



Commissioner Carlos Moedas

Bilateral with , Qualcomm &
 Qualcomm

World Economic Forum, Davos

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Key messages

- Encourage Qualcomm to make use of the opportunities offered by the Digital Single Market and to push for the removal of cumbersome market barriers;
- Emphasise the importance for companies in the Internet of Things (IoT) area to form IoT ecosystems where the members coevolve for improving products and services for the customers, and where smaller and bigger players “survive” together in an open environment without being dominated by large companies;
- Suggest the development of a set of principles and standards in relation of security, liability, privacy and data protection that could result in industrial certificates – e.g. a Trusted IoT label.

1. STEERING BRIEF

1.1 Scene setter

You received a request for a meeting from Qualcomm’s [REDACTED], and [REDACTED].

Research and innovation lies at the heart of Qualcomm’s history and business model. Our innovation lies behind virtually all the smartphones and tablets that European consumers and businesses have been embracing in their everyday activities. Their goal moving forward is to bring connectivity to even more aspects of people’s lives, connecting automotive, energy, healthcare, and many more to empower new opportunities for citizens and businesses in Europe and throughout the world.

A considerable part of Qualcomm's technology development in innovative areas, such as connected cars, occurs at our European facilities, and they are constantly looking for opportunities to invest in, and work in partnership with, innovative European companies, universities, and start-ups. Europe is also a key market in the development of leading solutions that connect digital government services such as healthcare, where mobile connectivity can drive significant efficiencies. Qualcomm therefore thinks that it is particularly critical that European policies build on the successes achieved so far and encourage large and small companies to engage in R&D for technology solutions and for participation in standardisation, which provides a solid framework to create large economies of scale and market opportunities for successful inventions.

[REDACTED] and [REDACTED] are interested in discussing how they can support Europe’s research and growth priorities in the next five years.

1.2 Objectives

Encourage Qualcomm to take an active role in the building of the Digital Single Market by engaging in collaborations with key European industrial stakeholders (to become part of the "IoT ecosystem") and contributing in the discussions on the European policy framework, including the definition of a trusted IoT.

1.3 Line to Take

3 EU Priorities

- **Digital Single Market (DSM):** IoT will be one key element to enable the DSM through new products and services. New business models like 'Product-as-a-service' or 'shared-usage' will be based on smart connected devices and object. These technologies can be rolled out quickly and across the whole of Europe so as to reap economies of scale and productivity gains for our economies. **The EC encourages companies to really exploit the DSM and push for the removal of cumbersome market barriers.**
- **IoT Ecosystem:** IoT application cases can be very complex and include suppliers, lead producers, competitors, and other stakeholders who need to team up and cooperate seamlessly - even big players need to liaise with SME and innovative start-ups. The EC expects **companies in the IoT area to form IoT ecosystems where the members coevolve for improving products and services for the customers**, and where smaller and bigger players "survive" together in an open environment without being dominated by large companies.
- **Trusted IoT:** Security, liability, privacy and data protection are critical challenges for the IoT. The EC expects industry-led incentives guaranteeing a proper use of data and security to the users. A set of principles and standards could be developed and result in industrial certificates – e.g. a Trusted IoT label. The Trusted IoT label would correspond with compliance with a set of (security and) privacy principles like for example 'transparency', 'privacy by design', and 'data minimisation'.

The Internet of Things

- The Internet of Things (IoT) represents the next major disruptive economic and societal innovation. Any physical and virtual object can become connected to other objects and to the Internet, creating a fabric of connectivity between things and between humans and things. IoT will allow companies to change their traditional business models through new services and also combine the benefits of selling products with value-added digital services.
- Europe cannot afford to miss the IoT revolution, as it missed the smartphone revolution. The new Commission is committed to ensure that IoT can flourish vigorously in Europe through open platforms and joint standardisation efforts, as well as a supportive legal framework (ex: on liabilities, privacy, security and spectrum and roaming). The IoT will not only benefit from the Digital Single Market (DSM), but will be a major enabler for the DSM through new products and services.
- To foster European IoT innovation ecosystems, the Commission published recently a € 51 million call for IoT projects in the context of Horizon 2020. The initiative cuts

across several technological areas and targets in particular SME / IoT innovators for creating an open IoT environment.

- Through the work programme 2016-17, the Commission will support IoT Large Scale Pilots to foster the end-to-end value chain integration of Internet of Things, Big Data and Cloud approaches and technologies. The pilots include solutions in and between large vertical markets including healthcare, smart cities, and transportation. The initiative replies to one of the biggest challenges: to overcome the fragmentation of vertically oriented closed systems, architectures and application areas.
- IoT is a strategic topic in many regions of the world and the Commission has been active for several years in the international dialogue on important IoT aspects such as architectures, standards, security and privacy, and governance.

