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WHAT YOUNG INNOVATIVE COMPANIES WANT:
FORMULATING BOTTOM-UP PATENT POLICY FOR
THE INTERNET OF THINGS

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The potential anticompetitive consequences of standard essential patents have been identified by the European Commission as a key area of policy formulation for the Internet of Things. Throughout the process of policy formulation, the input of young innovative companies may require additional consideration as illustrated by the series of thirty-one in-depth interviews undertaken with key figures in young innovative companies (YICs) across Europe. The information gathered shows that the way the E.C. conceptualized the policy issues at stake is not wrong, but may be incomplete. While it is important to promote a better understanding of what the FRAND promise entails, young innovative companies showed a remarkable disconnect to the patent system as a whole. They not only lacked intellectual property awareness, but many also thought that the Internet of Things could be helped by open source software, rather than a standard essential patents regime. Against this background, this study strongly encouraged the European Commission to better integrate young innovative companies in the process of patent policy formulation. The fair, reasonable and non-discriminatory (FRAND) guideline the Commission issued at the end of November 2017,

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reflected the findings of this study by recognizing the need to raise FRAND awareness among YICs and SMEs (Small and Medium Sized Companies).

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I

THE NEW PARADIGMS OF THE INTERNET OF THINGS

The next wave of internet usage will disrupt a host of different industries, while at the same time opening up so far unknown opportunities to those ready to seize them. Devices and components with an internet address will be joined to each other allowing for large-scale communication embedded in gigantic sensing systems.¹ In this sense, the Internet of Things (IoT) can be understood as a means to connect objects, machines and humans in large-scale communication networks.² The IoT merges physical and virtual worlds by interconnecting people and objects through communication networks, sending status updates, and reporting on the surrounding environment. Applications will become more sophisticated, allowing for the emergence of services and product offerings that are beyond our imagination: IoT based toys will accompany children from early age until adulthood, IoT driven medical devices will save the lives of those suffering from a sudden stroke, and clothing with IoT technology built in will allow everything from our shirts to our shoes to

¹ See, e.g., Ian Hargreaves, *Digital Opportunity: A Review of Intellectual Property and Growth*, at 14-15 (2011) (U.K.), <https://www.gov.uk/government/publications/digital-opportunity-review-of-intellectual-property-and-growth>.

² See *The Internet of Things*, EUR. COMM'N (last visited Sept. 4, 2017) <https://ec.europa.eu/digital-single-market/en/policies/internet-things>.

customize according to daily fashion trends. Smart homes, smart cities, and even smart countries will become the norm; reducing energy wastage to a minimum. The commercial opportunities associated with the IoT will be substantial. Markets will expand into areas we have not even conceived of, thereby creating new jobs and fostering further competition between the various regions of the world.

Against this background, the European Union has recognized the need to identify a governance framework that will enable it to take advantage of the promising opportunities associated with the IoT, while mitigating risks and adverse effects to the best extent possible. An important aspect of a European IoT strategy consists of adequately addressing the interplay between competition and intellectual property law. Consequently, the European Commission itself considers it necessary to formulate policy guidelines on fair, reasonable, and non-discriminatory (FRAND) licensing. In order to accomplish this, the European Commission (E.C.) launched a series of stakeholder consultations, workshops and published two in-depth reports addressing the potentially anticompetitive effects that standard essential patents could have for the Internet of Things.³ With the goal of offering further clarity on the licensing conditions for patents that read on standards, the E.C. issued guidelines on FRAND licensing⁴ on the 29th of November 2017.⁵ While these guidelines are non-binding, the E.C. will nonetheless take advantage of soft law mechanisms

³ See Communication from the Commission – Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements, 2011 O. J. (C 11) 55; Chryssoula Pentheroudakis & Justus A. Baron, *Licensing Terms of Standard Essential Patents: A Comprehensive Analysis of Cases*, JRC SCIENCE FOR POLICY REP. (Nikolaus Thumm ed., 2017); Tim Pohlmann & Knut Blind, *Landscaping study on Standard Essential Patents*, IPLYTICS (2016), http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8981;

Pierre Régibeau, Raphaël De Coninck & Hans Zenger, *Transparency, Predictability, and Efficiency of SSO-based Standardization and SEP Licensing: A*

Report for the European Commission (2016) http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=9028&lang=en;

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, *Public Consultation on Patents and Standards - A Modern Framework for Standardisation Involving Intellectual Property Rights* (2015), http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=7833;

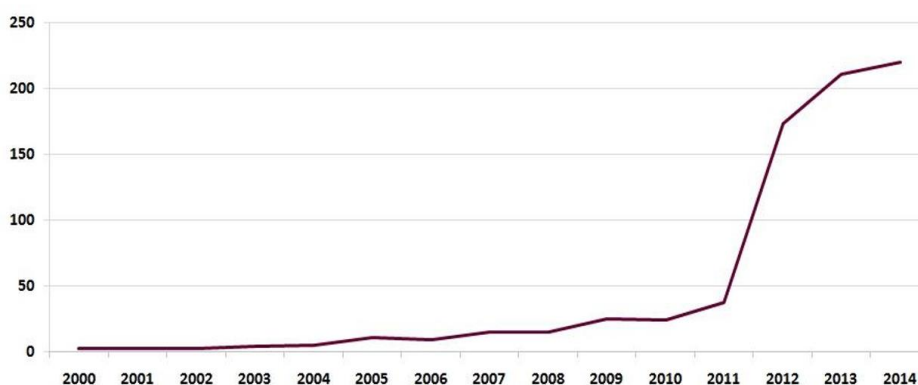
European Competitiveness and Sustainable Industrial Policy Consortium, *Patents and Standards: A Modern Framework for IPR-Based Standardization* (2014), <http://ec.europa.eu/DocsRoom/documents/4843/attachments/1/translations>.

⁴ *Setting Out the EU Approach to Standard Essential Patents*, EUROPEAN COMM'N, <https://ec.europa.eu/docsroom/documents/26583>.

