

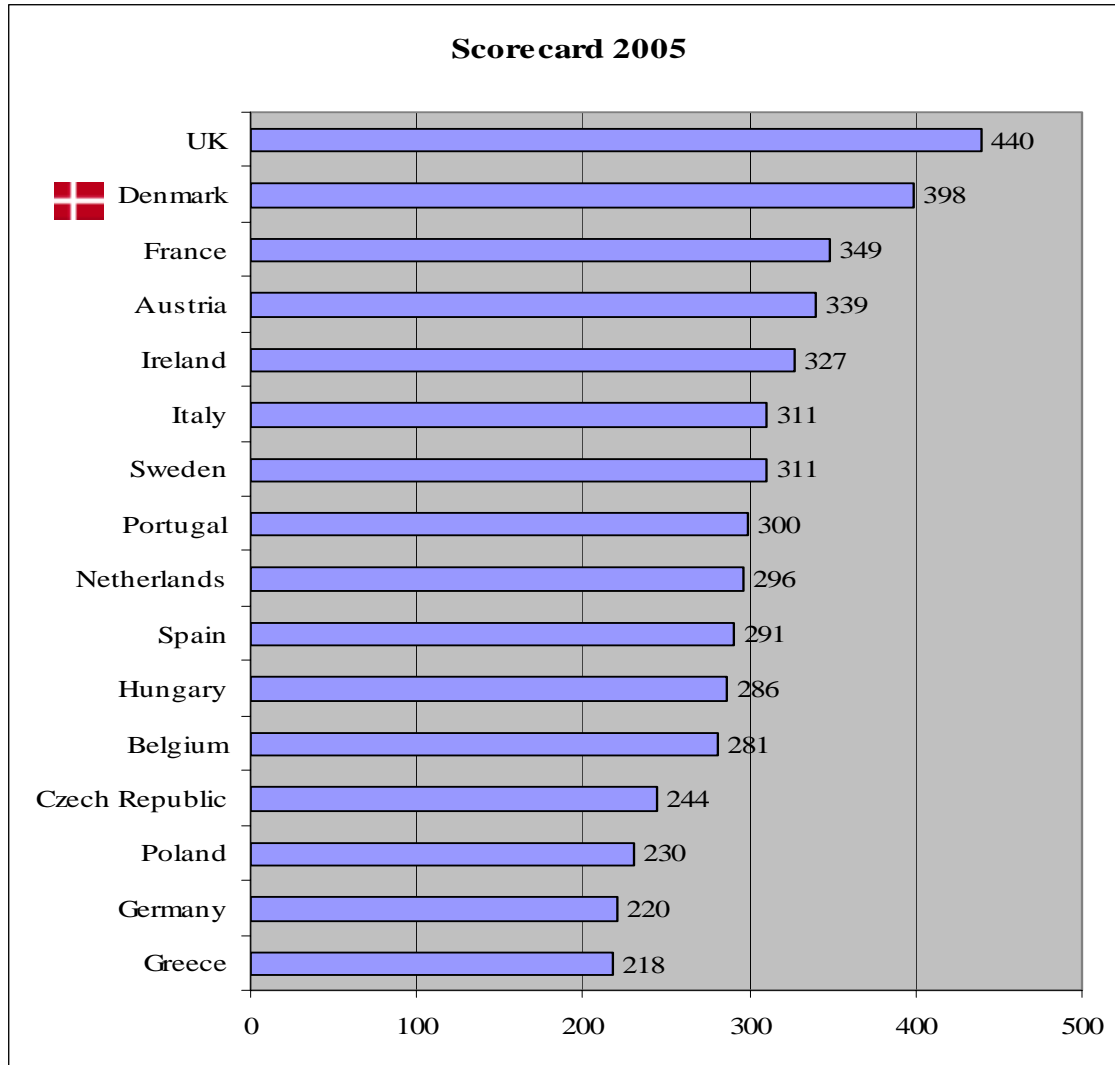
Regulation and investment Some Danish experiences

Allan Bartroff
TDC Regulatory Affairs

Agenda

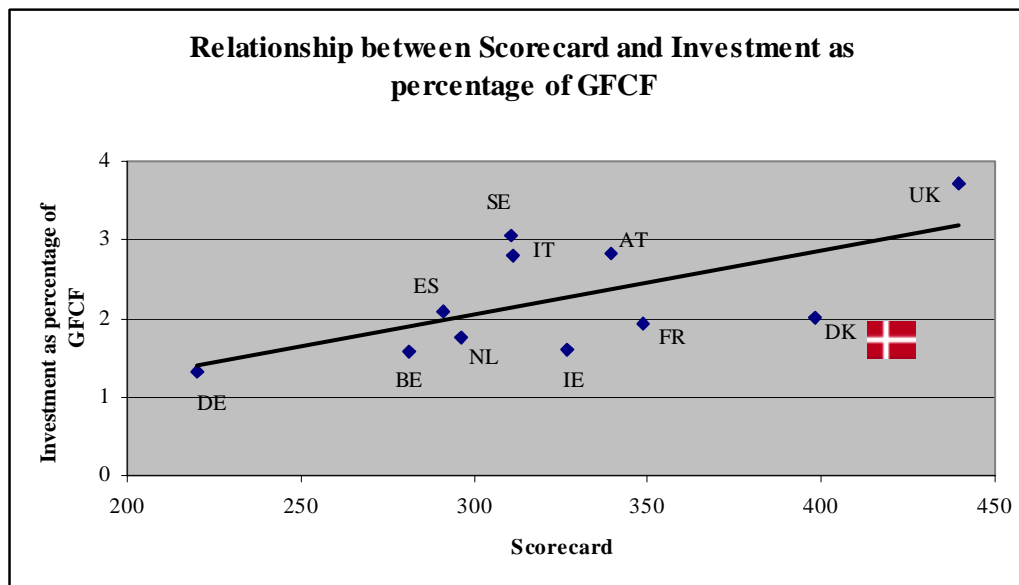
1. Denmark - and TDC: What's that?
2. Danish regulation: Key elements
3. The Danish telecom market(s): Key figures
4. Regulation and investment: Observations from DK

Why Denmark?



Why Denmark?

Figure 1: Relationship between Scorecard and Gross Fixed Capital Formation High Income Group

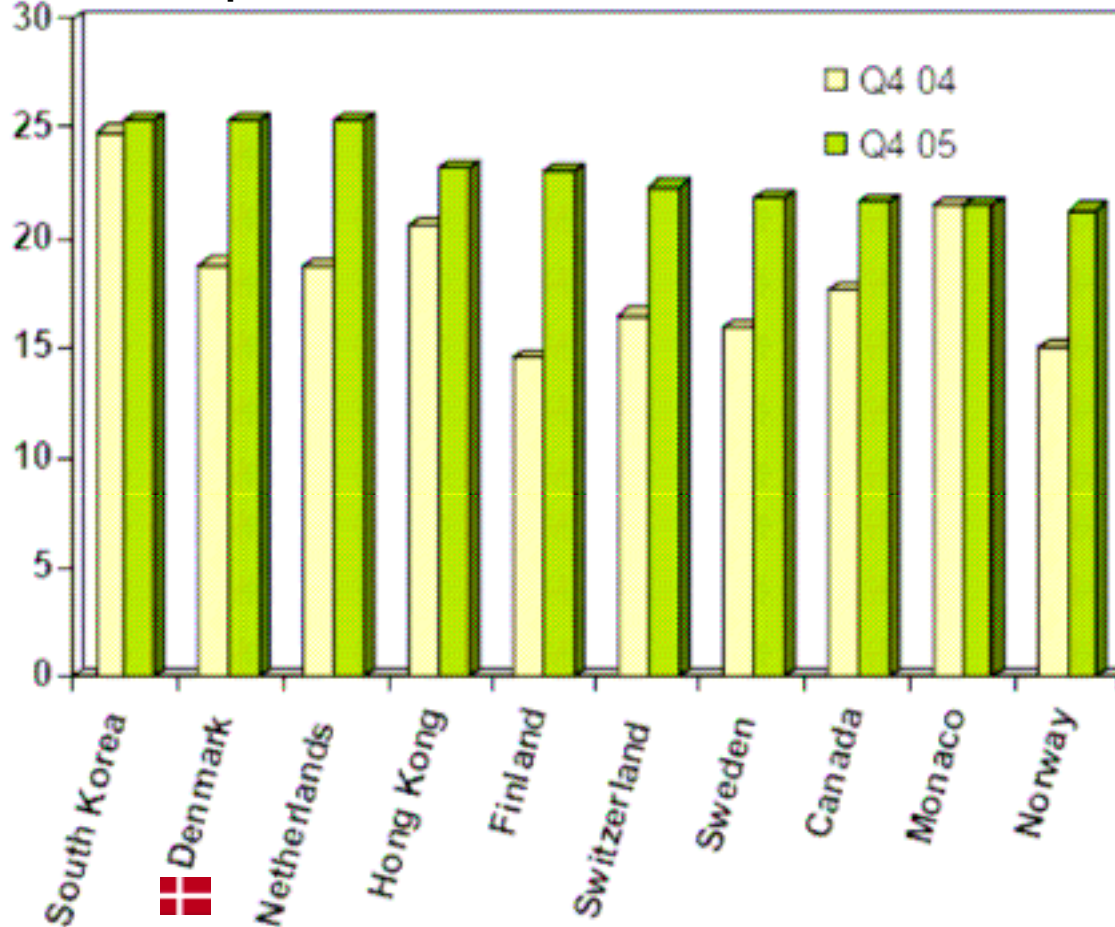


Denmark?