IoT and the 4th Industrial Revolution

- Emphasise the high relevance of the "Internet of Things" (IoT) for managing the 4th Industrial Revolution, which is crucial for the future of European industry and Europe's industrial renaissance. Physical devices and the virtual world will be linked to form Cyber-Physical Systems by way of a strong IT infrastructure, smart computer-based devices and advanced, flexible and resource efficient production processes. Europe needs to be one of the main actors in this digital revolution.
- Note that Horizon 2020 and associated initiatives address this challenge already. In order to fully exploit the potential of the 4th Industrial Revolution we need to go beyond mere technology development and have to address other elements crucial for innovation such as the right regulatory framework, the availability of appropriately skilled workforce and the awareness and acceptance of the public. The 4th Industrial Revolution actually goes beyond mere ICT aspects.
- Remind that a number of European countries have already launched activities to support the transformation to a smart industry in general and the development of the IoT in particular. These efforts should be coordinated and linked to the relevant European initiatives, such as the Digital Single Market.

2. BACKGROUND INFORMATION

2.1 The Internet of Things

The Internet of Things (IoT) is the next step of disruptive innovation and Europe cannot afford to miss it, like it missed the smartphone revolution. The new Commission is committed to ensure that such a promising development can flourish vigorously in Europe and that we can all take full advantage of its potential (cf. Mission Letter of J.C. Juncker to G. Oettinger).

According to Gartner nearly five billion things will be connected by 2015, reaching 25 billion by 2020. IDC estimates the IoT marketplace being worth over \$7 trillion by 2020.

IoT offers tremendous opportunities for Europe in terms of solving global societal challenges like industrial renaissance, reducing pollution, resource shortage, aging societies by providing more accurate information, efficient automated communication and by enabling alternative and more sustainable business models.

Most importantly, Europe's (and Germany's) industrial strengths on agile and high-quality production can be maintained and extended through new innovative products and services, reflecting in the same time important European values such as sustainability, trust and social inclusion.

There is a need for the Commission to reach out to Member States and make sure that a common vision and strategy emerges in the very near future, to avoid fragmentation between national economies, and to make sure that we can reap the benefits of the Digital Single Market in the IoT area too. The German initiative Industrie 4.0 could be mobilised to that effect as it goes much beyond Factories of the Future and touches upon the Connected Economy at large.

Fostering Europe...

In order to foster European **IoT innovation ecosystems** the Commission published recently a € 51 million call for projects (code ICT30) in the scope of Horizon 2020. The objective is to build stronger relationships between industry, innovators and research actors. The initiative cuts across several LEIT-ICT technological areas (smart systems integration, cyber-physical systems, smart networks, big data) and brings together different generic ICT technologies and their stakeholder constituencies to develop technological platforms which will have a strong influence on the way in which we live and work. This call for projects targets in particular SME and IoT innovators and developers fostering the creating of an open IoT environment.

To complement this funding initiative, and in order to i) overcome the fragmentation of vertically oriented closed systems, architectures and application areas in the field of IoT, but as well to ii) move towards open systems and platforms that support multiple applications, the Commission integrated in the draft Work Programme 2016-17 the support of **IoT Large Scale Pilots (LSP)**. In addition, IoT will be a Focus Area (FA), centred on LEIT-ICT and complemented with Societal Challenges (SC) activities together with other DGs (RTD, AGRI, MOVE, ENER,...).

LSP would provide application scenarios (cities, communes, rural areas) in order to co-develop and validate IoT approaches. The main objective is to enable the deployment of IoT solutions and services in the economy and society at large, by testing technology feasibility, user acceptance and relevance of business models, while preparing future IoT developments through research support.

Examples are IoT Large Scale Projects on Smart living environments, Smart Farming and Food Security, reference smart cities, environmental monitoring, etc. They shall exploit IoT innovation topics such as efficient and harmonised system architectures, security & privacy, semantic data exchange, while at the same time integrating the end-user, sectors, cities and regions.

The Commission has also set-up an internal coordination mechanism for linking the subject of the Internet of Things better to related areas of Privacy&Security, Internet governance, Digital Single European Market, Smart Cities, 5G and Big Data. The DG CONNECT Advisory Forum (CAF) set up a specific workgroup on the Internet of Things for providing a closer link with market actors. Regular exchange is taking place with Member States' Internet of Things initiatives.

