Body of European Regulators for Electronic Communications

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Next Generation Access – Collection of factual information and new issues of NGA roll-out

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Contents

0 Introduction

In 2010 BEREC has set up a project „*Next Generation Access – Collection of factual information and new issues of NGA roll-out*" (PRD4). This project is an update of country case studies that were published as part of the June 2009 Report "NGA – Economic Analysis and Regulatory Principles" (ERG (09)17, Annex 1). These updates describe roll-out strategies, the business models and technologies chosen as well as the regulatory decisions with regard to NGA since approval of the NGA Report.

In order to kick-start the project a comprehensive questionnaire was set up and distributed (September 2 2010). The following 27 countries have provided answers to the questionnaire: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia[1], Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom.

The questionnaire aimed at identifying recent developments with regard to the deployment of NGA networks and it addresses the status of broadband roll-out in view of the Digital Agenda. More specifically, it covers both, actual as well as announced NGA roll-out plans of incumbents as well as competitors (Chapter 1 "Market development"). The results may be compared with the results from the previous fact finding exercise from 2009 (ERG (09) 17) thereby providing some insights on the "speed" of NGA deployment and on whether certain announcements made in the past actually materialised in practice.

Also, the questionnaire addresses characteristic features of different wholesale products. The products follow the concept of the ladder of investment as outlined in the "ERG Report on NGA – Economic Analysis and Regulatory Principles"[2] as well as in BEREC's Report "NGA – Implementation Issues and Wholesale Products"[3]. In this respect both, wholesale products to reach access points (Chapter 2) and wholesale access products (Chapter 3) are looked at. This approach allows to cover regulatory measures and includes a preliminary assessment whether and to what extent the NGA Recommendation is already mirrored in the NRAs' decisions regarding NGA wholesale products in Markets 4 and 5. These chapters will serve as input to the deliverable regarding the implementation of the NGA Recommendation.

This project also takes a closer look at migration issues (Chapter 4) because ensuring a smooth, non-disruptive migration process is a key challenge for a successful migration towards NGA networks. Given this relevance, also previous projects have addressed migration issues.[4] Furthermore, issues of transparency regarding civil engineering infrastructure are addressed (Chapter 5) providing a closer look at BEREC best practices as set out in BoR (10) 08. Sharing information on these issues – migration as well as transparency – may provide valuable insights for NRAs as it allows to juxtapose different approaches taken by NRAs.

Chapter 6 of the questionnaire looks at symmetrical regulation based on national legislation following-up the results from ERG (09) 17.[5]

1 Latvia pointed out that up to now NGA regulation had a limited impact due to the demand and availability of alternative platforms..
2 ERG (09) 17 http://www.irg.eu/template20.jsp?categoryId=260349&contentId=546060.
3 BoR (10) 08 http://www.irg.eu/template20.jsp?categoryId=260349&contentId=546858.
4 See BoR (10) 08, Chapter E *"Migration: MDF closure"*; ERG (09) 17, Chapter D.6 *„Procedural Issues during the migration period".*
5 ERG (09)17, Chapter D.5.

Finally, the project addresses the issue of national broadband initiatives and measures aiming at promoting next generation broadband roll-out (Chapter 7) particularly looking at targets envisaged and the current achievements.
In order to ensure comparability data reflects the situation as of December 31 2010. Originally, the data collected reflected the situation as of June 30 2010. Twenty-one out of 27 countries provided updated information.

Annex 1 provides the comprehensive answers of all 27 countries to the questionnaire. Annex 2 summarizes the main findings of the answers provided to questions 2 to 7.

1 Market developments

1.1 Incumbent

1.1.1 Actual roll-out

- *Illustrate the current status of NGA roll-out in your country. Consider the following aspects*

  - *name of the operator and applied technology (e.g. FTTH GPON, FTTH P2P, FTTB, VDSL, Cable);*
  - *current coverage of the network and number of NGA lines (passed/connected). Please provide figures as of June 30 2010*

  Many incumbents currently use VDSL(2)-technology (e.g. Austria [small scale], Belgium, Czech Republic [small scale], Denmark, Germany, Hungary, Netherland, Poland [small scale], Romania, Spain, Switzerland, Turkey [small scale], United Kingdom).

  Current usage of FttH and FttB differs ranging from small scale test areas to deployment on a broader scale. FttH is applied e.g. in Austria [small scale], Estonia [small scale], France, Germany [small scale], Hungary, Lithuania, Netherlands, Norway [small scale], Poland [small scale], Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom). In the majority of countries where the incumbent deploys FttH (either as main or a NGA technology among others) the focus is on FttH GPON (Austria, France, Germany, Hungary, Italy, Norway, Portugal, Romania, Slovak Republic, Spain, United Kingdom) rather than FttH point-to-point (Slovenia, Sweden, Switzerland, Netherlands). In the other countries the roll-out technology was not specified.

  FttB is used e.g. in Czech Republic [small scale], Estonia [small scale], Germany [small scale], Italy, Lithuania, Norway [small scale], Poland [small scale], Romania, Slovak Republic, Switzerland. Cable technology is used in a few countries by incumbents (Denmark, Hungary and Norway).

  - *available retail services (e.g. product name, type of service (e.g. triple play), bandwidth, price level, price structure).*

  Usually, there are triple play bundles, the speed depends on the used technology and prices depend on the bandwidth provided. Several incumbents offer bandwidths of 100 Mbit/s, i.e. symmetrical in The Netherlands (triple play), Slovenia (triple play from 22 €/month for 20/20 Mbit/s to 140€/month for 100/100 Mbit/s), Switzerland (triple play, price upon request); asymmetrical in the United Kingdom (price upon request), Estonia (35,40€/month) and Ireland (price upon request). Portugal's incumbent even

offers a double play (84,99€/month) offer with speeds to 200 Mbit/s (downstream) and 30 Mbit/s (upstream). Lower bandwidths are available in each country.

1.1.2 Announced roll-out plans

- *Has the incumbent announced roll-out plans for NGA networks? For which period? When answering this question consider the aspects addressed mentioned in 1.1.1.*

Almost all incumbents have announced that they plan to roll-out NGA networks in the near future. However, the time frames and the plans are heterogeneous. For this reason only a few illustrative examples are presented here. In Italy the incumbent intends to deploy FttH in 14 metropolitan cities by 2012. In Germany the incumbent envisages to connect 10 % of all household with FttH (GPON) by 2012. In the UK the incumbent intends to cover – with a mix of FttH (GPON) and FttC – 40 % of the households by mid 2012 and two thirds by end of 2015. The Swedish incumbent intends to reach half of the population with fibre by 2014. In Czech Republic 60.000 homes shall be passed with FttH, a fourth of which shall be connected. The Estonian incumbent foresees a FttH project passing 1.000 apartment buildings every year in the period 2007-2015 and in Hungary 780.000 homes shall be passed with FttH (GPON) by 2013. In Norway, the incumbent recently announced VDSL2-coverage to 30 % of the households by the end of 2011. The incumbent started offering VDSL2 to end-users in February 2011..

Overall, comparing the empirical evidence of this project with that of ERG's NGA report from 2009[6] does not give a clear indication yet with regard to the degree of target achievement and whether current deployment lack behind the target set in the past. In order to provide a well-founded answer to this question a broader time frame needs to be looked at.

1.2 Competitors (other telcos, cable)

1.2.1 Actual roll-out

- *Illustrate the current status of NGA roll-out of competitors (e.g. telcos or cable operators) in your country. Consider the aspects addressed in 1.1.1. and add number of NGA lines (passed/connected). Please provide figures as of June 30 2010.*

In several countries local/regional ISPs deploy these FttH networks (e.g. in Austria, Germany, Sweden, Switzerland). In most cases, these networks are owned and operated by local utilites or municipalities. Often, deployment of fibre – either FttH or FttB – by competitors occurs on a small scale (e.g. in Austria, Estonia, Poland),

In Romania, RCS&RDS, the leading retail broadband access provider, migrated most of its cable access network to FTTB/UTP/FTP and FTTH network. Out of the total number of NGA lines in Romania the competitors provide broadband services on 98.17% (June 30 2010).

