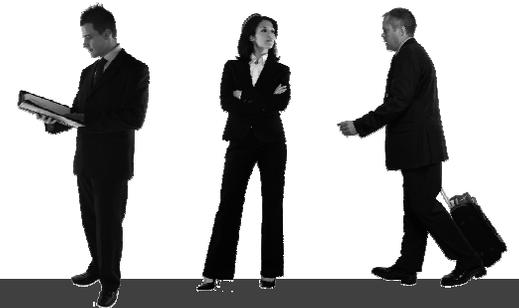


Regulating shared access in the wired service environment

NTC ITU Training Workshop on Infrastructure Sharing

Bangkok, 31 August – 3 September 2010

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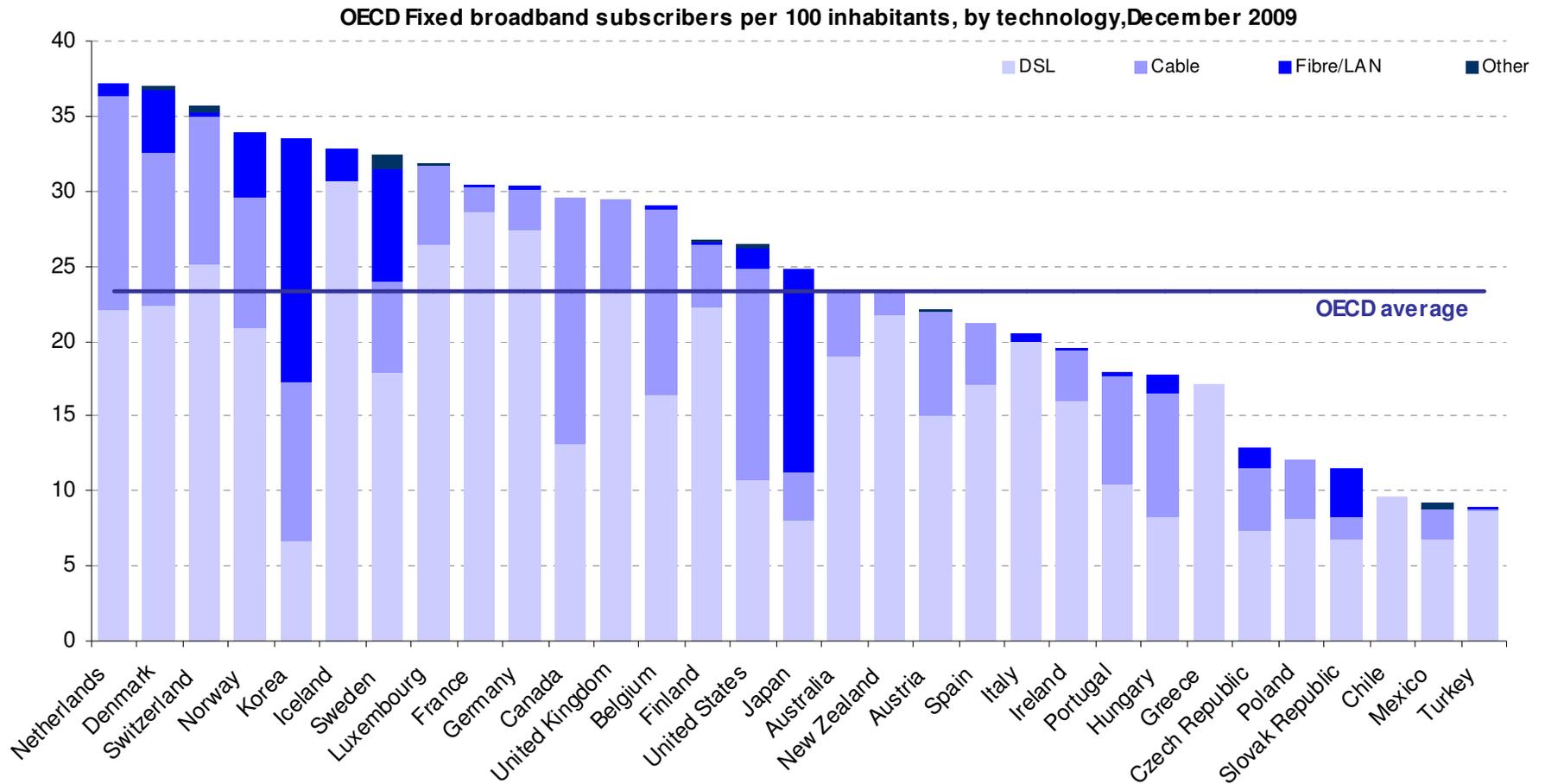
Agenda

- Market trends
- Technology options and implications
- Policy and regulatory options
- Case studies
- Best practices

