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## Challenges for next generation mobile networks

Wolfgang Kopf of Deutsche Telekom examines the impact of next generation mobile networks on European telecoms markets



### **Wolfgang Kopf**

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# CHALLENGES FOR NEXT GENERATION MOBILE NETWORKS

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## Introduction

The European mobile communications market is in great transformation. Looking back only a few years ago, it would not have been deemed possible to receive important information such as real-time stock exchange data, traffic information and optimised order processes while being mobile. This situation has become reality and many cannot imagine a life without high-speed mobile data communication. Mobile networks are considered to be a key driver for economic growth and technological advancement. Unsurprisingly, high-speed mobile networks and innovative services have caught significant political attention and attraction.

One of the key goals of the “Digital Agenda for Europe,” which the European Commission adopted in 2010, is the increase of penetration of fast and ultra-fast internet access “with internet speeds gradually increasing up to 30 Mbps and above.”<sup>1</sup> The commission emphasises that it is of great importance to guarantee universal broadband coverage in which “wireless networks can play a key role to ensure coverage of all areas.” However, the rapid growth of mobile broadband uptake comes with several risks. Mobile networks are becoming congested, largely due to the dramatic increase of data traffic and the “inefficient use of radio spectrum” in terms of its current allocation.<sup>2</sup> With increasing market needs for seamless nationwide mobile broadband services, more low-frequency spectrum is necessary to ensure a swift and cost efficient roll-out of high-quality networks and to fully satisfy the growing needs of private and business consumers.

In order to cope with the traffic increase of up to 100 percent per year<sup>3</sup>, and to be able to offer consumers the quality and usage comfort corresponding to their different needs, network

providers need to be able to manage the traffic accordingly. They need to apply different priorities and allow Quality of Service (QoS) or guaranteed service-level criteria in relation to the respective services and thus business models. Only in an environment where the operation of high-quality and high-speed Next Generation Mobile Networks (NGN) is profitable for the whole set of different services, can the key goals of universal high-speed broadband access be fulfilled.

## More innovative services – the necessity of more spectrum for mobile services

The introduction of next generation mobile networks, the Long Term Evolution (LTE) technology; offers a variety of new opportunities and services to consumers. LTE will contribute to coping with the challenges of fast-growing mobile data traffic. Numerous innovative app-based services will help to improve the connection to home while travelling, will enable decentralised work, and help to achieve a better work life balance. At the same time, new areas of eServices such as eHealth, eEnergy or eMobility will foster the development of a fully connected life and work environment. The significant increase of the importance of mobile networks will contribute to economic growth. However, in order to seize these opportunities for society and to profit from economic growth, regulatory changes and political work are needed.

The European institutions have recognised the positive impact of modern mobile broadband services at an early stage and initiated the right regulatory spectrum decisions.<sup>4</sup> In particular, the decision to make more spectrum available for mobile broadband in a harmonised way all over Europe deserves attention. However, it is important not to rest on this success, but to further continue on this path.

## Countrywide services – the need to exploit the Digital Dividend

Long before the World Radio Conference 2007 (WRC-07), the European Commission, unlike most of the EU member states, supported the proposal that part of the terrestrial broadcasting spectrum be vacated in order to bridge the “digital divide” in Europe. Many European citizens are living in remote or rural areas where no broadband services are available. These “broadband gaps” or “white spots” cannot be closed quickly by fixed networks in an economically feasible manner. This is different for mobile networks, provided that sufficient suitable spectrum is available. As for this, spectrum below 1,000 MHz offers adequate physical propagation conditions to cover large areas cost-efficiently.

WRC-07 allocated the upper part of the UHF broadcasting band (790-862 MHz) to mobile services. Furthermore, after WRC-07, the commission proposed a harmonised availability of this band all over Europe from 1 January 2013 onwards.<sup>5</sup> It is expected that this objective will be supported by European Parliament and Council in the Radio Spectrum Policy Programme (RSPP), due to be adopted by end of 2011 under the Polish Presidency. However, today’s availability of 72 MHz of Digital Dividend spectrum will not be sufficient to accommodate the increased data traffic from 2020 onwards, or even earlier if data traffic will increase quicker than currently estimated.