- **Small**
Small Scandinavian country both size and population (ignore territories outside EU): 5.4 mio inhabitants and 2.5 mio households, 43.000 km²
- **Simple**
High population density (122 per km²) and not many 'remote rural areas' (assuming that geography may be a driver or an obstacle for some investments)
- **Stable**
Stable political environment: government/prime minister appears to stay for at least 8 years
- **Wealthy**
GDP per capita at \$44,808 was the fifth highest in the world in 2004. For comparison GDP per inhabitant in 2003 measure of 125 with EU = 100 and Hungary 59.3
- **Advanced level of e-everything**
79% of households has a PC, while 69% of all households has access to the internet. These are the third highest penetration levels in Europe for both PC and internet penetration of households. Many public e-services (banking, tax, health...)

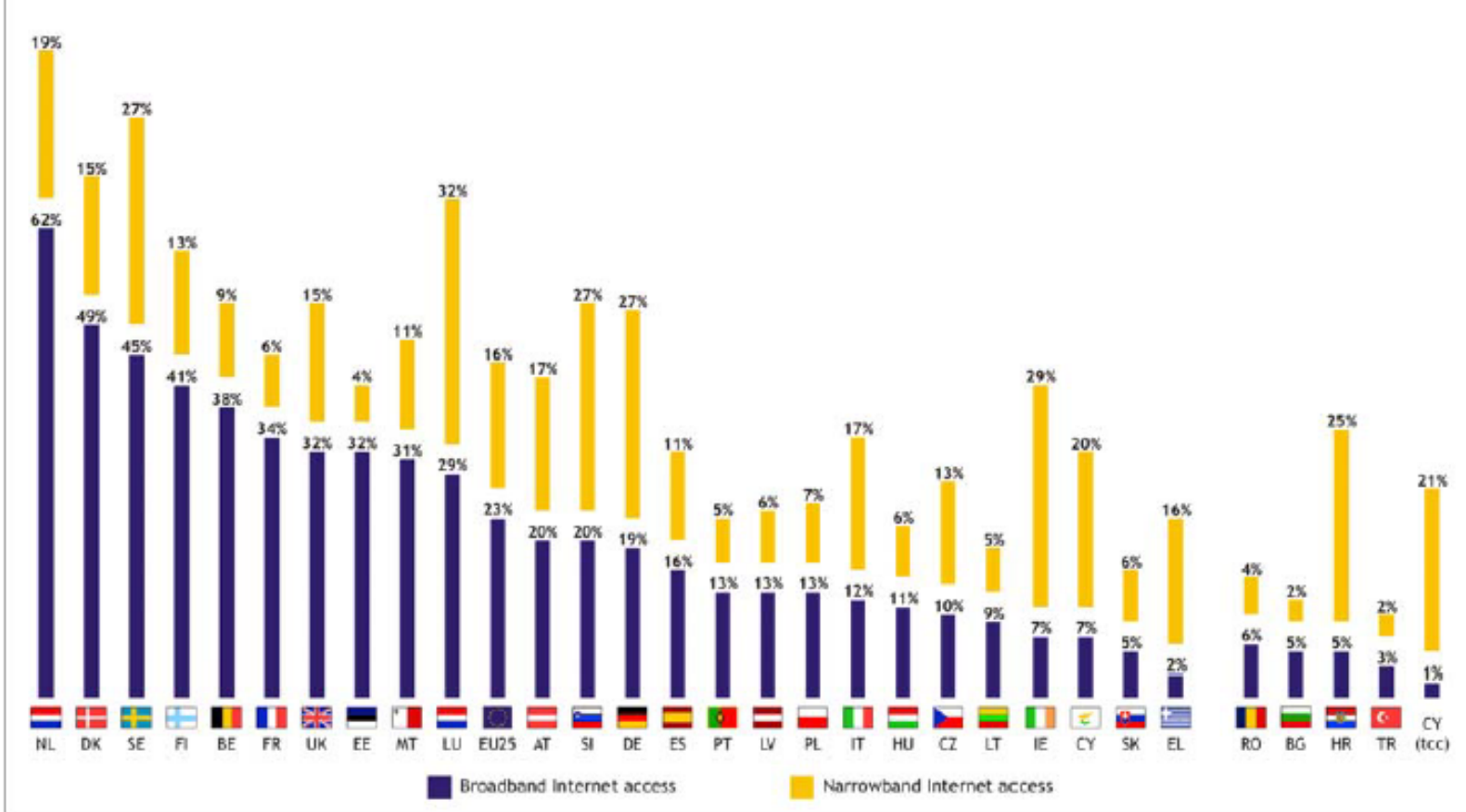
Broadband top 10

Broadband per 100 inhabitants December 2005



Internet/Broadband penetration per 100 households 2006

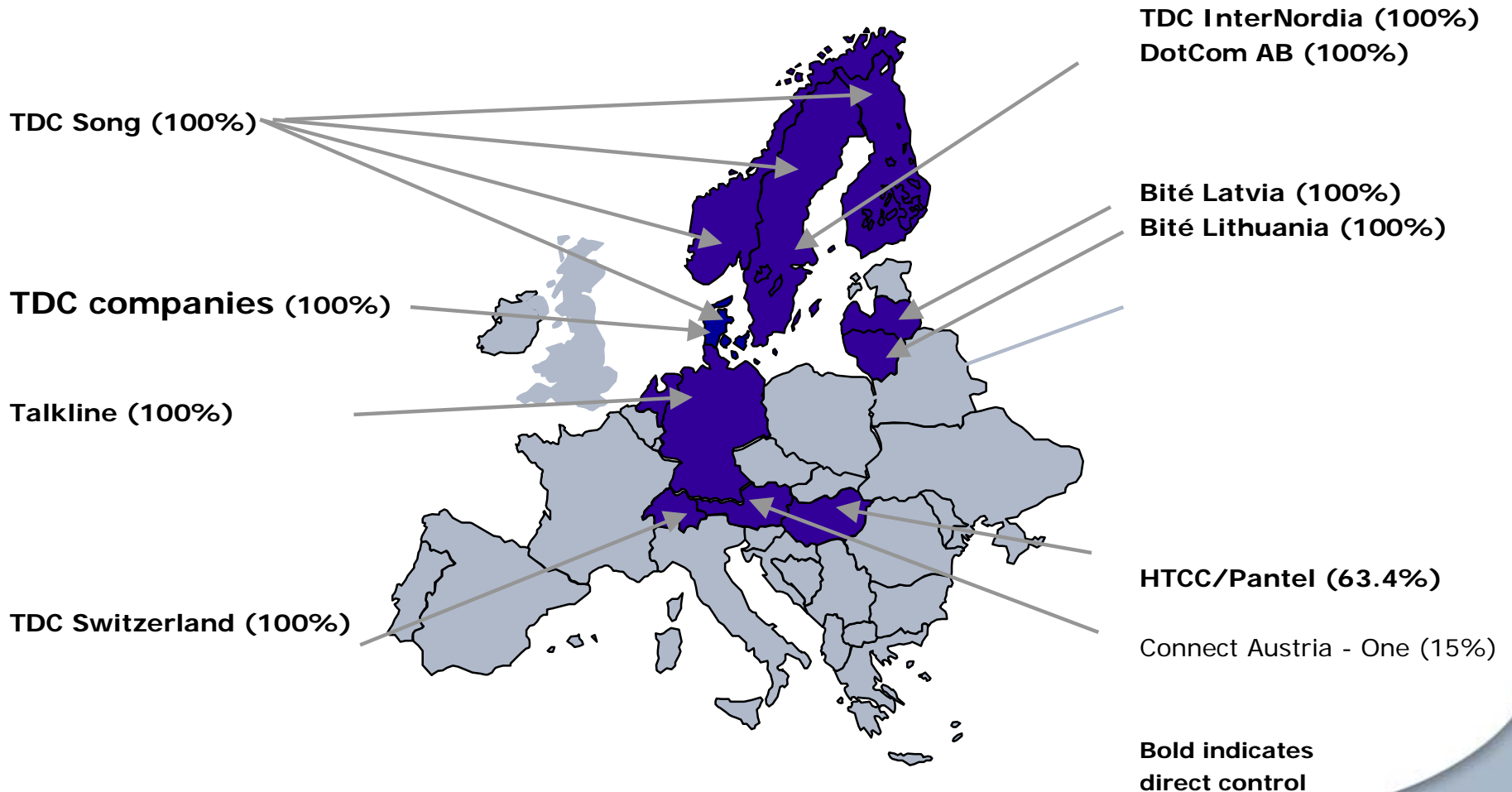
Question: Q22. Broadband Internet access & Narrowband Internet access



TDC?

