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The International Comparative Legal Guide to:

## Merger Control 2019

**15th Edition**

A practical cross-border insight into merger control issues

Published by Global Legal Group, with contributions from:

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# Qualcomm/NXP: A Textbook Conglomerate Merger?



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## 1 Introduction

Qualcomm's proposed acquisition of NXP attracted substantial media attention and interest from competition lawyers because of its scale (the acquisition was valued at \$38 billion) and the divergent conclusions reached by competition authorities globally.

The US Department of Justice cleared the merger unconditionally without requiring an in-depth review. However, the merger was subject to an in-depth phase 2 investigation by the European Commission, which lasted more than seven months as the clock was stopped on two occasions during the investigation as the Commission waited for information from the parties. The Commission ultimately cleared the merger subject to a number of non-structural, behavioural remedies relating to the provision of interoperability information and the licensing of intellectual property rights, and a requirement that certain intellectual property assets be excluded from the acquisition (see further below). Notwithstanding the European Commission's conditional clearance in January 2018 and the merger clearances secured in seven other jurisdictions, the Chinese competition authority did not reach a decision prior to an extended deal deadline. As a result, Qualcomm ultimately abandoned the transaction in July 2018 and paid a \$2 billion termination fee to NXP.<sup>1</sup>

The main competition concerns raised by *Qualcomm/NXP* are related to the diversification of Qualcomm into closely related markets, rather than the parties being important competitors. This chapter reviews the European Commission's analysis of conglomerate theories of harm, with such concerns being investigated in depth by the Commission in several recent cases.<sup>2</sup> In order to structure the discussion, we first provide an overview of the Commission's *Qualcomm/NXP* decision, before turning to discuss the key issues on which the Commission focused. In the final section, we draw some conclusions as to the wider implications of the case.<sup>3</sup>

## 2 Overview of the Qualcomm/NXP Merger and Commitments Given to the Commission

The *Qualcomm/NXP* merger combined two suppliers of complementary semiconductor components, sold to device manufacturers (original equipment manufacturers, or OEMs) such as Apple and Samsung.<sup>4</sup> Qualcomm supplies baseband chipsets for smartphones, which allow smartphones to connect to cellular networks.

NXP supplies semiconductor chips, including near-field communication (NFC, which provides short range connectivity) and

secure element (SE) chips. NFC chips are used by device OEMs for mobile payments, mobile ticketing/fare collection and other uses due to the security they provide and the ease of use between NFC-enabled equipment. To increase the security of NFC-based communications, NFC chips can be combined with various security technologies, particularly SE. SE chips guarantee that the data stored and transmitted in an NFC communication are protected by an additional hardware-based layer of security.

NXP also developed and owns MIFARE, a leading technology used by several transport authorities in the EEA for ticketing and fare collection. NXP provides MIFARE technology to device OEMs and licenses MIFARE to SE manufacturers.

Finally, the parties both hold a significant amount of intellectual property, including standard essential patents (SEPs) and non-standard essential patents (non-SEPs) relating to NFC chips. This was classed as a non-conglomerate issue since individual patents are generally not substitutable but complementary, with the Commission's concern focusing on the ability of Qualcomm to secure higher royalty rates.

The table below summarises the parties' areas of activity that were the focus of the Commission's investigation and remedies.

Area of activity	Qualcomm	NXP	Customers
Baseband chipsets for smartphones	✓ 60–70% worldwide share <sup>5</sup>	0%	Device OEMs
NFC and SE chips for smartphones	0–5% worldwide NFC share (but Qualcomm had exited) 0% SE	✓ 70–80% worldwide share NFC <sup>6</sup> 60–70% share worldwide SE <sup>7</sup>	Device OEMs
MIFARE technology		✓	MIFARE is licensed to suppliers of SE chips and SE operating system manufacturers (i.e. rivals to NXP)
Intellectual property, including SEPs and non-SEPs relating to NFC chips	✓	✓	Device OEMs and competing chip makers

Following its investigation, the Commission's conclusions were as follows:

- **MIFARE:** The transaction created the ability and incentive for the merged entity to increase royalties for MIFARE, or to cease licensing MIFARE to third parties. These issues were remedied by Qualcomm committing to license MIFARE for eight years on terms that are at least as advantageous as those available today.
- **Interoperability:** The merged entity would have the ability and incentive to degrade the interoperability of Qualcomm's baseband chipsets and NXP's NFC and SE chips with rivals' products, with the result that competitors might be marginalised. Qualcomm committed to ensure that for eight years it would provide the same level of interoperability between its baseband chipsets and the NXP NFC and SE products as for the corresponding products of rivals.
- **Intellectual property:** The combination of the parties' intellectual property portfolios would have increased the merged entity's bargaining power and enabled it to charge significantly higher royalties for its NFC patents relative to a no-merger scenario. To address these concerns, Qualcomm committed:
  - not to acquire NXP's standard essential NFC patents, and not to acquire certain of NXP's non-standard essential NFC patents. NXP would instead transfer these patents to a third party, and ensure that royalty-free licences to these patents were granted for three years; and
  - for those patents it acquired (certain of NXP's non-standard essential NFC patents), not to enforce its rights against other companies, and to grant worldwide royalty-free licences to those patents.

