



CNMOC COMISIÓN NACIONAL DE LOS  
MERCADOS Y LA COMPETENCIA

## *5G deployment & new business models*

Universidad Complutense de Madrid and Instituto Complutense de Análisis Económico (ICAE)  
[Seminar: Spectrum 5.0: Policy choices for 5G Deployment](#)

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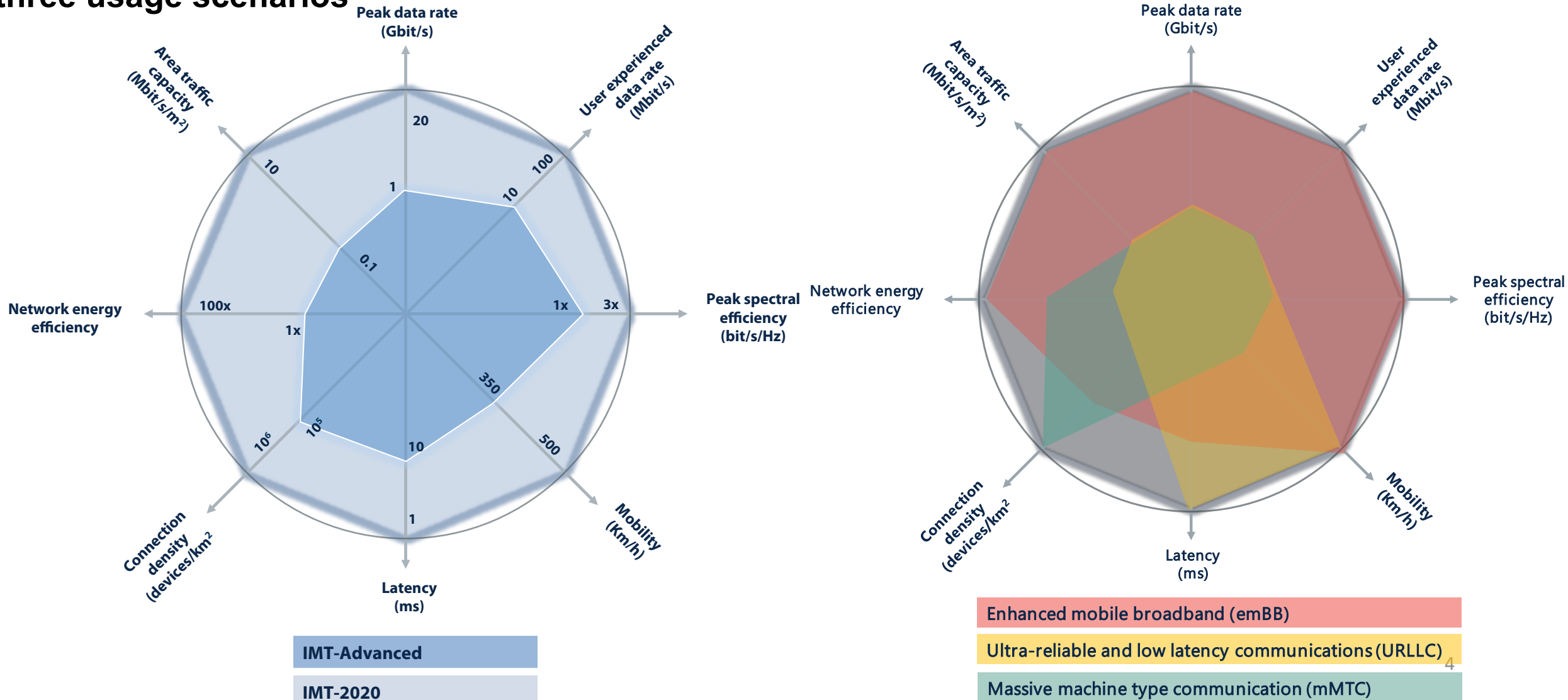
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## Outline

1. The new connectivity: Study for BEREC on Implications of 5G Deployment on Future Business Models
2. Regulatory issues: public numbering resources & net neutrality
3. Conclusion

