

“Democracy Catching up with Technology”

Deploying an open innovation platform for Greece: 5G

5G is a very challenging topic to address in a short speech these days and that is primarily because some of the things that we have heard about 5G or read about 5G so far **still** miss critical points about how this technology is positioned on our journey towards the future.

5G is a mobile technology that, in a way, it is less about our mobile phone and more about everything that surrounds our mobile phone.

5G is a paradigm shift on how we plan and how we deploy radio networks. It's about re-thinking our infrastructures. It's about prioritizing quality in planning and deploying infrastructure.

5G is more spectrally efficient than 4G over a given frequency band, but it is more efficient in 'just' an evolutionary way - After all, it's been a decade since 4G/LTE was commercially launched.

To improve data throughput, we pushed larger and more diverse types of radio spectrum into 5G specification. That is something that we could do for 4G as well, but 5G goals are above and beyond shortening our 4K video download times.

5G is about trying to solve problems like getting people in need to the hospital faster. On heart attack cases, getting to the hospital after 180 minutes mean that our heart muscles have already suffered irreversible damage due to lack of blood supply.

When at the hospital 5G technologies can be used to make sure that medical devices work properly/as they should.

5G is more about addressing health and safety problems than it is about getting our smartphone faster, yet 5G deployments around the world face skepticism and concerns over 5G radio 'health' issues when 5G Small Cell and Beam Steering technologies can actually help us live in safer 'radio' environments.

These are legitimate concerns by all means, but unfortunately amplified by lots of uninformed, partly informed or simply careless public speaking on what 5G actually is while sadly apply equally on anything '5G', even on the 600MHz and 700MHz spectrum bands we have spent the better part of last century with - through analog TV-.

The agenda on EMF Health concerns can easily spread from strictly scientific matters, for example addressing the 'non-thermal effect' academia controversy, or re-identifying volumetric (Specific Absorption Rate - SAR) and planar energy (Power Density) measurement standards for the massive MIMO age, to down-right philosophical ones that have to do with our collective decision to live in technology driven societies and to what extend asking for a 16th century radio environment is a legitimate goal to go after.

On 5G as with any new technology to be introduced at scale we need to stay practical and staying practical on 5G EMF means first of all understanding the components of public EMF concern.

What we believe 'wrong' with antenna deployment really?

To its very core, I believe is the fact that non-users of a radio link are exposed, at any given time, to EMF for someone else's convenience (that is for someone else's using of the radio link). Regardless of whether or not this is a limited or zero-risk exposure, it makes people feel uncomfortable about it.

This mostly reflects on our current experience of radio planning and antenna deployment strategies of past generation wireless/cellular/mobile networks. 15-50m high masts carrying base station antennas power enough go through buildings, some sensitive, like schools, in order to reach a receiver, almost at ground level, 300m away.

As previously said, 5G calls for a paradigm shift in planning and deploying next generation networks.

What if we deploy hyper-dense 5G networks with small cell antennas having their radiation lobes along street plane alone, making all non-public space effectively a zero EMF zone? Lowering instead of increasing the maximum radiated power from 5G's Radio Access Network equipment.

What if we further utilize MIMO beam steering techniques to make sure that, even for the ones moving along a street, EMF emissions will be directional towards the actual radio link user and not uniform to anyone in the vicinity of?

5G is more about everything that surrounds our mobile phone. It's about our business and our business is around network continuity and low latencies rather than bulk data transfers.

If we believe connected cars will revolutionize transportation, we are most probably right. Connected cars **will** revolutionize transportation not because they will stream movies on their back seats, but because they will manage to get uninterrupted connectivity on each turn of their road and predictable latencies throughout their routes. Getting street mapping, and traffic information along with geolocation data.

All that is again subject to properly planning and deploying 5G vehicle-to-vehicle (V2V) and Vehicle-to-Infrastructure (V2I) communications - Once more subject to infrastructure quality.

5G is an accelerator of innovation. In the same way as artificial intelligence/robotics, big data, high performance computing and semiconductors are. 5G has the ability to give business a strategic competitive edge.