The remainder of this chapter discusses each of the above three areas in turn, as well as a standalone bundling theory of harm that was analysed but rejected by the Commission.

### 3 Foreclosing Competition via Refusing to License MIFARE or Imposing Excessive Royalties

The Commission's theory of harm was that, post-merger, Qualcomm would require higher royalties for MIFARE than NXP does today, or that it would cease to license MIFARE altogether to rival SE chip manufacturers. Coupled with "mixed bundling" (whereby Qualcomm would charge a higher price for standalone NFC, SE and broadband chips than combinations of these products), the Commission considered that such conduct would foreclose competition across these markets. The basis of this theory of harm is considered further in section 4 below, but it is appropriate to consider first certain aspects of this theory of harm.

Perhaps the first point to make is that MIFARE is not part of any SEP, and thus there is no obligation for this technology to be licensed on fair, reasonable and non-discriminatory (FRAND) terms. If FRAND terms had been available to customers, then Qualcomm may have lacked the ability to engage in the strategy identified by the Commission. In particular, the Commission would have needed to consider whether the merged entity could have increased prices at all post-merger given these obligations, and certainly Qualcomm could not have refused to license altogether.

It is also important to set out why the Commission considered that MIFARE was essential for Qualcomm/NXP's rivals and why they could not engage in timely counterstrategies, as at first sight, it may not be immediately obvious why MIFARE was essential to the parties' competitors.

On the one hand, the Commission found that NXP holds a dominant position in the market for transit service technologies through

MIFARE.<sup>8</sup> While rival technologies to MIFARE exist, and not all transport operators in Europe have adopted MIFARE as the technology used, the Commission found that MIFARE has a large installed base in many large cities in Europe.<sup>9</sup> Those transport operators who have adopted MIFARE cannot readily switch away from it given the investments in hardware and software made in their ticketing systems, which are not frequently upgraded.<sup>10</sup>

However, it is striking that, while MIFARE is a leading platform in transport/ticketing today, Qualcomm argued MIFARE is typically not implemented on smartphone devices today, and that only a small share of SE chips shipped today are MIFARE enabled.<sup>11</sup> The Commission's theory of harm (and thus the remedy agreed with respect to MIFARE licensing) thus related to the fact that MIFARE implementation on smart phones was anticipated by the Commission to increase in the "near future" "when device owners are expected to require all SEs to be MIFARE certified (this has been mandatory only for high-end phones until recently)".<sup>12</sup> Regardless of the proportion of customers that currently or may in the future use MIFARE implementation on their smartphones to pay for transport, device OEMs (and their suppliers) indicated that it is important for their suppliers to provide MIFARE enabled NFC and SE products, and that MIFARE's importance is likely to increase in the next two to three years.<sup>13</sup>

Nevertheless, this raises the question as to whether device OEMs, particularly Apple and Samsung (which are the largest device OEMs), could compromise any such strategy by Qualcomm post-merger by ceasing to specify MIFARE on their SE chips unless Qualcomm continues to license MIFARE on similar terms to those that apply pre-merger. Such a counterstrategy might reduce the consumer appeal of their handsets (a matter not directly addressed in the Decision), but could have serious commercial implications for Qualcomm. This question is not explicitly addressed in the Decision.

Raising royalty rates and/or refusing to license MIFARE was not addressed as a theory of harm on its own in the Commission's decision. It was instead addressed only in the context of product bundling (forming a bundle with Qualcomm's LTE baseband chipsets and NXP's NFC and SE chips). For this reason, we discuss this further in the context of mixed bundling concerns in the next section below.

### 4 Bundling Concerns

Under certain circumstances (there is a large economic literature on this topic), firms can leverage market power from one market into another by bundling, tying or other exclusionary practices. Such concerns can only arise when a firm has a high degree of market power in one market. While, as can be seen from the table above, Qualcomm's and NXP's market shares in their respective areas of activity were broadly similar, the Commission found Qualcomm to be dominant in the worldwide market for LTE baseband chipsets,<sup>14</sup> and found by contrast that NXP held only "a certain degree of market power" with respect to NFC chips, SE chips and combined NFC/SE solutions.<sup>15</sup>

In this case, concerns about the parties' incentives to bundle its products post-merger and degrade MIFARE licence conditions were both raised by rival manufacturers of NFC/SE chips as well as by customer OEMs.<sup>16</sup>

The Commission's examination of bundling in this case related to "mixed bundling", which arises when two products are sold together (as a bundle) at a discount relative to buying each of the products on a standalone basis.<sup>17</sup> The Commission explored whether the merged entity would engage in mixed bundling between Qualcomm's LTE baseband chipsets, and NFC's and (MIFARE-enabled) SE chips. It

concluded that the merged firm *would* be likely to engage in such a strategy, but that this would *not* be likely to lead to significant anti-competitive effects.<sup>18</sup>

The Commission, however, viewed the addition of MIFARE into the mix as changing the picture completely. The Commission concluded that a combination of mixed bundling and raising MIFARE royalties (or refusing to license MIFARE altogether) would lead to competitor foreclosure for the reasons we explain below.