- Medium sized full scale incumbent operator (turnover 45 bDKR = 6b€)
- Ownership: plc - controlled by private equity fund (03-06: no majority shareholder, 97-03: controlled by US operators)
- Specificities: CATV operator, presence as new entrant or 3rd mobile operator in some European countries

TDC in Europe



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Danish regulatory policy key elements

1. Major determinant: EU regulatory framework
2. National interpretation: Correct implementation of EU rules. No attention to national telecom industries or state ownership of operators, i.e. no 'industrial policy'

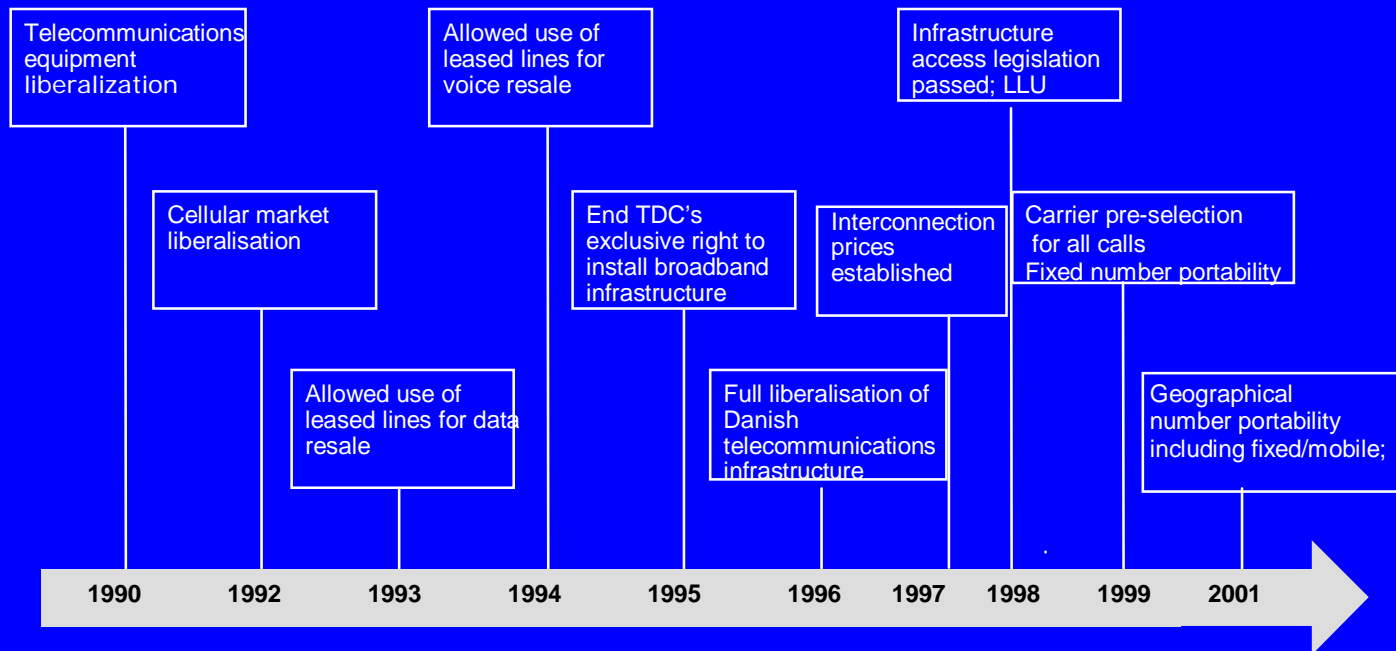
Liberalisation and regulation in Denmark – EU impact

The key elements of the 'old' ONP EU regulatory framework:

- Liberalisation (voice/infrastructure)
 - Mobile competition (national roaming)
 - Interconnection (including collocation)
 - Carrier PreSelection (for all services: local, national, int.)
 - Number portability (f/m)
 - Universal Service Obligations (rebalancing)
 - LLU (first full unbundling, shared access)
- +
- Service Provision fixed (wholesale line rental)/mobile
 - Bit stream access

all implemented timely or ahead of schedule

98 ONP framework - timely implemented or in advance of EU rules



Current EU Framework

- Timely transposed
- But the market analysis may have been over-particular (spilt into three steps) and has been ongoing for more than three years
- Today the most important markets have been completed (10, 14, 17 and 18 are missing)
- Some retail markets and market 15 were found competitive
- For the non-competitive retail markets regulation at wholesale level was sufficient, i.e. today no market regulation at retail level
- No radical change of the previous regulation for the markets to be regulated

National interpretation of EU framework

Agreement in Principle on Telecommunications Policy Aims – 1999

- Access to the Network Society
- Competition leading to innovation and growth
- Market should supply a broad variety of products meeting the increasing demand for high-speed networks and large bandwidth
- Securing a coherent and coordinated regulation of infrastructure and service supply
- Best and Cheapest

-> focus on:

A competition driven market

Both-and...

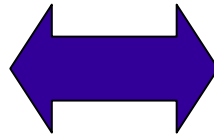
- **Access-based competition**
 - Wholesale broadband access
- **Facility-based competition**
 - Competition between alternative platforms

A competition driven market

- Several pipes to the home

Service-based competition

- Wholesale broadband access



Infrastructure-based competition

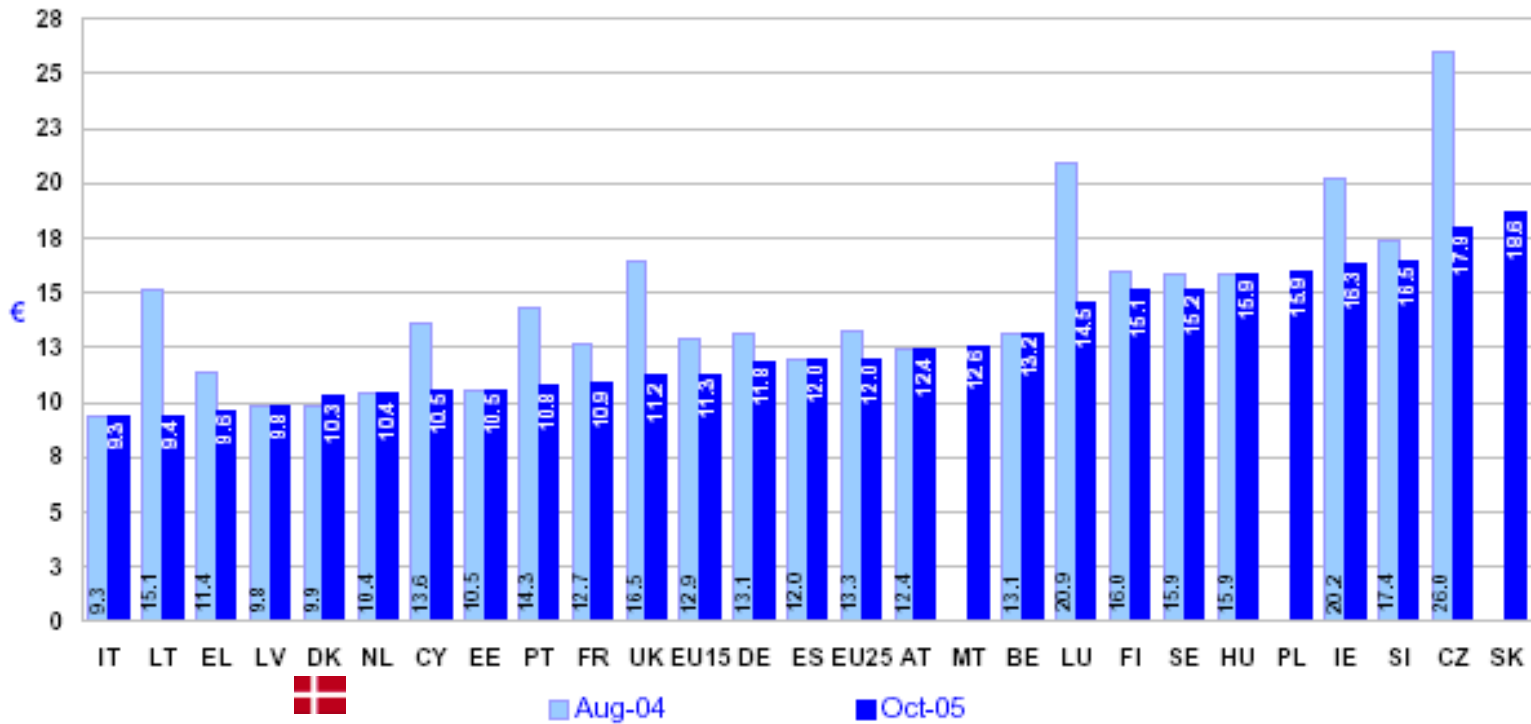
- Competition between alternative platforms