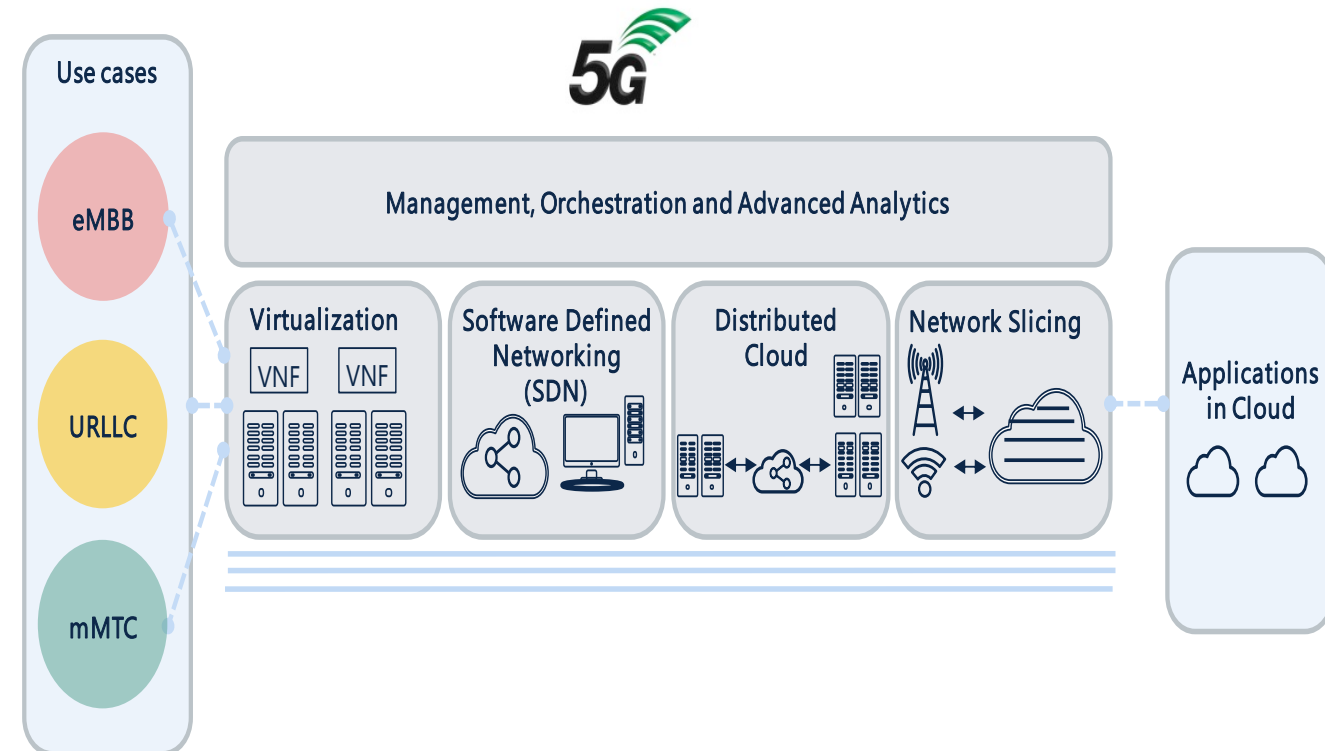
- **5G is a priority for BEREC, Board of European Regulation Authorities such as CNMC**
  - Internal workshops regarding 5G: November 2017 & March 2018
  
- **Study for BEREC on Implications of 5G Deployment on Future Business Models (March 2018)**
  - Available at  
[https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/8008-study-on-implications-of-5g-deployment-on-future-business-models](https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8008-study-on-implications-of-5g-deployment-on-future-business-models)

## The advanced connectivity features of the fifth generation (*Recommendation ITU-R M.2083-0*) for three usage scenarios



### The technology of *Network slicing* will enable differentiated services

- Network slicing can be used to create virtual networks with particular performance characteristics by prioritising certain features.
- Mobile data connectivity services will be made possible which will be tailored to the needs of specific users. A wide range of demand types can thus be addressed, differentiated by their requirements: latency, bitrate, density of devices, energy consumption, speed, ...
- Operators will configure service-oriented virtual networks in order to handle efficiently every use-case. A single physical network will diversify in multiple virtual networks optimized for each service.



- **USA, Korea & Japan focus on advanced connectivity features?**

- “KDDI and Samsung have achieved speeds of 1.7Gbps during trials of 5G on a train travelling at 100km/h near Tokyo” <https://www.zdnet.com/article/samsung-tests-5g-on-japanese-high-speed-train/>



- **EU & China focus on sector-specific solutions (so-called “verticals”)?**

- “Huawei joins forces with China Telecom and China's state grid to develop 5G slicing solution for power industry”

<https://www.telecomtv.com/content/5g/huawei-joins-forces-with-china-telecom-and-chinas-state-grid-to-develop-5g-slicing-solution-for-power-industry-28295/>



- **Services can be tailored to the needs of sector-specific solutions ("verticals")**
  - This new capacity for the differentiation of services without having to deploy different physical networks raises the possibility of services aimed at specific economic sectors -the so-called "verticals". Therefore, 5G has the potential to change business models for network operators. Currently they offer very standardized services.
  - What pricing structures or models of collaboration and risk sharing are suitable for these new uses? How will vertical solutions operate outside of 5G coverage?
  - Are there vertical solutions that, by themselves, can provide significant new additional revenue within a reasonable timeframe to drive the deployment of 5G? Or should a large number of niche applications be enabled in various sectors, whose needs are not met today by 4G networks?