The Commission followed the standard analytical framework of examining whether the merged firm would have the ability and incentive to pursue such a mixed bundling by offering device OEMs lower prices for packages of different types of chips, and then whether this would have anti-competitive effects. The Commission found that Qualcomm would have the *ability* to engage in a mixed bundling strategy post-merger,<sup>19</sup> which seems relatively uncontroversial. Among other factors, it seems reasonable to conclude that Qualcomm had the ability to engage in mixed bundling, because: LTE baseband chipsets and NFC/SE chips and MIFARE are purchased by a common pool of mobile OEM customers (e.g. Apple and Samsung); and as MIFARE is a proprietary technology, NXP is under no obligation to continue licensing the software once existing licences expire.

The Commission's published analysis of incentives and effects, however, raises a number of questions, albeit we recognise that this may be due at least in part to certain material being redacted.

#### Analysis of incentives to engage in mixed bundling

A common reason why firms may bundle complementary products is due to the "Cournot effect". This effect arises as when the price of one complement falls, its sales increase as do the sales of the complementary product. When firms price complements separately, each firm considers the effect of its pricing decision on its sales only. However, when the firm supplies complementary products and sets their prices together, it will take account of the fact that a reduction in price of one product increases sales across both products, and thus price more efficiently. This well-recognised efficiency is one reason why conglomerate (and vertical) mergers are often pro-competitive.<sup>20</sup> Some economic literature points out that there are conditions under which such Cournot effects may be limited, for example, if firms bargain on prices with their customers (as is likely to be the case here) as opposed to "posting prices" (as in a consumer retail environment).<sup>21</sup>

The Commission believed in this case that the scope of efficiencies arising from the "Cournot effect" between baseband chipsets and NFC/SE chipsets was limited because NFC/SE and baseband chipsets account for a small proportion of handset input costs, which "*would limit the incentive for the merged entity to reduce the price of the LTE baseband chipsets to drive increased usage of NFC/SE and vice versa*".<sup>22</sup> Despite finding a limited Cournot effect as just noted, the Commission's finding that Qualcomm would have incentives to engage in mixed bundling was in part because "*the merged entity now internalises the positive externality that a lower price of one component generates in terms of demand for other complementary components*" – in other words, due to the existence of the Cournot effect.<sup>23</sup>

The Commission found that this effect would result in an increase in the prices of standalone components, rather than a discounting of the price of the bundle, and that customers would then switch to Qualcomm's bundled product instead of switching away from it to pursue a "mix and match" strategy comprising of rivals' components.<sup>24</sup> The evidence cited for why this would be profitable is a widely cited academic economics paper,<sup>25</sup> submissions from third parties claiming that rivals may be driven out, and redacted internal documents referring, among other things, to Qualcomm's

approach to engage in cross-selling (which is something that many multi-product firms aim to do – with varying degrees of success in practice).<sup>26</sup>

While a strategy to offer a bundle and increase the prices of standalone products would, in the Commission's words, "*increase demand for the bundle and margins on the standalone products*",<sup>27</sup> this requires customers not to react by switching away from the merged entity's products. Customers, including Samsung, claimed that they would be unable to ignore the attractiveness of a bundled offer, given pressure from network carriers to lower costs.<sup>28</sup> A more detailed analysis of the likely reaction of customers in practice and an assessment of Qualcomm's profit incentives to engage in mixed bundling seems to be missing from the published decision, which is surprising.

The Commission's conclusions on incentives seems to be based in large part on internal documents (redacted from the Decision), in particular the finding that "*internal documents of the Parties also provide strong indications that Qualcomm would have the incentive to leverage MIFARE in order to protect the core business of baseband chipsets*".<sup>29</sup> In particular, the Decision makes reference to an internal Qualcomm email suggesting that worsening MIFARE licensing terms would limit the competitiveness of rivals (i.e. raise rivals' costs) to Qualcomm's advantage.<sup>30</sup> It is unclear from the published decision whether this point was supported by careful analysis as to, in practice, how effective such a strategy would be.

Two rivals to Qualcomm and NXP, Gemalto and Infineon, made economics submissions on bundling to the Commission. Gemalto's submission, based on a model by Choi, is described in the decision as a "Choi plus" model.<sup>31</sup> This Choi model shows that when mergers allow mixed bundling of complementary products, due to the Cournot effect mentioned above, they will price the bundle below the level that the two firms would price if they acted independently (i.e. did not merge), which will expand their sales and market share. The model also shows that the price of the standalone products will increase relative to pre-merger levels. This is because with standalone prices, some of the sales that would previously have been lost to competitors, are instead captured by the bundle (i.e. by the merged entity). While rivals may react to this by reducing their prices, to offset the increase in price for "mix and match" systems created by the merged entity's price increase for standalone products, in the absence of a counter merger their price cuts will not fully offset this. Their consequent loss of market share and profits raises the possibility of exit by rivals. Choi acknowledges that this model "*thus entails both pro-competitive and anti-competitive effects. There is no clear-cut answer to how mixed bundling by the merging parties would affect consumer and social welfare*".<sup>32</sup>