In Italy, Fastweb's NGA network passes 2 mio. homes connecting 300.000 customers with FttH. In Norway a major competitor (Altibox) has connected 200.000 customers with an FttH P2P infrastructure. In Hungary, competitors connect approx. 100.000 customers via FttB (GPON). Competitor's FttH lines amount to approx 13.000 (connected)/22.000 (passed) in Germany and 120.000 customers connected for FttB. In Slovenia where 11 % of households are connected with FttH, the main competitor (T-2) has a market share of approx. 62 % of the FttH connections.

6 See ERG (09) 17b, "NGA – Country Case Study Updates".

In some countries cable operators are the main (or at least significant) competitors of the incumbents NGA deployments (e.g. Belgium, Netherlands, Norway, United Kingdom). In the Netherlands for example there is a 95 % coverage with DOCSIS 3 networks, in the United Kingdom cable networks cover almost pass every second premise. Bandwidths of cable offers often provide bandwidths of 100 Mbit/s, sometimes even higher.

Prices vary depending on the bundle and the bandwidth. For example, a 100Mbit/s connection is charged in Spain with 136,36€/month (quad play; operator: Mundo R.) or 35,00€/month (double play; operator: GITPA), or in Romania 16,22€/month incl. VAT (5-play: digital cable TV, fixed internet access, fixed telephony, mobile telephony and mobile internet; operator: RCS&RDS). In Portugal FTTH double play 100 Mbit/s is available for 49,99€/month (operator Optimus), triple play with 300 Mbit/s for 93,90€/month (operator: Vodafone) and triple play with 1 Gbit/s for 241,98€/month (operator: ZON). The Danish competitors charge around 134€/month (bundle unclear; operators: Energi Midt and Smile Content).

1.2.2 Announced roll-out plans

- *Have competitors announced roll-out plans for NGA networks? For which period? When answering this question consider the aspects addressed mentioned in 1.1.1.*

In the following countries competitors plan a further NGA roll-out:
- Estonia (no time period)
- Germany (focus FTTB)
- Ireland (upgrade to DOCSIS 3.0, FTTx)
- Italy (FTTH)
- Norway (FTTH, no time period)
- Poland (FTTx, cable)
- Portugal (FTTH)
- Slovak Republic (no detailed information available)
- Spain (DOCSIS 3.0)
- Switzerland (cable, FTTx)
- Turkey (FTTx)
- United Kingdom (FTTx)

In other countries competitors have not yet announced plans to roll out NGA networks (Austria, Hungary, Malta, Slovenia, Sweden) or this information is not available.

Similar to the previous findings for the incumbents the empirical evidence does not yet allow qualified statements with regard to the degree of target achievement by competitors.

2 Wholesale products to reach an access point

Please note: the following questions relate to NGA wholesale access products as defined in ERG's/BEREC's NGA Reports only. Current generation wholesale access products are dealt with in the questionnaire of the Remedies PT monitoring ERG WLA/WBA CPs.

The following sub-items should be answered for each of the following access products. Under each answer, provide information for the main operators providing these products, to the extent that information is available on access products provided by non-SMP providers:

a) *Available: on a **voluntary/mandated** basis (please provide figures (number of the respective wholesale products) as of June 30 2010)*

b) *Product definition (main features, e.g. location of access point along the value chain).*
c) *Included in **Market X***
d) *Current **regulatory obligations** (available since .., also mention remedies still under discussion):*
   - ***transparency** obligation e.g. requirements to provide information on the planned NGA network topology, according to Art. 5 FD, see also Art. 4 NGA Recommendation;*
   - *availability of **reference offer**; time period to establish a Reference Offers (see NGA Recommendation Art. 15);*
   - ***non-discrimination** obligations (e.g. provisions restricting launch of retail product until wholesale product is available, see NGA Recommendation Art. 32);*
   - ***access obligations** (different types of mandated products? Details of product variants)*

e) ***Costing** (e.g. LRIC, CCA, costs determined based on cost model; cost allocation issues, cost of capital (specific to NGA, see ERG (09) 17 Ch. D.3.2 and Annex of the NGA Rec.)*
f) ***Pricing** (e.g. long-term pricing models such as upfront payments, volume discounts; price-cap; measures to ensure consistency of remedies in Markets 4 and 5) (see Annex of the NGA Rec.)*
g) *Mention any other relevant SMP regulatory measure*

2.1 Duct Access

a) Ducts access is not available in several countries (Czech Republic, Finland, Hungary [planned, about to be notified], Latvia, Malta, Romania, the Slovak Republic, Sweden, United Kingdom). In the other countries duct access is available on a mandated basis. In two MS it is available but not used (Belgium, Netherlands). Duct access on a symmetrical basis is available in Lithuania. Voluntary offers exist – next to the mandated offer – in Switzerland.

b) Duct access is a passive access product which in principle could exist at the access and the core level. In the access network duct access may stretch from the MDF to the street cabinet for example.[7]

c) Duct access is mainly included in Market 4. In some MS duct access constitutes ancillary service to Market 4 (Austria, Belgium, Germany, Norway and Spain). A separate duct access market is foreseen in Switzerland.

d) MS *typically* impose transparency, a reference offer, non-discrimination, and access obligations.

e) MS apply different cost methodologies:
   - Belgium: cost-orientation
   - Denmark: LRAIC
   - Estonia: HC FDC TD
   - France: Economic Current Cost (Tilted annuities readjusted for price evolution)
   - Germany: CCA, LRAIC based cost allocation, bottom-up cost model for the invest
   - Greece: LRIC, CCA
   - Hungary: LRIC (about to be notified)
   - Italy: LRIC (under discussion within public consultation issued with Agcom decision 1/11/CONS)
   - Norway: cost orientation, historic costs
   - Poland: cost oriented model
   - Portugal: cost estimation based on incumbent cost accounting system

7 For details see also BEREC Report “NGA – Implementation Issues and Wholesale Products”, Chapter D.1

- Slovenia: LRIC
- Spain: cost orientation, current costs
- Switzerland: LRIC

f) Specific pricing models such as long-term pricing are not applied in MS. Some MS apply cost-orientation (Estonia, France, Norway, Poland, Spain) and a LR(A)IC cost standard is used in Denmark and Slovenia. More specifically, Denmark points out that the same pricing is used for Markets 4 and 5 to ensure consistency. In Italy prices are currently set on the basis of "fair and reasonable economic conditions" and the NRA may apply international benchmarks. In case of confirmation of the Agcom proposal under public consultation (issued with decision 1/11/CONS) prices will be cost oriented (LRIC model plus risk premium included in the cost of capital).

g) A few MS mention further SMP-operator regulatory measures:
   - Denmark (third party access, incumbents responsibility for securing space for other operators)
   - ANACOM: improvements on the access (and QoS) to the "duct database" (on an Extranet), access to poles and other PT infra-structures, an IT system for handling requests and more strict QoS parameters and compensations to be paid to operators (in case of non compliance with the SLA).
   - Turkey (e.g. building entrances and inner-building cabling are mandated).
   - France is planning to extend the access of civil engineering infrastructures ti the poles (in the next market 4 review)
   - Italy has mandated Telecom Italia to foresee enough room in cables for the fiber of other operators in case of realization of new ducts. In addition Telecom Italia (as SMP) has to provide a data base of its passive infrastructures, including ducts and dark fiber. Communications to Agcom and OLOs, with enough period time notice, of its NGNA development technical plans is also imposed to Telecom Italia.

