DEPARTMENT OF JUSTICE

Patent Portfolio Acquisitions:
An Economic Analysis

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Presented at
Fifth Annual Searle Conference on
Antitrust Economics and Competition Policy

Northwestern University, Chicago, IL

September 21, 2012

Good evening. Thank you very much for being here tonight. I would like to thank the organizers for inviting me; I greatly appreciate a second opportunity to speak at such a substantive and enjoyable conference. Thank you to Bill for putting together an impressive program, and to Derek for fantastic organization, as usual.

Tonight I would like to discuss patent portfolio transactions. I will show that the antitrust analysis, undertaken from an economist's perspective, depends on the business model of the buyer. As you know, the standard under Section 7 is whether the effect of a transaction may be to substantially lessen competition. The analysis required to answer this question is necessarily forward-looking --- what will the new combined entity do? How will they price? With whom will they contract, and on what terms? Knowing the strategy and business model of the buyer is a great help in making this forward-looking analysis as accurate as possible. What I hope to accomplish in this talk is lay out an economic model of several types of patent acquisitions, and demonstrate what the model shows us concerning the impact of patent portfolio sales. Under the conditions I specify, some transfers raise costs and disadvantage consumers, as I will explain below. My discussion tonight is, of course, an academic exercise and does not necessarily reflect any particular approach that the Department of Justice might employ in considering the effects of a particular transaction.

My base case is that the initial owner of the IP is a Practicing Entity, which I will call PE for short. This firm operates in a broad sector of the economy (I will take as an example information and communication technology, or ICT) and sells a product, but does not participate in the focal market of interest to our analysis. Furthermore, it has a patent portfolio of average size, with both SEPs and non-SEPs, and it belongs to the industry SSOs. These conditions are designed to ensure that the PE can cross-license with the firms in any part of the ICT sector, including the market of interest, but that its product does not compete directly with the products of the focal firms. When the PE negotiates over royalties it owes for its products, it can barter its own IP in exchange for royalty payments. It can also offer licenses to its entire portfolio of patents, including those that it might own going forward. As a result, royalties will often be bartered down to zero, meaning marginal costs for IP are zero in those cases. In other cases marginal costs will be small due to cross-licensing of asymmetric portfolios. So while the PE could sue another firm to attempt to obtain a higher royalty, it could be sued in return, and the net result of

that dynamic is a cross license. The most potent weapon an IP owner has is the threat of an injunction or exclusion order from a court, which, if granted, would remove the potential licensee's product from the market. The power to remove another firm's product from the market requires, in principle, only one valid infringed patent that cannot be designed around. As a firm's portfolio size grows, the probability it owns such a patent likewise increases, though at a declining rate. Thus large portfolios that are not exactly the same size may nonetheless provide almost equal bargaining power. For this reason, symmetric injunction threats by PE firms can result in zero-royalty cross licenses.

My analysis throughout the talk will take the PE as the initial owner of the patents, and we will consider what pricing changes flow from the sale of those patents. I will show that, in this model, costs and prices depend in a foreseeable way on the business model of the buyer.

As an aside, note that I am setting up a benchmark of a firm selling its own product that is also vertically integrated into the IP market. This is not a standard benchmark that an IO research economist would use; the vertically disintegrated firm in an efficient market should generate market prices that internalize all costs of that segment of the supply chain and would generally serve as a more informative benchmark. However, in an analysis of transactions under Clayton 7, the benchmark is the pre-transaction ownership status of those assets. In addition, the PE benchmark is often appealed to by industry participants in the popular press.