The "Choi plus" model submitted by Gemalto then looks at the effect of mergers on R&D incentives. The model also asks whether rivals (when faced with increased MIFARE royalties of refusal to license), would develop their own MIFARE technology (which relies on fixed R&D spend). The Commission notes that Gemalto's economic submission found that if the cost to rivals of "inventing around" MIFARE (assumed to be a must-have IP) fell within a certain range of values, then the merged entity would have an incentive to raise MIFARE royalties post-merger, which would then increase prices for all products (presumably all products using MIFARE technology).<sup>33</sup>

The Commission concluded that the model was "*inconclusive*".<sup>34</sup> It found that the model's results were driven by the assumption that "*inventing around*" MIFARE is feasible, and the costs of this strategy. The Commission concluded that the model could not properly be calibrated, and therefore could not be used reliably to predict whether the merged firm has the incentive to significantly raise MIFARE royalties.

Despite the inconclusive economic evidence, the Commission considered that the merged entity would have an *incentive* to engage in a mixed bundling strategy for baseband chips and NFC/SE chips, while simultaneously raising MIFARE royalties for competitors.<sup>35</sup> This conclusion was based on standard economic theory about mixed bundling (which applied to LTE and NFC/SE chipsets, but not to MIFARE royalties), views of third parties, and largely redacted internal documents.

#### Analysis of effects of the mixed bundling strategy of baseband LTE chipsets and NFC/SE chips

The Commission concluded that a mixed bundling strategy of LTE baseband chipsets and NFC/SE chips would, in isolation, have no anti-competitive effects, for the reasons summarised below. This does raise the question as to why the merged entity would have an incentive to engage in such a strategy – because if a strategy is unlikely to have any effect, as concluded by the Commission, then why would a firm have an incentive to engage in it in the first place?

The Commission's evidence on why the strategy would have no effects was based on an examination of actual historic and current competitor and customer behaviour, in particular:

- Qualcomm's history of engaging mixed bundling: Qualcomm has in the past engaged in mixed bundling of its baseband chipsets with other chipsets, but OEMs have not always favoured the bundled product. Instead, they have obtained technical support from Qualcomm to mix and match its baseband chipset with the Wi-Fi and Bluetooth chipsets of other suppliers.<sup>36</sup> This suggests that one cannot assume that rivals would necessarily switch to a Qualcomm bundle in place of continuing with their preference to mix and match components across suppliers.
- OEMs dual-source, and this customer behaviour "*appears to be inconsistent with foreclosure effects materialising*" from a mixed bundling strategy.<sup>37</sup> The Decision notes that Apple dual-sources baseband chipsets from Qualcomm and Intel,<sup>38</sup> Samsung uses its own captive supply of baseband chipsets as well as Qualcomm chips, and uses captive and NXP NFC and SE chips,<sup>39</sup> and Huawei dual-sources SE chips from NXP and HiSilicon.<sup>40</sup>
- Rivals could work together to provide competing bundles. Rivals have in the past done this – for example, Samsung, Gemalto and Infineon previously worked together to provide a full NFC/SE solution to compete with NXP.<sup>41</sup>
- Firms may have an incentive to engage in R&D to introduce a new product. The Commission found that winning just "*one socket*" of a high value smartphone could be sufficient to recoup R&D investments in the NFC/SE market and achieve minimum efficient scale (i.e. be financially viable).<sup>42</sup>
- Rivals may be able to work together to match the merged firm's bundle. It appears that MediaTek is already on its way to being able to do this. MediaTek is integrating STMicroelectronics' NFC technology on MediaTek's baseband chipset mobile platform, and has won a socket at Nokia. It can offer a "*complete mobile payment solution*". Further, STMicroelectronics will start to offer a complete NFC/SE solution, and if that was combined with MediaTek's baseband (something which has not been confirmed in the Decision, but seems like a plausible next step), then this would indicate that MediaTek could compete with the Qualcomm/NXP bundle in the future.<sup>43</sup> MediaTek was a new entrant into baseband LTE chipsets in 2014, taking 20–30% revenue market share in just two years.<sup>44</sup> Other rivals including Samsung and Gemalto also indicated that they could work to offer rival bundles to Qualcomm if competition were to take place more on bundles and integrated products than on standalone products.<sup>45</sup>

#### Analysis of effects of adding MIFARE to the bundle

Despite finding that bundling LTE baseband chipsets and NXP's NFC/SE chips would not adversely affect competition, the Commission found that adding MIFARE to the mix would change this conclusion. It concluded that increasing MIFARE royalties or ceasing to license MIFARE would "*have the effect of foreclosing competitors of baseband chipsets and NFC and SE chips who would not be able to engage in timely counterstrategies and overcome obstacles related to the more restrictive conditions regarding the licensing of MIFARE*".<sup>46</sup>

The importance of MIFARE was discussed in section 3 above. In short, the Commission found that OEMs are expected to require all SEs to be MIFARE certified.<sup>47</sup> If unable to offer MIFARE, the competitors considered that an OEM would not consider them as an alternative to the merged entity. In section 3, we raised the question of why OEMs would continue to specify MIFARE certification if this were to enable Qualcomm to engage in anti-competitive conduct.