If we believe that the fourth industrial revolution will ultimately change how we build things today, we are most probably right. Industry 4.0 **will** change how we build things because 5G will enable 'fiber-like' throughput on data-intensive machinery –like high-end robots– enabling them to move unrestrictedly along the production floor (and beyond), flexibly adding work-force when and where is needed.

If we believe that Artificial Intelligence will revolutionize practically everything, we are most probably right. Maybe our current deep learning and AI won't be able to deliver Artificial General Intelligence (AGI) – maybe next year's crop will –, but **it will** allow us insight on extremely multi-dimensional datasets, that we now perceive as chaotic, like how we handle street traffic (per car) or how we prevent food waste (along the food supply chain) or energy consumption - in our cities.

5G can serve as the (needed) link that makes sure all this diverse, truncated and spatially distributed data will be collected and timely routed to our AI of choice.

In terms of consumer use, 5G **will** be used for reducing the digital divide, closing the gap between rural and semi-rural areas that currently lack ultrafast coverage, and urban areas. User demand for mobile connectivity, and so mobile data traffic, continues to increase steadily, which in turn requires ongoing upgrades in network capacity in the most populated areas.

Between now and 2025, a smartphone user's mobile data consumption is forecast to increase by an average 28% a year in Western Europe, and by an average 25% a year worldwide (Ericsson, Mobility Report 2020). Upgrading mobile networks will help to ensure they remain robust, and capable of addressing the growing demand.

Investments made in 5G will not be at the expense of improved fibre and 4G coverage in more sparsely populated areas. 5G rollouts do not clash with fibre. On the contrary, 5G fixed wireless access (FWA) will give operators the ability to rapidly bring ultrafast access services to those areas that are the hardest to cover with FTTH, while waiting for the wireline network to be deployed. Accelerating the vision of the 'Gigabit Societies'.

5G also creates an opportunity to rethink the energy consumption of mobile networks.

With past generations of mobile networks, increasing performance, especially in terms of speed and latency, was synonymous with increased energy consumption for the network. A number of innovations make 5G more energy efficient. Improvements include the ability to put base stations automatically to sleep, and using artificial intelligence to optimise network management in real time based on traffic. For the same amount of traffic, 5G will therefore consume less energy than 4G currently does, which will have a considerable positive environmental impact given the expected ongoing increase in demand for mobile connectivity.

As has been the case with 4G, the transition to 5G will be gradual. Network equipment and consumer devices will be replaced at the usual pace, in other words when old equipment comes to the natural end of its lifecycle, which will limit the amount of electronic waste produced, particularly as consumers are increasingly sensitive on environmental matters.

This of course is not specific to 5G and it is reflected in the increasingly slower rate at which consumers are replacing their old smartphones, which in Europe went from 18 months in 2013 to more than 26

months in 2018. Another growing trend is consumers' interest in second hand electronics. These are trends that 5G is not likely to stop.

An important point to keep: 5G adoption will not 'force-push' a mobile device replacement cycle of global proportions, it will most certainly align with current market trends.

However, the expected ongoing increase in global traffic will also mean an increase in global energy consumption. Governments and industries have to work on the development of ambitious carbon reduction policies.

In addition to the collective efforts to decrease the networks' and their operations' carbon footprint, new mobile applications and solutions are also reshaping how business is conducted and its overall environmental impact. A study conducted by GSMA and the Carbon Trust, which was presented at the UN Climate Change Conference (COP25) in December 2019, concluded that the use of mobile technology helped reduce global greenhouse gas emissions by around 2,135 millions tonnes of CO2 in 2018, a savings equal to almost ten times the mobile industry's total carbon footprint worldwide. This conclusion is based on the significant reduction in energy and petrol consumption resulting from the use of mobile technologies. In 2018, the use of Machine-to-Machine technology and the Internet of Things led to a reduction of 1.44 billion MWh of power and of 521 billion litres of petrol worldwide. By paving the way for innovative remote solutions, 5G is expected to further increase these positive externalities.

My speech on 5G could last for hours, but I have to respect the time limitations of the agenda today. **I know I said that quite a few times, but I believe that how we plan and deploy 5G networks matters the most.** Thank you warmly for the kind invitation to participate to this panel. I am looking forward to the very interesting debate that will follow.