2.2 Dark fibre

a) In approximately a third of countries, access to dark fibre is mandated (Austria, Belgium [currently not used], Denmark, Hungary [about to be notified], Germany (to be re-imposed in 2011), Italy (already published a reference offer by SMP), Netherlands, Norway, Poland, Slovenia, Spain [currently not used], Sweden). In Estonia and Portugal the product is available on a voluntary basis.

b) Dark fibre is a backhaul product consisting of unlit optical fibres.[8] Dark fibre products can exist at the access or the core network level. Dark fibre often covers .the distance between the cabinet and the MDF or another aggregation point.

c) Dark fibre is included in Market 4, sometimes as an ancillary service (e.g. Austria, Belgium, Netherlands).

d) MS *typically* impose transparency, a reference offer, non-discrimination, and access obligations.

e) Cost-orientation is applied in Belgium, Netherlands [EDC] and Poland. An LR(A)IC cost standards is applied by Denmark, Hungary [about to be notified], Slovenia and Sweden. In Italy cost orientation based on LRIC approach is proposed by Agcom within public consultation issued with decision 1/11/CONS.

f) Specific pricing models such as long-term pricing are not used. Slovenia and Denmark apply an LRIC methodology. Denmark specifies that the same pricing is

8 See also BoR (10) 08, Ch. D.2, II. Product Definition.

used for Markets 4 and 5 to ensure consistency. Italy sets prices on the basis of *fair and reasonable economic conditions* and the NRA may use international benchmarks. An Agcom proposal under public consultation (issued with decision 1/11/CONS) foresees cost oriented prices (LRIC cost plus risk premium included in the cost of capital). In Poland charges are based on costs incurred.

g) Sweden refers to the obligation to provide co-locating operators access to co-location space with own or other operators fibre.

3 Access products available

Please note: the following questions relate to NGA wholesale access products as defined in ERG's/BEREC's NGA Reports only. Current generation wholesale access products are dealt with in the questionnaire of the Remedies PT monitoring ERG WLA/WBA CPs.

The following sub-items should be answered for each of the following access products:

*a) Available: on a **voluntary/mandated** basis (please provide figures (number of the respective access products) as of June 30 2010)*
b) Product definition (main features, e.g. location of access point along the value chain).
*c) Included in **Market X***
*d) Current **regulatory obligations** (available since .., also mention remedies still under discussion):*
- ***transparency** obligation e.g. requirements to provide information on the planned NGA network topology, according to Art. 5 FD, see also Art. 4 NGA Recommendation;*
- *availability of **reference offer**; time period to establish a Reference Offers (see NGA Recommendation Art. 15);*
- ***non-discrimination** obligations (e.g. provisions restricting launch of retail product until wholesale product is available, see NGA Recommendation Rec.. 33);*
- ***access obligations** (different types of mandated products? Details of product variants)*

*e) **Costing** (e.g. LRIC, CCA, costs determined based on cost model; cost allocation issues, cost of capital (specific to NGA, see ERG (09) 17 Ch. D.3.2 and Annex of the NGA Rec.)*
*f) **Pricing** (e.g. long-term pricing models such as upfront payments, volume discounts; price-cap; measures to ensure consistency of remedies in Markets 4 and 5) (see Annex of the NGA Rec.)*
g) Mention any other relevant SMP regulatory measure and provide any other remarks on NGA regulation in your country.

3.1 Access to in-house wiring or equivalent

a) Access to in-house wiring or equivalent is mandated (SMP-based) in some MS (Austria, Germany, Poland, Slovenia) and in Italy it is under discussion (a public consultation has been issued with decision 1/11/CONS where such remedy is introduced in those areas where fiber ULL is not mandated). In Hungary the obligation is covered by obligations for sub-loop unbundling (about to be notified).

In France and in Portugal it is mandated through symmetrical regulation. Similar, Norway refers to its National Legislation. Spain applies a symmetrical obligation for operators deploying FttH. The other MS do not an apply obligation to provide access to inhouse-house wiring.

In Sweden and in Norway, in-house wiring is generally owned by the estate owner.

b) This product provides access to the vertical wiring infrastructure within buildings with the access point typically located in the basement of the building.[9]

c) In MS where access to in-house wiring or equivalent is mandated it is either included in Market 4 or imposed via symmetric obligations.

d) Several regulatory obligations such as transparency or non-discrimination are applied (in conformity with the NGA Recommendation). However, differences exist, as a reference offer for example is not mandated in every MS.

e) Poland applies a cost oriented model. Hungary [about to be notified], Slovenia, Sweden and Italy (here it is under discussion within decision 1/11/CONS) use an LRIC approach. France and Spain request that access prices are *reasonable*.

f) Specific pricings models such as long-term pricing are not used by MS. Poland requests prices to be based on costs incurred and Slovenia refers to LRIC based prices. Portugal points out that for fibre (symmetrical obligation) there are no regulated prices. In Italy prices will be based on LRIC + risk premium included in the cost of capital (under discussion within public consultation issued with decision 1/11/CONS).

g) No further issues

3.2 Concentration point/ manhole unbundling

a) Concentration point/manhole unbundling is available on a mandatory basis in some countries (Estonia, Poland, Slovenia; in Hungary [about to be notified], Germany[10], Norway and the UK the obligation is covered by obligations for sub-loop unbundling). In Italy concentration point/manhole unbundling will be available from 2013 in specific areas (such issue is under discussion within public consultation issued with decision 1/11/CONS). In Spain there is a symmetric obligation for operators deploying FttH.

b) A concentration point is an intermediary node allowing unbundling/sharing.[11]

c) Access to the concentration point/manhole unbundling is contained in Market 4.

d) The MS *typically* impose - in conformity with the NGA Recommendation - transparency, a reference offer, non-discrimination and an access obligation.

e) Countries apply different approaches/methods for costing issues:
- Estonia: HC FDC TD
- Hungary: LRIC (about to be notified)
- Italy: LRIC (under discussion)
- Poland: cost oriented model
- Slovenia: LRIC model
- Spain: reasonable prices

f) Estonia and Poland apply cost-oriented prices. Slovenia uses an LRIC approach.

g) No further issues

9 For details see also BEREC Report "NGA – Implementation Issues and Wholesale Products", Chapter C.1.
10 Access has to be provided at the point where the relevant product can be accessed in unbundled form, independent from the surrounding infrastructure, whether street cabinet or manhole.
11 See ibid Chapter C.2.

3.3 Cabinet unbundling

a) Approximately 60 % of the countries have cabinet unbundling available on a mandated basis. In Estonia cabinet unbundling is available on a voluntary basis.

b) Typically, cabinet unbundling is defined as providing access to the street cabinet. A more general understanding is used e.g. in Denmark, Norway or Slovenia, the latter defining sub-loos as connecting the network termination point to a concentration point or intermediate access point.

c) Cabinet unbundling is included in all countries in Market 4. In Switzerland cabinet unbundling is a separate market (no SMP analysis).

d) The MS typically impose - in conformity with the NGA Recommendation - transparency, a reference offer, non-discrimination and an access obligation.

e) An LR(A)IC cost standard is applied by several MS (e.g. Belgium, Denmark, Hungary, Romania, Romania, Slovenia, United Kingdom). In Italia an LRIC cost standard is under discussion. Spain and Portugal apply cost-orientation. In Belgium and Poland cost models are used. Germany uses CCA cost statements with cost-allocation based on LRAIC. Norway applies historical costs.

f) The countries questioned use different pricing issues. In Denmark and Slovenia prices are based on LR(A)IC. Specific pricing models such as upfront payments schemes are not in the MS.

g) Three countries referred to other SMP regulatory measures. Those are Denmark (Measure on the incumbent not to take actions which have a negative effect on copper lines used by alternative operators), Poland (access to fibre loops via LLU service is granted if no access to ducts or dark fibre is possible in a given local loop) and Portugal (maintenance of the obligation to grant access to local loops and sub-loops and associated resources). In Italy such remedy is foreseen in the case of FTTN NGA network topology