However, even disregarding the above point, it is necessary to ask the further question of why the merged entity would raise MIFARE royalties or refuse to license it, and thus behave differently from how NXP does today, particularly bearing in mind that NXP already owns MIFARE and is already the market leader in NFC/SE chips and the merger would not increase its market share in NFC/SE chips. How NXP behaves pre-merger is not fully determinative as the potential gains to foreclosure might increase if *post-merger* the strategy would enable foreclosure in baseband LTE chipsets, which NXP does not supply pre-merger. Nonetheless, pre-merger behaviour suggested that NXP did not previously have sufficient incentives, so one would wish to be confident that the merger makes a substantive difference.

Despite having earlier found that the results of the Choi Plus model submitted by Gemalto were inconclusive, the Commission in this context noted that *if* the transaction were to lead to an increase in royalty rates for MIFARE, rival producers of both NFC/SE chips and LTE baseband chips would be "*unambiguously weakened*", although the magnitude of the weakening is not discussed.<sup>48</sup> The Commission found that higher royalties on MIFARE would have a "*potentially negative impact*", and that the profitability of rivals would be "*likely to decrease*" and that they "*may*" find it more difficult to develop their products. We do not challenge any of these conclusions. However, we do find it noteworthy that there appears to be no (redacted) empirical analysis of the magnitude of these directional effects. The Decision notes that lower profitability and lower incentives to invest in R&D may weaken the competitive constraint from rivals,<sup>49</sup> and yet earlier had pointed out the relatively limited sales that are needed in order for a rival to recoup R&D investments and achieve minimum viable scale.<sup>50</sup> Furthermore, the question of *why* and *whether* the merged entity would behave in this way is not addressed by the discussion of the Choi Plus model.

The Decision unfortunately does not contain an evaluation of the costs and benefits to Qualcomm of engaging in this raising rivals' costs or foreclosure strategy, and why such a strategy would be profitable for the merged entity but is not profitable for NFC today. Questions as to OEM reaction to such a strategy remain open – would they be able to act to deter Qualcomm from such a strategy, for example, by switching away from its LTE baseband chipset (as seemed to be the case in the discussion of mixed bundling above)?

In considering OEMs' ability to switch away from Qualcomm, it is clearly relevant that it is the market leader today in the LTE baseband chipset market, with a revenue share in 2016 (the most recent year for which the Decision contains data) of 60–70%. However, MediaTek, a brand new entrant into this product market in 2014,<sup>51</sup> had taken a 20–30% share in just two years, while

Qualcomm's share dropped from 90–100% over the same two-year period. The decision does not address whether device OEMs may encourage MediaTek's growth for strategic reasons if they fear that Qualcomm may raise the costs of licensing MIFARE, or refuse to license it to third parties.<sup>52</sup> Nonetheless, the Commission's finding of dominance is consistent with its decision, announced the week after its merger decision, to fine Qualcomm €997 million for abusing its dominant position in LTE baseband chipsets.<sup>53</sup>

### Analysis of pure bundling

The Commission also investigated whether the parties would pursue a pure bundling strategy post-merger.<sup>54</sup> As for a mixed bundling strategy, the Commission found that the merged entity would have the *ability* to engage in a pure bundling strategy, combining baseband chips with NFC and MIFARE enabled SE chips.<sup>55</sup> However, due to a lack of economic evidence, the parties' internal documents, and the fact that it was economically beneficial to continue offering the two products separately, the Commission found that the merged entity lacked an *incentive* to engage in such a strategy. In any case, even if the merging party did have an incentive to engage in tying or pure bundling, there was no evidence to suggest that such conduct would lead to any significant foreclosure effects.<sup>56</sup> This seems wholly consistent with the Commission's analysis of why mixed bundling would not have anti-competitive effects.

## 5 Interoperability

Several competitors raised concerns during the investigation that the merged entity would have the ability and incentive to degrade the interoperability of Qualcomm's LTE baseband chips and NXP's NFC and SE chips with rivals' standalone components. This would mean OEMs would prefer the merged entity's offering, foreclosing rivals from the market.<sup>57</sup>

The Commission found that the merged entity would have the *ability* to degrade the interoperability between Qualcomm's baseband chipsets and other suppliers' NFC and SE chips or between other suppliers' baseband chipsets and NXP's NFC and SE chips. Interoperability between the components is necessary on both the baseband chipset side as well as the NFC and SE chip side. Many respondents (both rivals and device OEMs) presented multiple feasible ways the merged entity could degrade interoperability.<sup>58</sup> The merged entity could degrade interoperability by withholding information and commands to third-party suppliers.<sup>59</sup> The Commission therefore considered that *"the merged entity would have the ability to degrade interoperability between Qualcomm's baseband chipsets and other suppliers' NFC and SE chips or between other suppliers' baseband chipsets and NXP's NFC and SE chips"*.<sup>60</sup>