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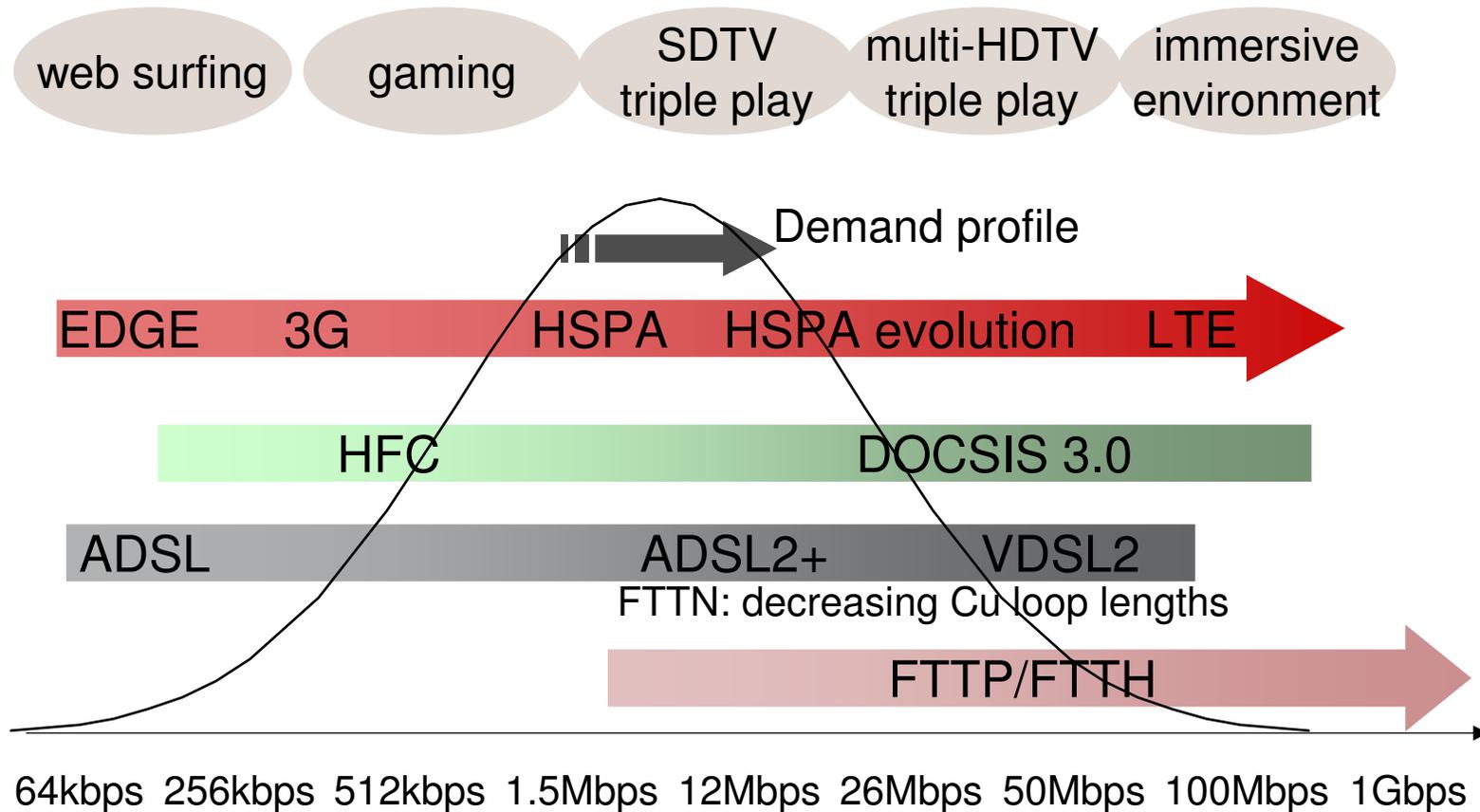
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OECD league tables



Source: OECD

Bandwidth demand drivers



Source: Ovum

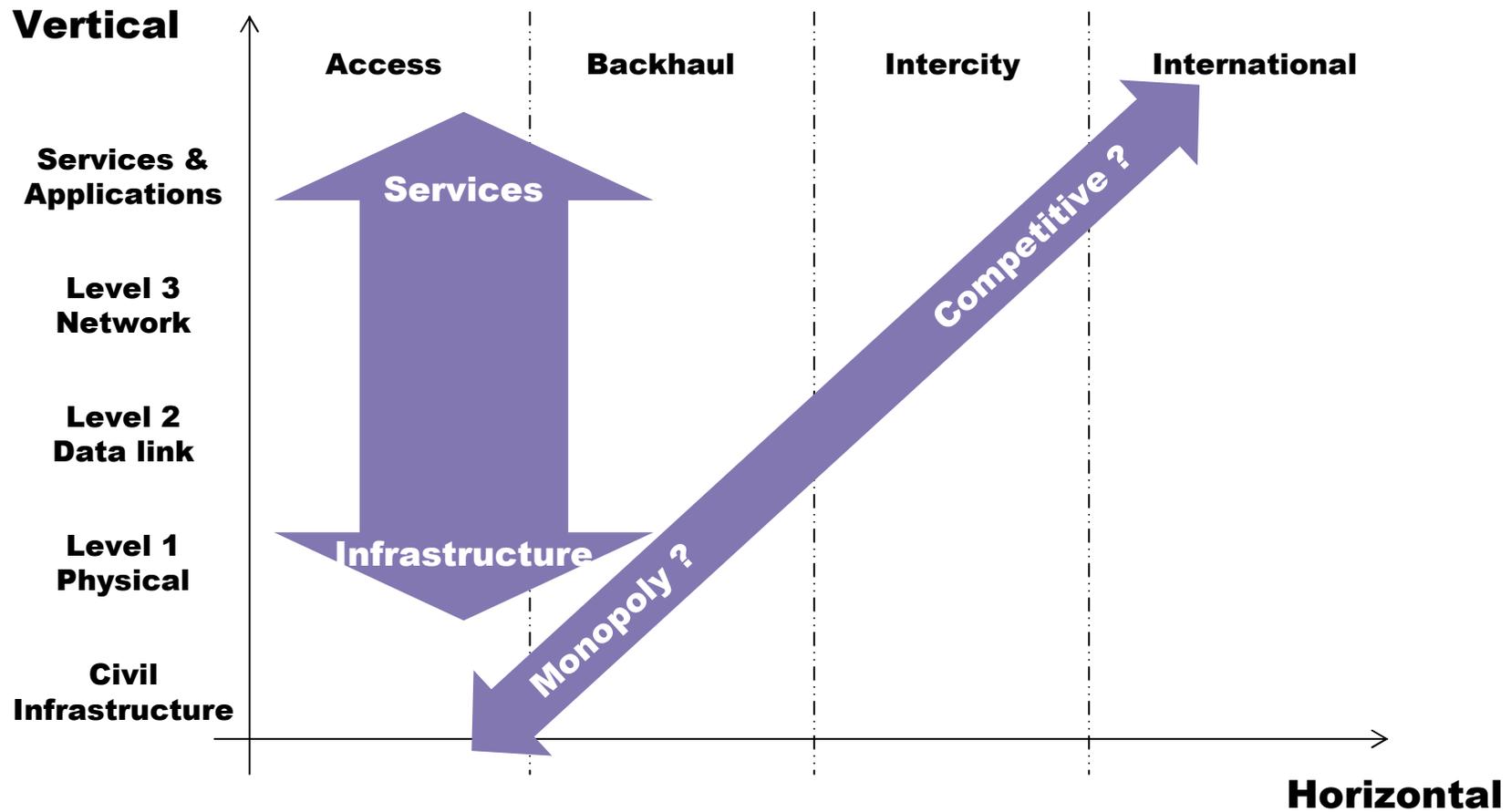
Key market trends and issues

- Traditional revenues being eroded
 - Bit pipe commoditisation
 - Functional separation and wholesale only impacts business case
- Rapid growth in data usage requires network upgrading
 - Fibre pushed to network edge/access network: cost/bit/km metric shifts to cost/bit/customer
- Digital divide/universal service
 - Investment attracted to selected areas – average cost to connect
 - Erosion of voice based cost equilisation schemes
- Externalities not taken into account by commercial business plans
- Demand and technology uncertainty
 - Mobile innovation and service uptake
 - Known unknowns and unknown unknowns
- Network sharing as an option to reduce costs
 - EU: estimated EU\$250b to provide 100Mbps (down) to 50% by 2020
 - Particularly an issue in developing countries with lower GDP