⁵ Directorate-General for Internal Mkt., Indus., Entrepreneurship and SMEs, *Communication from the Commission on Standard Essential Patents for a European Digitalised Economy*, Ares(2017)1906931 (2017), https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-1906931_en.

so to offer a transparent framework for FRAND licensing. This appears justified given the major patent wars⁶ that the licensing of standard essential patents triggered in the telecommunications sector. For a quantitative analysis of the imminent rise in patent litigation in the area of speech recognition, an area closely related to IoT, see for example the below analysis by iRunway; showing a sharp increase in patent litigation since 2011.⁷

Figure 1: Patent Litigation Trend in Speech Recognition Domain



(Source: iRunway analysis based on patent data from USPTO and litigation data from RPX)

While it is laudable that the E.C. is taking ownership of a key policy area that will make or break the success of the IoT, it is regrettable that the process preceding policy formulation has been primarily driven by interaction with large corporations and industry associations having significant experience with FRAND licensing. The views, experiences and opinions of European young innovative companies, YICs, are largely missing from the policy development process. Given that young innovative companies are seeking to advance the IoT, the European Commission is hence likely to have missed out on input from those companies, who are doing their best to move the IoT forward. To fill this gap, this study undertook a series of thirty in-depth interviews with young innovative companies active in the European IoT space. In doing so, it hopes to counter policy formulation that lacks grass roots linkages and takes insufficient consideration of the needs of YICs. In doing so, this study is pleased to report

⁶ See, e.g., Lea Shaver, *Illuminating Innovation: From Patent Racing to Patent War*, 69 *WAS H. & LEE L. REV.* 1891, 1933 (2012); Thomas H. Chia, *Fighting the Smartphone Patent War with RAND-Encumbered Patents*, 27 *BERKELEY TECH. L. J.* 209, 210, 239-238 (2012); Jeff Hecht, *Winning the laser-patent war*, 12 *LAS ER FOCUS WORLD* 49, 49 (1994); Sonia Karakashian, *A Software Patent War: The Effects of Patent Trolls on Startup Companies, Innovation, and Entrepreneurship*, 11 *HAS TINGS BUS . L.J.* 119, 122 (2015); Tim Bradshaw, *Smartphone patent wars set to continue*, *FINANCIAL TIMES*, May 28, 2013, available at <https://www.ft.com/content/3eda6296-b711-11e2-a249-00144feabdc0>.

⁷ Aditi Das, Ashish Gupta, & Bhargav Ram, *Speech Recognition Technology & Patent Landscape*, *iRUNWAY*, (2015), at 26, available at <http://www.i-runway.com/images/pdf/iRunway-Speech-Recognition-Patent-Landscape.pdf>.

that the suggestions made hereby were reflected in the E.C. Guidelines on FRAND.⁸

The study is structured in two main parts. The first part is dedicated to discussing key features of the IoT from an IP and competition policy perspective. The second part presents the findings from the field study undertaken in the summer of 2016. It concludes by urging policy makers to include young innovative companies in the policy process as it finds that there is quite a significant gap between the theoretical conceptualisation of the topic and the practical experiences of YICs.

A. *Defining the Internet of Things*

Identifying a working definition for the Internet of Things is complicated by the fact that the IoT is an umbrella term encapsulating a variety of different technologies. The IoT has been described as “a concept that interconnects uniquely identifiable embedded computing devices, expected to offer Human-to-Machine (H2M) communication replacing the existing model of Machine-to-Machine communication.”⁹ It has also been labelled as “[I]nternet-enabled applications based on physical objects and the environment seamlessly integrating into the information network.”¹⁰ More narrowly, the OECD defined the IoT as “Machine to Machine communication (M2M)”¹¹ and the European Commission describes the IoT simply as something that “merges physical and virtual worlds... where objects and people are interconnected through communication networks and report about their status and/or the surrounding environment.”¹² All of these definitions are fairly vague and it is probably for that reason that they encapsulate the gist of the IoT so well. The IoT constitutes a high growth business opportunity as its application is vast and it bears the potential to transform virtually every sector of the economy. In current IoT markets, it is not yet clear what type of business models will succeed and who will emerge as a market leader. As such, the IoT space has been described as

⁸ *Setting Out the EU Approach to Standard Essential Patents*, *supra* note 4.

⁹ LexInnova, *The Internet of Things: Patent Landscape Analysis*, (Nov. 2014), available at <http://www.lex-innova.com/resources-reports/?id=33>.

¹⁰ William H. Dutton, *The Internet of Things*, (June 20, 2013), <https://dx.doi.org/10.2139/ssrn.2324902> (quoting William H. Dutton et al., *A Roadmap for Interdisciplinary Research on the Internet of Things: Social Sciences'*, addendum to *Internet of Things Special Interest Group, A Roadmap for Interdisciplinary Research on the Internet of Things*. London: Technology Strategy Board (January 5, 2013), <https://dx.doi.org/10.2139/ssrn.2234664>).

¹¹ Organisation for Economic Co-operation and Development [OECD], *Machine-to-Machine Communications: Connecting Billions of Devices* at 7, *OECD Digital Economy Papers*, No. 192 (Jan. 30, 2012), <http://dx.doi.org/10.1787/5k9gsh2gp043-en>.

¹² *The Internet of Things*, EUR. COMM'N, <https://ec.europa.eu/digital-single-market/en/policies/internet-things>.

being quite dispersed and driven to a large extent by small early stage companies.¹³

II

THE INTERNET OF THINGS IS EXPOSED TO NETWORK EFFECTS ...

The IoT is a network-based technology, which thrives on multilateral exchange. Similar to telecommunications networks, it constitutes an interconnected eco-system. Such systems can be associated with “network effects.” Network effects are “defined as a change in the benefit, or surplus, that an agent derives from a good when the number of other agents consuming the same kind of good changes.”¹⁴ The more the peculiar software solution of one firm becomes adopted, the more it will benefit this specific firm, making it more difficult for new entrants to see their technological solutions adopted in the market; even if they are of higher technological quality. Network effects enable large-scale access to an interoperable software solution, whose value thrives with additional adoption.¹⁵ The more the IoT solution is in use, the more it becomes known and even more additional users will be attracted to it. At the same time, existing users are less and less inclined to switch to another service provider.¹⁶ Some scholars consequently associate networks with “increasing returns” to “path dependence.”¹⁷ The initial success of one specific IoT solution is often owed to small, random events; yet once it establishes a strong position in the market, it will remain in use, even if better technological solutions are identified. This is because users cannot afford to switch, as they would have to give up the interconnectivity provided by the existing network. Thus the overall

¹³ See Raph Crouan, *Why are SMEs the single most important element in our Alliance for IoT today?*, EUR. COMM’N (Nov. 20, 2015), <https://ec.europa.eu/digital-single-market/en/blog/why-are-smes-single-most-important-element-our-alliance-iot-innovation-today>; *‘Internet of Things’ has huge potential for SMEs*, KNOWLEDGE TRANSFER IRELAND, <http://www.knowledgetransferireland.com/News/‘Internet-of-Things’-has-huge-potential-for-SMEs.html>; *The Business Drivers and Challenges of IOT for SMEs*, IOTUK, <https://iotuk.org.uk/the-business-drivers-and-challenges-of-iot-for-smes/>; The business drivers and challenges of IoT for SMEs. <https://iotuk.org.uk/the-business-drivers-and-challenges-of-iot-for-smes/>.