Large parts of the lower bands are currently used by broadcasting.<sup>6</sup> European institutions and member states need to initiate a broad political discussion on the merits of an ongoing digital switchover, in an ever-growing mobile data world, and determine whether it is necessary to vacate more broadcasting spectrum for further allocation to mobile broadband. The ambitious European mobile broadband goals can only be achieved with a “second digital dividend.” This would also not harm broadcasters’ interests. Television broadcasters have several ways of transmitting their services (i.e. cable TV, satellite TV, IPTV), whereas mobile communication solely relies on spectrum. The fact that nationwide transmission for broadcasting via terrestrial networks is much more expensive than other distribution channels shows that spectrum currently may not be used efficiently.

## The need to increase capacity

Services enabled by high-speed broadband have already contributed significantly to growth in European GDP, despite the recent economic downturn, and will continue to play a key role in economic development.<sup>7</sup> These developments

are put at risk if mobile service networks were not able to accommodate data traffic growth due to limited spectrum resources. The increasing demand – which is worth 660 billion euros (EU-25) and growing<sup>8</sup> – will inevitably lead to more spectrum needs for mobile broadband to ensure a full functioning of high-speed and quality networks for consumers. The World Radio Conference of 2015/16 should take the necessary decision to allow the EU the release of a second digital dividend for mobile operators harmonised with other parts of the world.

The EU may even go a step further. In the framework of the RSPP, some members of the European Parliament even consider making 1,200 MHz of spectrum available in order to accommodate mobile data traffic.<sup>9</sup> The fourth mobile generation LTE performs best if at least 2x20 MHz per operator can be assigned. Therefore “mainstream bands” are needed in a harmonised fashion all over Europe to avoid a high number of fragmented “niche market” bands. Fragmented bands are difficult to be accommodated in mobile handsets and hence would not be supported by global manufacturers. However, it is likely that the challenge of rapidly growing

mobile data traffic cannot be overcome by more spectrum alone. New spectrum, changes to more efficient technologies (e.g. LTE), traffic “offloading” by WLAN, and “home base stations” etc., network optimisation and network sharing will have to be combined to further ensure the important development of mobile networks and services in future.

The cost of spectrum is also a major factor in the roll-out decision making and network planning. The scarcity of spectrum should certainly not be artificially increased by auction designs or by reserving specific bands for new entrants. Increased costs for spectrum acquisition will decrease the ability of the investing operators to roll out new networks and hence slow down the availability of modern, innovative mobile broadband networks. In order to ensure further investments in network infrastructure, including increases in scope and capacity, regulators have to ensure an investment-friendly environment to allow operators to reach profitability with next generation mobile networks.

## Sustainable investments in next generation mobile networks

While the efficient allocation of frequencies plays a crucial role in shaping the future of the NGN environment, it has to be borne in mind that two-sided business models exist for network operators, with both the end users as well as content providers. Both sides have so far benefited from investments in high-quality networks, resulting in enormous traffic increases.

**Spectrum availability and the approach to net neutrality will be the acid test for the mobile industry**

According to internal studies, three percent of mobile customers currently generate 53 percent of the mobile network traffic, thereby significantly affecting other users.<sup>10</sup> This implies a cross-subsidisation from the average to the heavy users, which clearly does not reflect the goals of efficient network management and fair prices for all users.

At present, network operators alone are shouldering the financial burden of network upgrades. These costs cannot, at present, be attributed among market participants according to a cost-benefit logic. On the other hand, the economic equivalence principle requires that all parties that benefit from needed investment in NGN pay their share of the costs, thus involving not only end-users, but content providers.

For that reason, a sound regulatory policy should provide legal certainty and clear leeway – a kind of safe harbour, enabling a necessary degree of network management which provides for the possibility of quality of service levels at different charges, as long as there is no exclusivity in service contracts.<sup>11</sup>

Furthermore, the EU Digital Agenda stipulates clear political goals that may only be achieved if they correspond to the companies' commercial interests. Recently, the European Commission's Digital Scoreboard noted disappointing progress, particularly regarding the roll-out of new, super-fast broadband networks.<sup>12</sup> Therefore, market players must have the tools for implementing sound business models. It has to be clarified how to bring in line the imbalance between the rising traffic volumes and the performance-pressure on the one hand, and price levels in the retail business and the policy pressure to freeze the current model on the other.