Also note that there are several reasons to be cautious about using the vertically disintegrated firm as the benchmark. In the ICT sector, the market is distorted by the threat of injunctions and exclusions described above and the problem of *ex post* licensing, both of which may lead to holdup. It is widely recognized that these problems lead to inefficiencies in licensing, exacerbated by the very poor quality of many patents. The prices achieved by negotiation between a buyer and an IP supplier in this environment will therefore tend *not* to reflect the value of the patent before it was incorporated into the product or standard, and will *not* be at levels that most stimulate innovation. For example, in a standard model, the high transaction cost of determining the value of a patent leads to royalty rates that do not reflect the value of the technology described by the patent, but rather the higher value of avoiding litigation. This outcome – when holdup is threatened, royalty rates rise – is the working assumption I use going

forward in my analysis. (In a legal system that ensured modest royalty payments, reflective of the contribution of the technology prior to complementary investments and so forth, then the threat point of the licensor would be reduced. As a consequence, equilibrium negotiated royalty rates would also be lower. However, I think it is more realistic to include holdup as the working assumption in my model.)

The first type of buyer I will consider is a non-practicing entity, or NPE. The textbook example of a perfectly efficient NPE is not primarily the one I will be analyzing today. For example, imagine if a faculty member at MIT or a garage entrepreneur patented some useful innovation, and then a colleague founded a startup to commercialize the innovation. The patent owner (MIT or the garage guy in my example) would negotiate license fees for the patent from startup, but would not own the business, so they would be categorized as NPEs. One can see from this example why a "textbook" NPE is efficient. First, the negotiation over the royalty will take place *ex ante*, before the startup begins operation and when it has the choice to use different technology or not exist at all. Therefore, no holdup is present. Second, the NPE actively uses the innovation by supporting the startup and licensing to it. Thus, the NPE is stimulating new products or services that would otherwise be unavailable. Third, the licensee learns about the innovation from the patent-holder, rather than inventing a product on its own and finding that some of its practices have been patented by others. This more likely means that the patent is a new and useful innovation. In this case of a textbook NPE, we expect that the royalty reflects the true economic value of the patent; there is no holdup; and new products available to consumers are increased. These factors are not present for the next type of NPE.

The NPE I model here buys large quantities of patents from others, and its business model is to monetize that intellectual property. I will refer to it as a troll going forward to reduce the number of acronyms in this talk. In the ICT sector, patents are often weak and vague, especially software patents. Any single patent may not prove much of a threat to a potential licensee if the chance of it being both valid and infringed is low. However, by combining weak patents into large groups, the troll increases the likelihood that the licensee has infringed at least one valid patent in the portfolio. The large size of the troll's intellectual property portfolio means it is expensive for a potential licensee to prove it is *not* infringing the portfolio. If the licensee declares he should not

pay, the troll will produce ten patents on which it threatens to seek an injunction or exclusion order if the portfolio royalty is not paid. If the licensee invests in determining it has not infringed those ten, the troll will produce another ten. Since the troll has thousands of patents, the total cost of defense can become very high and the licensee may rationally choose to pay a royalty to license the portfolio. Furthermore, the troll has invested in organizational capabilities to assess the value of patents and teams of people who are specialized in negotiating royalties. These teams find potential infringers and maximize revenue, using the outside options of litigation, injunctions, and exclusion orders to raise revenue, if those are possibilities allowed by the situation.

In a world where the transaction cost of determining infringement and validity are high, practicing entities are already using the technology and will incur costs to design around it, and a troll can threaten injunctions or exclusion orders, we will see trolls obtaining royalties in excess of the market value of the IP. Now suppose that there are many thousands of patents that read on a widget, and many trolls seeking royalty payments in the economy. Suppose each troll has IP worth .2% of the value of the final product, but each negotiates for 2%. Further suppose there are 20 trolls doing this. The royalty stack in this example becomes 40% of the final value of the product. Inefficient royalty stacking can therefore raise costs for widget makers; these higher costs will raise prices to final consumers, or in the longer run reduce entry into widgets or drive widget firms out of the market. (Note that any one troll does not want to drive the widget maker out of the market, as that would lower his profits. However, there is a public good problem here.) The reason royalty stacking does not happen in the symmetric PE case in the model is that the high licensing demands cancel each other out.