- PSTN (DSL)
- CATV (cable modem)
- FWA/WiMax/WLAN
- 3G/EDGE
- Optical fibre
 - Fibre/LAN
 - FTTH
- Satellite
- Digital Terrestrial Television

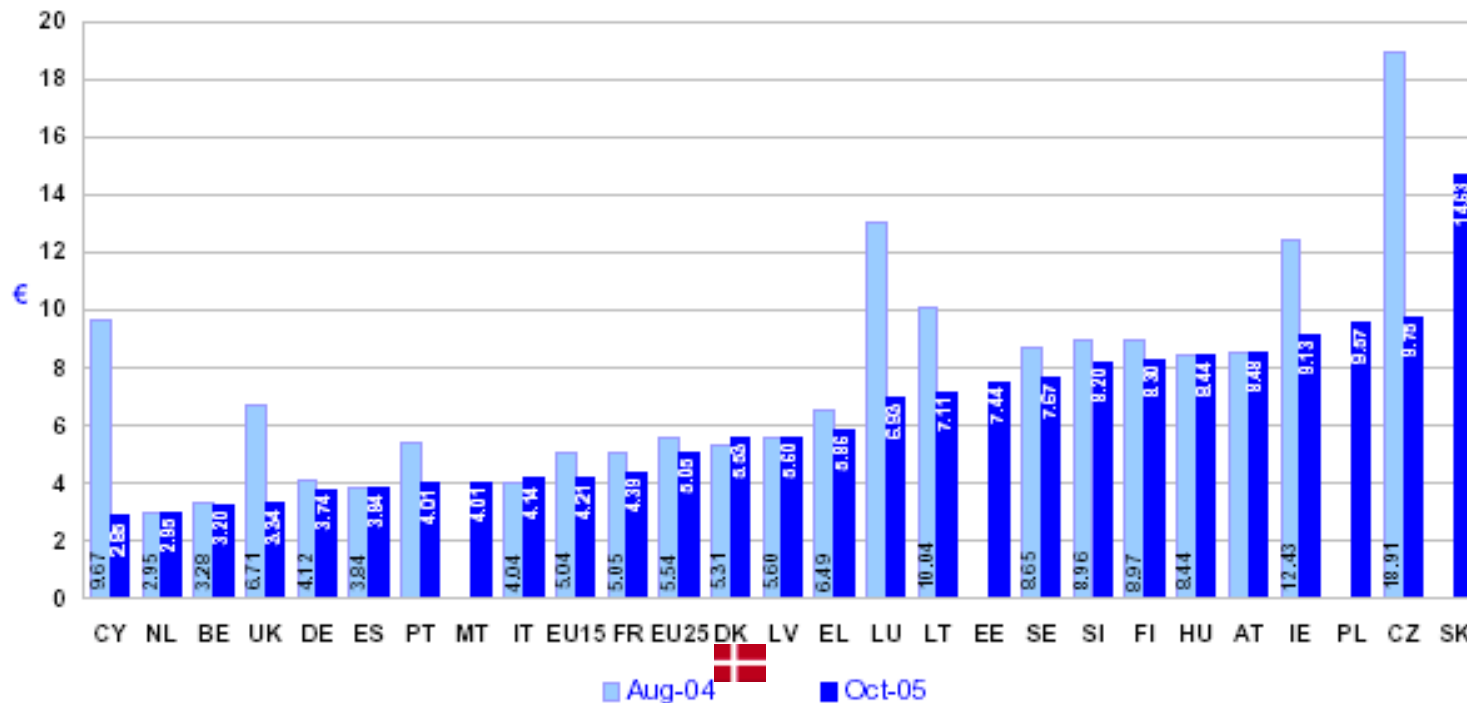
ULL – PSTN (DSL)

- "raw copper"
- shared access
- bitstream
- simple resale

Monthly average total cost per full unbundled loop, 2004 & 2005

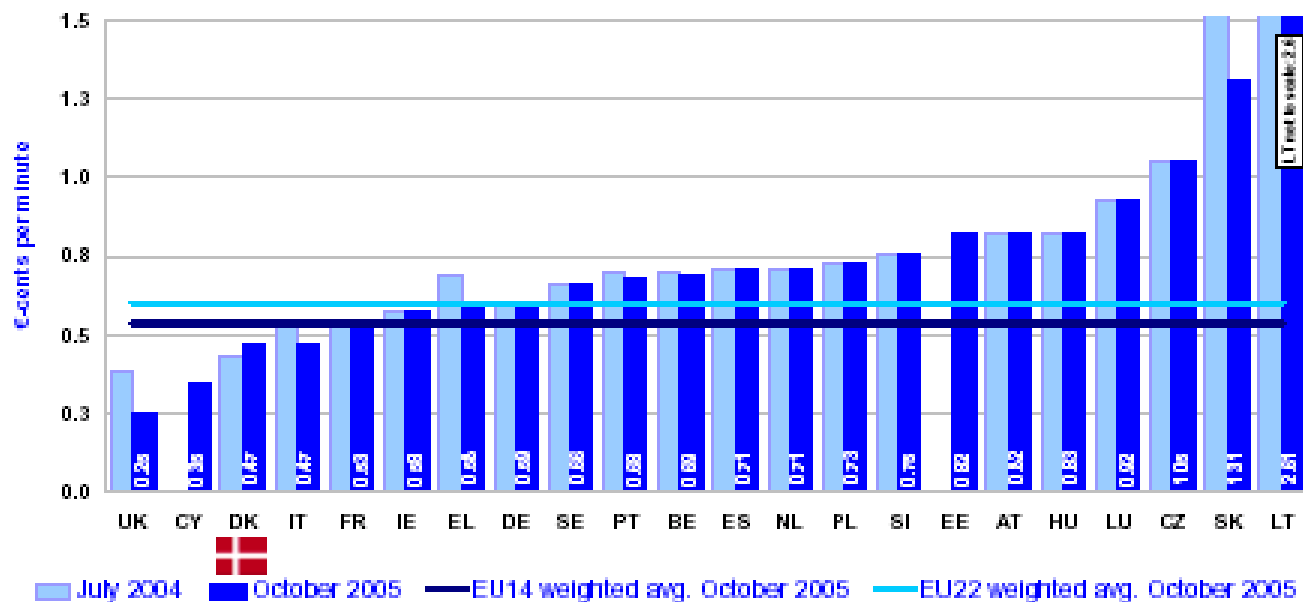


Monthly average total cost per shared access, 2004 & 2005



Interconnection charges for call termination on Incumbents' fixed network (peak time)

Local level - EU14 average: 0.54 €-cents - EU22 average: 0.60 €-cents



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PSTN competition: Fixed lines Service Provision (WLR) - impact of WLR

- The fixed lines markets are besides C(P)S influenced by the additional opportunity for resale offered by the mandatory access to WLR at retail minus
- WLR: made mandatory in 2000 at retail -21%
- WLR amounts to about 15% of total numbers of subscribers
- The WLR option has enabled resellers to enter and stay on the declining market but hasn't brought any new services to the market