¹⁴ S.J. Liebowitz & Stephen E. Margolis, *Network Externalities (Effects)*, <https://www.utdallas.edu/~liebowit/palgrave/network.html>.

¹⁵ See Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8.2 J. ECON. PERSP. 93 (1994).

¹⁶ See Joseph Farrell & Paul Klemperer, *Coordination and Lock In: Competition with Switching Costs and Network Effects*, in 3 HANDBOOK OF INDUS. ORG. 1967 (Mark Armstrong & Robert H. Porter eds., 2007).

¹⁷ Pierson Paul, *Increasing Returns, Path Dependence, and the Study of Politics*, 94(2) AM. POL. SCI. REV. 251, 251-67 (2000); see also Kenneth J. Arrow, *Increasing Returns: Historiographic Issues and Path Dependence*, 7(2) EUR. J. OF THE ECON. THOUGHT 171, 171-80 (2000).

effect is to discourage technological innovations as incumbents entrench themselves through network size and technological compatibility rather than technological sophistication.¹⁸

Once critical mass is reached, usage of the service will grow quasi-automatically and this comes often to the detriment of other service offerings.¹⁹ Furthermore, critical mass allows incumbents to gain significant cost advantages over new entrants who undoubtedly will face significant upfront costs because IoT solutions are complex to design, costly to deliver to the market, and accessibility to the needed know-how is often protected through patents or trade secrets. In addition, incumbents will be in a position to offer complementary services, extensions, add-ons and customer support to further strengthen their dominance in the market, making it more difficult for new entrants. Hence, network effects can reasonably be understood as the “*tendency for that which is ahead to get further ahead, for that which loses advantage to lose further advantage.*”²⁰ Consequently, network effects can distort competition and adversely affect consumers.

III

WHICH CAN TRIGGER ANTICOMPETITIVE LICENSING BEHAVIOUR

Adverse implications of network effects can be even more pronounced if interoperability is achieved through standardization and market participants leverage patents to protect their inventions. Standards are dynamic, in the sense that their main function is to ensure a collaborative technology development. Standards do evolve over time. However, the status quo of a technological solution does exist for a given period of time, at least until a new standard is adopted by the market that addresses the same technological challenge.

Patent protections on these standards, particularly if held by a wide range of market participants, can incite anticompetitive behaviour. To mitigate the kind anticompetitive licensing behaviour that standard essential patents can trigger, the FRAND agreement was introduced. The “FRAND promise is construed according to its core function as an irrevocable waiver of extraordinary remedies” and hence seeks to counterbalance the exclusionary

¹⁸ See Vernon W. Ruttan, *Induced Innovation, Evolutionary Theory and Path Dependence: Source of Technical Change*, 107(444) THE ECON. J. 1520, 1520-29 (1997); Robert W. Rycroft & Don E. Kash, *Path Dependence in the Innovation of Complex Technologies*, 14(1) TECH. ANALYSIS & STRATEGIC MGMT. 21, 21-35 (2002); ARTHUR W. BRIAN, INCREASING RETURNS AND PATH DEPENDENCE IN THE ECONOMY, 46 (1994).

¹⁹ See Venkatesh Shankar & Barry L. Bayus, *Network Effects and Competition: An Empirical Analysis of the Home Video Game Industry*, 24(4) STRATEGIC MGMT. J. 375, 375-84 (2003).

²⁰ William B. Arthur, *Increasing Returns and the Two Worlds of Business*, 74(4) HARV. BUS. REV. 100, 100-09 (1996) (emphasis added).

aspects of patent law.²¹ Because of the FRAND or RAND (in the U.S.A.) commitment, companies are obliged to license patents on a standard on fair (Europe only), reasonable and non-discriminatory terms, following the IP policies of the relevant standard setting organizations. Hence, the FRAND concept seeks to offer a governance framework for the licensing of standard essential patents. Because these patents can accrue market power to their owner and hence potentially provoke anticompetitive licensing behaviour, it is believed that standard essential patents are warranted different licensing pathway than other patents – namely, they must be licensed in a way that comports with the FRAND framework. Exactly how such a FRAND framework should be applied, and whether the scope of the application should be narrow or broad, is currently subject to international IP policy formulation. If the FRAND agreement offers adequate means to mitigate against risks associated with widely dispersed patent ownership, that will also deserve further policy attention.

A new entrant may need to hack through a host of patents held by many different IP owners, which can lead to an undesired anti-commons effect, whereby existing patents stifle rather than promote innovation and the very purpose of the patent system is undermined.²² While it is important to note that the IoT does not yet dispose of any prominent standards, nor depend on any particular technology protected through patents, it is quite unlikely that this will remain that way. If the IoT is to evolve from its current state of infancy to a more mature technology field, it will be necessary to establish widely used standards. At this point, contributors to those standards will undoubtedly want to leverage their IP for licensing, sales purposes or blocking third party entry. Although these may be legitimate usages of IP, the licensing of standard essential patents has also been associated with an undesired behaviour known as “holdup.”

The impact of holdup can be particularly pronounced where firms benefit from first mover advantage or where firms have the necessary innovation capacity to capture the patent landscape. It is, however, incorrect to assume that patent holdup would only be an issue concerning “important” patent owners. In fact, each and every standard essential patent owner (SEP owner) could theoretically engage in holdup because its position as a gatekeeper to the standard allows him or her to do so. It is alleged that these patent holders –

²¹ Joseph S. Miller, *Standard Setting, Patents, and Access Lock-In: Rand Licensing and the Theory of the Firm*, 40 IND. L. REV. 351, 378 (2007).