One suitable tool is the possibility of data prioritisation in the framework of adequate net neutrality concepts. The purpose of any implemented measure would be primarily to secure a reliable network connection in the case of congestion, and secondly to incentivise the necessary investment in network upgrades.

QoS measures in no way affect freedom of expression, cultural diversity or media pluralism. Contrary to an understanding of net neutrality where all data packets should be treated equally, irrespective of their content, source and destination, net neutrality must encompass a right of product differentiation. Different charges for QoS should be allowed as long as there is no exclusivity in service contracts in accordance with established competition law.

New, better and differentiated products, as well as efficient allocation of the resources must be the very essence of every electronic communications regulatory and competition policy. Knowing that customers' preferences are highly heterogeneous, QoS-differentiation and traffic management undoubtedly support these goals. In order to achieve this, network operators

must be able to offer a variety of services, which includes the means to differentiate one service from another.<sup>13</sup> For example, a customer would likely rather have his voice or web-browsing services be prioritised than a long download which negatively affects the performance of the former two services.

Most national legislations contain no explicit statutory prohibition of Quality of Service, such as data prioritisation.<sup>14</sup> The EU legal framework addresses the issue by providing for transparency and the right of consumers to be informed about the minimum service quality levels offered and procedures that could affect service quality. Moreover, it is in network operators' interest to introduce specified, standardised quality access on top of best-effort internet access. It may well be assumed that for the reason of standardised interconnection, all network carriers have the incentives and interest to negotiate and agree voluntarily on various QoS classes. In a market with strong competition, no operator has an incentive to arbitrarily block certain packages.<sup>15</sup> The principle of non-discrimination must be safeguarded, and Deutsche Telekom is very committed to this goal.

At this stage, it is inappropriate to propose regulatory measures in advance, without knowing how markets respond to a future scenario. The result of such a policy would risk deterioration of investments and innovative business models. The established principles of EU competition law, particularly Article 101 and 102 TFEU, offer a clear legal framework to any behaviour related to traffic management that may restrict or distort competition.

Any regulatory remedy imposing minimal quality standards inevitably implies restrictions of the network providers' core responsibility, the management of networks. Deutsche Telekom is committed to a continued development of the "best effort" internet. The quality of "best-effort" IP traffic delivery is an important differentiator between competitors in national markets. This competition is the best safeguard for European citizens' net freedoms, and should not be interfered with in absence of a market failure. Quality classes should be standardised at the international level on top of the best-effort internet.

Finally, adopting net neutrality laws similar to the one adopted very recently in the Netherlands would negatively influence the mobile internet for a large group of consumers, and prevent the emergence of innovative services. This will by no means contribute to the achievement of the ambitious political goal of a large coverage of high-speed broadband. It is thus of key importance to offer network operators the possibility to engage in normal market behaviour, including the conclusion of service agreements with various partners and customers in order to best serve their individual needs, and to ensure that business models will remain profitable in the long run.

**Final remarks**

Over the past years, significant changes have taken place with regard to regulatory intervention in (next generation) mobile networks, which greatly affect their success. Despite difficult times for all businesses in economic downturns, the mobile industry continues to invest in new network infrastructure and services. Enabling high-quality and innovative services helps to significantly boost the fragile European economy, which undoubtedly will help it to recover from the economic crisis. However, mobile broadband as a driving force for growth can only be assumed when sufficient funds are available for long-term investments. The mandated movement towards pure Long Run Incremental Cost approaches for access regulation (e.g. fixed and mobile termination rates) have restricted and will further significantly reduce the investment incentives of the industry. In the past, it has been a major mistake to deprive the European mobile industry of billions of euros by fierce termination rate cuts, which are now no longer available for investments.

A similar issue becomes apparent in relation to the Roaming III Regulation,<sup>16</sup> which the European Commission recently proposed. Applying further reduced retail price caps and at the same time requiring billion-euro investments into access and unbundling solutions, as foreseen by the commission's proposals, will by no means contribute towards achieving

the challenging goals of the Digital Agenda, which require significant investments in both mobile and fixed networks. Applying diligent and well-balanced regulatory measures that take into account dynamic market developments is the key to overall success that is of equal benefit to both consumers and the industry. Deutsche Telekom has introduced worry-free data-roaming packages with "Travel and Surf"<sup>17</sup> including the first Europe-wide data flat, giving customers full transparency of what they are using at attractive prices. Data usage of those customers has significantly increased and attracted new customers to use data roaming abroad – customers who would have switched off their smartphones in the past.