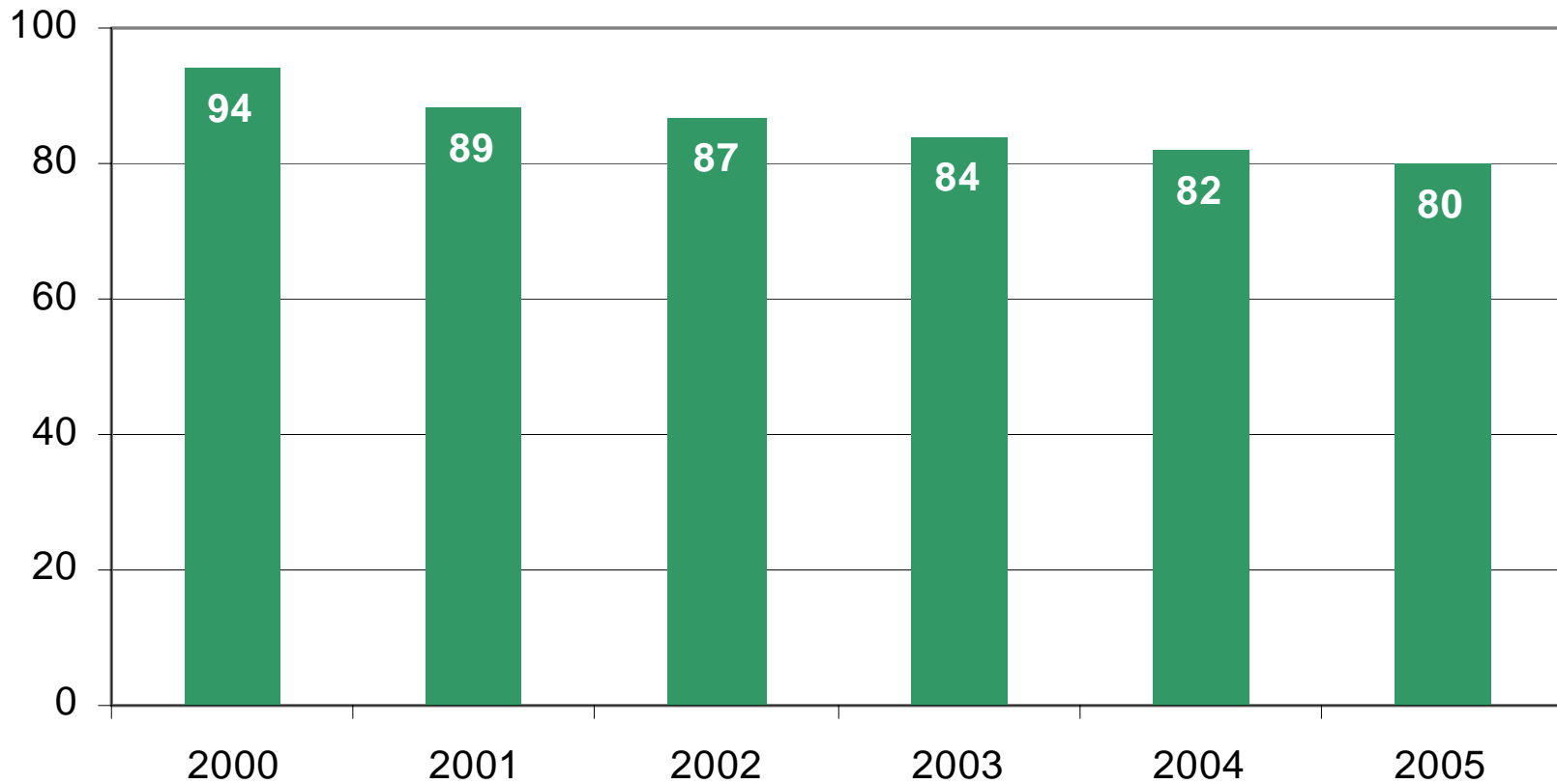
PSTN Competition: impact of WLR

	No CPS	With CPS	Total
FLEX ISDN	3	191	194
ISDN 2	7350	30.118	37.468
ISDN 30	17	136	153
PSTN	102.048	355.903	457.951
Total	109.418	386.348	495.766

Number of WLR June 05, total no of subscribers 3.485 mio

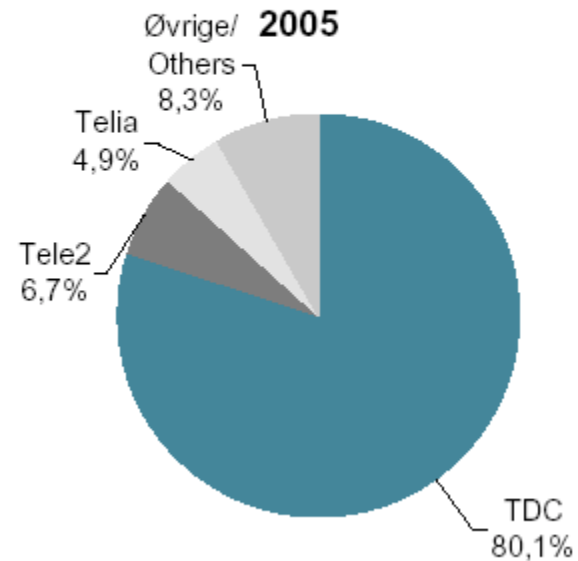
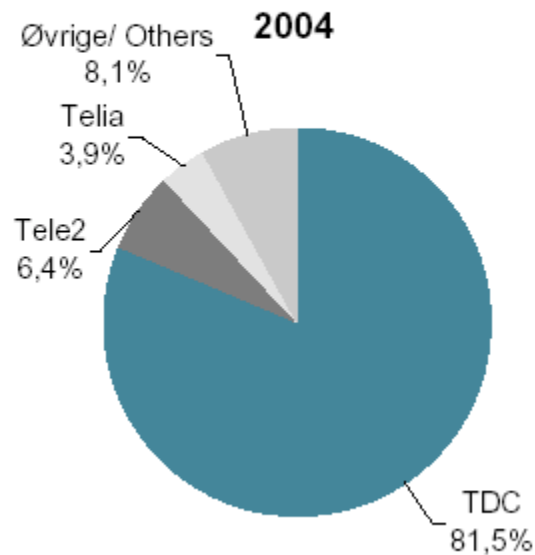
Fixed lines subscriptions

TDC's marketshare (%)



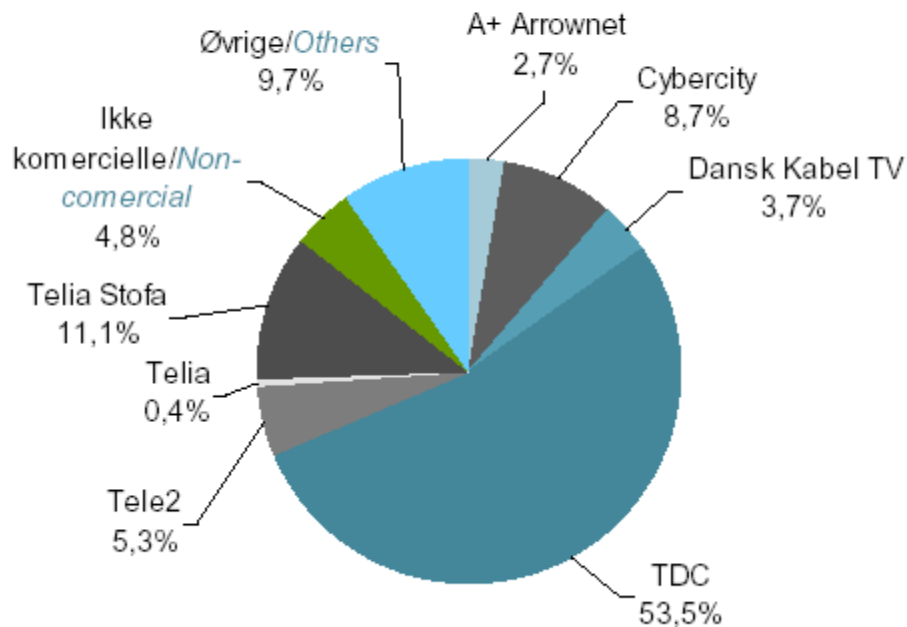
PSTN competition: market shares

ABONNENTLINIER FORDELT PÅ SELSKABER
SUBSCRIBER LINES BY COMPANY



Broadband competition: market shares including LAN, xDSL, FWA, fibre, cable

Figur 8. Bredbånd-abonnementer¹, markedsandele, 2. halvår 2005
Figure 8. Broadband-subscriptions¹, market shares, end of 2005