A second tool the troll can use is to take advantage of the incomplete nature of contracts already written on the intellectual property it has purchased. For example, license contracts can specify a certain royalty rate for a license to a firm's entire portfolio. It may be the case that those licenses do not continue to cover the patents in the portfolio in the event that they should leave the portfolio of the original firm. Assume further that the portfolio sale we are modeling contains some of the patents desired by licensees, but not all. So a licensee with a product that practices those patents - some of which are sold and some of which are not - will find that it no longer

holds a license to all the IP it needs. If it was paying 2% for the portfolio, it now must continue to pay the 2%, plus pay an additional fee to the buyer for old IP to which it formerly had access as part of a bundle. Its marginal costs clearly rise in this circumstance. If the patents are sold to another PE, by contrast, they are subsumed into the bundle of IP to which licensees may already have access. In my model, if the potential licensee already has a portfolio cross-license with the buyer of the IP, its costs to gain rights to the patents being sold would be unchanged.

Another important set of incomplete contracts are the FRAND commitments concerning SEPs into which the original owner may have entered. A troll may assert that it is not clear that FRAND commitments travel with the IP, and that in any case it has a different notion of FRAND than the original owner, and therefore it will negotiate new royalty agreements for the portfolio. This would allow the troll to engage in holdup and increase royalty rates on the SEPs it has purchased. Also note that these two examples of incomplete contracts interact. Suppose the FRAND commitment leads to a negotiated 2% royalty rate for all the IP a PE owns that is necessary to implement the standard -- and that might be 1000 patents. If the PE divides that group of 1000 into five subgroups, and sells four packages to four trolls, then each can abide by the letter of the negotiated FRAND royalty rates (2% for the portfolio) and effectively raise the total royalty rate paid by manufacturers to 10%. If another PE should purchase those same patents we get a different result; in my model it has also made a FRAND commitment to the SSO and therefore the acquired patents are subsumed in the terms of that commitment.

Under the assumptions in this framework, we see that incomplete contracts for IP and significant inefficiencies in IP licensing lead to large differences in licensing outcomes between PEs and trolls.

The second type of buyer I will consider is a practicing entity that competes in the product market of interest. I will refer to it as a PPE. This practicing entity responds to incentives concerning diversion from competitors' products to its own product. Once again, I assume that this firm owns a balanced and significant portfolio of patents and belongs to SSOs. I further assume that the PPE is an oligopolist, and therefore earns measurable sales diversion to its own product, should its rivals set higher prices or leave the market. For this reason the PPE has

asymmetric incentives, unlike a PE. The PE is happy to cross license with everyone who has equivalently valuable IP. The troll is likewise happy to license to anyone who will pay its royalty. In contrast, the PPE appreciates that royalties that raise the marginal cost of its competitors will generate not just increased royalty revenue, but increased sales of its own product. The high royalties raise rivals' costs (RRC). Moreover, in the bargaining game between the firms concerning whether a patent is valid or infringed, the PPE has an additional incentive to threaten an injunction or an exclusion order. Should such actions be effective, the rival product would be withdrawn from the market and significant diversion would accrue to the PPE's product. In this setting, product market competition alters the PPE's calculation concerning how aggressively to price its patent portfolio; its incentive is to charge more to competitors, which distorts competition in the market. This case should be familiar because it is a classic vertical merger: in this instance a firm competing in the market of interest is acquiring assets in an important input market, intellectual property. The PPE may also have an incentive to block entry into its markets in a way that a troll does not. If the patent is not a standard essential patent, then the owner may be able to exclude, *ex ante*, an entrant from its innovation. If the entrant is small and has no portfolio with which to trade, the entrant may have no way to obtain a license to compete with the PPE. Note that the same incomplete contracts that create leverage for the troll when it buys patents are here also. Inefficiencies in licensing and incomplete contracts give the PPE the ability to extract more than the previous owners of the SEPs; the diversion effect gives the PPE an incentive to extract more than the previous PE owner from its product market competitors.

