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NGA-Roll out in Europe: Current Regulatory challenges

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- **Economics of NGA – Impact on wholesale remedies**
- **Determining factors of NGA Roll-out**
- **Regulatory Measures**
- **Overview of EU Member states**
- **NGA Roll-out in Germany**
 - **Broadband market situation**
 - **Vectoring Decision**



FTTC

**sub-loop unbundling: local loop ends at the cabinet
ancillary services ducts, dark fibre backhaul**

FTTB

**local loop ends in or near the basement of the building
(basically comprises inhouse cabling), ancillary services
like ducts, dark fibre, backhaul**

FTTH – full optical solution

P2P: dedicated fibre loop up to the ODF

**P2MP - PON: Unbundling only for up to 64 dedicated fibre
lines between end- user and splitter, ancillary services to
carry traffic away from splitter**

**Wave Division Multiplexing would allow dedicated colour
loops – but not currently available to get back to full
unbundling ancillary services like ducts, dark fibre, backhaul**

Fibre moving closer to the home

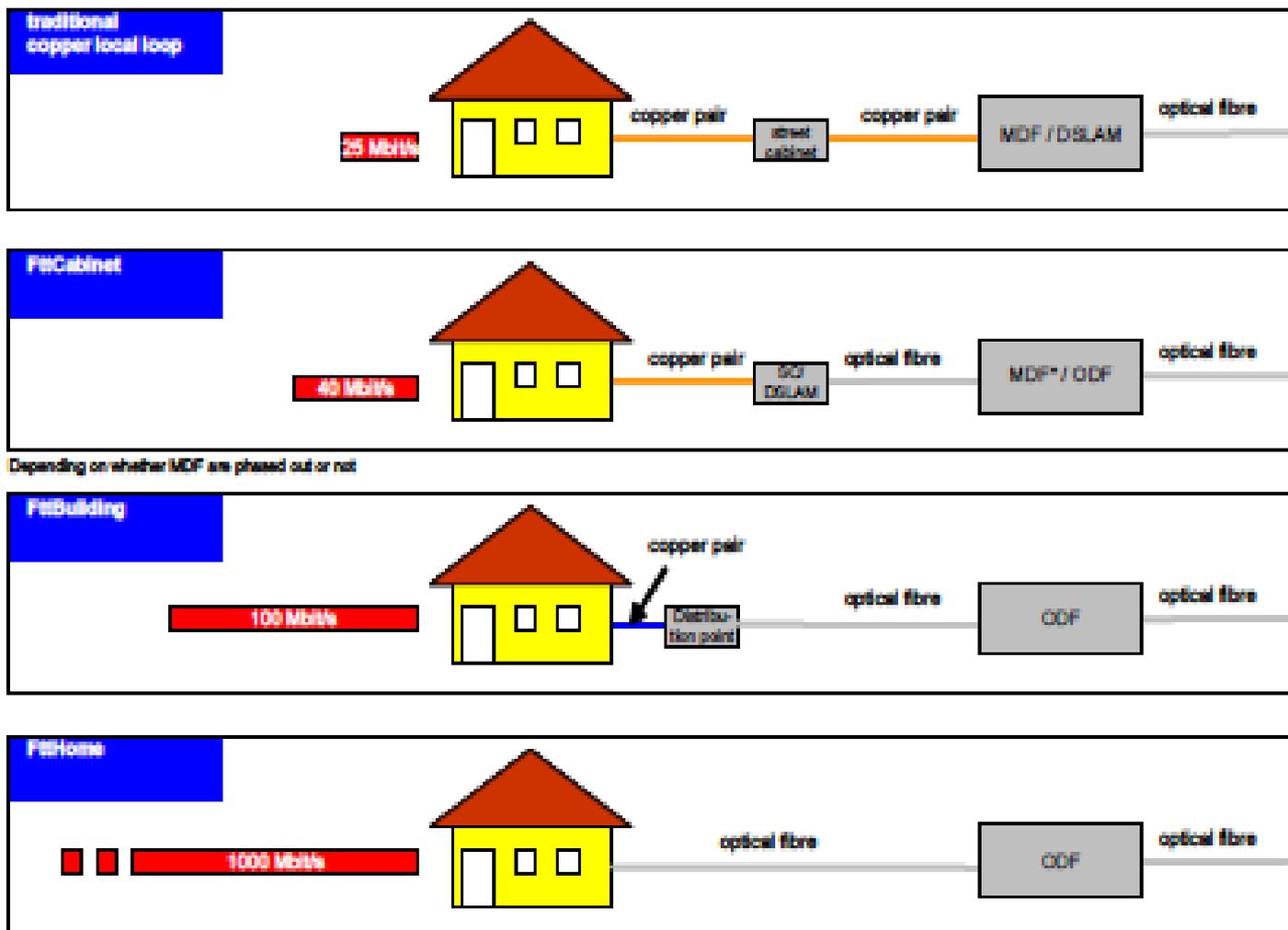


Figure 1: Access architectures using fibre and typical maximum speeds (Source: Arcep).



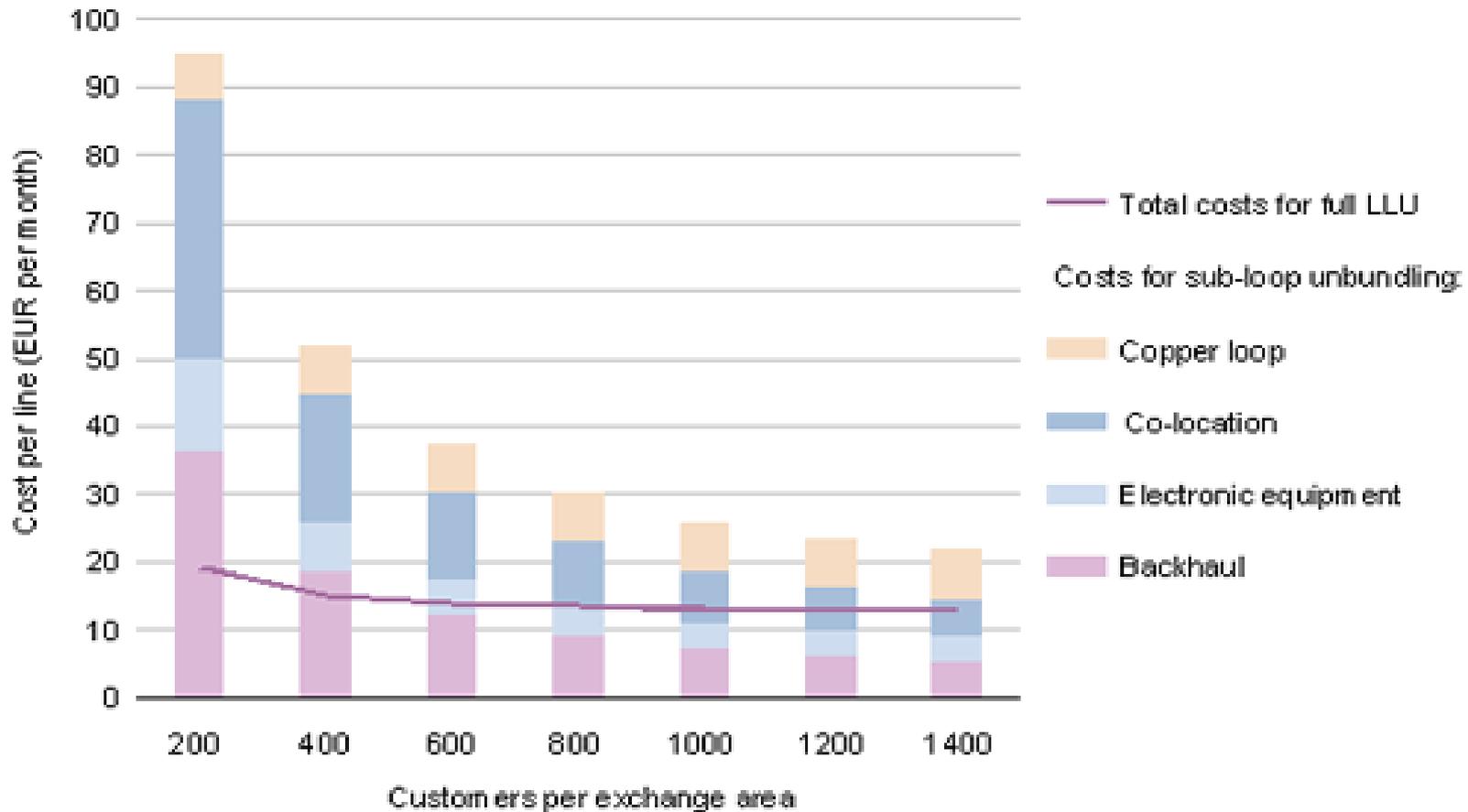
- **Customer density & dispersion**
- **Presence of multi-dwelling units**
- **Quality of existing network architecture**
 - **# of Street Cabinets per Main distribution frame (MDF)**
 - **Availability of ducts and other facilities**