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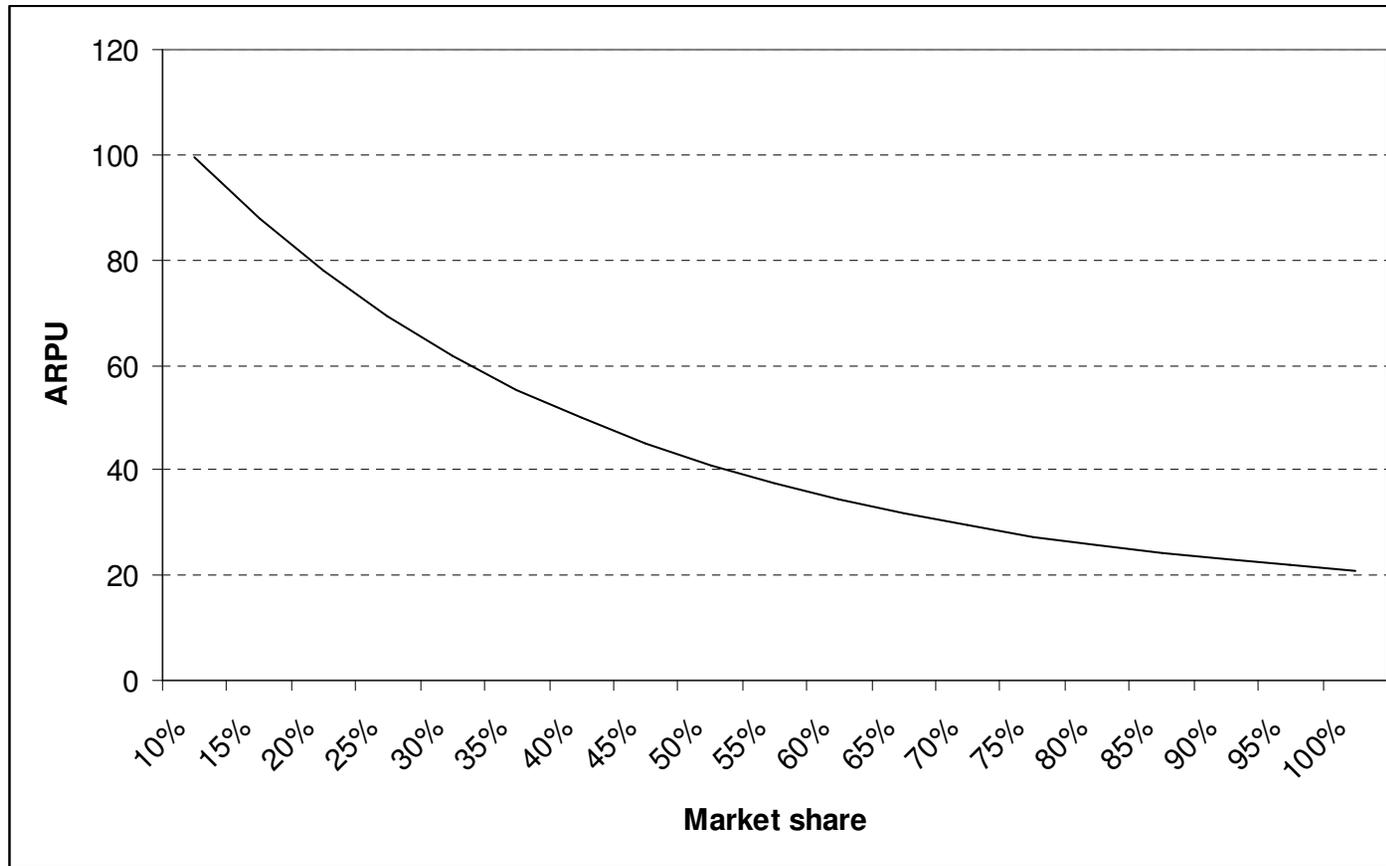
Potential network bottlenecks



Access technology options

- DSL – legacy access to incumbent’s copper (LLU), but customer bandwidth depends on copper loop length
- FTTN (VDSL) – trade-off between investment cost and bandwidth speeds
 - Can cut off existing LLU competitive access
 - Not easily upgradable beyond original design trade-off
- Fixed wireless
 - Low fixed cost, good for low market penetration, alternative network
 - Capacity/cost issues in high density areas
- FTTH – bandwidth highly upgradable (100Mbps/1Gbps)
 - PON – shared capacity within a fibre serving areas
 - P2P – separate fibre to the premise
 - Multi-fibre – 4x or more over-deployment of fibre from aggregation point to optical termination at premise

Cost dependence on market penetration



Illustrative only

Cost implications

- FTTH capex is 3-5 times more expensive than FTTN capex
 - Civil infrastructure large part of costs (~65-75%, if below ground)
 - FTTH opex is 60% or less than FTTN opex
 - FTTH capex and opex dependent on design, e.g. aerial vs below ground
- P2P FTTH only costs approx 10% more than PON FTTH
 - Better future proofing for bandwidth upgrading
 - Easier to unbundle fibre local loops – dark fibre vs WDM for PON
- Access to civil infrastructure substantially lowers competitive network costs
 - Expand pockets of competitive access networks
 - Competitive pressure provided by ability to enter as well as actual entry
 - Allows later entry as technology capability/costs develops
 - Access to existing ducts (eg utility ducts)
 - Guidelines/regulations for new ducts to facilitate competitive access