The PPE setting in which I am particularly interested is the case where the PPE sponsors a mobile device platform. These platforms compete for final consumers. In the economy today, platform competition among smartphones and tablets is vigorous. I can allow for different business models of platform sponsorship by not requiring that the PPE's revenue model be based on sales of the widget. Instead it could be based on sales of inputs (e.g. an operating system) or complementary products (e.g. advertising). One might think that organizational form would matter because the party paying the royalty is the OEM, the actual manufacturer of the equipment used by consumers. However, even firms that earn revenue from the sale of widgets may not actually do their own manufacturing. A platform sponsor who owns relevant IP can

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negotiate licenses that flow through to its OEMs. The platform sponsor also internalizes the profit impact of exclusion threats and other negotiation tactics over IP licenses.

Suppose that we allow two competing PPEs to vertically integrate into intellectual property. Assume further that each can threaten injunctions or exclusions to the same degree. In the case of symmetric PEs modeled above, these incentives cancelled and we obtained low marginal costs with cross licenses. In the model I present here, PPE threats do not cancel -- though the same reasoning suggests that they should. The reason for the different assumption is only empirical: we see global litigation among platform competitors, rather than the "patent peace" some observers thought would occur with heavily armed competitors. The PPEs we read about in the newspaper are certainly not withdrawing demands for royalties and exclusion orders in response to equivalent actions by platform competitors. I do not have a good explanation for why this is the case. It's an empirical puzzle that would make an excellent research topic. It may be that the incentives to be aggressive are high at particular moments in the evolution of competition. If platforms are at a tipping point, or perceive a chance to obtain a sustainable competitive advantage over rivals, these actions may be worth taking.

A third business model to consider as a buyer of IP portfolios is a joint venture between a troll and a PPE. Assume such a JV works as follows: the PPE sells the intellectual property to the JV while retaining a license for itself. Then the JV, which is a new and separate corporation, is charged with generating royalty revenue from its IP assets, which it can do by using the reputation and litigation economics/skills of the troll. It also has no product to be threatened with countersuits and exclusion. Profits are divided between the two owners of the new entity. All the incentives of the simple troll model are included here, including exploitation of incomplete contracts, royalty stacking, and lack of cross-licensing -- all of which require that the patent is no longer owned by the PPE. The higher royalty rates will be applied to firms in the industry that are not platform competitors. In addition, the preference of the PPE is to charge higher prices to platform competitors to create diversion, and these preferences may be incorporated into the incentives or structure of the JV. In such a case the joint venture combines the reasons for higher royalty rates from both models: higher costs for many other PE firms in

the broad industry, and even higher marginal costs for platform competitors who compete with the JV owner.

A possible further outcome in this case is that more than one product market competitor enables a troll to engage in raising rivals' costs. Should a second firm in the widget market start a JV with another troll, this would raise costs even further and reduce output further. The ability to keep the JV secret, and therefore not raise a strategic response, would be valuable in this context. If the JV is set up using a shell corporation and the transfer of the patents is not disclosed, it may be difficult for licensees to know whether there is a product market competitor behind the troll or not.

The last business model I will address is a joint venture between the troll and more than one PPE. I model the asset transfer as follows: the two PPEs sell their patents to the JV. Each retains a license for itself and grants a license to its partner PPE. Then the JV owns the patents and has some agreed upon objective for earning revenue. Such a firm has the troll incentives - now that the patents are no longer owned by a practicing entity - and the diversion incentives already discussed. In this case, in addition, the diversion incentives are toward both the JV partners and away from the PPE(s) that are not cooperating with the troll. Such a JV may be helping product market competitors effectively coordinate or collude to disadvantage a rival. The JV partners are firms that are in theory competing with each other in the product market, and instead are cooperating, through the troll, to raise rivals' costs and share the profits from doing so.

Now that I have provided a taxonomy of owners, we can return to the analysis of asset acquisitions and the standard laid down in Section 7. We can clearly see what outcomes will arise from transfer of the patents from a PE to a troll under the assumptions laid out above: marginal costs of all industry participants will increase. If there are enough trolls, the royalty stack could get large enough to make some products unprofitable to develop or produce. These higher royalty rates will raise the prices paid by consumers, and may reduce consumer choice to the extent that expected high royalties discourage entry and innovation. There are no offsetting efficiencies from trolls in this model.