The Commission also found that the merged entity would have the *incentive* to engage in this strategy.<sup>61</sup> First, both competitors and customers believed the parties would have the incentive. Second, the Commission's phase 1 and 2 investigations provided *"some indications"* that did not support the parties' claims that they had never tried degrading (or refused support/information) in the past.<sup>62</sup> Third, baseband chipsets are an essential component of any mobile device and a major purchase decision. Therefore, those customers choosing Qualcomm's baseband chips would be much less likely to purchase NFC/SE chips from a rival supplier if the merged entity pursued this strategy. Finally, the Commission asserted that providing information and support to third parties is costly. Therefore, in summary, the Commission found that the merged entity would *"internalise any profit gains from diverting [baseband chipset] customers from third party suppliers to its own NFC/SE*

*products"*.<sup>63</sup> The Commission therefore *"considers that the merged entity would find it less profitable to invest in supporting third parties' products to successfully interact with its LTE baseband chipsets and its NFC/SE chips respectively, compared to the pre-merger situation, where the Notifying Party did not have any in-house production of NFC/SE chips"*.<sup>64</sup>

As regards effects, in the context of a mixed bundling strategy as described earlier in this section, the Commission found that degrading interoperability would likely compound the foreclosure effects from increasing MIFARE royalties.<sup>65</sup>

What is striking about this analysis is that it does not address why OEMs would persist with purchasing Qualcomm's products in the face of any degradation in interoperability. Why would they not switch to rival baseband LTE suppliers who offer better interoperability? Qualcomm was clearly the market leader and the Commission had found it to be dominant, but it did seem to be facing growing competitive challenge (as discussed above) and worsening the appeal of its baseband chipsets by reducing their interoperability might have posed real competitive risks to Qualcomm. This issue may explain why this theory of harm relating to interoperability was not put forward as a standalone theory of harm, but rather as a concern that compounded the anti-competitive effects from mixed bundling and MIFARE discussed above.

## 6 Intellectual Property

The Commission also found that the parties both hold a significant amount of intellectual property (IP), particularly in NFC technology, including SEPs and non-SEPs relating to NFC chips. The Commission concluded that the combination of the parties' IP portfolios would result in a *"disproportionate"* increase in bargaining power and negotiated royalties,<sup>66</sup> i.e. an increase that is above the sum of the patent holders' pre-merger bargaining power and royalties.<sup>67</sup>

As discussed above, Qualcomm addressed these concerns by committing not to acquire the NFC SEPs of NXP as well as certain non-SEPs, and to ensure that royalty-free licences to these patents were granted for three years. In addition, Qualcomm committed not to enforce its rights on the NXP acquired patents (certain non-SEPs) against other companies, and to grant worldwide royalty-free licences to those patents.

As its starting point, the Commission examined the parties' pre-merger licensing practices, which differed from each other in several respects:

- Qualcomm engages in "device-level licensing" only, i.e. it licenses its IP to end-device manufacturers only.<sup>68</sup> NXP, by contrast, licenses to device manufacturers as well as to rival component manufacturers.<sup>69</sup>
- When NXP sells NFC chips to mobile device OEMs, the sale of its chips "exhausts" its IP claims relating to patents reading on its chips *vis-à-vis* its customers.<sup>70</sup> Qualcomm, by contrast, does not. When it sells baseband chipsets to its customers, it requires its customers to take a licence to its cellular SEPs, which has been termed a "no licence no chip" policy.<sup>71</sup>
- Qualcomm licenses its IP on a portfolio basis.<sup>72</sup>

These descriptions in themselves do not explain how, in practice, an increase in Qualcomm's share of NFC patents to about a third of all NFC patents<sup>73</sup> would increase its royalties per patent in terms of the merged entity's bargaining with device OEMs or NFC/SE chip suppliers.

The Commission did note that there were various antitrust investigations and private litigation involving Qualcomm's IP licensing practices, albeit it took into account the Commitments in assessing the risk of any further anti-competitive effects and it did not identify any merger specific IP-related foreclosure concerns.

Given the Commission's findings, we focus on the adverse finding it did reach that the transaction would give rise to a "disproportionate" increase in bargaining power and royalties, which then required a remedy.