3.4 ODF unbundling

a) In several countries (Netherlands, Poland, Slovenia, Sweden, Switzerland) ODF unbundling is available on a mandated basis. In Germany and Hungary it has been notified resp. is about to be notified. In Italy this remedy is under discussion within the public consultation issued with decision 1/11/CONS.

b) In a Point-to-point infrastructure ODF unbundling provides access to the fibre at the optical distribution point (ODF) or equivalent facility.[12]

c) ODF unbundling is included in Market 4.

d) MS typically impose an access obligation, transparency, non-discrimination and a reference offer as foreseen in the NGA Recommendation.

e) An LRIC approach is applied by some countries (Hungary [about to be notified], Slovenia, Sweden [from 2011]) and Poland implements a cost oriented model (according to Art. 13 of AD).

f) Specific pricing models such as long-term pricing are not applied. Cost-oriented prices are required in Poland and foreseen in Slovenia

12 See also BoR (10) 08, Ch. 4, elaborating on ODF point-to-point unbundling and (Ch. 4.1) and on wavelength unbundling at the ODF in a FttH PON architecture.

g) In the Netherlands the obligation to provide ODF unbundling is supplemented with the obligation to provide collocation and backhaul as ancillary services. And in Poland, as a proportionate application of the ladder of investment principle tackling market failures in Poland, access to fibre loops is granted if no access to ducts or dark fibres is possible for a certain loop. The Swedish regulator makes sure that access fibre has to be provided between the ODF stations (if less than 10 km between customer and access ODF in neighbouring ODF stations).

More specific questions regarding fibre unbundling mainly resulting from the Commission's NGA Recommendation:

- *Specify for Market 4 which of the **remedies** according to Art. 12-30 are **in place** with regard to FttH/B and FttN.*

  Countries differ concerning the remedies in place with regard to FttH/B and FttN:
  - Czech Republic: none
  - Denmark: FttN: all remedies in place; FttH: no remedies in place
  - Germany: FttN access to mass market: remedies in place (completed by ancillary service: access to ducts); FttH: no obligation for access to FttH in the existing remedies decision; however the new version (including access remedies regarding FttH) has been notified to the Commission
  - Hungary: all remedies will be imposed (decision is about to be notified)
  - Italy: access to ducts and dark fiber, with reference offer publication, are in place. Under discussion fibre ULL and access to in-building vertical wiring. In addition to access, non-discrimination, transparency, accounting separation, cost orientation remedies are foreseen
  - Norway: FttN/C: all remedies included (except accounting separation); FttH/B: no remedies are imposed
  - Poland: obligations of access, non-discrimination, transparency, accounting separation, cost orientation of prices
  - Portugal: no remedies
  - Romania: FttN/FttB: all remedies are in place; FTTH: no remedies (not included in Market 4)
  - Slovenia: all remedies will be imposed (planned)
  - Spain: FttN/FttB: all remedies are in place; FTTH: access to civil engineering infrastructure; access to terminating segment is imposed as symmetric obligation
  - Sweden: no remedies
  - UK: no remedies

- ***Art. 22f** NGA Rec. foresees to mandate **unbundled access to the fibre loop** irrespective of the network architecture and topology implemented by the SMP operator. Are there any **exceptions** applying to SMP providers (e.g., **in certain geographic areas)** from such an obligation? If so, specify these exceptions and elaborate on the reasoning for not imposing unbundled access to the fibre loop.*

  MS where unbundled access to the fibre loop is available do not apply such exceptions. For Poland see 3.4 g above. In Italy, according to public consultation proposal issued with decision 1/11/CONS, unbundled access to the fiber loop of FFTH/GPON will be mandated at the intermediate concentration point (after the last splitter) and in those areas where only the SMP NGA network is available.

- *Specify the conditions of the **reference offer** for unbundled access to the fibre loop, in particular those conditions that go beyond the minimum list of conditions as set out in Annex II FD (→ **Art. 24** NGA Rec).*

In Poland the scope of the referene offer covers the minimum list of conditions as set out in the FD but contains more specific conditions. In Slovenia the reference offer additionally includes data on reserved loops for technical purposes, the most frequent defects and the time limits foreseen for the remedy of such defects. In Italy the SMP is mandated to provide a *data base* of its passive infrastructures (indicating type, location, occupation degree).

- *What is the basis of the prices charged for access to the unbundled fibre loop (e.g., **cost-orientation)**? Is a **premium** incorporated reflecting any additional and quantifiable investment risk? If so, how you took account of the various **factors of uncertainty** on the one hand and the criteria **mitigating** the risk of NGA investment for the SMP operator on the other hand (→ **Art. 25** and Annex I NGA Rec.).*

  Germany (ex-post rate regulation) and Sweden apply an LR(A)IC approach in order to adequately reflect the investment risk. Poland adopts cost orientation. In Italy prices will be based on underlying costs plus an investment risk premium to be evaluated according to relevant market conditions.

3.5 Enhanced Bitstream[13]

a) In **many countries enhanced bitstream products are available on a mandated basis** (Belgium, Denmark, Estonia, Germany, Hungary [about to be notified], Italy, Norway, Poland, Portugal (copper/DSL), Slovenia, Spain, Sweden, The Netherlands [regional PoI], United Kingdom). In other countries such products are provided on a voluntary basis (Lithuania, Switzerland).

b) Access typically is provided at regional and national level. At a regional point of access a bitstream product is available for example in Germany (regulated IP-bitstream), Hungary [about to be notified], Italy (under discussion), Norway, Portugal (copper/DSL), Spain, The Netherlands. In some countries there are also national points of access such as in Germany (voluntary IP-bitstream, mandated in current remedies decision), Hungary, Norway, Poland, Portugal, Slovenia, Spain. A local point of interconnection is provided in Estonia, in Italy (under discussion) and in the UK.

c) Typically, mandated bitstream products are included in Market 5. Exception: two countries, Austria and the United Kingdom, included a Layer-2 bitstream product in Market 4.

d) **Regulatory obligations in most countries include transparency, non-discrimination, reference offer and an access obligation**. Accounting separation is mandated in a several countries (e.g. Germany, Hungary, Italy (under discussion), Norway, Portugal, Slovenia, Spain). The same holds for price control and(or) cost accounting obligations (Estonia, Hungary, Italy, Portugal, Slovenia)

e) Cost-orientation/LR(A)IC is applied in several countries (e.g. Belgium[14], Denmark, Germany [ex-post in current regulation], Hungary [about to be notified], Italy (currently under public consultation), the Netherlands[15], Poland, Portugal, Spain, Sweden) and cost models are used in e.g. in Belgium, Germany or Poland. The concept of retail-minus is used by Portugal (for specific cases) and Slovenia. Norway applies historical costs in the accounting separation reporting and price-cap is used in Estonia.

13 See ERG (09) 17, Ch. D.1, in particular p. 12.
14 For VDSL2 bitstream access an additional mark-up is applied to obtain reasonable pricing.
15 Cost orientation is applied (EDC) only for high quality wholesale bitstream access.

f) Specific pricing models such as upfront payments or volume discounts are not applied in any country. Considering the provision of Art. 5 NGA Recommendation which requests NRAs to ensure that remedies in Markets 4 and 5 are consistent with each other, Denmark for example mentions that the same pricing models are use for both markets. Belgium mentions that there are stable tariffs during the migration period. In Italy prices are based on LRIC + risk premium included in the cost of capital (under discussion).

g) As regards the question of other relevant SMP regulatory measures Belgium stresses that due to closing of MDF a bitstream offer is to be created which offers a worthy alternative.