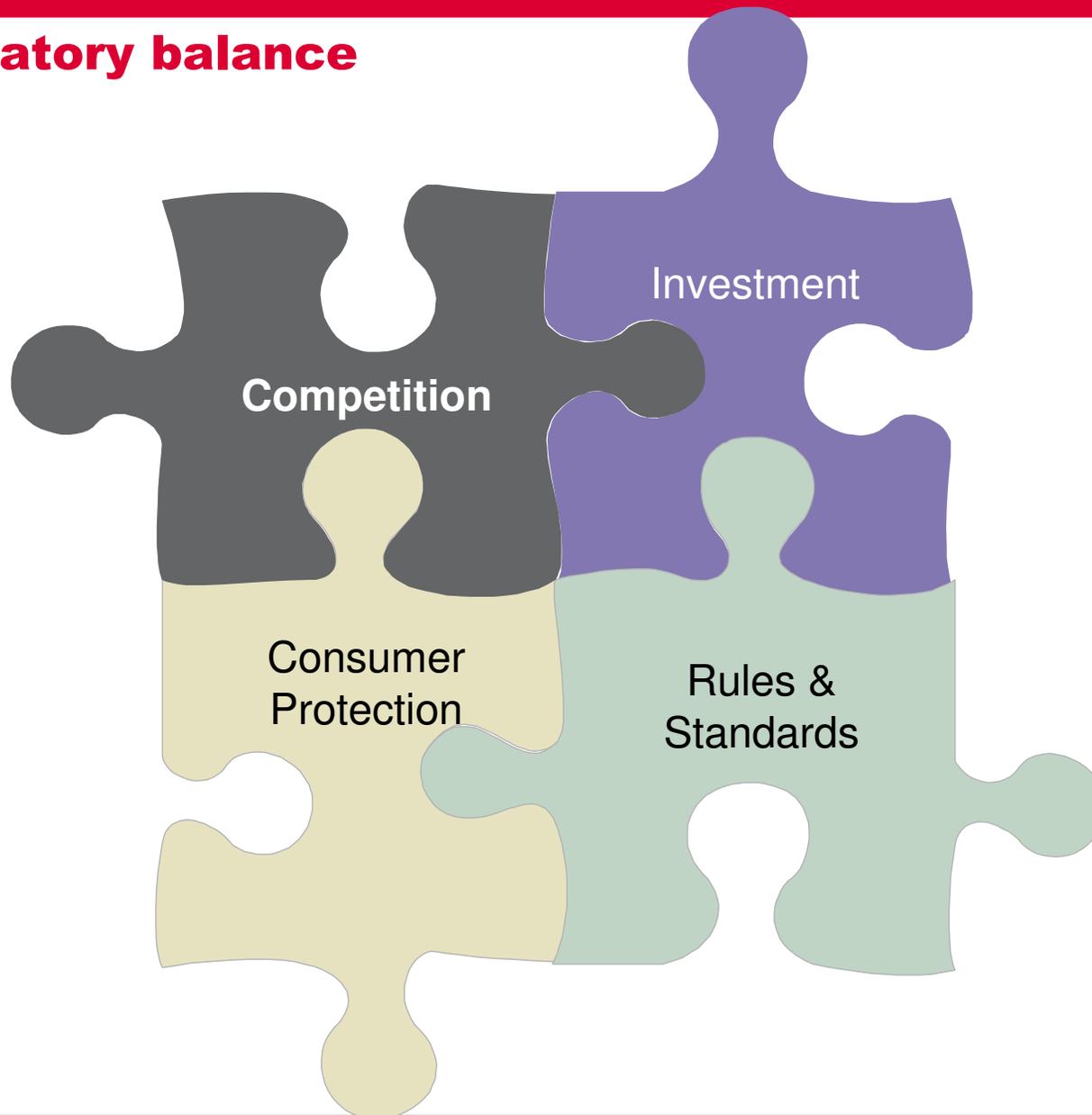
Technology implications

- Need to consider if lack of competitive backhaul is a barrier to access competition
 - Focus on the problem
 - Access network is only one input to a broadband service
- FTTH can be an interim step to FTTP
 - Sufficient bandwidth to allow low(er) risk investment payback and cashflow
 - Postpone larger investment until have better demand certainty
 - But no easy upgrade path to FTTP
 - Still need to consider competitive access
- FTTH
 - PON – bitstream access will need to support a variety of business models (e.g. different QoS levels, multicasting)
 - P2P – allows fibre loop unbundling, but one operator still controls the active connection to a particular customer
 - Multi-fibre – most flexible, but more expensive, alternative that provides direct access to multiple operators