- **Killer applications**
- **“Culture”**
- **Crucial demand factor for profitability of NGA-roll-out: Willingness to pay**
- **Penetration rate/take up**
- **ARPU**



Cost per line vs. customers per exchange area



Distribution of Loop length

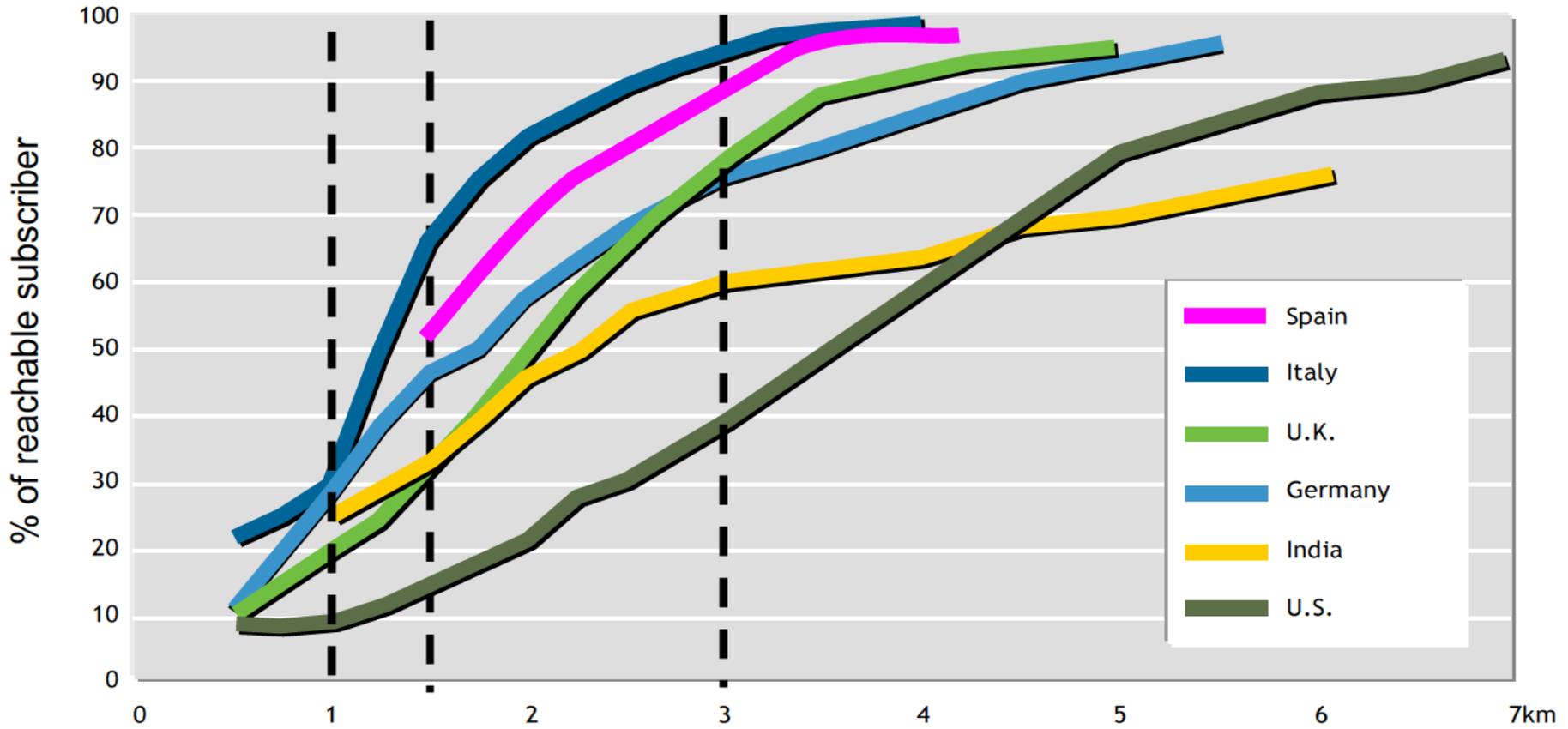


Figure 8: Distribution of Subscriber Loop Length (Source: Alcatel)