²² See Dan Hunter, *Cyberspace as Place and the Tragedy of the Digital Anticommons*, 91 CALIF. L. REV. 439, 439-519 (2003); Sven Vanneste et al., *From “Tragedy” to “Disaster”:* *Welfare Effects of Commons and Anticommons Dilemmas*, 26 INT’L REV. OF L. AND ECON. 104, 104-22 (2006); Clarisa Long, *Patents and Cumulative Innovation*, 2 WASH. U. J.L. & POL’Y 229, 229-46 (2000).

having claimed an important position in the patent landscape – can charge abnormally high licensing rates to standard essential patent licensees.²³

By charging these high licencing rates, the patent holders are engaging in the practice of what is commonly called patent holdup. For instance, it has been stated that the holdup problem is particularly severe with mobile telecoms standards because the standards that are adopted are used for a long time and the costs that are associated with switching to an alternative standard are high.²⁴ Further it has been argued that standards holdup is both a private problem facing industry participants and a public policy problem. Privately, those who will implement the standard (notably manufacturers of standard-compliant equipment) do not want to be overcharged by patent holders. But standards hold-up is also a public policy concern because downstream consumers are harmed when excessive royalties are passed on to them.²⁵ Given that the IoT can be associated with network effects, it is likely that such adverse effects could occur within the context of the IoT as well.

Adverse licensing behaviour could also occur if licensees stall payment, refuse a licensing agreement all together, or take a license below the fair rate. Such holdout constitutes an equally problematic market practice as it leads to free riding problems associated with technology used. Licensees may also simply engage in a series of offers and counteroffers to further stall negotiations. Such strategic behaviour can erode the incentive to invest in R&D. Both patent holdup²⁶ and holdout²⁷ are possible in the IoT context and both can constitute undesired strategic behaviour.²⁸

²³ See, e.g., U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION (2007) (addressing 'hold up' in the context of standard setting).

²⁴ Philippe Chappatte, *FRAND Commitments - The Case for Antitrust Intervention*, 5 EUR. COMPETITION J. 319, 326 (2009).

²⁵ Joseph Farrell, John Hayes, Carl Shapiro & Theresa Sullivan, *Standard Setting Patents and Hold-Up*, 74 ANTITRUST L. J. 603, 608 (2007).

²⁶ See, e.g., U.S. DEP'T OF JUSTICE & U.S. FED. TRADE COMM'N, *supra* note 21 (addressing hold up in the context of standard setting); Mark A. Lemley & Carl Shapiro, *Patent Hold-up and Royalty Stacking*, 85 TEXAS L. REV. 1991 (2007); Carl Shapiro, *Injunctions, Hold-Up, and Patent Royalties*, 12 AM. L. & ECON. REV. 280 (2010). For a critique of Lemley & Shapiro, see Einer Elhauge, *Do Patent Holdup and Royalty Stacking Lead to Systematically Excessive Royalties?*, 4 J. COMPETITION L. & ECON 535 (2008); John M. Golden, *"Patent Trolls" and Patent Remedies*, 85 TEXAS L. REV 2111 (2007); Vincenzo Denicolò, Damien Geradin, Anne Layne-Farrar, & A. Jorge Padilla, *Revisiting Injunctive Relief: Interpreting Bay In High-Tech Industries With Non-Practicing Patent Holders*, 4 J. COMPETITION L. & ECON 571 (2008); Peter Camesasca, Gregor Langus, Damien Neven, & Pat Treacy, *Injunctions for Standard-Essential Patents: Justice Is Not Blind*, 9 J. COMPETITION L. & ECON 285 (2013); James Ratliff & Daniel L. Rubinfeld, *The Use and Threat of Injunctions in the RAND Context*, 9 J. COMPETITION L. & ECON 1 (2013).

IV

... THAT CAN PARTICULARLY AFFECT YOUNG INNOVATIVE COMPANIES

Young innovative companies (YICs) can be particularly vulnerable to adverse licensing behaviour. YICs, which have come to be understood as small, young and highly engaged in innovation, aim “to exploit a newly found concept, stimulating in that way technological change, which is an important determinant of long run productivity.”²⁹ While it would appear that the very process that drives YICs would quite naturally be associated with patent protection, it has been observed that micro enterprises and SME lack IP awareness.³⁰

YICs’ fear above all are the costs associated with patent protection and patent enforcement. From the perspective of YICs, IP is primarily a cost factor that diverts time and attention away from doing business. Studies undertaken by the UKIPO,³¹ the IPR Helpdesk of the European Commission,³² as well as WIPO³³ show that such firms associate IP protection with a tedious, laborious and time-consuming endeavour that offers only moderate support to business because costs associated with enforcement are often unaffordable. For the same reasons, these firms tend to be reluctant to enforce their own patents against infringers, leaving this group of firms with questionable patent proposition. This has led several observers to the conclusion that “deterred by high costs and complicated procedures, YICs tends to lack the necessary skills to take any

²⁷ Gregor Langus, Vilen Lipatov & Damien Neven, *Standard-Essential Patents: Who Is Really Holding Up (and When)?*, 9 J. COMPETITION L. & ECON., 253 (2013); Damien Geradin, *Reverse Hold-Ups: The (Often Ignored) Risks Faced by Innovators in Standardized Area The Pros and Cons of Standard Setting*, (Nov. 12, 2010) (paper prepared for the Swedish Competition Authority on the Pros and Cons of Standard-Setting).

²⁸ Michael J. Meurer, *Controlling Opportunistic and Anti-Competitive Intellectual Property Litigation*, 44 B.C. L. REV. 509 (2003).

²⁹ Dirk Czarnitzki & Julie Delanote, *Young Innovative Companies: The New High-Growth Firms?*, 1 (Ctr. for Eur. Econ. Research, Discussion Paper No. 12-030) (2012).

³⁰ Robert H. Pitkethly, *Intellectual Property Awareness*, 59 INT’L J. TECH. MGMT. 163 (2012).

³¹ Robert Pitkethly, *UK Intellectual Property Awareness Survey 2006*, CHRONICLES OF INTELLECTUAL PROP., <http://breese.blogs.com/pi/files/ipsurvey.pdf>; Preliminary Report, *Intellectual Property Awareness Survey 2015* (Feb. 11, 2016), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/500211/IP_awareness_survey_2015.pdf.

³² See IPEuropeAware, Promoting the Benefits of greater knowledge and effective management of European SMEs & Intermediaries, https://www.dpma.de/docs/dpma/conclusion_paper_ipeuropaware.pdf; EUROPEAN IPR HELPDESK, <https://www.iprhelphdesk.eu/ambassadors> (last visited Dec. 1, 2017).