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Regulatory balance



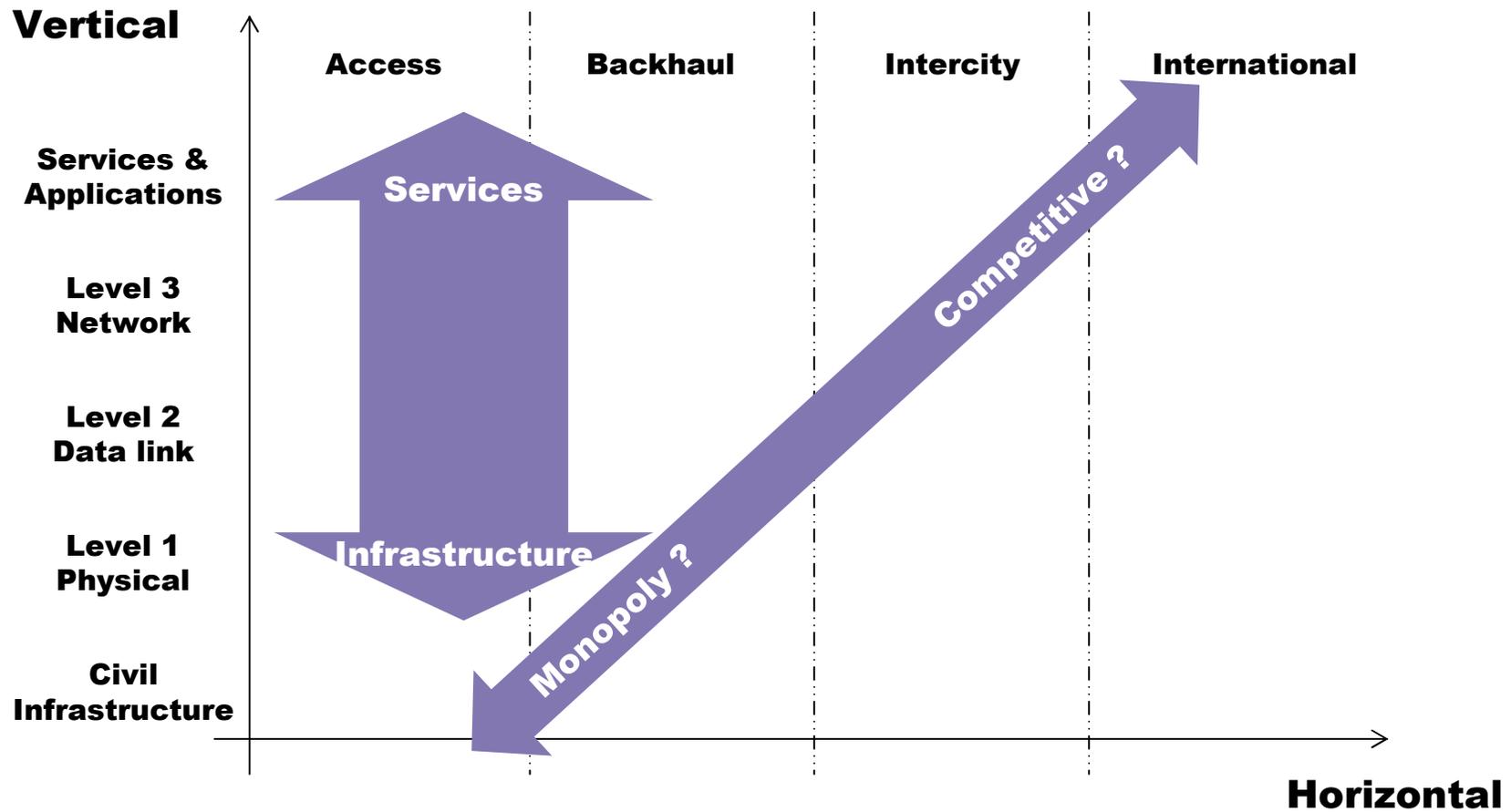
Infrastructure based competition

- Regulators have traditionally focused on infrastructure based competition to drive:
 - Efficient investment
 - Economic welfare growth
 - Innovation
 - Service quality and continuity
 - Efficient pricing
- Regulator market intervention was in response to market failure (actual and anticipation)
 - Occurs when a competitor has the ability to exercise market power and is able to change prices or supply without fear of effective response by competitors
 - Typically occurs when a competitor has control over bottleneck facilities or services
 - These are facilities or services that cannot be economically duplicated
- But also need to consider consumer interests and efficient total investment

Consumer interests and efficient investment

- Universal service has been an objective in most markets
 - Traditional voice focus now shifting to broadband access
 - Various mechanisms used to achieve outcome
 - Higher cost of broadband networks requires this to be reexamined
- Innovation is now driven from the services level
 - IP networks separate services from the transport network, no longer embedded/enabled in the network as per legacy voice
- Efficient investment needs to take into account network externalities
 - Can be substantial societal benefits to broadband access
 - Commercial business case will only consider the producer surplus
- Different segments of the market can have different competition/investment outcomes

Where is the bottleneck?



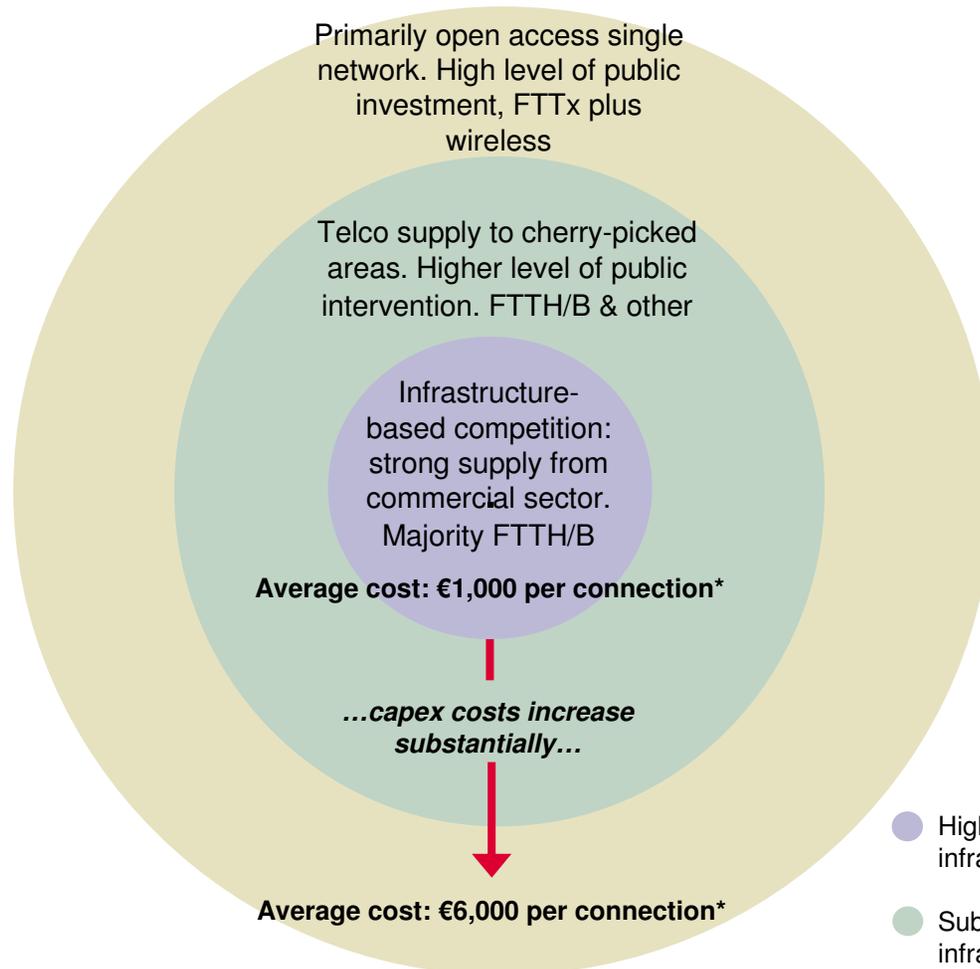
Government options

- Two key objectives: promotion of competition and extending access coverage
 - Need to identify where the problems are: access, backhaul, international and different geographic/demographic areas
 - May adapt different regulatory/intervention approaches in different segments of the market
- Promotion of competition
 - Opening up bottleneck facilities at competitive wholesale prices
 - Regulatory action through competition or telecoms laws
- Access coverage extension
 - To capture societal externalities or for social inclusion (digital divide)
 - Overcome the gap in the commercial business case