App. Relationship Street Cab/MDF



Country	Lines	MDFs	Lines Mdf	SCabs	Lines SCab	MDF / SCab	Subloop length
France	~33 Mio	16,0 00	20 00	125,0 00	264	1:10	+/- 750
UK	~24 Mio	6,00 0	40 00	80,00 0	300	1:16	+/- 500
NL	~8 Mio	1,36 0		28,00 0	286	1:21	+/- 1000
Belgium						1:38	+/- 1000
Germany	~ 40 Mio	8,00 0	50 00	>300 000	130	1:40	+/- 300



Variety of local market conditions

Regional differentiation of remedies (dense/non-dense)

Determination of concentration point requiring micro-management

Pricing increasingly differentiated across regions as spread of profitability widens

Increased number of players at the wholesale level

No uniform roll-out across and within MS (mix of architectures)

Increasingly local fibre networks rolled out by new entities (municipalities, utilities etc.)

Will incumbents also become wholesale buyers?

Chance for voluntary access provision / Open access?

Symmetric regulation (Art. 5 AD)



Increased complexity

Newly designed wholesale access products required

Access obligations increasingly based on different legal basis:
Significant Market Power, Symmetric Regulation, State Aid

Technology neutrality endorsed as a principle, however specification and implementation of wholesale products such as fibre unbundling depend on the architecture chosen by the SMP operator: danger of strategic roll-out choice to foreclose market'

Intervention at the deepest level but whether business case based on passive remedies (e.g. duct access) is feasible differs across geographical areas



Incumbents tend to roll out FTTC if

Altnets have not rolled out Fibre

Good quality of copper network,

the closer Street Cab to the end-user the higher bandwidth and reach, but the more expensive

Allows modular investment to compete with cable

No ducts between Cabinet and end-user

Street cabinets exist

Why are specific roll-out strategies chosen?