As a result of the transaction, the Commission believed that the merged IP portfolio of the parties would create a "critical mass" of patents as it would hold a patent portfolio three times as important as all other patent holders (except Sony).<sup>74</sup> The Commission finds that the increase in the scale of the patent portfolio brought about by the merger would – in the event of patent litigation – increase the likelihood that patent infringement is found in court and the scope of remedies imposed. This improved litigation strength and would in turn disproportionately strengthen Qualcomm's bargaining position, enabling it to increase royalty rates for both SEPs (notwithstanding that these must be licensed on FRAND terms, thus recognising that the level of FRAND royalties is in practice influenced by the number of SEPs held) and non-SEPs (as it becomes harder to invent around non-SEPs as the portfolio of such SEPs held by the merged undertaking increases).<sup>75</sup>

The Commission examined Qualcomm's historic royalty rates, including what happened when IP was added to its portfolio in the past. While royalty rates appear to have remained relatively constant, the Commission believes that the standard rate might have fallen absent these ongoing additions and quality improvements to Qualcomm's IP portfolio. It therefore concludes that the transaction would increase royalty rates relative to a no-merger counterfactual.<sup>76</sup>

While the merged patent portfolio might *directionally* increase Qualcomm's bargaining strength and royalty rates, the *magnitude* of this effect is not explicitly examined, although the Commission states that the effect is likely to be significant. The Commission seems to have found an internal document relating to a similar but different planned transaction that would have led to an "exponential increase" in the parties' respective licensing revenues.<sup>77</sup>

Finally, it is not entirely clear to us why Qualcomm's litigation capabilities contribute to the Commission's finding relating to its IP theory of harm.<sup>78</sup> Device OEMs and rival suppliers also appear to be well-resourced companies capable of undertaking litigation, and presumably have similar access to litigation funding if required. However, we would see this as an incidental point, rather than the key driver of the Commission's adverse finding.

## 7 Conclusions

In conclusion, this merger highlights the Commission's willingness (and ability) to impose wide-ranging remedies if it fears a merger between firms selling complementary products could lead to anti-competitive conglomerate effects. It is clear in this case that, as with many cases examined in phase 2, significant concerns raised by customers and competitors have contributed to the in-depth review which lasted over seven months.

While in this case the Commission did not find concerns relating to mixed or pure bundling of LTE and NFC/SE chips, it did find an ability, incentive and potential effect on competition relating to the licensing of MIFARE technology (in conjunction with mixed bundling of LTE and NFC/SE chips), and the interoperability of the merged entity's products with components of competitors. In our view, these adverse findings were heavily influenced by the Commission's findings of dominance in relation to both MIFARE and LTE baseband chipsets, and the active complainants faced by Qualcomm. These adverse findings may also have been influenced by the Commission's investigation of Qualcomm for abuse of a dominant position in LTE baseband chipsets, which resulted in it being fined nearly €1 billion the following week.

It is also striking that the Commission's rejection of concerns relating to mixed bundling (and pure bundling to a slightly lesser extent) in isolation did not rest on concluding that the merged entity would not have the ability or incentives to engage in such bundling, but that customers and competitors had effective counterstrategies open to them such that there were no appreciable anti-competitive effects.

As indicated in the discussion above, there are places in the decision where certain interesting questions have been left unanswered, at least from the public version of the decision. While we do not suggest that the Commission reached the wrong conclusion in this case, it would have been interesting to see in the Decision some further analysis of incentives and effects, and in particular a quantification of the magnitude as well as the direction of the some of the effects on competition identified.

While interoperability remedies have been adopted in several recent semiconductor mergers (*Inter/McAfee*,<sup>79</sup> *Intel/Altera*,<sup>80</sup> and *Broadcom/Brocade*<sup>81</sup>), the MIFARE remedy is somewhat novel given the nascent consumer demand for transport payments using this particular smartphone technology.<sup>82</sup> This perhaps also highlights that advisors should take a forward-looking approach to consider the essentiality of inputs such as MIFARE, even if it can be reasonably argued that these inputs were not generally essential in the recent past.

If the value of MIFARE was expected to increase in the future, then a remedy capping royalties to those set out in prevailing licensing agreements might also be viewed as being harsh to the merging parties.

As discussed above, the Commission's analysis of how a merger might increase the parties' bargaining strength in relation to IP is also very interesting, since it highlights that mergers of IP portfolios may raise competition concerns and that this issue warrants careful consideration.

In short, *Qualcomm/NXP* was not a textbook conglomerate merger, but a complex case that raised a variety of challenging issues. The decision makes clear that in cases raising potential conglomerate concerns, merging parties should be prepared to engage in careful economic modelling of foreclosure, particularly when rival complainants are well-resourced and submit their own economic modelling, as was the case in *Qualcomm/NXP*.

## Endnotes

1. Qualcomm press release dated 26 July 2018: "Qualcomm Announces Termination of NXP Acquisition and Board Authorization for \$30 Billion Stock Repurchase Program" (available at <https://www.qualcomm.com/news/releases/2018/07/26/qualcomm-announces-termination-nxp-acquisition-and-board-authorization-30>).
2. For example, the Commission investigated conglomerate competition concerns in detail in *Essilor/Luxottica* (2018) (which was cleared unconditionally at phase 2) and *Bayer/Monsanto* (2018) (where conglomerate concerns were ultimately dismissed and the merger was cleared subject to remedies at phase 2, with the remedies addressing horizontal concerns associated with a loss of competition between the parties).
3. Case M.8306 Qualcomm/NXP Semiconductors, Article 8(2) decision dated 18 January 2018 (the Decision).
4. The Commission examined and dismissed concerns relating to semiconductors for automotive appliances and the internet of things (Decision paragraphs 45 and 56). These issues are not discussed further in this chapter.
5. Revenue share of LTE baseband chipsets in 2016, excluding captive sales by Samsung, HiSilicon and Texas Instruments.