Backhaul & international access

- Access network is only one cost component of providing broadband (internet) access to retail customers
 - Backhaul: from aggregation point (exchange or node) near customer
 - Global internet access: international gateway, submarine/satellite, transit
 - Access network cost typically fixed wrt usage
 - Backhaul and global internet vary with traffic usage
 - Retail bandwidth caps (if relevant) typically driven by variable cost components
- Competitive access (DSL, fixed wireless, etc) can be curtailed if the backhaul or international access costs are prohibitive
 - Government facilitation of a shared wholesale backhaul network is substantially cheaper than building the access network (cf Australia case study)
 - International access – cf IDA International Gateway session

Access networks: different market outcomes



*Source: vendors, regulators (EU costs)

- Incumbents and altnets are overwhelmingly focusing investment on FTTH/B in high-density and/or urban areas
- FTTH/B deployments in lower-density areas or small towns are either:
 - a) via municipal network deployment
 - b) via utility deployment
 - c) in greenfield sites
- Europe, NA, Australia have a less highly concentrated population and fewer MDUs than leading FTTH/B markets in AP
- How to determine boundaries (which change over time)?

- High-density, urban areas with mostly MDUs – market driven, but promote infrastructure sharing
- Suburban, less dense areas with mix of housing – requires infrastructure sharing to be commercial
- Rural, low-density areas; high level of detached housing – government assisted

Government intervention guided by cost benefit analysis

- Intervention (direct or regulatory) should be supported by cost benefit analysis
- Baseline should be the status quo
 - Many cost benefit studies of high speed broadband start from the no-broadband baseline, rather than the existing level of mixed broadband availability
- Can be used to estimate the boundaries between the competitive and non-competitive regions
 - Potential network coverage on basis of commercial returns
 - Appropriate network coverage on basis of societal externalities
 - Also consider digital divide/equality factors
- Opportunity cost of government funding
 - At what point do other projects generate greater societal externalities? (e.g. eHealth vs a new hospital)

Promoting competition

- Regulated access to service inputs
 - Passive infrastructure and/or active network elements
 - Separation options: structural, functional, operational, accounting
 - Equivalence of Inputs – processes as well as pricing
- An open access wholesale only network can still be a monopoly
 - Dependent on availability of competitive alternatives in the relevant area
 - Still requires regulatory oversight of wholesale pricing
 - Balance appropriate risk based return against competitive pricing: static vs dynamic allocative efficiency
- Network to network access
 - Legacy focus on voice access: voice termination
 - IP networks: likely to switch to peering (bill and keep)

Access to network service inputs

- Passive infrastructure
 - Rights of way: simplify and speed access
 - Duct access: can include as a requirement tied to rights of way
 - Equipment rooms
 - Legacy access: copper LLU
 - Dark fibre access depends on network topology
- Active infrastructure
 - Legacy access: wholesale line rental
 - Bitstream access over FTTx networks
 - Layer 2 (Ethernet) and/or Layer 3 (IP)
 - IPTV platform?

Extending access coverage

- To capture societal externalities or for social inclusion (digital divide)
- Provide regulatory certainty for investment (not necessarily concession)
- Government demand side aggregation (anchor tenant, e.g. school, hospital)
- Subsidy – direct or via special rate loan or tax/regulatory concessions
- Subsidy can be funded from a universal access type scheme
- Regulatory concessions may involve access holiday or even overbuild protection – but should be for limited duration
- Direct subsidy often tied to open access wholesale only provisions
 - Government tender to private industry (Singapore model)
 - Government owned and operated (Australia model)

Vertical integration or wholesale/retail separation

- Can be driven by policy/regulation or commercial decision
- Vertical integration has efficiencies
 - Economies of scope
 - Avoidance of transaction costs
 - Direct costs of Openreach (functional separation) estimated at GBP100-200m
 - Increases investment – retail profits part of investment consideration
 - But can leverage SMP to downstream markets through bundling
- Commercial value of separation
 - Different risks of wholesale vs retail
 - Access to capital
 - Regulated rate of return (WACC) for different operating units
 - Weaker separation to avoid stronger regulatory driven separation
- Spectrum of separation options
 - Structural, functional, operational, accounting
 - Changes the problem, does not solve it – still have a monopoly supplier
 - Changing technology – changing bottlenecks – changing separation boundary

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Europe updates

The UK

- The *Digital Economy Bill* has begun making its way through parliament. It is made up of the actions in the final Digital Britain report that need primary legislation – in particular, giving Ofcom enhanced duties in relation to investment in infrastructure.
- The first committee session is scheduled for 6 January 2010.

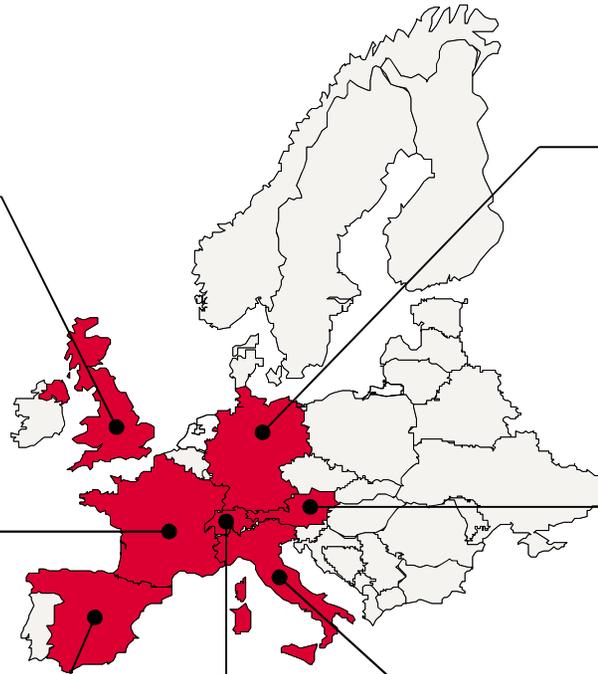
France

By early 2010, ARCEP is expected to:

- have approved its final decision on multi-fibre deployment for FTTH
- have approved its final decision on technical arrangements for access to the sub-loop.