³³ See WORLD INTELLECTUAL PROPERTY ORGANIZATION, <http://www.wipo.int/ip-outrreach/en/tools/> (last visited Dec. 1, 2017).

particular advantage of the patent system.”³⁴ The UK Government’s Hargreaves Review “IP and Growth,” further highlighted that strategic advice would be needed to help fill this gap stating that “many SMEs have only limited knowledge of IP and the impact it may have on their businesses; they lack strategic, commercially based IP advice; have difficulties identifying the right source of advice and IP management is made impossible due to too high costs.”³⁵ Hence, cost and time constraints tend to discourage YICs from taking ownership of the patent system. With respect to the particular challenges associated with standard essential patents, it is very likely that the overarching lack of IP competence will overshadow any potential experiences there may be with standard essential patents. Arguably, the lack of IP skills will make YICs more prone to unreasonable licensing requests, while at the same time making them more likely to inadequately respond to licensing requests themselves. Hence, lack of knowledge will risk exposing YICs to anticompetitive IP requests, while at the same time making them more likely to stall licensing engagement payments.

V

METHODOLOGY

Is there a gap between the way European policy makers and YICs are conceptualising the role of IP in the IoT? To gain further insight into that question, a series of thirty-one in-depth interviews were undertaken with YICs during the course of 2016. In addition, four contextual interviews were carried out. Interviewees were asked to reply to a set of open ended questions, allowing them to discuss their experiences with patents and standards, present their licensing practices and the extent to which they were (if at all) exposed to licensing requests. They were also asked if they feared patent wars similar to those in telecom could occur in the IoT space and what they would expect the European policy maker to do to counter potentially anticompetitive usage of IP, while helping them to take advantage of standards and patents. The issue of software patents was deliberately excluded from the conversations as this was subject to historical policy formulation and not that of current policy thinking. Given the stance taken on software patents in the E.U., the market participants

³⁴ Intellectual Property Office, *From Ideas to Growth: Helping SMEs get value from their intellectual property* (Apr. 3, 2012), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/316116/ip4b-sme.pdf; Competitiveness and Innovation Framework Programme, *IP Awareness and Enforcement Modular Based Actions for SMEs*, http://www.obl.gr/obi/portals/0/imagesandfiles/files/abstract_en.pdf.

³⁵ Ian Hargreaves, *Digital Opportunity: A Review of Intellectual Property and Growth* (May 18, 2011), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32563/ipreview-finalreport.pdf.

interviewed here would simply not have been in a position to comment on their experience with software patents in the E.U.³⁶

The technique applied is known in social sciences as a “semi structured interviewing” process.³⁷ The techniques give the interviewees space to express their own perspectives and mitigates against biased research results. This approach is somewhat comparable to a study based on focus groups. Such a qualitative research method was considered suitable as it allows us to theorize about what public policy formulation could look like in an emerging field of technology, where policy guidelines are yet to be identified. In addition, this specific research approach offers the necessary insights for a bottom-up approach to public policy formulation.

The target group was identified via LinkedIn. The firms interviewed usually had no specialized lawyer dedicated to IP issues, so the most senior person in the company was interviewed. This was usually the Chief Executive Office, Chief Technology Officer, Chief Operating Office or sometimes one of the investors in the firm. The vast majority of the firms interviewed were early stage firms or start-ups. Only Italian firm ‘S.’ has been acquired by a major technology company. In addition to interviewing a core group of young innovative companies, we also undertook contextual interviews with a financial analyst, a few management consultants specialized in the IoT space, as well as a patent analyst with whom we discussed patent landscapes. Of the 350 people we reached out to, we obtained thirty-five interviews – yielding a response rate of 10%. A sample of thirty-one in-depth interviews with Young Innovative Companies and four contextual interviews is usually considered sufficient to provide meaningful insights.³⁸ It is recognized, however, that such a qualitative research method, cannot offer “hard facts,” but only views, opinions and impressions.³⁹ Yet, it is precisely this web of views and opinions that is key in

³⁶ *Patents for software? European law and practice*, EUR. PAT. OFF., <https://www.epo.org/news-issues/issues/software.html> (“Under the EPC, a computer program claimed “as such” is not a patentable invention (Article 52(2)(c) and (3) EPC). Patents are not granted merely for program listings. Program listings as such are protected by copyright. For a patent to be granted for a computer-implemented invention, a technical problem has to be solved in a novel and non-obvious manner.”).

³⁷ See generally Margaret C. Harrell & Melissa A. Bradley, *Data Collection Methods: Semi Structured Interviews and Focus Groups*, RAND NAT’L DEF. RES. INST., at 27 (2009); Siw. E. Hove & Bente Anda, *Experiences from conducting semi-structured interviews in empirical software engineering*, SOFTWARE METRICS, 2005, at 3.

³⁸ See, e.g., Mark Manson, *Sample Size and Saturation in PhD Studies Using Qualitative Interviews*, Forum: Qualitative Soc. Res., Sept. 2010, at 3, 9 (citing several major works recommending between 20-50 interviews and finding an average of 31 among studies included in analysis).

³⁹ See Florian Kohlbacher, *The Use of Qualitative Content Analysis in Case Study Research*, Forum: Qualitative Soc. Res., Jan. 2006, at 13.

politics. Language is a constitutive element of politics, shedding light on the language of those otherwise marginalized in the political process, which is conducive towards the democratic process. The FRAND debate forms no exception to that.

Table 1 offers an anonymized overview of the interview process. In order to shield the interviewees from potential exposure to patent assertion entities, it was decided not to disclose their identities publicly. The detailed transcripts of the interviews are available only in my private archive.⁴⁰

VI FINDINGS

A. Trends in Internet of Things Markets

Of the 31 firms we interviewed, no two firms had the same business proposition or sought to apply the IoT in the same manner. The firms interviewed seek to apply the IoT in areas as vast as fashion, toys, lighting, smart cities, health care, automotive and even social housing. In regards to technology, cloud services, big data, and platforms appear key to many of these early stage businesses. Social Innovation and lean management were other concepts, which were often combined with the usage of the IoT. It was surprising to hear that the majority of the firms interviewed had fairly little start-up capital. In many instances, EU grants were considered too complicated to obtain and if obtained at all, then regional funds were used. Some sought funding in the U.S., as they thought there was more capital available there.

Interviewees confirmed that the IoT was a mesmerizing and also somewhat confusing term: “The IoT is a buzz word just like big data, the market is still very early stage, but I have a feeling that we may be not far away from a break-through in the market.” (K.) This makes it quite difficult to describe the state of the market or capture industry trends. “The IoT market is still in search for adequate applications . . . many solutions are quite simple and they could just as well function without the IoT.” (J.) Overall, interviewees agreed that the market is still very early stage, with many firms still looking for an adequate business model. “The main problem is how to establish the business model around the technology . . . the market is still in a trial and error stage.” (M.) Yet, in spite of the various uncertainties surrounding the IoT, it is seen as a “mega trend” with substantial growth opportunities: “The Iot? I think it is going to happen . . . in up to five years we will be able to talk about billions.” (I.)