A sale to a PPE is a vertical merger between a product market competitor and critical inputs. Vertical mergers are a type of acquisition that competition authorities are long accustomed to analyzing. There are many formal models that demonstrate how anticompetitive outcomes can arise from vertical mergers, many of which were contributed by people in this room. A PPE transaction results in a distortion of competition: the PPE has greater incentive than the PE to raise rivals' costs and seek exclusion of rivals' products from the market, and has greater ability to raise royalties to the extent that IP contracts are imperfect. Thus there is potential harm to competition in this type of case using the standard antitrust vertical merger framework.

An IP asset sale to a joint venture of a PPE and a troll both distorts competition and raises marginal costs to other parties in my setup. Potential harm to competition arises for the same reason as in the PPE case, and in addition, costs to producers in the sector will be higher. Higher royalty rates will again lead to higher prices and potentially less innovation.

An IP sale to a joint venture of multiple PPEs and a troll has the additional problem of potentially enabling or facilitating horizontal collusion designed to distort competition. Such a patent portfolio acquisition could be problematic under the antitrust laws for three reasons: the diversion incentive due to the vertical merger, higher costs and prices overall, and potential collusion by horizontal competitors.

It is important to note that outside my model trolls have the potential to generate efficiencies. Trolls create a market for intellectual property that potentially allows the market for ideas to function more efficiently. For example, the garage inventor in the opening example could sell his patent for a lump sum to use immediately, rather than receiving royalties over twenty years. Small inventors who cannot commercialize or monetize their patents due to lacking organizational capability or access to capital may be supported by being able to sell the asset to a larger firm. More generally, inventive activity can lie in any sort of organization, vertically-integrated into manufacturing, a research shop, a person in her garage, etc., if the market for both sale and rental of IP functions well. Trolls may be able to help this happen and improve efficiency in this sector.

A second potential efficiency of trolls is their skill at monetizing patents. A small inventor may not employ attorneys who can find licensees, negotiate with them, and litigate if necessary. Trolls have economies of scale and specialized staff to engage in these activities. However, note that the owner of intellectual property who would like to monetize it can do so without selling the patents. The owner can simply hire a troll as an agent with instructions to collect revenue. An agent troll would exploit its organizational capabilities as previously discussed. A critical difference in this model is that the troll would not own the patents, and therefore would have to work within the limits of previous contracts agreed to by the patent owner. Furthermore, the troll would negotiate and litigate in the name of the owner of the patents, which would aid transparency in this market.

The secrecy and lack of transparency facilitated by trolls plays an interesting role in the inefficiencies we have discussed. For example, if a potential licensee knew that the patents with which it was being threatened had recently been sold to a troll by Firm X, that licensee might re-evaluate how to write its contracts with Firm X, it might update its view of Firm X's reputation, it might decide to initiate countersuits against Firm X, and so forth. In general, the long term relationship between the licensee and Firm X would be affected, despite the fact that the troll was the party actually engaging in the licensing negotiations or litigation. If a valuable business relationship could be harmed by the actions of the troll, this raises the possibility that the seller of the patents might internalize more of the effects its patent sale creates. It is an interesting policy question to consider whether more transparency would increase the role played by reputation, and enable firms themselves to alleviate some of the inefficiencies caused by patent sales to non-practicing entities.

My last slide shows the taxonomy of the model and the effects of IP sales in a summary table. I hope I have raised interesting issues we can talk about during the rest of the conference. I am sure the discussion over how the antitrust laws can best be applied to these problems will be vigorous as we move forward with efforts to improve the functioning of the market for ideas. Thank you.