Spain

- In November 2009 CMT imposed on Telefonica the obligation to grant access to its civil infrastructure.
- The offer is available to all operators (i.e. including mobile and cable operators) provided they require the access for deploying fibre networks.



Germany

- On 3 December 2009 the EC ruled that Section 9a of the German Telecommunications Act, which grants DT a regulatory holiday for investment in new markets, infringes EU law.
- BNetzA imposed on DT the obligation to grant access to its VDSL network, cable duct systems and dark fibre if there is no space available.

Austria

- In September 2009 RTR reviewed market 5 and defined the relevant product market as including both DSL and mobile connections.
- At first the EC expressed serious doubts but later approved the decision after receiving more data from RTR that mobile broadband connections are substitutes to fixed-line broadband connections for residential customers.

Italy

- Agcom's proposal for the remedies in markets 4 and 5 include:
 - the obligation for TI to grant access to its ducts and dark fibre (market 4).
 - bitstream access over copper and fibre (market 5).

Switzerland

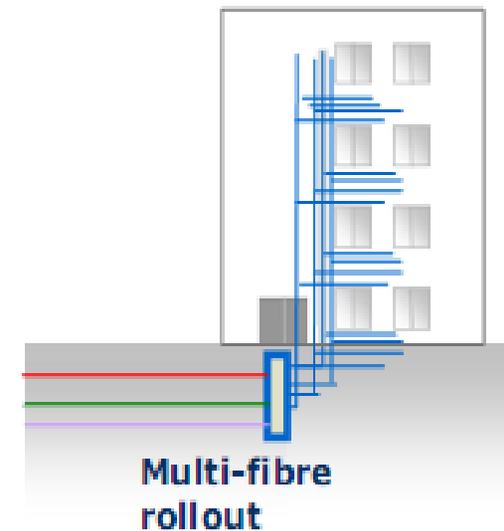
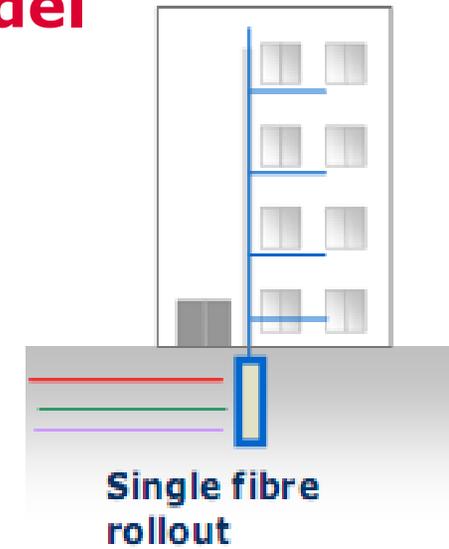
- ComCom and OFCOM adopted a multi-fibre model.
- For the first time, ComCom has regulated the prices and conditions for duct access to Swisscom's network. Prices are calculated using an LRIC model.

European Commission

- European Commission set broadband targets (2Q2010)
 - Basic access for all by 2013
 - 30Mbps for all by 2020 (est cost: EU\$80b)
 - 100Mbps for 50% by 2020 (est cost: EU\$250b)
- Realisation that FTTH deployment is concentrated on urban areas
 - Market forces alone will not provide high speed broadband to all
- Cost reduction measures
 - Information sharing on ducts (SMP operator)
 - Unbundling will be required regardless of network architecture and technology implemented
 - In-house wiring standards requirements
 - Coordination of infrastructure built
 - PPPs leveraging state aid: black, grey and white areas

France and Switzerland: multi-fibre model

- France and Switzerland have both recommended a multi-fibre approach. Multi-fibre rollout offers several **advantages**:
 - operators can be independent, having their own network from end to end, whereas sharing a fibre involves complex interaction
 - operators can implement their own technology (either PON or P2P) and differentiate themselves from one another
 - consumers can have the choice of several offers from different ISPs, and churn costs should be reduced.
- The multi-fibre model is advocated by the EC in its second draft recommendation on NGA. The draft recommendation suggests that NRAs should facilitate the deployment of multiple fibre lines under the assumption that the additional cost will be minimal.
- However, multi-fibre rollouts are not without their **disadvantages**:
 - there are various estimates of the extra cost of multi-fibre deployment
 - it's difficult to foresee the number of fibre cables needed.



France and Switzerland: multi-fibre model

- **FRANCE:** ARCEP proposed the symmetric multi-fibre model measure in densely populated areas of France in its draft decision on deploying and accessing optical fibre. The main elements of this approach are as follows:
 - The definition of very densely populated areas: about 20 metropolitan areas, 5.5m households, where rollout costs are the lowest.
 - The principle of technology-neutrality: operators can choose either a point-to-multipoint (PON) or a point-to-point (P2P) network architecture.
 - Transparency: access to fibre lines should be provided under transparent conditions.
- **Switzerland:** ComCom and OFCOM proposed a multi-fibre model to promote competition and encourage investment by Swisscom's cooperation partners.
 - Swisscom is to invest in building an FTTH network with several fibre lines laid in each building, where one fibre will be used by Swisscom and the others will be available to its partners.

The debate has mostly focused on the incremental cost of multi-fibre deployment:

In France, France Telecom has declared the extra cost of deploying multi-fibre is 40%. ARCEP, however, estimates that the extra cost is only approximately 5%. In Switzerland, Swisscom estimates that there is a 10% extra cost for deploying multi-fibre lines rather than a single-fibre FTTH project.