Below, some *additional* questions on bitstream:

- *Please describe the different points of access available (e.g. at the broadband PoP, MDF) and the layers (layer 2, 3)*

  Countries differ with regard to the available access points and the layer:
  - Austria: up to nine regional concentration points;
  - Belgium: 54 PoI for ATM and 10 PoI for Ethernet;
  - Estonia: access at DSLAM, local and national level;
  - Germany: Layer 2 bitstream, Layer 3 bitstream (both are available at national or regional delivery points);
  - Hungary: layer 2 and layer 3 at national and at the access aggregation points;
  - Italy: local exchange, parent node, distant node (level 2 and 3) – under discussion;
  - Norway: VDSL2 bitstream as layer 2 and 3 services at national and regional delivery points;
  - Poland: DSLAM, ATM and IP level;
  - Portugal: ATM and Ethernet (layer 2), IP (layer 3), 28 Regional and 2 National PoPs;
  - Slovenia: Local level – access on MSAN point or DSLAM as an equivalent device; Regional level – transmission access to BRAS (broadband remote access server); National level - access in administrated networks through IP/MPLS.
  - Spain: ATM access at layer 2 (109 points); IP access at layer 3 at 40 points and a single national point; Ethernet layer 2 product will be available at 40 points;
  - Sweden: access at level 2a (100+ points providing national coverage) and level 2b (27 metro Ethernet rings with 27 PoI providing national coverage);
  - Turkey: ATM and IP bitstream;
  - UK: access at local NGA exchange.

- *Is quality differentiation possible and how is it implemented? Please mention the relevant quality parameters and state whether guaranteed bandwidth is available.*

  Quality differentiation is possible in several countries (Belgium, Hungary, Italy, Norway, Poland, Portugal, Spain). Available quality characteristics are for example: UBR, CBR, VBR-rt, VBR-nrt. Guaranteed bandwidths are available e.g. in Belgium, Italy, Poland or Portugal (for ATM: CBR).

  Other countries do not foresee quality differentiation (e.g. Austria, Denmark, Turkey, United Kingdom [it is expected that quality differentiation will be possible (details are under discussion by industry)]).

- *Is multi-cast technology available for alternative operators (e.g. as part of the regulated product)?*

  From those countries that provided answers to this question most stated that multi-cast technology is not available for alternative operators (Austria, Belgium [under consultation], Estonia, Hungary [about to be notified], Norway, Poland, Portugal, Spain, United Kingdom).

  However, in a few countries multi-cast is available (Denmark, Italy, Slovenia, Turkey) or will be available (Sweden: from 2011). In Germany, according to the new Review of the Market 5 Remedies Decision (Sept. 17 2010) Multicast is foreseen for Ethernet- and IP-Bitstream). In the United Kingdom BT may decide a multi-cast product on a commercial basis.

More specific questions regarding bitstream resulting from the Commission's NGA Recommendation:

- *Did your NRA apply **exceptions** (e.g., in certain geographic areas) from **imposing** wholesale **bitstream** access on SMP providers? If so, elaborate on the reasoning of that decision. The NGA Recommendation foresees in Art. 37 the possibility of removing a bitstream access obligation if access to the fibre loop, in a given geographic area, results in effective competition.*

  Most countries pointed out that there are no such exceptions from imposing wholesale bitstream access on SMP providers (Belgium, Denmark, Germany, Ireland, Hungary, Norway, Sweden, Turkey, United Kingdom).

  A few countries foresee such exceptions (Austria, Estonia, Portugal). For fibre bitstream at the DSLAM level Estonia does not regulate the tariffs. In Austria, regulation applies to bitstream access for business customers but no longer for residential customers due to strong intermodal competition of fixed and mobile broadband offers. However, the incumbent provides this product on a volunatary basis. In Portugal bitstream access is not mandated at national level. In areas where there is competition at the retail broadband access level, Market 4 obligations (access to ducts and LLU) were considered sufficient to address the competition issues in the relevant geographical market. In Italy bitstream will be available at national level until 2013. After 2013, following to fiber ULL introduction, bitstream could not be available in those areas that are covered by ULL according to a sunset clause approach with switch off in 12-24 months (under discussion).

4 Migration issues

- *Is there a migration **path envisaged from current to next generation access products**? What does it look like? To what extent is the NRA involved in setting up the migration path?*

  Migration paths may consist of various (related) elements. They ensure that *alternatives* to current wholesale products are available. They may also foresee *procedural provisions* to ensure a smooth migration. And they often encompass provisions - including notice periods - for decommissioning current network elements.

  Given this understanding, some kind of migration path from current to next generation access products is envisaged in many countries (e.g. Austria, Belgium, Denmark, Hungary, Italy, Lithuania, The Netherlands, Portugal, Romania, Slovenia, Spain). In Poland there is the obligation to migrate from copper to existing fibre loops within

three months from the request by the alternative operator, which can result in migration path applied to the reference offer.

Some countries mention that a migration path is planned as Market 4 remedy or that migration issues are subject of further consultations (Ireland, Italy, Malta).

- Austria: Possible scenarios for migration from unbundling to virtual unbundling are envisaged (decision Sept. 2010)
- Belgium: Alternatives for existing wholesale products have been defined
- Denmark: Migration path from local loop unbundling to sub-loop unbundling
- Italy: Agcom has proposed a migration path within public consultation issued with decision 1/11/CONS
- Spain: Migration procedues from different wholesale products to bitstream are available
- Portugal: The NRA will proceed defining procedures for the migration to NGA products. These procedures will include the definition of the process and effective migration of end-customers.

- *Are there any specific provisions for **decommissioning MDFs** that may help to create a level playing field and avoid discriminatory situations? E.g., is a certain notice period required so that competitors are informed about such decommissioning a reasonable period in advance, thereby avoiding discriminatory situations?* [16]

  In Italy SMP operator is allowed to decommission MDF with a 5 year notice period (under discussion the possibility to foresee a 3 years period under specific market conditions).

- *Elaborate on the rationale for allowing or not allowing a decommissioning of MDFs, and any conditions involved. E.g., approval for a phase-out may be made contingent upon the **availability of an equivalent alternative wholesale product**.* [17]

  About **4 out of 10 countries foresee certain provisions for decommissioning MDFs** (Belgium, Czech Republic, Denmark, Estonia, Hungary, Ireland, Italy Lithuania, Norway, Portugal, Romania, Spain, Sweden). There is a great **variety of notice periods ranging from 3 months to 5 years**. Ireland, nominally having mandated a notice period of 5 years, applies a case-by-case approach. Some countries allow for shorter periods if agreed upon by the operators involved (Belgium, Denmark, Hungary, Portugal, Spain).

  - In the UK, the SMP operator has a general obligation in Market 4 to notify technical changes with an “appropriate” period of notice. However, there are no current plans to decommission MDFs.
  - In Poland, a withdrawal of access to copper loops already granted is not allowed, whereas the SMP operator may decommission its MDFs with a notice period of 3 months in other cases. Similar, Belgium applies a period of notice of 5 years if there is collocation and 1 year if there is no collocation. Hungary (about to be notified) applies the same periods as Belgium, but the decommissioning of MDFs with collocation is subject to the NRA's permission.
  - In Germany, the incumbent cannot decommission its MDFs without changing the reference offer first, including the definition of the migration process, which has to be approved by the NRA.

16 BoR (10) 98, p. 9 suggests *“Information on phasing out legacy wholesale service should be announced a reasonable period in advance to avoid discriminatory situations”* whereas the Draft NGA Recommendation envisaged (Art. 39) a general five year transitional period.

17 See ERG (07) 16rev2, Ch. 4.5.2 and in particular the flow-chart diagram illustrating procedural issues in the substitution phase.

The approach concerning the decommissioning of MDFs is in some cases guided by the aim of ensuring the availability of equivalent alternatives (e.g. Belgium, Hungary [about to be notified], Portugal) whereas other countries do not make the approval of decommissioning contingent on any conditions as long as the notice periods are adhered to (e.g. Denmark, Norway).