Patent Portfolio Acquisitions: an Economic Analysis

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Benchmark

- Practicing Entity
- Makes an information or communications product
- Owns IP: both SEPs and non-SEPs
- Belongs to standard-setting organizations, SSPs
- Does not compete in the focal market

Practicing Entity

- Can barter IP with those from which it needs to license
  - If portfolios similar, then result may be zero royalty, marginal cost = 0
  - If portfolios do not perfectly offset, transfer required, but barter makes marginal costs low
- Threat of injunction or exclusion order
  - Product at risk for all PEs
  - When licensing to each other, offsetting threats
  - Reduces impact of portfolio size

Probabilistic patents

- Shapiro (thicket 2001, probabilistic 2005)
- Any one patent may have a low probability of being valid and infringed
- With enough patents in the portfolio, the probability that one of them is valid and infringed becomes high
- Declining marginal benefit (through this mechanism) of incremental patent

Non-standard benchmark

- Practicing Entity with IP portfolio
- This firm is vertically integrated into intellectual property, a key input in the ICT industry
- More standard benchmark would be vertically disintegrated firm
- Market prices would capture social costs of all inputs
- Not as useful here...

Licensing inefficiencies

- Threat of injunctions and exclusion orders are widely recognized to create holdup and inefficiencies in licensing
- Holdup occurs ex post, after widgets designed and made, complementary investments sunk, and standards set
- Rents can be appropriated that are not due to the value of the intellectual property ex ante: higher royalty rates, and if rational anticipation, decreased innovation
- Cost of determining true value of patent through litigation is high
- Royalty rates reflect these inefficiencies rather than perfectly functioning market for ideas => vertically disintegrated firm makes poor benchmark

Section 7: asset acquisitions

- Use the benchmark of PE ownership to evaluate asset acquisitions
  - For the reasons just described
  - Also, often used by industry participants
- Will evaluate changes in incentives and costs for a taxonomy of buyers
- Sale will be from PE to one of four types of buyers

Textbook NPE

- Garage inventor
  - no li̧uidiţ or organization
  - Or perhaps University researcher
- Patents an invention and sells to NPE
- NPE licenses patent to startup
  - License negotiations are ex ante to creation of startup or product
  - Innovation stimulated
  - Startup learns about innovation through patent
  - Innovator gets return on useful activity
- => royalty rate reflects market value of innovation and NPE's role has increased innovation

Second model of NPE: Troll

- Purchases large quantities of patents from others
  - In ICT sector, recall that patents often weak
- Monetizes patents through royalties
  - Has organizational capabilities, economies of scale
- Large portfolio makes it expensive to prove no infringement
  - Litigation is expensive, injunctions/exclusions are threats
- Inefficient royalty stacking occurs when many trolls engage in this strategy (2% x #trolls)

Trolls and incomplete contracts: FRAND

- The PE has made FRAND commitments to an SSO
  - E.g. **1% for all the IP owned by PE required to implement standard X**
  - These patents are never identified or listed individually
- Troll can take advantage of undefined FRAND and make a new royalty demand
  - Perhaps charge 2.5% for the IP because "other" firms list 2.5% as a FRAND rate
  - Royalty demand could be in wide range due to undefined FRAND

Trolls and incomplete contracts: Portfolio licensing

- PE may have licensed on a portfolio basis
  - E.g. 2% royalty for all the IP you need from my portfolio
- Troll can abrogate portfolio license as asset is no longer part of PE portfolio, and make a new royalty demand
- Licensees may continue to need IP belonging to PE seller as well as IP sold to troll
  - Continue to pay 2% under original arrangement
  - Also pay royalty demand of troll for remaining IP
- Might be short term problem
  - Re-write contract so that license covers the patent going forward regardless of owner
  - Reduces value of patents if licensor agrees

Incomplete contracts

- Combine FRAND and portfolio effects with declining marginal benefit to additional patents
- PE has 1,000 SEPs and 2% portfolio rate and sells off groups of 200 to 4 trolls
  - Each troll mimics the FRAND rate of PE
  - Each troll offers portfolio license like original PE
- **Total royalty payments now 10% for same IP**
- By contrast, the sale of this IP to another PE would result in SEPs being included in PE's existing portfolio licenses -- no additional fee

