TELECOM REGULATION AND INVESTMENT

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LIFE IS FOR SHARING.

TELECOM REGULATION IN A CHANGING INDUSTRY ENVIRONMENT

TELECOM 1.0	TELECOM 2.0	TELECOM 3.0
▪ From the beginnings of voice telephony until the 1990s	▪ 1990s, first decade of the new century	▪ Today
▪ Copper analog networks ▪ Transmission speeds in the kilobit per second range	▪ Copper digital networks ▪ Mobile, Internet and broadband boom ▪ Transmission speeds in the megabit range	▪ New network technologies require high investment (FTTx, 5G) ▪ Shifting user behavior (mobile, tablets) ▪ New business opportunities (IoT, industry digitization) ▪ Increasing OTT competition
▪ Traditional monopoly system, state owned (“Regulation 1.0“)	▪ Sector specific regulation (“Regulation 2.0“), liberalization, privatization, market entry and competition, plummeting prices	▪ “Regulation 3.0”: major adjustments necessary – investment incentives, pricing flexibility, predictability, level playing field

LEGACY NETWORKS (Telecom 1.0 and 2.0)

NEW NETWORKS (Telecom 3.0)

Source: Noam (2010)

€ 660 billion

Investment need to reach the levels of speed and coverage outlined in the European Commission’s Gigabit Society vision

Source: BCG

UNBUNDLING AND COST REGULATION IMPEDING DIFFERENTIATED, SEGMENT-SPECIFIC PRICING

Broadband market segments

High-end segment
- SMEs, „digital natives“, gamer, large households with multiple users
- Technology- and Internet oriented

- Demand for high-speed Internet access
- High willingness to pay

Low-end segment
- Latecomer to digital technologies, „digital immigrants“, single-person households
- Moderate-bandwidth applications
- Budget limitations

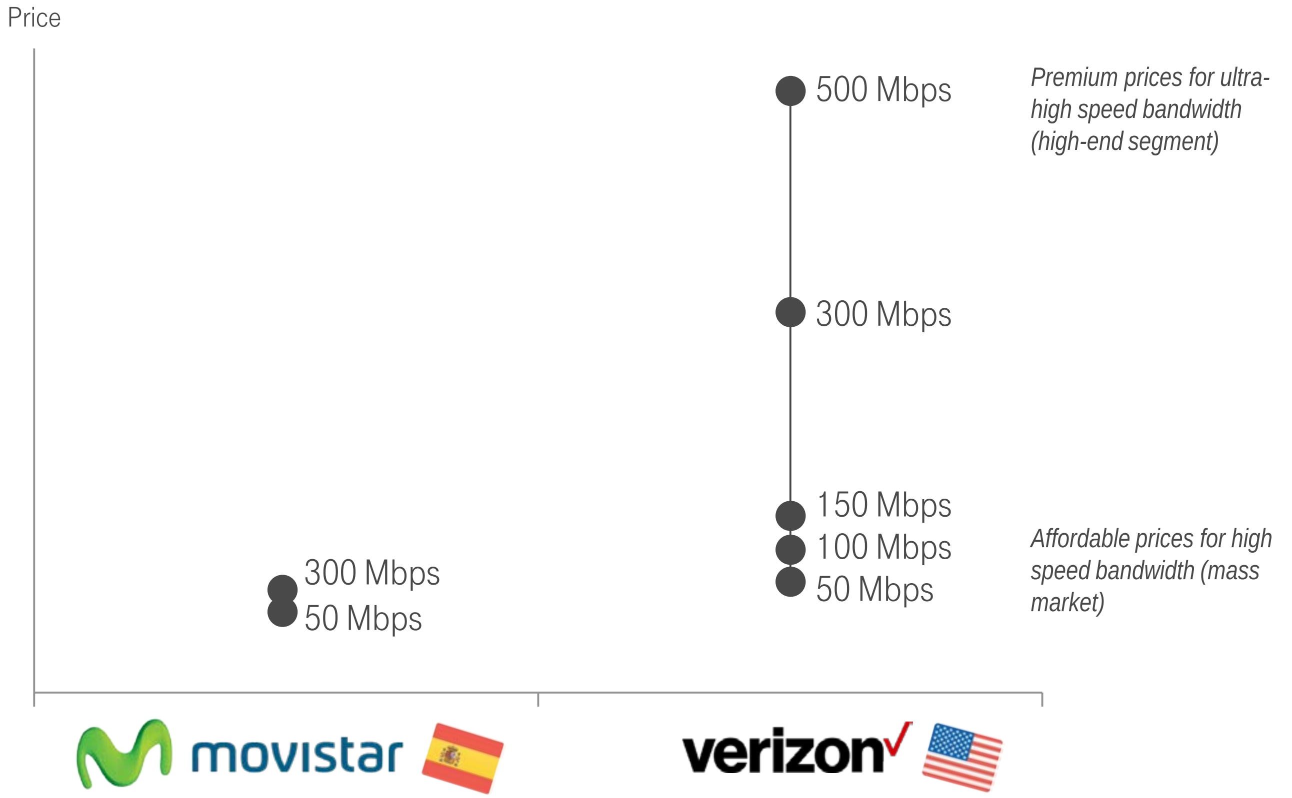
- Content with moderate access speeds
- Low willingness to pay

Networks, regulation, pricing and investment

- **Single platform multipurpose production for all market segments** (fibre replacing copper)
- **Unbundling** and **cost regulation** leading to uniform wholesale prices, hindering price differentiation (arbitrage problems)
- **Retail price** level determined by regulated wholesale prices