Incumbents tend to roll out FTTH if

Population density high

Altnets or municipalities roll out fibres

Upfront payments/commitments can be established

Ducts are available

No street cabinets

Copper network not existant or bad quality

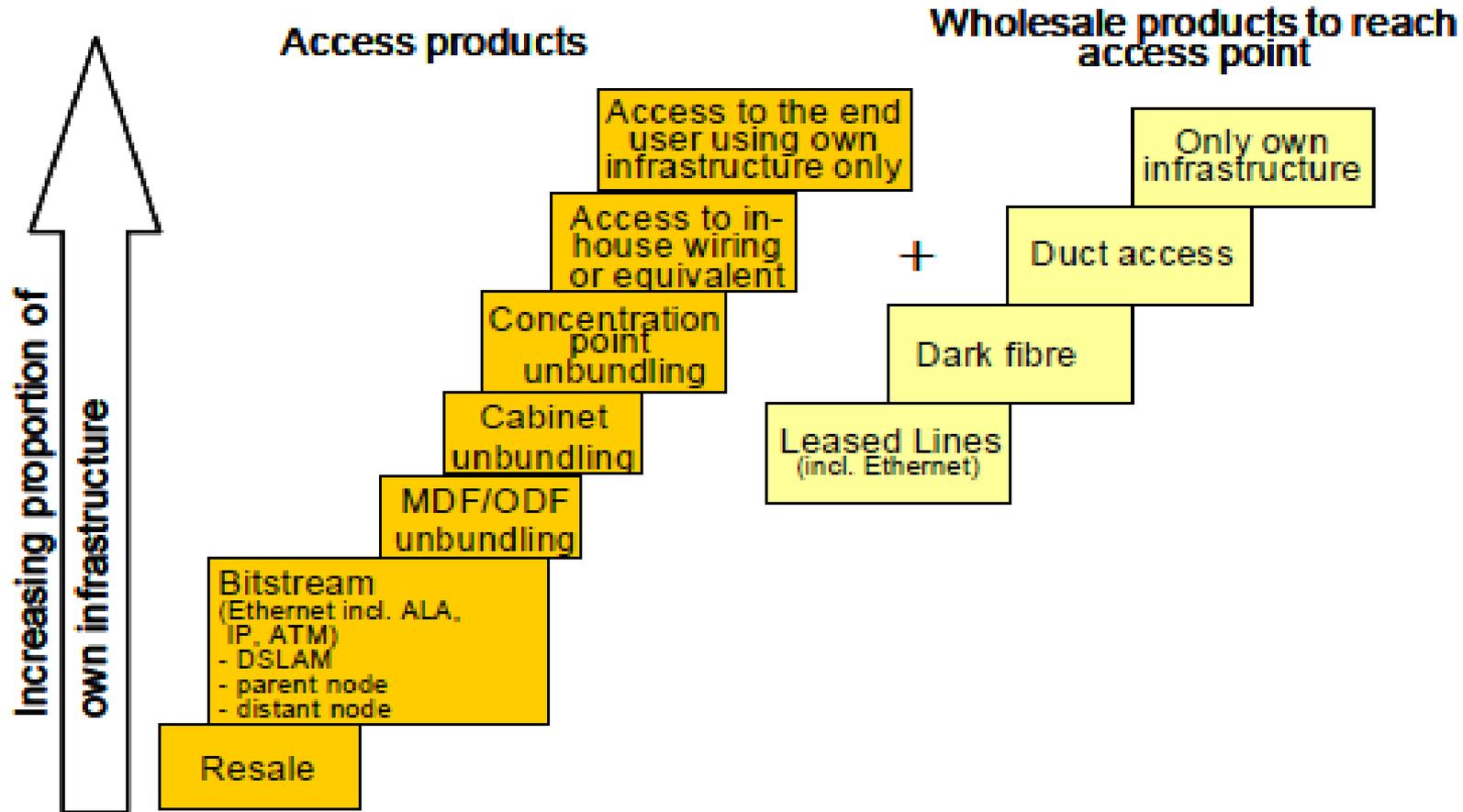


- **Regulators tools: SMP regulation (Art 12/13 AD)**
 - **Wholesale products such as**
 - Duct access
 - Unbundled local loop
 - Subloop unbundling?
 - VULA/Bitstream
- **Regulators tools: Symmetric regulation (Art. 12 FD/National Laws)**
 - Access to “Vertical infrastructure” (Inhouse)
 - Network sharing/Co-Investment
 - Duct Access

