Technological neutrality and network neutrality in telecommunications regulation. Policies at the 5G crossroads?

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The argument in a nutshell

- Technological neutrality and network neutrality are two instantiations of the regulatory **principle of non-discrimination**
- The types and relevance of various **non-discrimination issues ultimately depend on the underlying market structure**, and particularly on:
  - vertical integration
  - scope for competition/cooperation at the different layers of the value chain
  - availability and control of key resources at the heart of competitive advantage
- **5G is a game changer** of the connectivity-based (extended) value chain, and it is therefore bound to affect these aspects
- By making even more unpredictable horizontal competition across technologies, it **strengthens the case for technological neutrality**
- By promising to bring about massive system capacity, it **weakens the case for network neutrality**, while increasing the static and dynamic efficiency losses the latter entails

Motivation and literature

- We contribute to a relatively scant literature on the interplay between 5G and regulation (e.g., Alexiadis and Shorthall, 2016; Frias and Martinez, 2017)
- Even though 5G is still surrounded by much uncertainty (which makes the paper highly speculative), it is worth addressing these issues early on because
  - they are relevant in the context of “Recovery investments”
  - regulatory changes take time
- The underlying logic of the paper is inspired by the evolutionary literature on the relationship between the nature of technology, market structure and dynamics, and innovation (e.g., Malerba and Orsenigo, 1997; Breschi et al., 2000)

5G as a game changer of the connectivity-based value chain

Architecture&technologies

Densification of the access network
Addition of mmWave small cells, broader use of spectrum resources

Virtualization
Abstraction of network resources and their provision independently of common infrastructure

Resource sharing
Both horizontally (among players at the same layer) and vertically (among infrastructure providers and service providers)

Edge Computing
Shift of network intelligence from core to edges, closer to users

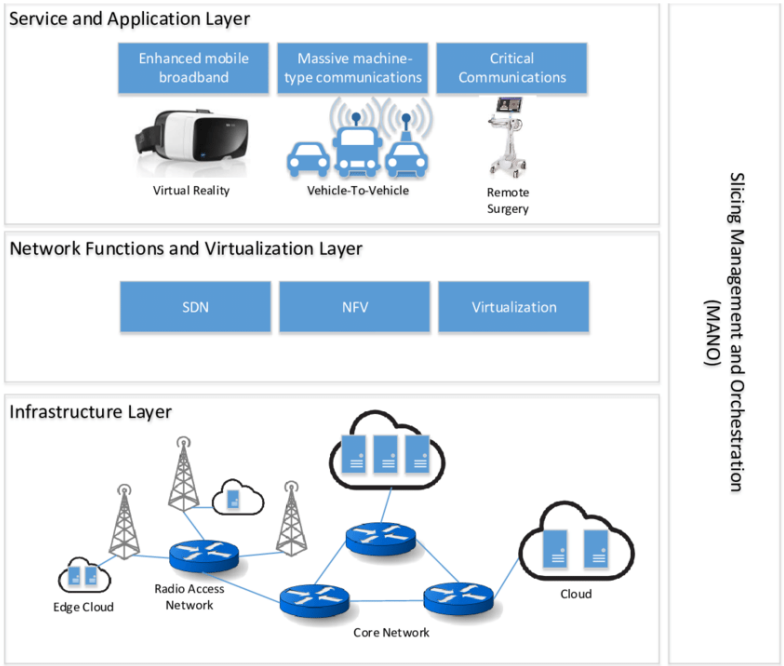
Performance&applications

Speed
600x 4G LTE standard >> competitive with wireline solutions

Capacity
100x increase in traffic capacity/ubiquitous connectivity

Latency
Instantaneous and real-time communications across devices and applications

Network slicing



Wide range of new applications
that require high data speed and responsiveness and benefit from differentiated functionalities, QoS and security features (e.g., virtual reality, augmented reality, full industrial automation with real-time data synchronization, autonomous vehicles etc.).

Source: Toosi et al., 2018

Implications for market structure and market dynamics

- **Networks** are turned from general-purpose “one-size-fits-all” connectivity platforms to **flexible and scalable collections of resources** that can be combined and reconfigured in multiple ways

- Main effects:
  - ↓ vertical integration/ ↑ co-investment
  - ↑ horizontal competition among technologies (wireless and wireline, satellite and wireless etc.)
  - ↑ scope for cooperation among market players at different layers of the value chain (both ex ante and ex post)
  - changes in the nature and control of key resources → capacity (possibly) no longer scarce; ↑ role of players different from OTTs in the control of data

- All of these effects have implications for the relevance of different issues of non-discrimination

5G and technological neutrality

Technological neutrality (TN)

- Objective: to prevent **distortions of horizontal competition among technologies** induced by policy/regulatory choices
- Rationale: private parties have better knowledge and better incentives to pick future-proof technologies
- "weak" implementation – can subside to industrial policy or efficiency objectives (e.g., VHC networks targets)

- 5G has been interpreted as a force that, under certain conditions, may justify abandoning the TN principle to promote FTTH investments
  - because of the externalities it entails and the cost complementarities between 5G and FTTH investments (Briglauer et al., 2020)
  - because FTTH may prevent incumbents from distorting competitors' investment choices (Cave and Shorthall, 2016)
- At least three arguments suggest otherwise:
  - Across-the-board complementarity between 5G and FTTH cannot be taken for granted in light of the unexpected evolution of complementarities/substitutabilities between different technologies
  - More generally, radical uncertainty increases the expected costs of mistakes in picking "future-proof" technologies
  - Incumbents' scope for distorting competition is reduced by recourse to co-investment models

5G and network neutrality

Network neutrality (NN)

- Objectives: to prevent vertical distortions (a) denying consumers unfettered access to the internet; (b) discriminating among content providers, thus jeopardizing decentralized innovation
- Rationale: scarcity of capacity. Entails a trade-off between preserving a level playing field and efficient price discrimination
- After much controversy, it has emerged as a clear policy choice

5G renders NN irrelevant or counterproductive

- The scarcity logic underlying NN does not appear sound in the prospective 5G world of massive capacity
- The very comparability of services (basic internet access vs. specialized services) at the heart of NN looses meaning with network slicing
- The expected static and dynamic costs of foregoing efficient price discrimination are much greater given the radically broader scope for new collaborations along the extended ‘verticals’ value chain
- NN may end up being at odds with TN

Concluding remarks

- The advent of 5G should lead to reconsider, and reverse, any EU regulatory trend towards weaker technological neutrality and strong net neutrality rules
- 5G's impact on non-discrimination issues is broader than we have represented
- Further research:
  - Non-discrimination in 5G Standard-Essential Patent licensing
  - Non-discrimination in access and network separation regulations

Thank you for your attention!

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