Linking EU / MS initiatives on IoT– Industrie 4.0

Linking EU/MS initiatives on IoT is important in order to ensure complementarity of policies and where applicable a certain degree of convergence at this two levels of implementation.

Industrie 4.0 is an initiative in the high-tech strategy of the German government, which promotes the computerisation of traditional industries such as manufacturing. The goal is the intelligent factory (Smart Factory), which is characterized by adaptability, resource efficiency and ergonomics as well as the integration of customers and business partners in business and value processes. The basic principle of Industrie 4.0 is that by connecting machines, work pieces and systems, we are creating intelligent networks along the entire value chain that can control each other autonomously. The main technological basis is cyber-physical systems and the Internet of Things. Experts believe that Industry 4.0 or the fourth industrial revolution could be a reality in about 10 to 20 years. The Federal Ministry of Education and Research (BMBF) plans to spend up to 200 M€ for the initiative.

Present challenges are a lack of adequate skill-sets, the threat of redundancy of the corporate IT department, and a general reluctance of the stakeholders (in particular end-users) to change.

Standardisation

Why is IoT Standardisation important in this exercise? Standardization is one of the essential elements for successfully deploying the IoT technology into the marketplace. The innovative solutions (use cases) coming out from the IoT ecosystems and Large Scale Pilots can only be taken up by the market if interoperability across these use cases is ensured; important elements of the use cases (e.g. platforms, architectures, protocols etc.) need to be transformed into global/European standards. To this end, the EC has mandated ETSI (European Telecommunications Standards Institute) this year to draw a

roadmap of the existing IoT standards and prepare recommendations on priority standards that could be further validated through the LSP initiative. Results are expected by late summer 2015.

Integration of EC FIWARE/IoT activities

Stronger emphasis is now given to the integration of IoT components of FIWARE (FI-PPP) with the results from direct IoT research and innovation, supporting the development and deployment of common IoT platforms with generic and open enablers / open source components, in order to provide a platform for rapid Internet of Things take-up and support pre-normative activities. A further intention is to federate the innovation communities from FI-PPP phase 3 with the IoT innovation communities and makers.

RRI&SSH (Responsible Research & Innovation and Social Sciences and Humanity) research

Responsible Research and Innovation in the context of H2020 and IoT means that societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society.

In view of the radical changes brought on by the deployment of ICT in today's society, ICT challenge the very meaning of what is responsible research. It is suggested that the CONNECT RRI-SSH approach in H2020 WP16-17 would not only support SSH research for ICT R&D and all elements of RRI (open access, public engagement, gender equality, ethics, and science education), but would also explore new ways to achieve responsible research and innovation.

International cooperation

IoT is a strategic topic in many regions of the world and for this reason it is important for the EC to have a very good understanding of planned or on-going foreign IoT initiatives. The Commission has been active for several years in the international dialogue on important IoT aspects such as architectures, standards, security and privacy, and governance, in particular with Asian countries but the US is also an important partner. At present more emphasis is given on how to connect European IoT innovation to foreign marketplaces and to expand the exchange on IoT Large Scale Pilots.

2.2 ICT, the 4th Industrial Revolution and IoT

ICT and R&D&I

There are strong links between the digital world and research, development and innovation. Most innovative products, processes and services rely on Key Enabling Technologies and are intrinsically linked to IT systems. This applies to all life-cycle phases, be it development, production or use and implementation. The 4th industrial revolution will further entwine the physical with the virtual world and make the internet of things a reality.

Research and innovation play a major role in this respect. Europe fulfils the major prerequisites, that is, the research and innovation which are indispensable to capitalise on its advanced know-how, a strong industrial basis, a well-developed IT infrastructure and a skilled workforce. But Europe has to act quickly and be determined to succeed in the face of fierce global competition. In this respect, the cooperation between EU Member States and Associated Countries in Horizon 2020 provides mutual benefits for both sides.

The "digital economy" and the support for the transition to a "smart industry" are not new to European research and innovation. A number of activities have been and will be contributing to make the 4th Industrial Revolution happen, such as the public private partnerships (PPPs) on Factories of the Future (FoF), and on Sustainable Process Industries (SPIRE). These PPPs are well embedded in Horizon 2020.

Although R&D is key for the competitiveness of Europe's industry – and consequently for growth and jobs –, it is not sufficient to ensure innovation. We also need the right framework conditions, including a well-functioning "digital single market". If we want to establish a flexible, smart, highly efficient industrial system, benefitting where appropriate from cross-border value chains, we need to encourage investments in new online services and applications and in digital infrastructure. Furthermore, industry needs easy access to digital and online technologies and services and to secure (business to business) e-commerce.