⁴⁰ On an anonymized basis and subject to prior approval the transcripts of the interviews are available upon request.

Overall, interviewees were sceptical about the prospects for European markets. According to them, the markets for IoT will take off in the U.S. and Europe will eventually follow. “I think we are behind the US with its Silicon Valley and its big tech firms that lead the tech industry.” (A.) “The IoT market in Europe is imagined.” (L.) “The IoT market is something we believe in, but it is not yet established in Europe.” (G.) This should be a wake-up call for policy makers in the EU and set them thinking about what can be done to promote the IoT in Europe.

B. Standardization, Patents and Standard Essential Patents Experiences

The YICs interviewed were not able to formulate particularly nuanced views on SEPs, standards, patents or licensing markets. With respect to standard essential patents they were entirely ignorant on the topic and were also not involved in the regulation processes of any of the standardisation organizations. Their experience with patents mainly pertained to difficulties associated with obtaining patents, facing high filing costs, feeling overwhelmed by legal costs and finding information on prior art. “Our patent attorney is ripping us off . . . and we don’t even know if it is really worth it.” (S.)

Alarmingly, many YICs we talked to even doubted that the patent system mattered at all for them. “The technology in this area is moving so fast that by the time you have the patent the technology is outdated. I am not sure patents are really helpful, it is only expensive for a small firm . . .” (S.) It was lead-time advantage and open source software that mattered, rather than proprietary innovation. “When you are in the Savanna and you don’t know if you are the antelope or the lion, what do you do? You run! With IP it is the same. We care about first mover advantage. The IP is so hard to enforce and so costly that we feel we are better off without it.” (F.) Equally, defensive mechanisms associated with IP were entirely ignored. The reason given was that a defence would be too expensive. There was heavy doubt that the patents had a business proposition at all. Also, there was a sense that the value proposition of the firm was to deliver customer solutions or products and there, so many agreed, IP had not really any particular meaning for them. It was products they offered that were valuable, not IP protection. “We have filed a few patents in the US and through the PCT, but we have no business usage for them.” (M.) These findings are commensurate with what has been reported in the literature and underline the need to combine overall IP measures geared towards YICs with the overarching SEPs debate.

Some of the firms we interviewed went as far as to state their discontent with the patent system openly. “In general we don’t like patents . . . we think they are very bad . . . the original idea of the patent was to protect an invention, but in the software space patents have been abused for a long time . . . just look

at the patent trolls.” (W.) Patents were also mentioned as a means to slow down businesses and as leaving YICs exposed to threats of litigation. “I don’t like the IP part . . . patents slow things down . . . I would prefer never to file patents. I believe in building a lot of brand capital.” (H.) Even those firms who considered developing a patent strategy, found that costs associated with patent ownership prevented them from taking advantage of the patent system. For example, a Partner at V. presented plans for a patent strategy, but was not able to execute it because of cost constraints. “Patents are expensive and there is no point in patenting if you don’t have the money to defend your patents . . . [s]o, we are waiting.” (H.)

C. Licensing Experiences in the Internet of Things Space

The YIC’s knowledge of European patent ameliorating efforts was no better. When asked about FRAND licensing, they were also completely uninformed and key terms had to be explained first. Following that, firms generally did not feel competent enough to comment. Similarly, the consequences they could be facing in case of patent infringement were unknown to them.

The YICs talked to were not involved in patent licensing and they generally denied having been exposed to patent licensing. If, at all, it was copyright licensing they used. This was however called by all the interviewees “software licensing,” maybe because they were not very IP savvy. This was seen as a fairly straightforward process and nobody found there was a need to discuss this at length. “Software licensing is our business strategy, not patent licensing... our business is to sell the usage of the platform.” (S.) However, interviewees were not exactly sure what the question meant. Only two firms had experience with patent licensing. N. told us that he had been exposed to licensing in another firm he worked for and there they used the out-licensing of patents as a means to manage competition. “Licensing no, not in this firm no, but in another firm, we used patent law suits to slow down our competitors.” (B.) Furthermore, the IoT sector was not considered an industry where patent licenses were needed. “In our industry nobody would want to take a license.” (T.)

The role of patents was however seen in a different light by more established firms. Here, costs mattered less and measures such as licensing did play a role. Both inbound and outbound licensing was critically reflected upon. Such firms were also often part of industry associations such as the IP Europe Alliance⁴¹ or the Fair Standards Alliance.⁴² These firms are, however, not

⁴¹ IP Europe Alliance, *About Us*, IP EUROPE, <https://www.iptalks.eu/> (last visited Nov. 9, 2017).

directly engaged in the IoT space and hence their input is probably less of relevance here.

Some firms, like the Spanish University spin-off we talked to, had moved their business from producing parts of an Antenna to pursuing an active IP licensing program. They found this strategy more lucrative. (I.) Similarly, the CEO of a Danish software firm confirmed that his company is “now slowly moving from a mere defensive approach to IP to a more aggressive way of managing its IP.” In particular, this firm is interested in establishing a systematic licensing program targeting potential infringers.

However, even those who have an active licensing program in place do not find it an easy business. For example, one Danish inventor explained that it took him nearly ten years to obtain a patent family and that he also attracted significant investments so to obtain licensing revenues from firms that infringed on his patents, but he overall found it to be a very long, complicated and so far not particularly lucrative process. He concluded that “the patent system was a bit ridiculous . . . and that the return on investments in patents is not very good . . . you always have to use a lawyer, but these guys [the firms he was trying to get a license from], they shut down their business and then they open up a new one and you get to start all over again with suing them . . .” (J.) The CTO of the spin-out from the Spanish University was the only one we talked to who felt that the patents the firm had were truly beneficial to their business. His only concern was that licensees can deploy delay tactics and that can become difficult. Otherwise he considered patents an important instrument of monetization.