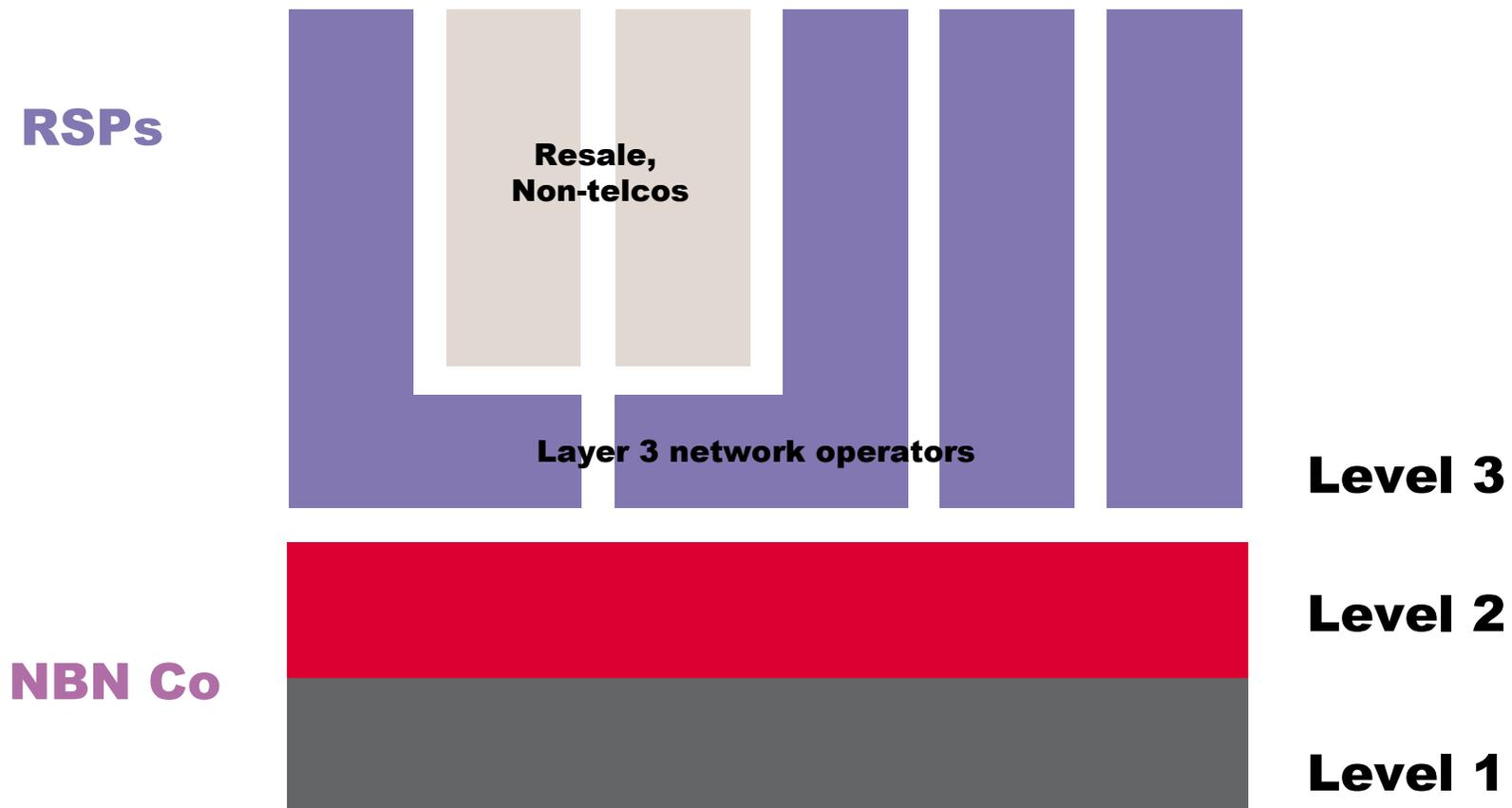
Australian NBN timetable

- Nov 2007: Labor party wins federal election with a key promise of 12Mbps to 98% of homes with \$4.3b government funding
- Mar 2008 – Apr 2009: NBN Mk I RFP
 - RFP responses evaluated by ACCC and expert panel
 - Telstra excluded from process – SME participation plan
 - Issue over access to Telstra's copper network
 - RFP cancelled
- Apr 2009 – current: NBN Mk II
 - FTTP to 90% (93%) of premises, 100Mbps D/L PON and P2P
 - Wireless/Satellite to 10% (7%), 12Mbps D/L
 - Government owned, with plans to sell down later
 - Full rollout over 8 year period
 - NBN Co established
 - Early (pilot) rollout in Tasmania and selected areas
 - Dec 2009: requested capability statements from potential suppliers

Australian NBN timetable (cont)

- June 2010: Telstra and government reached Heads of Agreement
 - Telstra's cooperation is critical to the success of the NBN
 - AU\$11b in value (\$9b direct payments plus changes to universal service arrangements)
- Aug 2010: election
 - Broadband access was an important differentiator between the 2 major parties
 - Minority government formed with independent rural MPs – outcome still uncertain

Australian wholesale model



Australian NBN issues

- If operated on a purely commercial basis, NBN pricing would need to be 4-6 times higher than current industry wholesale costs
 - Dependent on market share by NBN
 - Only a few customers are likely to initially pay more than a small premium for higher speeds
 - Need legacy transition products
- Product mix changes over time, yielding rising average pricing
- High bandwidth (>20 Mbps) consumer applications do not yet exist
 - No cost benefit study conducted to evaluate societal externalities
- Deal with Telstra both reduces the cost to build and provides a guarantee of customer volumes
- Mobile growth will impact NBN potential market share
 - Mobile broadband is both competition and complimentary to fixed broadband

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Best practices

- Need to consider where the problem (bottleneck, unserved areas) lies
- Technology options constrain regulatory options (e.g. unbundling)
- Regulatory oversight of pricing is still needed for wholesale only networks operating in the absence of competitive pressure
- Allow for flexibility: geographically/demographically and over time
- Be aware that regulation changes market dynamics, do not lock an asset in as a bottleneck if evolving technology allows later replication
- Cost benefit analysis to guide government intervention

Thank you

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