- Decision, Table 10 paragraph 370. It should be noted that Qualcomm's market share fell from 90–100% in 2014 to 60–70% in 2016, reflecting the growth of a new entrant, MediaTek, which increased its market share from 0–5% in 2014 to 20–30% in 2016.
6. Revenue share. Qualcomm abandoned its NFC development programme in 2014 and ceased shipping NFC chips in 2016 (Decision paragraph 372, Table 11 and footnote 350).
  7. Revenue share (Decision Table 12).
  8. Decision paragraph 480.
  9. Decision paragraph 435.
  10. Decision paragraph 436.
  11. Decision paragraph 428.
  12. Decision paragraph 670.
  13. Decision paragraph 437.
  14. Decision paragraph 404.
  15. Decision paragraph 424.
  16. Decision paragraph 518.
  17. In “pure bundling”, by contrast, the products are only sold together in fixed proportions (e.g. cars are typically sold with four wheels).
  18. Decision paragraph 496.
  19. Decision paragraph 545.
  20. For example, the Commission's Guidelines on non-horizontal mergers emphasise that vertical mergers provide substantial scope for efficiencies (see paragraphs 13 and 14).
  21. Spulber, Daniel F., “Complementary Monopolies and Bargaining”, *Journal of Law and Economics*, vol. 60 (February 2017). As an aside, we note that the author acknowledges research support from Qualcomm.
  22. Decision paragraph 528.
  23. Decision paragraph 585.
  24. Decision paragraph 585.
  25. Choi, Jay Pail, “Mergers with bundling in complementary markets”, *The Journal of Industrial Economics*, 56.3 (2008): 553–577.
  26. Decision paragraph 594.
  27. Decision paragraph 587.
  28. Decision paragraph 588.
  29. Decision paragraph 595.
  30. Decision paragraph 633.
  31. Decision paragraphs 635–641.
  32. Choi, Jay Pail, “Mergers with bundling in complementary markets”, *The Journal of Industrial Economics*, 56.3 (2008): 553–577.
  33. Decision paragraph 637.
  34. Decision paragraph 640.
  35. Decision paragraph 641.
  36. Decision paragraph 648.
  37. Decision paragraph 651.
  38. Decision paragraph 652.
  39. Decision paragraph 653.
  40. Decision paragraph 654.
  41. Decision paragraph 656.
  42. Decision paragraph 659.
  43. Decision paragraph 661.
  44. Decision Table 10 paragraph 370.
  45. Decision paragraphs 662–3.
  46. Decision paragraph 689.
  47. Decision paragraph 670.
  48. Decision paragraph 685.
  49. Decision paragraph 685.
  50. Decision paragraph 659.
  51. Decision paragraph 386.
  52. The Commission's decision refers (paragraph 400) to the fact that MediaTek does not supply chipsets that support the full CDMA standard (it addresses segments of this only). The Decision also (paragraph 386) refers to the fact that MediaTek is focused on mainstream baseband chipsets, and not the premium end of the market. MediaTek's ability to expand further might be limited if it would be costly for it to supply chipsets that support the full CDMA standard or to expand into the premium end of the market.
  53. See the European Commission press release dated 24 January 2018, “Antitrust: Commission fines Qualcomm €997 million for abuse of dominant market position”, available at [http://europa.eu/rapid/press-release\\_IP-18-421\\_en.htm](http://europa.eu/rapid/press-release_IP-18-421_en.htm).
  54. Decision Section 7.4.3.
  55. Decision paragraph 734.
  56. Decision paragraph 767.
  57. Decision paragraph 768.
  58. Decision 781 and 783.
  59. Decision paragraph 782.
  60. Decision paragraph 784.
  61. Decision paragraphs 784 and 785.
  62. Decision paragraph 790.
  63. Decision paragraph 792.
  64. Decision paragraph 792.
  65. Decision paragraph 794.
  66. Decision paragraph 808.
  67. Decision paragraph 819.
  68. Decision paragraph 832.
  69. Decision paragraphs 826–7.
  70. Decision paragraph 826.
  71. Decision paragraph 833.
  72. Decision paragraph 835.
  73. Decision paragraph 864.
  74. Decision paragraph 877.
  75. Decision paragraph 867.
  76. Decision paragraphs 902–918.
  77. Decision paragraphs 874–876.
  78. Decision paragraph 870.
  79. Case COMP/M.5984 – *Intel/McAfee*. Commission decision of 26 January 2011.
  80. Case COMP/M.7688 – *Intel/Altera*. Commission decision of 14 October 2015.
  81. Case COMP/M.8314 – *Broadcom/Brocade*. Commission decision of 12 May 2017.
  82. Competition Merger Brief, Issue 1/2018 – Article 1.



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