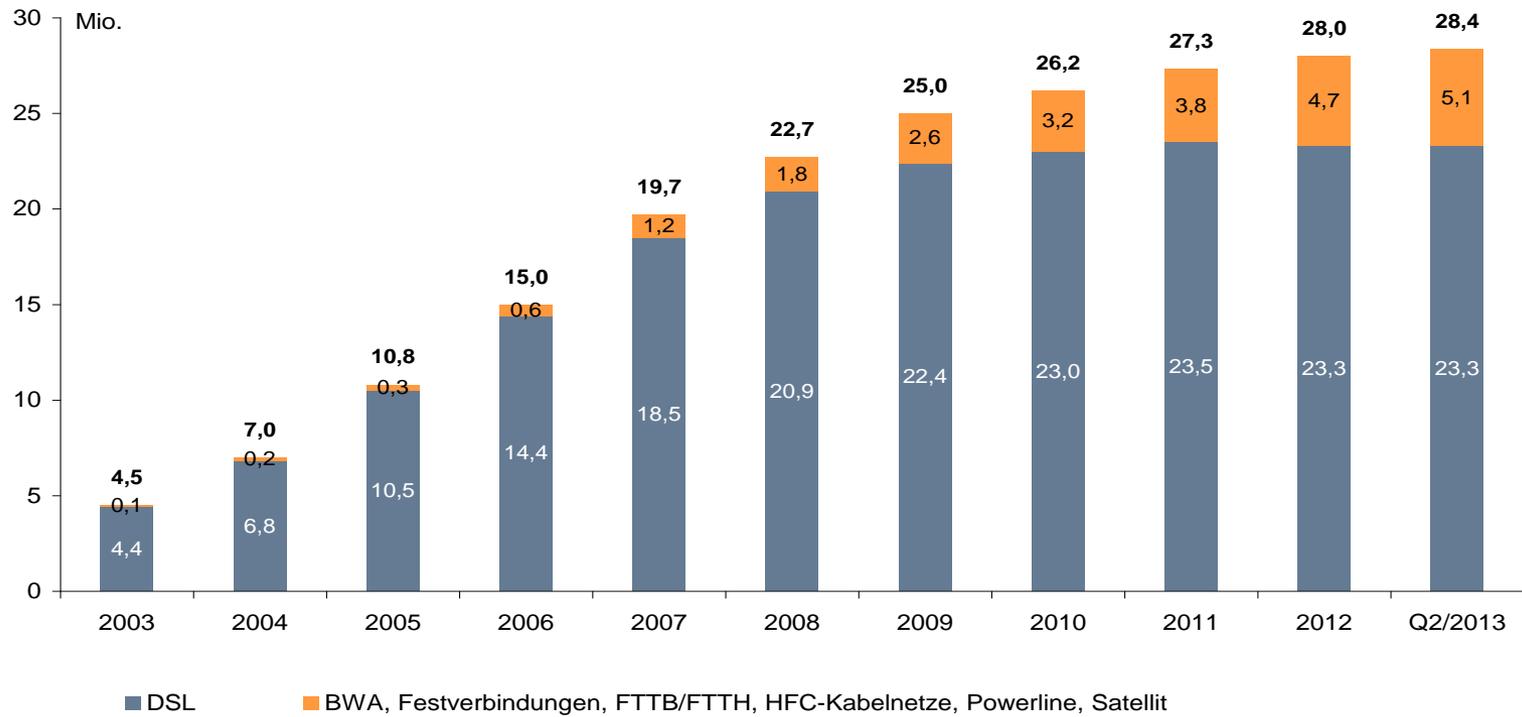


- **State Aid (State Aid Guidelines)**
 - **NRAs get increasingly involved to ensure consistent wholesale access**
 - **Legal basis required**
- **“Voluntary” Open Access**
- **Usually fair and reasonable pricing**
- **Interplay of SMP/Symmetric/State Aid regulation?**

Ladder of investment



Broadband in Germany





- The use of vectoring
 - Works like noise canceling
 - Increases the achievable bandwidths in down- and upstream direction significantly
 - Increases the filling factor substantially and makes it possible to use all copper pairs of a cable with VDSL2, and
 - Makes the achievable bandwidths more predictable.
 - **But:** to use the advantages, it is not possible that more than one operator can use vectoring on VDSL2 lines in the same cable (binder)



- In principle, the obligation to grant access to the unbundled sub-loop is maintained.
- Under certain conditions SLU may be denied to allow Telekom or an ANO the deployment of VDSL2-Vectoring.
- If a SC has been or will be developed by a first-mover (Telekom or a competitor), access of a second-mover with regard to spectrum above 2,2 MHz must or may be denied if
 - the first-mover uses or intends to use Vectoring,
 - the second-mover has been advised when ordering the co-location at the street cabinet that someone else uses or intends to use Vectoring, and
 - the first-mover grants an appropriate access to bitstream (on layer 2, though until 31 December 2015 a layer 3 product suffices).



As exception and taking its property rights (Art. 14 Constitution) into account, Telekom is entitled to terminate or deny access to SLU for use with spectrum above 2,2 MHz if

- Telekom has installed Vectoring at the SC,
 - Telekom grants an appropriate access to bitstream (on layer 2),
 - Telekom has developed more cabinets with Vectoring than a competitor with VDSL2 or Vectoring in the region concerned, the later being defined by a common area code, and
 - at least 75% of the buildings connected to the street cabinet in question are connected to a second fixed telecommunications infrastructure.
-
- All conditions must be cumulatively fulfilled



- The termination rights of Telekom Deutschland are softened by several counter-exceptions concerning grandfathered rights and state aid cases
 - Collocation of Street cabinet of “first accessor” occurred before 29/8/2013 and vectoring is offered by 2017
 - “First accessor” has received State Aid



- **“Vectoring Liste”**
- Standard offer proceedings: A so-called “Vectoring-Liste” will act as a register and grant legal security and non-discrimination when reserving SC for development.
- Reservations may be made one year in advance.
- Penalty if vectoring does not occur within the registered period
- Though the list will be installed and operated by Telekom, Bundesnetzagentur retains far reaching monitoring and intervention rights.
- Telekom has to publish vectoring register on a monthly basis
- Cases of conflict need to be notified to Ruling Chamber



Challenges caused through vectoring?

- Viability of the so far successful LLU/SLU (9 Mio LLU, app. 200 000 SLU)?
- the 2 largest ANOs have already announced their retreat from unbundling and switching to bitstream
- Increased importance of bitstream, especially layer-2-bitstream