That said, we should take a more holistic approach going beyond ICT aspects and including other dimensions crucial for innovation as well, such as a skilled (or re-skilled) workforce, and minimising environmental impacts and the reliance on resources (referred to as the "circular economy").

The 4th Industrial Revolution

Over the last three decades, the IT revolution has radically transformed our working and living environment. The rapid development of IT infrastructure, the evolution of PCs into smart devices, the miniaturisation and the linking of ubiquitous powerful and autonomous microcomputers in embedded systems with each other and with the Internet will link the physical and the virtual worlds together to form Cyber-Physical Systems (CPS).

This dramatic change, often referred to as '4th Industrial Revolution', offers huge potential for increasing flexibility, efficiency, resource productivity etc. in the production and service sector, but also in our everyday life. The manufacturing industry in highly industrialised countries is in danger if no action is taken, as devices become commodities and functional differentiation becomes more difficult.

The European 'Factories of the Future' Public-Private Partnership (FoF cPPP), which started in 2008 as part of the recovery package, supports EU manufacturing enterprises, in particular SMEs, to adapt to global competitive pressures by developing the necessary key enabling technologies across a broad range of sectors. The focus of the forthcoming years will be on the development of clean, highly performing, environmental friendly and socially sustainable high added value manufacturing technologies. It includes important elements of the '4th industrial revolution', for example the use of ICT and 'interconnectedness' to make manufacturing more flexible in terms of distributed supply chains, increase automation and enable small-lot manufacturing of customised products and solutions.

In addition to FoF, many other activities undertaken or planned by the Commission address the concepts behind the 4th Industrial Revolution: the SPIRE cPPP for sustainable process industries (DG RTD); the future KIC on Added Value Manufacturing (DG EAC); ICT for manufacturing (linked to the Internet of Things, DG CNECT); the Task Force on Clean Manufacturing, etc. – all support the desired transformation of the European manufacturing industry.

Policy framework

In the 2012 Communication on the Industrial Policy Update 'A Stronger European Industry for Growth and Economic Recovery', advanced manufacturing technologies that enable clean production are recognised as one of the six priorities areas for the new industrial revolution: 'Tomorrow's factories will use highly energy- and material-efficient processes, employ renewable and recycled materials, and increasingly adopt sustainable business models such as industrial symbiosis to recover materials and dissipated heat and energy.'

In the Communication 'For a European Industrial Renaissance' of January 2014 it is stated that a strong industry, supported also by advanced manufacturing, will be of key importance for Europe's economic recovery and competitiveness (see the Staff Working Document 'Advancing Manufacturing – Advancing Europe').

2.3 R&I on IoT and the 4th Industrial Revolution under FP7 and Horizon 2020

Europe's research and innovation programmes have been addressing these challenges for years, in particular by public private partnerships (PPP) such as '*Factories of the Future*' (FoF) and the PPP for *sustainable process industries* (SPIRE), which are jointly managed by DG RTD and DG CNECT (the latter one focussing on the ICT related parts). Many additional activities are undertaken or planned by the Commission relating to the 4th Industrial Revolution, e.g. the future KIC on Added Value Manufacturing (DG EAC); ICT for manufacturing (linked to IoT, DG CNECT); and the Task Force on Clean Manufacturing. All support the desired transformation of the European manufacturing industry.

Under FP7, € 70 million went directly to projects on IoT, indirect contributions are difficult to estimate as they are distributed across the programme.

To foster European IoT innovation ecosystems, a call of € 51 million for IoT projects was published under Horizon 2020. The initiative cuts across several technological areas and targets in particular SME / IoT innovators for creating an open IoT environment. Through the work programme 2016-17, the Commission will support IoT Large Scale Pilots to foster the end-to-end value chain integration of Internet of Things, Big Data and Cloud approaches and technologies. The pilots include solutions in and between large vertical markets including healthcare, smart cities, and transportation. The initiative, managed by DG CNECT, replies to one of the biggest challenges: to overcome the fragmentation of vertically oriented closed systems, architectures and application areas.

DG CNECT intends to increase its budget for the Calls 2016-17 on the Internet of Things to € 110 million (€ 17-20 million to go to Large Scale Pilots). They are considering putting forward a Focus Area on IoT in that programming period to work more closely with the Societal Challenges.

Furthermore, Horizon 2020 will continue to support the contractual PPPs linked to the 4th Industrial Revolution (see below) with an average annual budget of roughly € 160 million for FoF (out of which € 100 million are not directly ICT related) and € 130 million for SPIRE.

3. ANNEX

3.1 CVs

[REDACTED]

[REDACTED], Qualcomm Incorporated

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