- **New intermediaries to enable “verticals”**
  - Public or private networks to serve specific vertical needs
  - New roles for intermediaries who know specific industries well to assemble connectivity services targeted to their needs: aggregators for trans-national connectivity, vertical virtual network operators
- **Open APIs** (as mentioned in CERRE Study “Towards the successful deployment of 5G in Europe: What are the necessary policy and regulatory conditions?”)
  - Network virtualization will allow the definition of innovative vertical solutions by different players: mobile network operators, specialized virtual operators or very large users themselves.  
Open and standardized application programming interfaces (APIs) that allow the construction of solutions for "verticals". How to encourage open interfaces to support the innovative nature of vertical 5G solutions?

Available at <http://www.cerre.eu/content/5g-roll-out-new-cerre-report-points-key-challenges-policy-makers-and-regulators>



- Can vertical solutions be launched relying on widespread 4G coverage or do they need to wait for the advanced functionalities 5G will bring?
  - The extent to which 5G is adopted will depend on sufficient coverage and alignment of incentives between the manufacturers of sector-specific connectivity technology and the mobile network provider.
  - Bilateral agreements between manufacturers and operators or opportunities for new intermediaries to negotiate agreements with multiple operators in multiple regions to ensure high coverage, providing a 'one-stop shop' for 5G connectivity
  - Who will support the necessary network investment for a generalized 5G coverage? Co-investment or risk sharing between telecommunications and selected vertical industries?

### Case study: automotive

- Communications services can improve the driving experience, improve traffic flow and general road safety and obtain vehicle performance information and help with maintenance.
  - navigation, information and entertainment services
  - autonomous vehicle coordination / traffic management and accident prevention
  - roadside assistance, remote diagnostics, insurance and services in payment for use.
- Point-to-point communications between vehicles or generalized communications (Cellular Vehicle-to-Everything, C-V2X)
  - Short to medium-range communications between vehicles may be insufficient, vehicles may also need to communicate with the infrastructure to receive and send information to traffic lights or traffic control centers; and to other road users, such as pedestrians or cyclists, etc. It may also be necessary to exchange information with a server for processing.

## Case study: automotive

Cellular-Vehicle-to-Everything (C-V2X) provides a solution for V2V, V2I and V2P integrated in operation with V2N taking advantage of the existing cellular network infrastructure. The excellent performance of the 5G (low latency and greater reliability) will allow vehicles to share data in real time, supporting fully autonomous driving experiences.

Picture from Qualcomm <http://www.ieeevtc.org/conf-admin/vtc2016fall/21.pdf>



## **Other study conclusions**

- There is a role for private deployments of 5G within spaces such as factories or warehouses. New licensing models might be appropriate for private networks.
- Small cells are needed to achieve the high data rates promised by 5G and mmWave bands. Small cells put power into the hands of site owners who could think of restrictive or exclusive access arrangements to increase revenue. Governments should seek to increase the supply of sites.
- 5G also likely to lead to more infrastructure sharing, due to the use of small cells.

## BEREC Report Enabling the Internet of Things (February 2016) & BEREC Workshop on IoT (February 2017)

- Regulatory framework
- Scarce resources (spectrum & numbering)
- Competition aspects: vertical integration, barriers to switching providers
- Roaming
- Consumer protection
- Privacy & Security

- Numbering resources are planned by the Spanish Government and managed by CNMC
  - Telephone numbers (Rec. E.164 from ITU)
  - SIM card numbering resources (Rec. E.212 from ITU)
  - Limited availability
  - National use and extra-territorial use.
- Global numbering resources managed by ITU
- Switching connectivity provider
  - Numbering allocation for new players
  - “Over the Air” re-provisioning of SIM cards

- Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access <https://eur-lex.europa.eu/eli/reg/2015/2120/oj>: *“Providers [...] shall be free to offer services other than internet access services which are optimised for specific content, applications or services, or a combination thereof [...]”*
- The regulation is not against the optimization that network slices allow: the technological neutrality of the Regulation allows 5G to be developed, and there is no a priori prohibition of any ingredient of 5G technology.
- The key issue is whether the services and applications comply with the conditions and rules for Internet access services and specialized services, as appropriate, of the Regulation. It is these conditions and rules that determine the room for operators and suppliers and applications (including those of the "verticals") in the use of 5G technology.

1. The 5G is ideally suited to offer vertical solutions optimized for every sector need.
2. Innovative vertical solutions will benefit from the high performance of 5G, but initially without the widespread coverage achieved with 4G.
3. The regulation of access to scarce resources and net neutrality are part of the context in which vertical solutions can be configured.





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***Thank you!***