Additionally, the senior representatives of three SMEs were interviewed. These firms had been approached for taking a license but all of them found the process unhelpful. One firm, for example, criticised that licensing requests were not supported by adequate documentation. Many licensors do not even send claim charts or send them only very late, in an effort to pass on costs from licensor to the licensee. Also, they complained it was very common to receive unrealistically short deadlines for a legally binding reply. This situation is made even more complicated as it is a lengthy and costly procedure to determine whether some patents claimed to be standard essential, really are standard essential: “what is a standard essential patent and what not is essentially gut feeling.” (L.) According to them, it is also very costly and time consuming to negotiate licensing rates. Many times they are forced to accept a license rate simply because costs to counter the argument would be too high. They argued that it is also difficult to determine what an adequate royalty rate is in the

⁴² Fair Standards Alliance, *Our Vision*, FAIR STANDARDS ALLIANCE, <http://www.fair-standards.org/> (last visited Nov. 9, 2017).

absence of an adequately defined framework for licensing standard essential patents.

D. The Threat of Patent Wars and Lack of Defence Mechanisms

There was a general sense among interviewees that patent wars as seen in the telecom space could repeat themselves in the IoT space. “Definitely, definitely . . . I think the IoT space is a classic example . . . I would not be surprised if in 2019/2020 we would see these things.” (R.) The only reason, in their view, why this had not happened yet, was because the IoT sector was still too immature. Still, the potential emergence of patent wars is seen in a negative light. Once more, interviewees underlined that the patent system is not equally accessible to small and big players: “it is a downward spinning circle. The more cases you have, the more people will shy away from the IoT because patent litigation is really expensive . . . and then the IoT will only be for the super big ones.” (B.) Nobody expected such patent confrontations to occur any time soon, though: “Maybe in the future, when the markets are more mature, but I don’t think we will see much trolling in the next five years.” (M.)

If patent confrontations were to occur in the IoT space, it is my impression that it would leave most interviewees unprepared. Some even thought that they could not face any patent litigation because they had no patents themselves. “Probably it will happen. But I don’t think about it, but now that you say it . . . yes . . . but since we don’t have an IP for end customers or big scale use, we will not be attacked by trolls.” (A.) Some did not even know what the patent war was or thought that it would not concern them: “What is that? I have never heard of that.” (M.) YICs also felt quite powerless and that they had little to defend themselves with against potential litigation. “They are so big and if they want to break you, they can do that. As a small firm you have no chance to defend yourself.” (N.) The only firm in our sample that was not concerned with patent wars was the Spanish firm that had an active licensing program.

E. What Role for European Policy?

Many of the firms interviewed felt that the patent system would require a radical reform. Under a particularly critical light were the activities of patent assertion entities. “Patents do not help SMEs, the best would be to get rid of them . . . if that is not possible, then we would need a complete reform of the patent systems . . .” (S.) For interviewees making the patent system accessible to YICs meant also making patent enforcement accessible to them. Helping young firms obtain patents, but leaving them without the necessary financial means to protect themselves from litigation, was, according to the interviews, not of great help. “The EC should support smaller firms in enforcement and in a way that they have the right to have a patent and also a right to enforce it.” (J.)

Small firms should somehow have a chance to defend themselves and the Government should provide some means to do that. “Any policy reform that helps assure that the patent system is actually used in a way to promote genuine innovation and not in a predatory way . . . that one guy invents something great and a patent troll just buys the patent to sue other people . . . the government should do something to prevent that.” (H.) In that respect, the E.C. was called upon to identify policies that would counter the inequalities between parties, something that would enable small players to level the playing field with large firms. “It would be good to make legislation that would help avoid situations where big companies use patents as a means to shield competition from small firms.” (K.) On a more practical level, there could be more information made available on the role of IP and standards in the context of the IoT.

Interviewees expressed that educational material, websites, really anything that would help to get more acquainted with the issues at stake would be very welcomed and the E.C. should do more in that respect. “What would help is to allow small firms to learn about patents . . . Are there educational materials, websites . . . we could get to learn more about IP?” (T.)

There was also a general sense in the community that open source software should be promoted and that the standard essential patents regime was not particularly fit for the IoT space. Their policy suggestion was to promote awareness about open source software and the role it can play in an IoT driven business. “Patenting software is dead and that is good . . . I would suggest that they spend more time explaining Open Source Software to common people and to business . . . they should find the European version of Open Source Software licensing, make it more common, teach about it and sponsor work to formulate Open Source Software licenses.” (B.)

In that respect it was proposed that the E.C. could identify stimulation funds, however these should be made available with as little administrative burden as possible. “Promote Open Source Software . . . maybe also subsidies for stimulation funds, but in the end it is mainly the established firms that get that and the true innovation comes from the small ones and they don’t access these funds because it is too bureaucratic to get these funds.” (A.) Equally, more training on Open Source could be an alternative to the traditional standard essential patent regime. “Anything the Government can do to assure firms win by conquering markets and not by paying expensive lawyers . . . I would suggest spending more resources in explaining Open Source Software and focus much more on training firms in Open Source Software.” (B.)

CONCLUSIONS

The E.C. is eager to approach the role of SEPs in the IoT through the lens of the FRAND agreement. Through this process the E.C.'s goal is provide further clarity of what the FRAND commitment entails. While very important, this aspect is not entirely reflective of the issues raised by the interviewees of this survey. Hence, an additional section was added to the FRAND Guidelines that address the need to raise awareness among SMEs (small and medium sized enterprises) on standard essential patents and the role of the FRAND commitment. This is entirely commensurate with the findings of this study.

Like the findings of Pitkethly, Talvela and Nikzad,⁴³ the survey showed that young innovative firms lack IP awareness and do not understand the role that IP management could play for their firm. A good illustration of this issue is that respondents showed two apparent contradictory views on the IP system. On the one hand side they lacked awareness on IP, on the other hand, they felt that the patent system should be urgently reformed. This suggests that the senior managers in YICs have, at best, a layperson's understanding of the IP system and it underlines the need for further IP awareness-building campaigns.

The interviewees also had a minimal understanding of standard essential patents and the accompanying FRAND debate, especially the early stage firms. This leaves them exposed to unexpected licensing requests, while depriving them of the opportunity to pursue their own licensing programs. Certainly, standard essential patent owners focus their licensing programs on companies with significant revenues, which is usually not the case of YICs. However, once YICs obtain critical mass, they could be hampered in their growth due to licensing requests they did not expect. If they do reach such a level, these licensing issues will require further policy attention and there will be a need to raise awareness among YICs about FRAND.