The future of next generation mobile networks is in the hands of operators, politicians and regulators – each playing their respective part. The industry is committed to enable growth and contribute with significant investment to allow Europe a competitive position in the global market – policymakers and regulators should contribute to this. Spectrum availability and the approach to net neutrality will be the acid test for the mobile industry. ■

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**Footnotes**

- 1 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, "A Digital Agenda for Europe," COM(2010) 245 final/2, 26.08.2010.
- 2 Ibid, p. 19.
- 3 Europe in a Zettabyte World – Cisco's Visual Networking Index IP Traffic Forecast, 2010-2015, July 2011.; Commission, 'Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions' COM(2011) 222 final, 3.
- 4 For instance, see COM(2007) 700 final: Reaping the full benefits of the digital dividend in Europe: A common approach to the use of the spectrum released by the digital switchover; Recommendation 2009/848/EC: 'Facilitating the release of the digital dividend in the European Union.'; Communication COM(2009) 586/2 on 'Transforming the digital dividend into social benefits and economic growth.'; Decision No 2010/267/EU: Harmonised technical conditions for the 800 MHz band.
- 5 COM(2010) 471 final: Proposal for a decision of the European Parliament and of the Council establishing the first radio spectrum policy programme, Brussels, 20.9.2010.
- 6 E.g. the band 470-790 MHz.
- 7 The impact of the crisis was less significant in the telecommunication sector. In 2008/2009 the telecommunication revenues as a percentage of GDP slightly increased (OECD Communications Outlook 2011, p. 98/99).
- 8 BITKOME/ITO World Report on ICT Markets (2011) p. 20.
- 9 Interinstitutional File 2010/0252 (COD): Proposal for a Decision of the European Parliament and of the Council establishing the

- first radio spectrum policy programme - Outcome of the European Parliament's first reading (Strasbourg, 9 to 12 May 2011), see amendment 38.
- 10 See [http://ec.europa.eu/information\\_society/policy/ecom/doc/library/public\\_consult/net\\_neutrality/comments/01operators\\_isps/dtag.pdf](http://ec.europa.eu/information_society/policy/ecom/doc/library/public_consult/net_neutrality/comments/01operators_isps/dtag.pdf), p. 5.
- 11 Within the CEO roundtable initiated by Commissioner Kroes the industry agreed on key principles for a sound regulatory policy, see [http://ec.europa.eu/information\\_society/newsroom/cf/itemlongdetail.cfm?item\\_id=7211](http://ec.europa.eu/information_society/newsroom/cf/itemlongdetail.cfm?item_id=7211).
- 12 Commission, 'Digital Agenda: Scoreboard shows progress' Press Release from 31.05.2011, IP/11/663.
- 13 For further information from external stakeholders, see "Netzneutralität – Innovation und Differenzierung keine Antipoden," Deutsche Bank Research, 25.08.2011.
- 14 C.Koenig/E.Visbeck, 'Verursachungsgerechte Internalisierung der negativen "Google-Effekte"' (Deutscher Bundestag, Drs. 17(9)471) 2; See also Commissioner Kroes' statement in E-005159/2011 regarding charges for specific internet services.
- 15 For example, see the industry statement "Delivering openness, innovation and choice for consumers - A European approach to the open Internet", available at [http://www.cableeurope.eu/uploads/Publications/documents/4930\\_Industry%20Joint%20Statement%20on%20Delivering%20Openness%20Innovation%20and%20choice%20for%20consumers.pdf](http://www.cableeurope.eu/uploads/Publications/documents/4930_Industry%20Joint%20Statement%20on%20Delivering%20Openness%20Innovation%20and%20choice%20for%20consumers.pdf).
- 16 Proposal for a Regulation of the European Parliament and of the on roaming on public mobile communications networks within the Union, COM(2011) 402 final , 2011/0187 (COD), 06.07.2011.
- 17 See <http://www.telekom.com/dtag/cms/content/dt/en/1048350> for more details.