Product market competitor: PPE

- Suppose IP sold by PE to PPE, a Practicing Entity that competes in the focal product market at issue
- PPE cares about diversion whereas PE does not
- PPE may exploit ambiguities in FRAND and incomplete contracts to increase royalties that Raise Rivals' Costs
- Moreover, should an injunction or exclusion order be upheld, PPE would benefit from diverted sales to its own product
- PPE has increased incentive to increase royalties due to diversion, and increased ability relative to PE due to contract ambiguities created by sale

PPE transfer is vertical merger

- This example should be familiar: it is a vertical merger, a staple of antitrust analysis
- PPE competes in product market and is acquiring essential/important input required by competitors, IP
- Competitors are not protected by pre-existing contracts for the IP
- Competition can be distorted in this setting (demonstrated by many classic models)
- Entry could become more difficult

PPE setting: mobile platforms

- Of particular interest today is the mobile device industry: smartphones and tablets
- Platform wars are in the newspaper frequently
- Does business model affect analysis? No
  - Apple and RIM: VI, revenue from sales of devices
  - MSFT: disintegrated, revenue from OS
  - Google: sponsor/organizer, revenue from advertising
- Platform sponsor with any model can acquire IP and license through to OEM

Empirical Puzzle

- Why don't PPE threats cancel?
  - We see dramatic litigation in the platform wars
  - Despite both sides being heavily "armed" with patents
  - PE against PE symmetric threats seem to cancel more often and lead to cross-licensing
- Something special about platform competition?
  - Tipping point?
  - Special moment of competitive import?

Joint Venture: PPE + troll

- Consider JV formed by PPE and troll
  - PPE sells IP to the JV; keeps license for itself
  - Troll operates the JV using its capabilities
- Two types of incentives for JV
  - Troll incentives leading to higher royalties for all licensees due to lack of cross-licensing and royalty stacking
  - Diversion incentives leading to higher royalties or more onerous licensing terms for product market competitors of JV PPE

JV: Multiple PPEs and a troll

- Consider the case of competing PPEs in a joint venture with a troll
  - Each PPE sells IP to the JV, while retaining a license for itself and the other PPE partners
- The troll raises royalty rates using the techniques described and has particular incentive to raise costs of the competitor(s) of the PPEs in the JV
  - Onerous licensing terms; threats of exclusion, etc
- Troll in this example is facilitating cooperation between product market competitors

Results: Sale of IP from PE to--

- Troll: higher royalties, royalty stacking
  - Marginal costs higher, prices higher, innovation discouraged => under usual model creates harm
- PPE: incentive and ability for higher royalties charged to product market competitors
  - RRC, competition distorted => standard vertical merger framework will generate harm
- JV: Troll and PPE: both of the above
- JV: Troll and multiple PPEs: above + cooperation
  - potential collusion between product market competitors => collusion in addition to the vertical merger framework will generate harm

Possible efficiencies from trolls

- Create market for ideas
  - As described in textbook case above: create liquidity, allow variety of organizational forms for innovation
- Lower transactions costs in market for ideas
  - Skilled at monetizing innovation, locating licensees, negotiating
  - Access to capital, economies of litigation
- Note: easy to outsource this service without asset sale
  - Would get efficiencies desired by small inventor
  - Would need to work within existing contracts, product would be at risk, reputation at risk

Secrecy

- What if competing PPE or PE decides to form retaliatory JV with different troll?
- Secrecy valuable:
  - Owners of JV shrouded
  - Transfer of patents not disclosed
- Effect of troll sale or JV might be different if transparency
  - Licensee might retaliate in the courts, license its own IP differently, or update its view of seller's reputation
  - Firms themselves might be able to reduce some of the effects of troll/JV if they had information about patents and source

Benchmark PE		PPE	Troll	Troll+PPE	Troll+PPEs
X	Can't cross-license MC > 0	X	√	√	√
X	Exploit incomplete contracts	X Unless rival	√	√	√
X	Inefficient royalty stacking	X if cross-license	√	√	√
X	Incentive to RRC	√	X	√	√
X	Cooperate to RRC	X	X	X	√