- *In its report "NGA – Implementation Issues and Best Practice"[18] BEREC suggested that "in addition to the reference offer – wholesale customers should be able to obtain relevant information on roll-out of new infrastructures or technologies* ***per geographical area****. A reasonable* ***window of announcement*** *is necessary to create a level playing field on the retail market".*

  - *Explain if such provisions are applied and what they look like.*

  - *Elaborate on your practical experiences with such provisions (e.g. have there been any practical problems with enforcing such provisions?).*

  In several countries the incumbent is obliged to provide information on roll-out of new infrastructures (Belgium, Denmark, Hungary [about to be notified], Italy, Poland, Portugal, Romania, Spain). **Notification periods typically lie in a range between 4 and 12 months**.

  In Belgium the SMP operator has to provide the NRA and competitors with its network plans per region over a period of five years. In Poland where the SMP operator is obliged to provide technical specifications of the network to an IT system, information must be made available upon request of a telco operator within one week.

  Most MS states did not mention any practical problems with such provisions. Poland pointed out that in the past the SMP operator did not provide all requested data.

- *Are there any provisions dealing with* ***stranded assets?*** *Investments by alternative operators get sunk if the closure of MDFs implies that pay-back periods are shorter than initially expected. Are there any measures in place to solve the problem of stranded assets and what do they look like (e.g.* ***compensation schemes***[19]*)?*

  Some countries (Belgium, Denmark, Hungary, Italy, Portugal, Spain) point out that appropriate notification periods help to avoid or alleviate the issue of stranded assets. Compensation scheme apply in Austria and Sweden.

- *Are there any provisions relating to the* ***costs of migration****? E.g., how are the costs of migration split between the SMP operator and the competitors?*

  Regarding the costs of migration two countries (Denmark, Norway) envisage orientation and apply the principle that the alternative operator pays his own part. In Austria costs are borne by the operator rolling out the NGA network and compensation scheme for frustrated investments apply if full unbundling is no longer possible or feasible. Belgium has specified certain actions (e.g. deconnecting of ATM access) that are not billed when migrating from ATM to Ethernet bitstream products. Other countries do not yet have provision concerning the costs of migration.

18 BoR (10) 08; Chapter E.2, p. 9.
19 See BoR (10) 08, Ch. E.2.

5 Transparency regarding civil engineering infrastructure

- ***Art. 17*** *of the NGA Recommendation foresees the establishment of a* ***database*** *containing information on (e.g.) geographical location, available capacity of all ducts*[20]*. In case such a database exists already in your country, explain:*

  - ***Who established/runs*** *this database: the NRA or another institution, possibly in co-operation with the NRA?*

  Several MS already has some sort of database containing information on civil engineering infrastructure (Denmark, Estonia, Germany, Italy, Lithuania, Portugal, Slovenia, Spain, Switzerland). and a few countries have plans to establish such a database or did not finally decide yet (Austria, Czech Republic, Malta, Romania).

  Differences exist with regard to the institution establishing or running the database. In some countries the database is run by the incumbent (Estonia, Portugal, Spain, Switzerland). In other countries this is done by the NRA (Germany), the Ministry (Slovenia) or local authorities (Italy). In Portugal, besides the database of ducts of the incumbent operator, the implementation of a national infrastructure database is foreseen containing also information of other entities (telcos and non-telcos).

  - ***Which data*** *are collected in this database?*

  - *Does the information collected cover just telcos or also non-telcos?*

  - *How is the information being provided, on a* ***voluntary*** *basis or based on* ***obligations****? Specify the legal grounds for any obligations.*

  - *What are the legal* ***requirements*** *that must be met to be entitled to get access to this database? Who in your country is entitled to access this database, only operators or also administrative units?*

  - *Are there different* ***levels*** *of accessible information e.g. depending on the type of the entity requesting access to the database?*

  Typically, these databases contain **information on the location of ducts and associated infrastructure** whereas information on empty capacities of ducts is provided in few countries only (Germany, Portugal).

  In some countries databases not only encompass information on fixed network infrastructure but also on wireless infrastructure (Germany) or provide information on joint digging efforts of other telco companies (Denmark).

  In some countries only data from the incumbent are collected following from a **regulatory obligation** (Estonia, Portugal, Spain). In these cases **only other operators are entitled to get access** to the database. In other cases the database also encompass data of **non-telcos** (Germany, Italy and, in future, Portugal). Here, operator and administrative units are entitled to get access. In the case of Germany data are provided on a voluntary basis. A segmentation with different level of accessible information is not foreseen in any country.

20 Note: In its Opinion to this Draft Recommendation BEREC suggested to replace “all ducts” with “civil engineering infrastructure”.

- *How are **business secrets** dealt with?*

Concerning the treatment of business secrets Spanish operators must sign non-disclosure agreements. In Germany operators may classify data as sensitive. In case of data requests the NRA submits this request to that operator who may then decide on whether data may be passed on.

- *If relevant, elaborate on **practical experiences** in your country with such databases. Did this tool contribute to a more efficient provision of broadband services, in particular in "white" areas? Did any practical problems occur when establishing/running the database? (Note: this information may be helpful for other NRAs when setting up similar databases)*

Overall, it seems **too early to make to assess the practical experiences** made so far. However, Portugal pointed out that the process of establishing the database as well as providing information has been delayed by the incumbent.

- *What are the set-up and running costs of the database, and who pays for them? Were the costs shared out based on agreements or formal obligations?*

In Spain costs are included in the price per meter of ducts used. In Portugal, two principles apply, first, costs-orientation and, second, the principle that only incremental costs resulting from the obligation of the incumbent to develop a database are considered.

6 Symmetrical regulation based on national legislation

- *E.g. laws in France, Portugal, Spain: elaborate e.g. on the scope and content of the national legislation applied and also on which entities are covered by this legislation (see ERG (09) 17 Section D5).*
  In the following countries symmetrical regulation is used:
  - Austria: access to passive infrastructure
  - France: symmetric measures; ARCEP has to mandate passive access for all operators rolling out in-building wiring
  - Hungary: under consideration
  - Ireland: any operator has recourse to negotiate to share physical infrastructure owned by another operator and refer the issue to ComReg if negotiations prove unsuccessful; ComReg can intervene (both has never occurred); infrastructure sharing of many masts, high-sites, b-nodes sites
  - Italy: in place the obligation to provide access to existing infrastructures for fibre installation only in the case of impossibility to get rights of ways from the local public municipalities. Other symmetrical obligations are under discussion (decision 1/11/CONS) in the general case of bottlenecks.
  - Lithuania: provision for infrastructure sharing and construction of the electronic communications networks
  - Poland: every owner of ducts located on the property or in the building and in-building/house-wiring (including fibre) is obliged to provide access to those resources to each telecom operator, if there are no other possibilities of ducts access or in-building/house wiring duplication
  - Portugal: installation and access to in-house wiring
  - Slovenia: obligation of any investor into any form of electronic communications infrastructure to inform APEK on any planned investments; after publication all other interested parties have a chance to express their interest for co-investment and to conduct a co-investment agreement
  - Spain: access obligations to the terminating fibre segment in buildings

7 National next generation broadband initiatives/ measures

- *Illustrate the main content of initiatives/measures aiming at promoting next generation broadband.*[21] *Consider the following aspects:*

  - ***Main focus*** *of the initiative/measure (e.g. providing broadband in currently underserved areas; outlining the regulatory approach towards NGAs networks in order to provide legal certainty and planning security for operators; providing transparency);*

  - *Scope and envisaged* ***target*** *of the measure;*

  - *Current* ***achievements****, milestones reached.*

Focus of national broadband initiatives/measures

Most Member States have taken initiatives/measures and have published documents such as "National broadband plans" in order to actively promote next generation broadband.

The initiatives/measures taken by MS contribute to accomplish the goals of the Regulatory Framework, the NGA Recommendation as well as the goals of the "Europe 2020" strategy and, more specifically, the European Commission's five year plan for the "A digital agenda for Europe" from May 2010 which aims at providing all Europeans with fast Internet by the end of the decade. At the same time these initiatives/measures take account of the respective stage of roll-out and deployment in MS.

