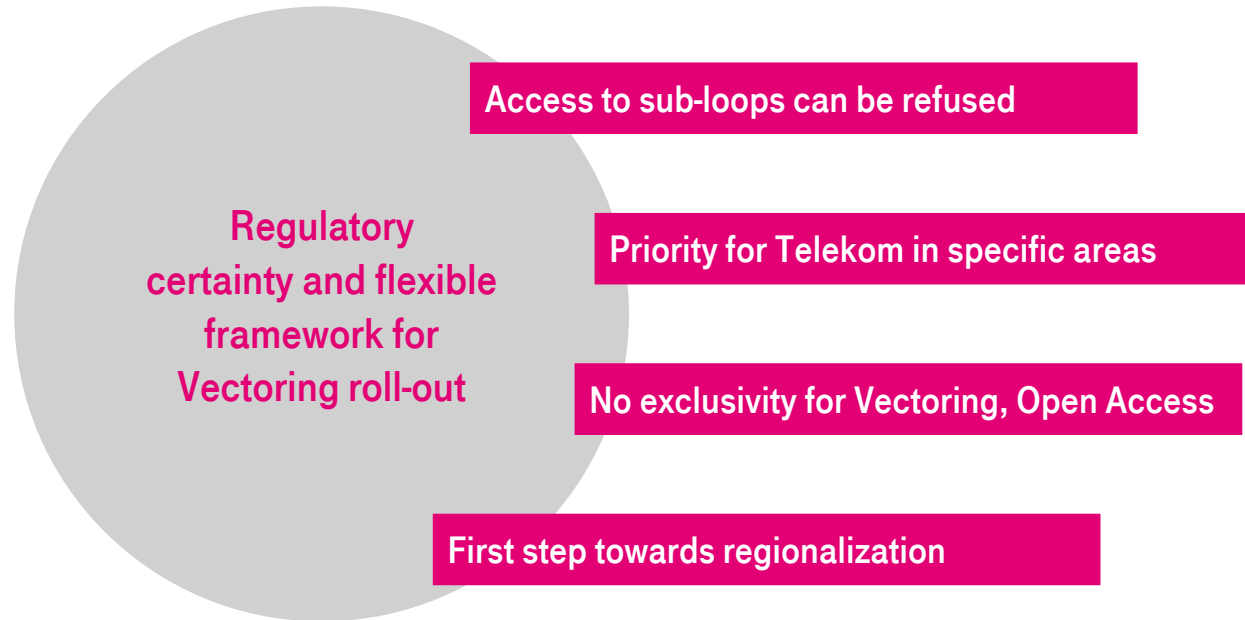


### 2a Preventing sub-loop

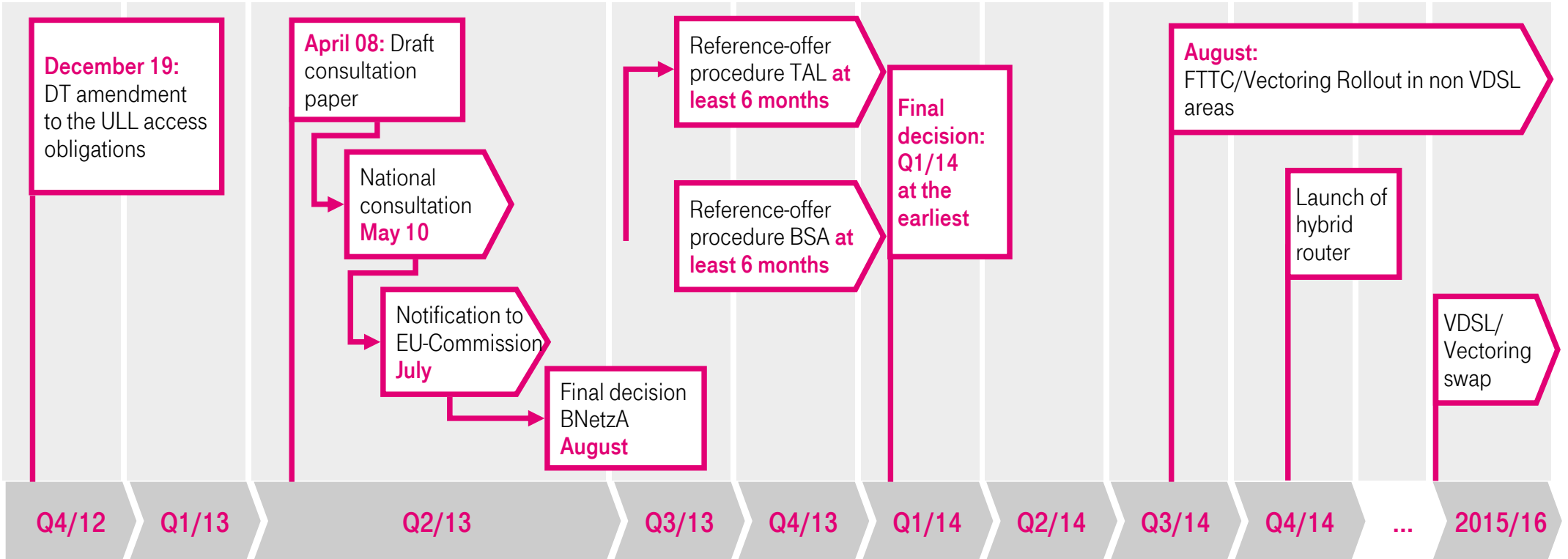
- Telekom is not able to terminate, but to prevent sub-loop
- First operator rolling out vectoring is privileged and investments are protected
- Prerequisite: All companies must offer L2 BSA as substitute
- “Cherry picking” in rural areas may lead to a Greyhound racing, but expected only in lucrative spots
- Full coverage of rural areas is unlikely

- No regional monopolies are permitted, obligations are generally symmetrical
- For first time, regulator imposes reciprocal, open access

# BNETZA FRAMEWORK ALLOWS USE OF VECTORING



# TIMEFRAME VECTORING



# WEBINAR VDSL-VECTURING

## Q&A



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