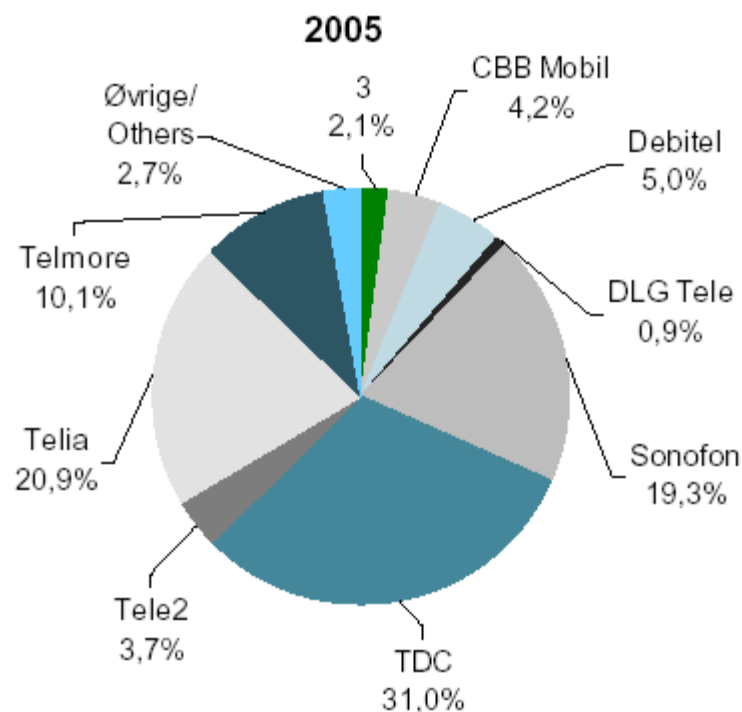
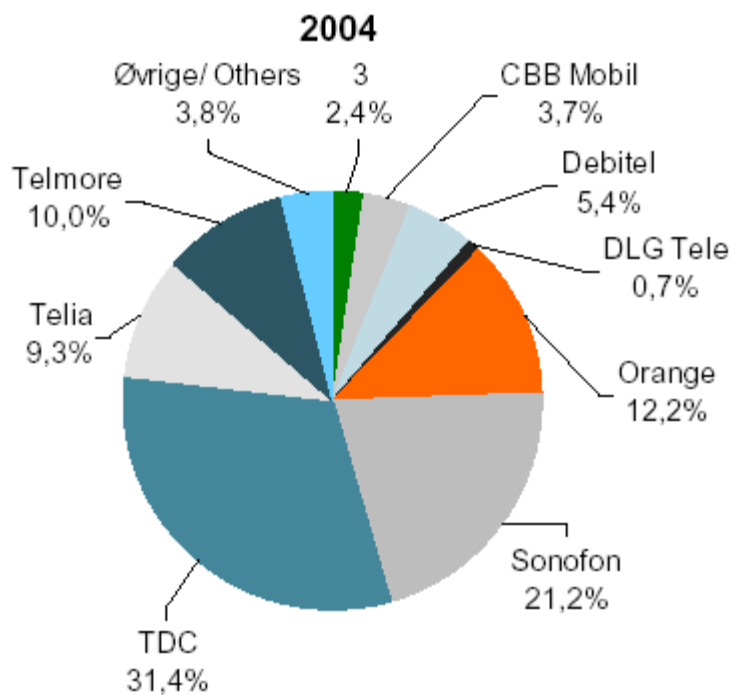


Mobile

- From the beginning obligation to offer service provision and commercially negotiated national roaming
 - Today the number of MNOs have had a major impact on the market: 4-5 2/3G operators
 - Today no regulatory obligations on market 15
- > many SPs/MVNOs: jointly more than 20% market shares (subscriptions) and 18% of minutes
- > *To conclude, mobile services are the most expensive, for any volume of usage, in Latvia, Poland and Malta. Denmark and Cyprus are the countries where such services are less costly. (L.E.)*

Mobile competition: market shares

MOBILABONNEMENTER FORDELT PÅ SELSKABER
MOBILE SUBSCRIPTIONS BY COMPANY



Regulation and competition – status

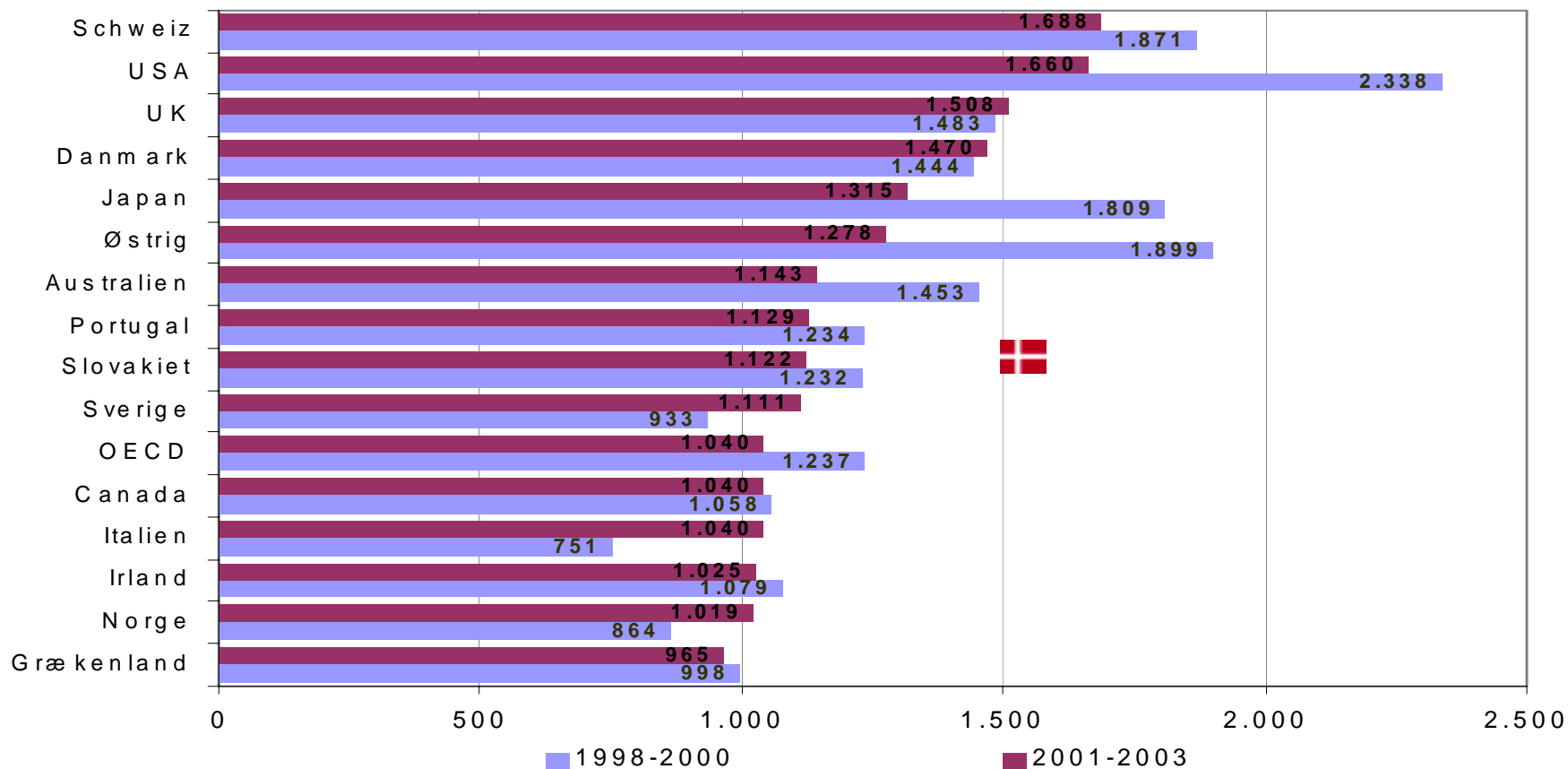
- DK appears to have effectively implemented the EU framework+ (previous as well as current)
- High level of penetration of broadband, mobile, improving of BB offerings etc.
- Competition is working in most markets although not self-sustaining
- Regulation supports both Service competition (low access prices, CPS,WLR) and infrastructure competition (no right of way issues, no authorisation, effective collocation)