National broadband strategies typically contain the goal to provide a certain percentage of the population with high-speed broadband in a certain period (see figure on page 21).

Overall, MS – as well as the Commission's Digital Agenda – have set ambitious goals with regard to the targets for bandwidth and coverage.

The speed targets range from 2 Mbit/s in the Czech Republic (rural areas until 2013), Hungary and the United Kingdom to 400 Mbit/s in the Netherlands. The majority of MS's target has a target bandwidth of 50-100 Mbit/s which goes beyond the 30 Mbit/s target set in the Digital Agenda.

The majority of MS has a target coverage of +90 % (often 100 %). Three MS – Greece, Italy and Sweden - have a significantly lower target coverage with 50 % respectively 40 %. However, Sweden has already achieved its target coverage for 2014 and actual take-up has reached approx. 28 %. Similar, Norway, which has not set a specific target coverage, achieves a coverage of 17 % (February 2010) and a relatively high take-up of 12 % (June 2010). Typically, for the other MS, there is a significant gap between current take-up and coverage (both, achieved and targeted coverage).

21 This may be initiatives/measures adopted by the government. Where appropriate you may also refer to NRAs' strategies aiming at the promotion of next generation broadband.

Further measures

Given that the national broadband strategies often encompass a variety of different measures, the following provides an overview of *further* measures or institutions which are established by Member States in order to promote next generation broadband:

- Austria foresees a target of providing every Austrian citizen with a connection of +25 Mbit/s until 2013. The "Competence Centre for Information and Communication Technologies" (established 2010) aiming at promoting development, roll-out and usage of broadband technologies.

- Belgium initiative "Belgium – Digital heart of Europe 2010-2015: 30 action points" contains very different elements, ranging from the target to provide all new buildings with FttH or installing ducts during road works to measures aiming at strengthening competition (e.g. by easing switching procedures) or promoting e-security and e-services.

- The Dutch Ministry of Economic Affairs has published a document which intends municipalities to identify their role in stimulating NGA roll-out and take-up. In most cases a facilitating role (e.g. opening streets) or a role for pooling demand is considered sufficient.

- In Estonia, a non-profit organization was set-up in 2009 by operators and the government in order to reach the envisaged NGA coverage plans. That organization shall only provide wholesale service.

- The Finish broadband strategy aims includes a legislative amendment to include basis broadband in the universal service in 2010. Second, the Governments devotes € 66 millions for increasing the supply with high-speed connections in remote areas.

- The French "National Ultrafast Broadband Program" released in June 2010 contains, as a first step, that the Government launches a call for expressions of investment intentions for low-density areas in the next 5 years. This measure serves as a basis for granting financial support in the next step. A new call for expressions of investment wild be held every 2 years. An amount of € 2 billions is devoted to increase national coverage with high-speed networks.

- In Germany, the Government's "National Broadband Strategy" has 4 pillars:
  - Exploit synergies in infrastructure deployment ; set up of an "Infrastructure Atlas" (allowing to identify infrastructure suitable for pooling)
  - digital dividend
  - Growth- and innovation-geared regulation
  - Support programmes (total € +150 m) for areas neglected by the market

  The NRA has published "Key Elements for Progressing on Modern Telecommunications Networks and Creating Powerful Broadband Infrastructures" (March 2010). Furthermore, in May 2010 a high-level "NGA-Forum" was established addressing broadband access issues (open-access, technical aspects, infrastructure sharing, co-investment) and migration issues. The NGA-Forum will publish its results in a final report. In November 2010 the strategy *"Deutschland Digital 2015"* was published setting out the government's overall approach for information and communication technologies including implementation and update of the 2009 "National Broadband Strategy". This strategy comprises a variety of targets as well as measures.

- In Italy the NRA has established a *NGN Committee* to define guidelines for NGN. The Italian government has started the "Italia digitale" project. The two pillars of the Plan are the National Broadband Plan to bridge the digital divide and the Next Generation Access Networks Plan. The latter, in particular, will allow at least 50 per cent of Italians to surf the Internet at a speed exceeding 100 mbps on fixed networks (FTTH) and on mobile networks (LTE) by 2020. Agcom has issued a public consultation (decision 105/10/CONS) for the simplification of the procedures to get right of ways for the realization of NGNA networks (backbone network and access network) by the definition of transparent and non discriminatory symmetrical rules and for the implementation of a centralized and freely accessible passive infrastructure database. Administrative simplification procedures were already introduced for both fixed and mobile connectivity in laws No. 133, 2008, No. 69, 2009 and No. 40, 2010.

- In Lithuania the National Broadband Strategy aims at simplifying infrastructure and coordination of civil works. The Government also has initiated RAIN and RAIN-2 projects with the help of State Aid to stimulate provision of fast broadband services in rural areas. The aim of those projects is to construct a core network (mostly physical infrastructure) in rural areas and create more favourable conditions for "last mile" construction by local ISPs.

- In Poland the national broadband strategy, currently under elaboration by the Ministry of Infrastructure, will include specific measures/activities aimed at increasing investment in fibre networks, effective use of the existing infrastructure, including exploitation of synergies with non-telecommunications infrastructure, liquidation of barriers to investment, support to local broadband investment and development of modern mobile networks, undertaken in order to achieve pre-defined broadband targets. At the same time the Polish NRA is working to publish this year an inventory of telecommunications networks in Poland, which should give an overall picture of their coverage and duplication as well as identify areas for potential investment.

- In Spain activities encompass the aim to facilitate the deployment of telecommunications infrastructure in new buildings, new roads and railway (draft regulation). Furthermore, the "Plan Avanza 2 – 2011-2015 strategy" provides state aid for extend basic as well as high-speed broadband coverage.

- In Slovenia the government is preparing a revised strategy for information society development, which will include NGA development measures. APEK has no specific information on the new strategy at this time.

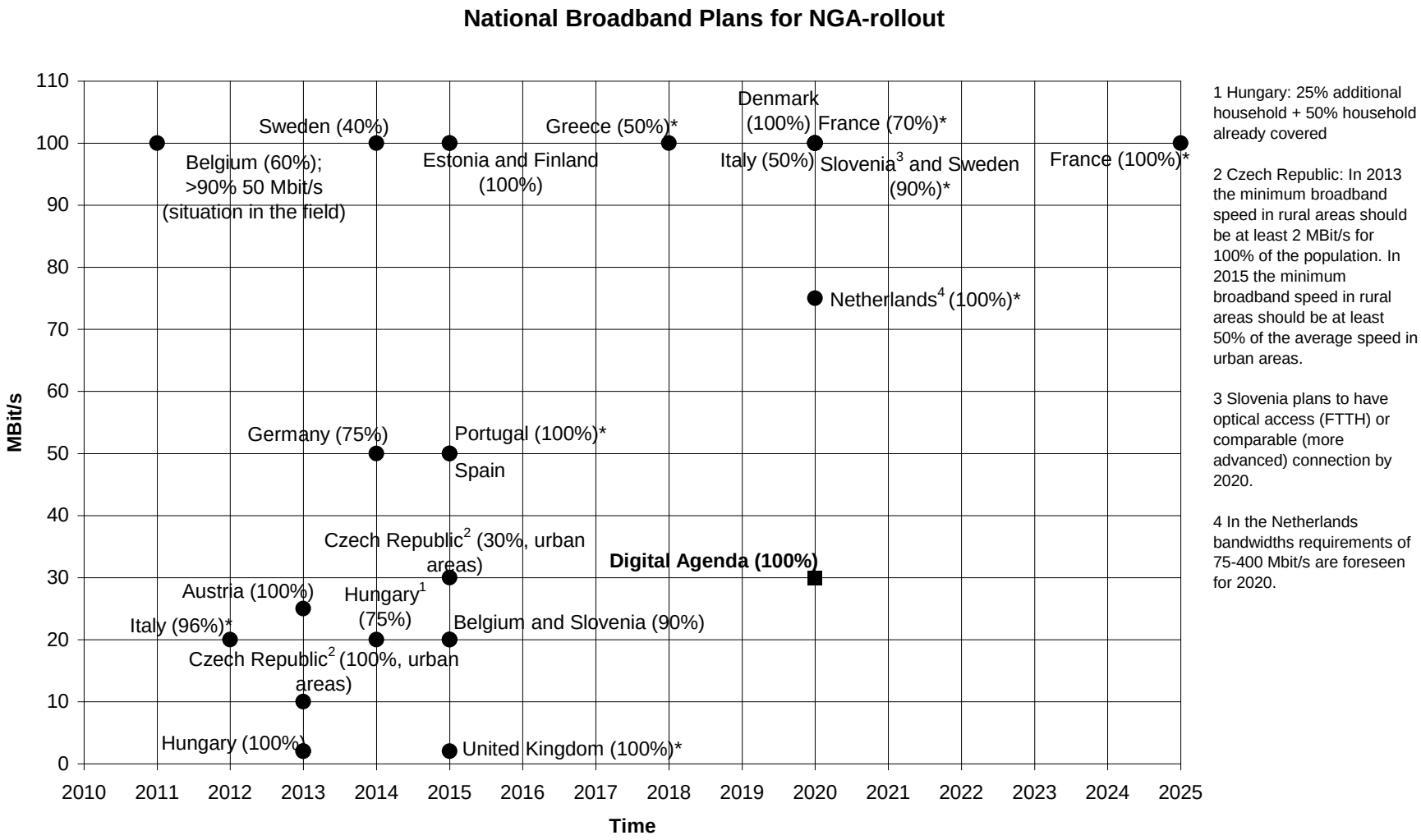
Despite the differences in detail there are several **similarities between MSs approaches**:

- Another characteristic feature is the **dual approach** taken in many MS:
  - Setting targets for the provision with NGA access allowing high-speed Internet by 2015-2020
  - **Focus in many countries on rural/underserved areas** (e.g. in Austria, Denmark, Finland, France, Germany, Italy, Lithuania, Malta, Portugal, Romania, Spain, Sweden, United Kingdom).
    National broadband strategies set out a target for covering (mostly) 100 % of the population with basic broadband. The deadlines for this are set much earlier than the targets for NGA access. Often basic broadband targets were envisioned already for the end of 2010. This approach can be interpreted as a measure to reduce the digital divide and to increase social cohesion within Member States.

- The Commission has announced (20 January 2011) that a record amount of state (€1.8 billion) which is more than four times the amount allowed in 2009 has been approved in 2010 to keep up with the ambitious goals of the Digital Agenda.[22]

- **Public funding** is available in many MS often with a focus on rural areas.
- Some of the MS have set up **expert groups** in order to promote the development of NGA networks or to overcome practical challenges such as migration issues (e.g. Austria, Germany, Italy).
- Related, several Governments or NRAs employ a role as an enabler in the context of the migration to NGA networks (e.g., Germany, Italy, Lithuania Netherlands) e.g., by alleviating the coordination of civil works and/or pooling demand. In economic terms such activities contribute to a reduction of transaction costs and to exploit economies of scale and scope (see also answers to questions on migration and transparency).

22 See Press Release (IP/11/54, 20/01/2011) http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/54&format=HTML&aged=0&language=EN&guiLanguage=en.



1 Hungary: 25% additional household + 50% household already covered

2 Czech Republic: In 2013 the minimum broadband speed in rural areas should be at least 2 MBit/s for 100% of the population. In 2015 the minimum broadband speed in rural areas should be at least 50% of the average speed in urban areas.

3 Slovenia plans to have optical access (FTTH) or comparable (more advanced) connection by 2020.

4 In the Netherlands bandwidths requirements of 75-400 Mbit/s are foreseen for 2020.

* taken from: OECD, National Broadband Plans (6-7 December 2010); Cullen International, National targets for basic, fast and ultra-fast broadband (December 2010); checked by NRAs. The digit in brackets is the planned coverage.

Figure: National Broadband Plan: Targets and Time Horizon

8 Final remarks regarding roll-out and National next generation broadband initiatives/ measures

Taken together the different stages in Member States reflect differences in national circumstances such as

- Level of (infra) competition (presence of Cable and/or FttH networks)
- Level of (effective) regulations (LLU)
- Level of available network capabilities (DSL, Cable)
- Cost differences:
  - Type of geographical areas (population density and dispersion metropolitan/, rural)
  - Type of housing (flats, apartments, houses, presence of multi-dwelling units…)
  - Availability of (re)usable ducts for NGA
  - **Topology** of the existing network infrastructure
- Roll out strategies of operators of NGA networks (technology mix FTTH, FTTB, FTTC)
- Also various national programs for national availability of broadband services and role of (local) governments

Current achievements/milestones reached

The Digital Agenda regards Broadband Access as driver for more economic growth and consumer benefits. BEREC recognizes and fully supports the important role broadband networks can play in the further development of the economies of Europe and the benefits that they can bring to its citizens. In line with these goals most Member States have taken initiatives/measures and have published documents such as “National broadband plans” in order to actively promote (next generation) broadband developments.

Furthermore BEREC considers that effective competition has been, and will continue to be, the key driver for efficient investments. BEREC believes that regulatory certainty and consistency are crucial in order to foster a competitive environment for long-term investments. BEREC considers that this will accomplish the goals of the Regulatory Framework, the NGA Recommendation and the Digital Agenda. Together, these documents provide a regulatory environment containing appropriate and considered measures to promote both investment and competition, to ensure the roll-out and deployment of NGA across Europe while recognising that Member States are at different stages of NGA roll-out and deployment.

Moreover we can see that compared to the last country case studies progress in broadband roll-out has been achieved albeit differing across Member States. In a number of Member States the focus of roll-out has shifted from VDSL to FTTH/B (e.g. Germany, Italy, Netherlands).

However it is too early for an overall assessment to what extent national broadband targets have been reached given that national broadband plans typically have been set up in most cases in 2009 or 2010. Most targets for NGA coverage cover a medium term reaching as far as 2025.

Concluding remarks regarding discrepancy between coverage and take-up

MS have set ambitious goals regarding the targets for bandwidths and coverage of NGA networks. In many MS the bandwidth targets exceed the 30 Mbit/s envisioned in the Commission’s Digital Agenda.

In the *ERG Opinion on Regulatory Principles of NGA* (ERG (07) 16rev2) the possibility to achieve a higher ARPU had been identified as an important factor impacting on the profitability of broadband roll-out.[23]

However, the evidence[24] indicates that actual take-up of NGA high-speed broadband services in almost all MS significantly falls short of the coverage achieved already. There are several possible reasons for this lack of demand for high-end offers..

Customers' willingness to pay a premium for very high-speed services is limited. This is particularly important if customers can use current applications and services in a sufficient quality with existing broadband access services. Killer applications that strictly require speeds of 50 or even 100 Mbit/s do not exist so far.

These demand side factors are likely to feed back onto the viability of broadband projects from a supply side perspective possibly impacting on roll-out plans. Thus they need to be taken into account when assessing the achievement of national broadband targets and may require an adjustment of expectations.[25]

23 See ERG (07)16rev2 (Ch. 3.2.2.) and, more specifically, Ch. 3.1 of the Annex (ERG (07)16rev2) to that ERG Opinion. An Analysys study (conducted for OPTA) concluded that the economic viability of a business case for sub-loop unbundling particularly depends on the possibility to increase ARPU as well as a competitor's market share. I another study of WIK it turned out that the profitability of VDSL roll-out critically depends on the demand for VDSL access (i.e. a sufficiently high penetration rate is necessary).

24 See Cullen (2010).

25 Other exogenous factors such as the financial crisis may also have played a role.