PRICE DIFFERENTIATION IN PRACTICE: LIGHT-TOUCH REGULATION IN THE U.S. ENABLING DIFFERENTIATED PRICING

Broadband offers EU vs. US: two examples



Light-touch regulation

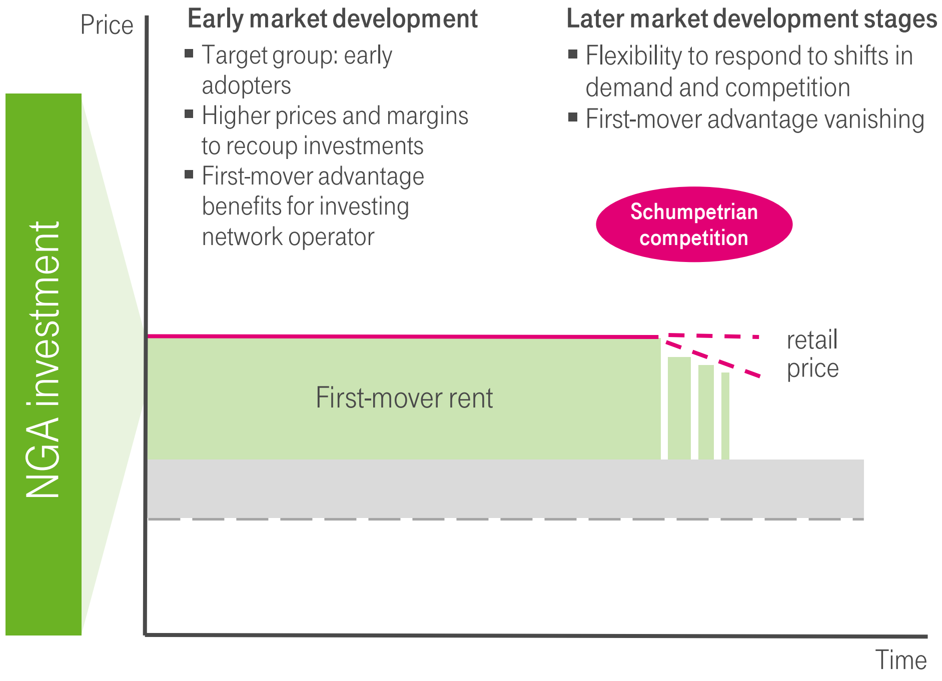
- Enables operators to introduce differentiated, segment-specific pricing for customer segments that are willing to pay for higher speeds
- Ensures that returns on network investments are more attractive

Based on company information November 2016, BCG

FIRST-MOVER ADVANTAGES CRUCIAL TO FOSTER NETWORK INVESTMENT

Commercial NGA deployment

STYLIZED



Regulated NGA deployment

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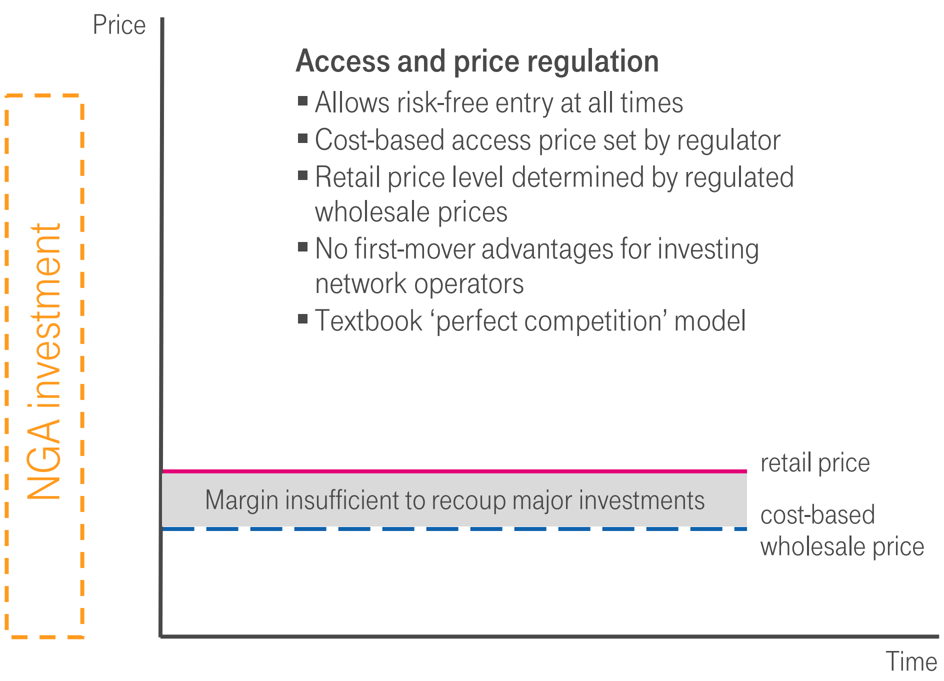


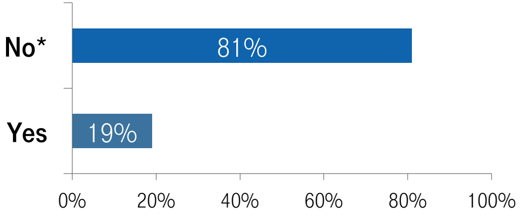
REGULATION IN EUROPE NOT CONDUCIVE FOR INVESTMENT IN NEW HIGH-SPEED NETWORKS

- Tough access and price regulation
- Plummeting prices, declining revenues
- Huge investments requirements
- Value capture by OTT players

- No first-mover benefits for investing network operators
- Price differentiation difficult with physical unbundling and cost orientation
- Very long investment payback periods
- Investors highly sceptical

CREDIT SUISSE TELECOM INVESTOR SURVEY, 2016

Does EU telecoms regulation strike the right balance between price competition and network investment incentives?



* too focused on competition (e.g. from resellers)

Fixed and mobile CAPEX in domestic networks (million EUR)