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Telecom investments in OECD

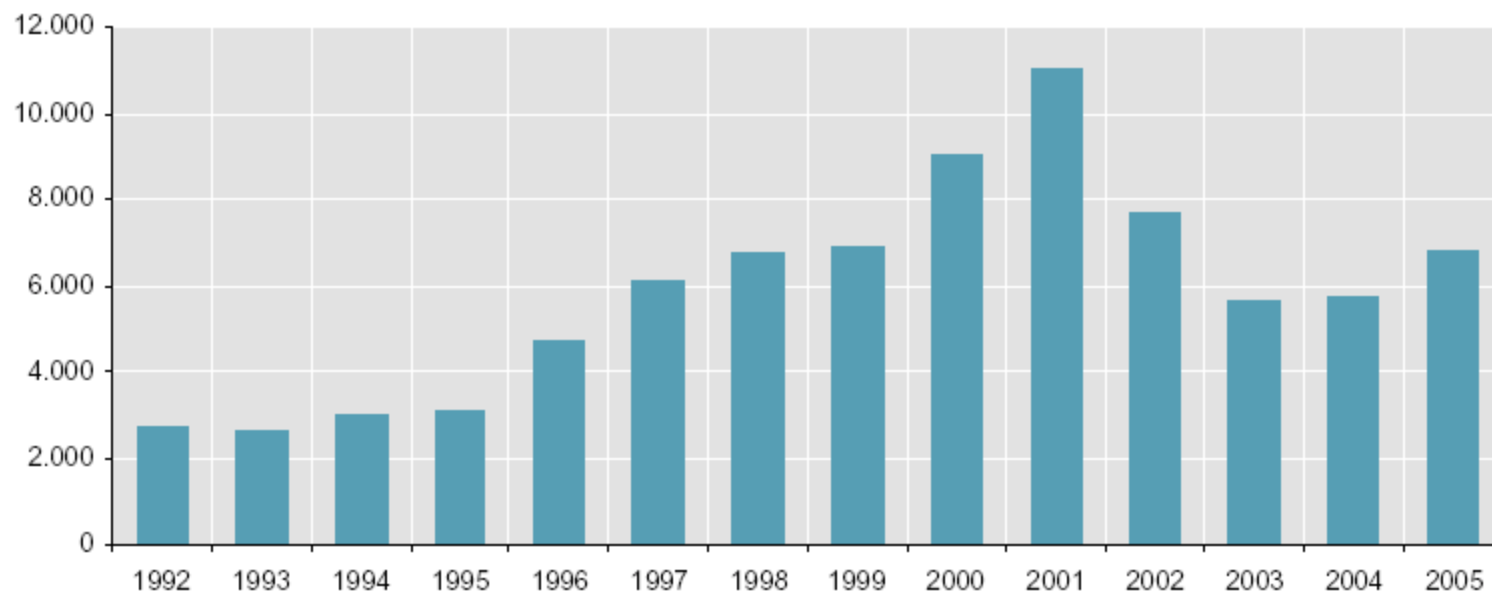
- DKK per inhabitant 1998-2000, 2001-2003



Kilde: OECD Communications Outlook 2005

INVESTERINGER I TELESEKTOREN I DANMARK TELECOM INVESTMENTS IN DENMARK

Mio. kr.
DKK million



Investment and access regulation

One assumption...

- Regulation shall promote investment by 'ladder of investment' regulation



E.g. Danish telecom law, Explanatory notes, Article 51 (6)

- *NITA must - when imposing a remedy - take into account the need to ensure an appropriate balance between Serviced-based and Infrastructure-based competition.*

Ladder of Investment – only introduced recently

Infrastructure based competition

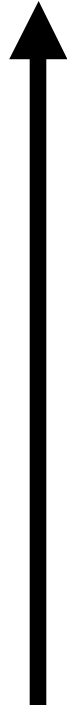
Consistent pricing - Balanced regulation

Intensity of competition

Investments

Innovation

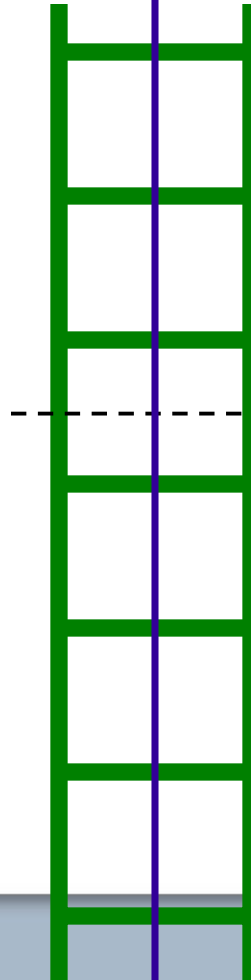
Growth



Market entry

Service based competition

Ensure incentives to “climb the ladder”



FTTH / FTTB (LAN)

FWA/WiMax/WLAN

Cable TV

ULL

Shared access

BSA

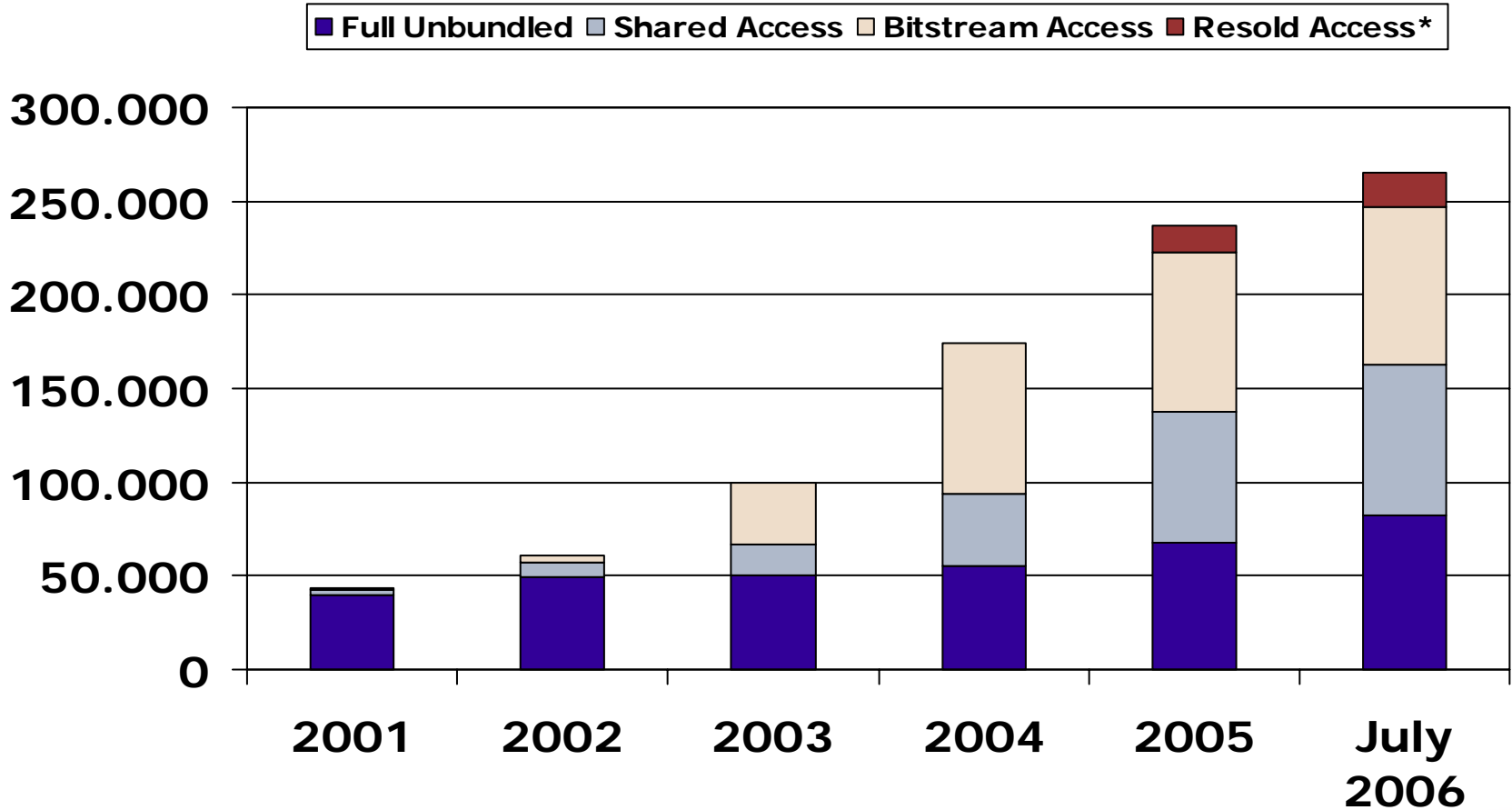
Simple resale

However....