Against this backdrop, the FRAND guidelines will very likely be accompanied by tailored awareness-raising measures that allow YICs to adequately familiarize themselves with the peculiar challenges associated with

⁴³ Robert Pitkethly, *Intellectual Property Awareness*, 59 INT'L J. OF TECH. MGMT. 163 (2010); Juhani Talvela, *How to Improve the Awareness and Capabilities of Finnish Technology Oriented SMEs in Patent Related Matters*, RESEARCHGATE, June 2016, available at https://www.researchgate.net/profile/Juhani_Talvela/publication/316735577_How_to_Improve_the_Awareness_and_Capabilities_of_Finnish_Technology_Oriented_SMEs_in_Patent_Related_Matters/links/590f8bbea6fdccad7b126a31/How-to-Improve-the-Awareness-and-C; Rashid Nikzad, *Small and medium-sized enterprises, intellectual property, and public policy*, 42 SCI. & PUB. POL'Y 176, 178-179, 183 (2014); Robert Pitkethly, *UK Intellectual Property Awareness Survey 2010*, INTELL. PROP. OFFICE (2010), available at <http://www.ipo.gov.uk/ipsurvey2010.pdf>.

standard essential patents. The nature of the FRAND agreement deserves further policy attention, but so does its practical applicability. This aspect was given adequate consideration in the FRAND guidelines.⁴⁴ If young innovative companies have not even heard of FRAND or standards essential patents before, it is highly unlikely that they will be prepared to formulate smart strategies as licensees or licensors. Nowhere are these concerns included in the current policy debate. The European Commission and even National Patent Offices are actively working towards raising IP awareness and enhancing the understanding of IP among young innovative companies. However, so far this has not been approached from a FRAND perspective. Adaptations are sorely needed in light of the risk of patent wars⁴⁵ spreading to the IoT.

Lastly, there is a dire need to assume governance responsibilities and identify a mediating structure between the inherent tensions prevailing between the exclusionary features of patent law and the open, collaborative nature of the Internet of Things. The interviews showed that the patent system cannot be viewed in isolation and the benefits of other innovation strategies, such as the promotion of open source software, need to be weighed against the further advancement of the patent system. Many of the firms we talked to found an open source strategy more effective than a patent strategy. They also thought that the open architecture enabled by open source was more befitting of the nature of the IoT.

Certainly, such statements need to be read with care, but at present too much policy formulation is occurring in isolation. What the IoT needs is a cross-functional, horizontal policy formulation, rather than policies developed in vertical silos. This can only be achieved by bringing all actors in the IoT space into the debate. Therefore, I urge policy makers to study further how IP can be promoted as a tool to promote openness rather than as a means of segregation.

⁴⁴ *Setting Out the EU Approach to Standard Essential Patents*, *supra* note 4.

⁴⁵ Chia, *supra* note 5; Karakashian, *supra* note 5.

ANNEX: TABLE 1 - OVERVIEW OF INTERVIEWEES

Position in Company	Firm has patents	Date interview	Time Interview	Type of Firms	Location	Firm Size
Vice President - Strategic Partnerships	Yes	27-07-16	2:00 PM	Telecommunications	UK	11-50
Vice President, Licensing	Yes	28-07-16	11:00 AM	Wireless	Spain	11-50
CEO	Yes	28-07-16	3:00 PM	Computer Software	Ireland	11-50
Founder	Yes	28-07-16	Via email	Computer Software	Denmark	11-50
CEO	Yes	02-08-16	3:00 PM	Medical Devices	Italy	1-10
CEO	Yes	03-08-16	11:15 AM	Info Technology	Denmark	1-10
Partner / Head of development	Yes	03-08-16	3:00 PM	Electronic Manufacturing	Denmark	11-50
CEO, co-founder	Yes	03-08-16	4:00 PM	Info Technology	Sweden	11-50
Business Development	Yes	04-08-16	2:00 PM	Consumer Electronics	Denmark	11-50
CEO	No - prefers not to file patent	04-08-16	3:00 PM	Automotive	Sweden	11-50
CEO and Founder	IP but not patent	05-08-16	12:00 PM	Info Technology	Netherlands	11-50
Co-Founder and Partner	Yes	08-08-16	4:00 PM	Consumer Electronics	Denmark	1-10
Technology Evangelist	Yes	08-08-16	5:00 PM	Info Technology	Italy	11-50
CEO	Yes	08-08-16	5:30 PM	Info Technology	Denmark	200-500
Founder	Yes	09-08-16	11:00 AM	Business Supplies and Equipment	Spain	1-10
CEO and Co-Founder	No	09-08-16	1:00 PM	Computer Software	Norway	11-50
Sales & BD Director	IP is in the sister company	09-08-16	2:00 PM	Computer Software	Denmark	50-200
Manager of Operations	Yes	09-08-16	2:50 PM	Internet	Denmark	1-10
Patent Strategy	Yes	09-08-16	3:00 PM	Network Security	Germany	50-200
CEO	Yes	09-08-16	4:00 PM	Info Technology	Sweden	11-50
CEO	Yes	10-08-16	Via Email	Info Technology	Netherlands	11-50
CTO	Yes	10-08-16	Via Email	Info Technology	Sweden	1-10
CEO	Yes	25-08-16	10:00 AM	Info Technology	Germany	11-50
CEO	Yes	25-08-16	4:00 PM	Info Technology	Sweden	1-10
CEO	Yes	26-08-16	12:00 PM	Consumer Electronics	Germany	1-10
CEO	Yes	26-08-16	2:00 PM	Electronic Manufacturing	Denmark	1-10

Position in Company	Firm has patents	Date interviewed	Time Interviewed	Type of Firms	Location	Firm Size
COO	Yes	30-08-16	9:15 AM	Consumer Electronics	Germany	11-50
CEO	Yes	30-08-16	10:00 AM	Consumer Electronics	Sweden	11-50
Director and co-founder	No	30-08-16	12:00 PM	Computer Software	Finland	50-200
General Counsel	Yes	03-08-16	2:00 PM	Cellular Communication Technology	Italy	500-1000
General Counsel	Yes	02-08-16	4:00 PM	Wireless semiconductors	Switzerland	500-1000
CONTEXTUAL INTERVIEWS						
Sr. Analyst and Director of Content	No (IoT Analyst)	08-08-16	3:00 PM	Financial Analyst for the IoT	USA	1-10
Managing Director	No (consulting firm)	05-08-16	2:00 PM	Lighting Innovation	Germany	1-10
Sr Analyst, Partner, Chief Tech Officer	No	02-08-16	7:00 PM	IP and Financial Analyst for the IoT	USA	1-10
General Counsel	Yes	03-08-16	2:00 PM	Premium WiFi	Turkey	50-200