- Ladder of investment may not be 'proven' by Danish experiences
- Major investments in infrastructure come from players that haven't climbed any ladder

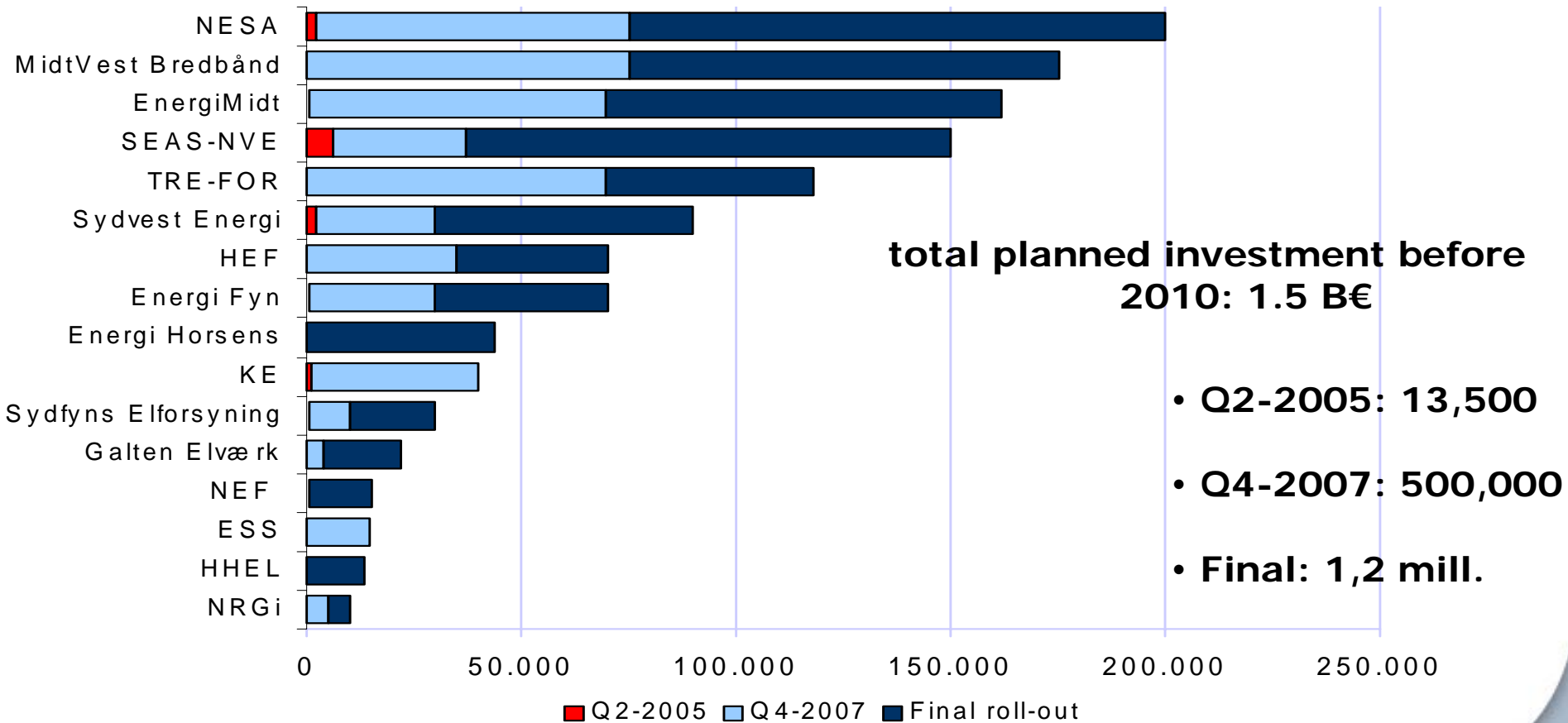
Ladder of investment?

Impact of LRIC based LLU pricing since 2003 on the LLU take-up?



Electricity distributors entry into the broadband market

FTTH roll-out plans, homes passed – total planned investment 1.5 Bill €

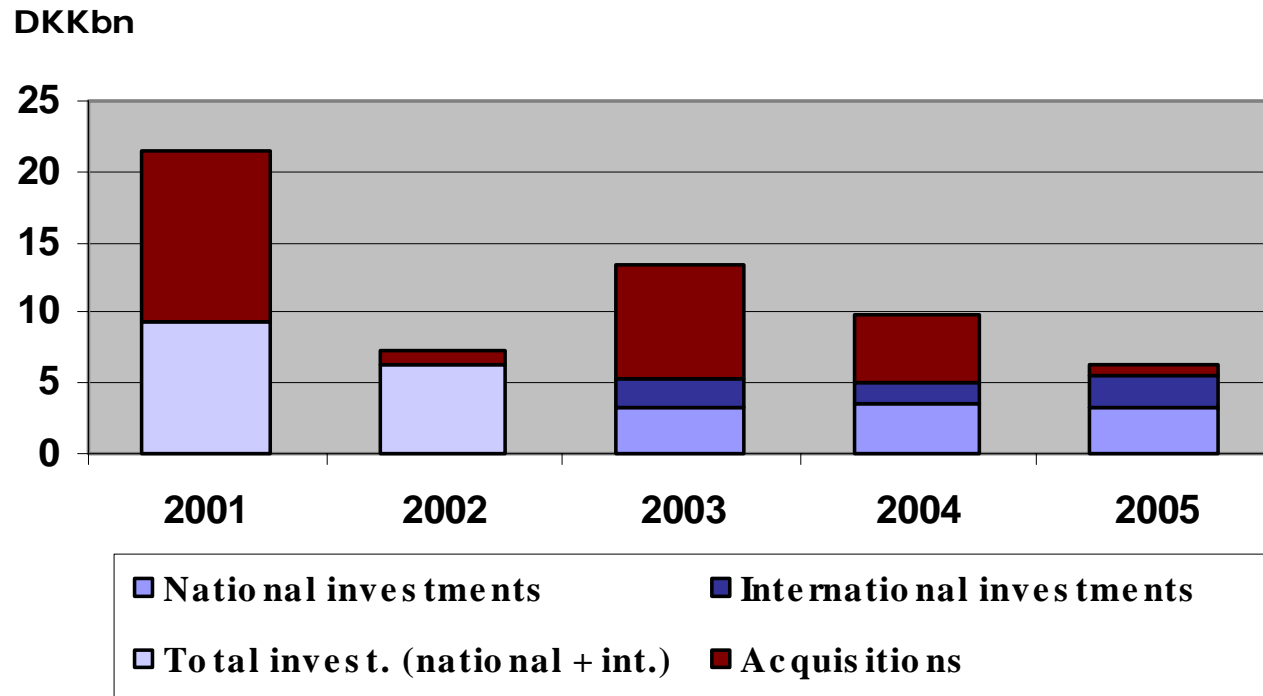


Investment and access regulation

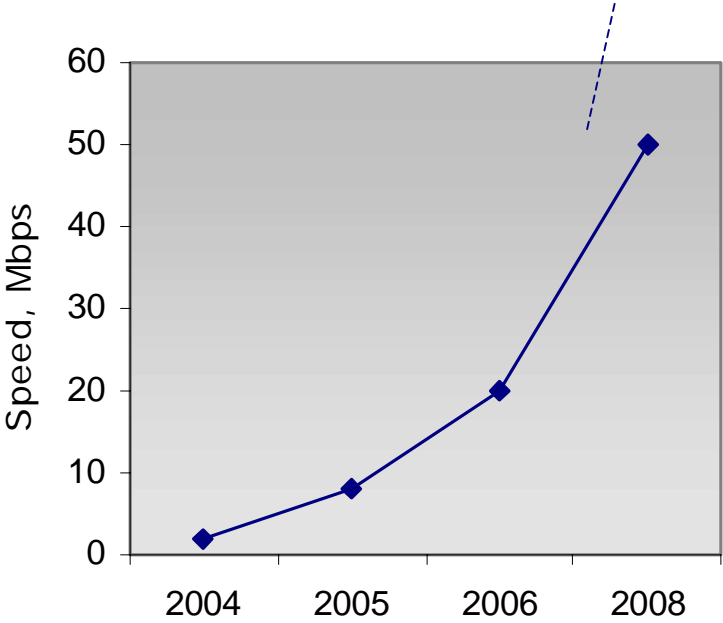
Another assumption...

- *While access regulation may increase entry, it can also work against the incentives for incumbents. Some authors (Jorde et al., 2000) are opposed to mandatory unbundling at long-run incremental costs because the incumbent's obligation to unbundle the network assets works in favour of new entrants and depresses any incentives for the incumbent to upgrade the network and to deploy new systems.*
- [An Assessment of the Regulatory Framework for Electronic Communications – Growth and Investment in the EU e-Communications Sector London Economics p. 75]

TDC investments 2000-2004



Bandwidth for the customers



◆ Max bandwidth in TDC's network



TDC's roll-out strategy			
	20 Mbps	25-50 Mbps	100 + Mbps
Planned 2006	40 pct.	33 pct.	Field tests
Access strategy 2008	75 pct.	55 pct.	Selected areas
Expected 2010	>90 pct.	85 pct.	75 pct.

Conclusions

- Policy objectives and regulatory LoI theory may be conflicting and are not necessarily reflected neither in the actual behaviour of the market nor in the actual regulation applied
- So a very simple relationship between regulation and investment that has been working so far appears to be:

'right' level of regulation



competition



further investment

- In any case, the relative intensive access regulation appears so far **not** to have 'disturbed' or 'disincentivised' the level of investment which at least is comparable with similar countries
- For further studies: is 'right' still right??

Thank you
– and questions most welcome !