From Patent Thickets to Patent Networks: The Legal Infrastructure of the Digital Economy

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Majority Academic View

• Since the early 1980s, the patent system has “exploded” – issuance + damages + litigation.

• This is bad. It drowns innovation in an IP “thicket” or “anticommons”.
  – Transaction costs
  – Royalty stacking

• Solution: fewer or weaker patents, or both.
Minority View

• Markets are good at anticipating and fixing thicket problems (Merges 1999). Principal evidence in copyright markets (ASCAP, BMI).

• Suggestive evidence: patenting is intensive but output is up and prices are down in ICT markets.

• This paper brings new systematic evidence: the proliferation of “open” patent pools in ICT markets since the late 1990s.
Incidence of IP Pools (1900-2014)

Source: Barnett (2015)
Standards and ICT Markets

• ICT markets are filled with standards: USB, Firewire, MS Windows, WiFi, Bluetooth, etc.

• Standards are a precondition for achieving network effects.

• Standardization can be achieved in 3 ways:
  – State Monopolist (FCC)
  – Market Monopolist (MS, AT&T)
  – Market Association (DVD, Bluetooth, WiFi)
The Problem With Standards

• Standardization implies hold-up risk. That discourages adoption.

• So a credible commitment is required. How?
  – SSO bans patents (atypical)
  – SSO requires disclosure of all “essential” patents
  – SSO mandates “RAND” patent licensing

• All these instruments are imperfect . . .
The Pooling Solution

• Pooling complements standardization by providing licensees/adopters with (i) a single patent portfolio and (ii) a defined and fully enforceable set of terms and conditions.

• Standard/pool pairs in ICT markets. E.g.:
  – MPEG-2 (video codec) → MPEG LA
  – AAC (MP3) → Via Licensing
  – DVD → DVD 3C Consortium
Parameters of Pool Design

• Directional relationships: vertical/horizontal
  – Licensor/Licensor
  – Licensor/Licensee

• Asset flows: IP; $ (royalties)

• Management: internal/external
Idealized Pool Structures

Pool A

X Corp. ➔ Y Corp. ➔ Z Corp. ➔ POOL

→ = patent/IP flow
↔ = monetary flow

Pool B

X Corp. ➔ Y Corp. ➔ Z Corp. ➔ POOL ➔ Administrator

Fee ➔ L Corp.

<table>
<thead>
<tr>
<th>Pool Intermediary</th>
<th>First Pool Formed</th>
<th>Total Pools</th>
<th>Total Licensors</th>
<th>Total Licensees</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pools</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPEG-LA</td>
<td>1997</td>
<td>11</td>
<td>131</td>
<td>4046</td>
</tr>
<tr>
<td>SISVEL</td>
<td>1997</td>
<td>9</td>
<td>42</td>
<td>c.2099*</td>
</tr>
<tr>
<td>Sipro Lab Telecom</td>
<td>1998</td>
<td>5</td>
<td>34</td>
<td>c. 225*</td>
</tr>
<tr>
<td>Via Licensing</td>
<td>2003</td>
<td>8</td>
<td>14</td>
<td>c. 1761*</td>
</tr>
<tr>
<td>VoiceAge</td>
<td>2004</td>
<td>3</td>
<td>11</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Consortia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bluetooth SIG</td>
<td>1998</td>
<td>1</td>
<td>7</td>
<td>&gt;20000</td>
</tr>
<tr>
<td>DVD3C (One-Red)</td>
<td>1998</td>
<td>1</td>
<td>4</td>
<td>551</td>
</tr>
<tr>
<td>DVD6C</td>
<td>1999</td>
<td>1</td>
<td>10</td>
<td>467</td>
</tr>
<tr>
<td>Premier BD</td>
<td>2010</td>
<td>1</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td>One-Blue</td>
<td>2011</td>
<td>1</td>
<td>15</td>
<td>53</td>
</tr>
</tbody>
</table>
Network Graphs

- Node size = Number of other pools to which a given pool is connected by common membership of at least 1 licensor

- Edge thickness (line weight) = number of entities that are members-licensors in both of the linked pools

- Color = “pool family”
"Dominant" MPEG LA Pool Members

- Samsung
- Philips
- Mitsubishi
- JVC Kenwood
- Sony
- Cisco/Scientific Atlanta
- Panasonic
- Fujitsu
- Columbia Univ.
- Microsoft
- Toshiba
- LG
- GE (Tech. Dvlpmt.)

- Sharp
- Member = integrated hardware mfr
- = MPEG LA equity holder
Policy Implications

• The ubiquity of patent-pooling in ICT markets supports the minority view that markets self-correct for thicket effects.

• But this observation is normatively ambiguous. Do patent pools generate allocative (pricing/output) inefficiencies that offset transactional efficiencies?
The Commoditization Thesis

- Some patent pools in ICT markets are designed principally by large hardware manufacturers to commoditize the pooled technology. Commoditization shifts value to other non-IP components of the value chain in which those firms have a comparative advantage.

<table>
<thead>
<tr>
<th>Commoditizing Firm</th>
<th>Target Firm</th>
<th>Commoditized Feature</th>
<th>Non-Commoditized Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>IBM</td>
<td>PC Hardware</td>
<td>OS</td>
</tr>
<tr>
<td>MS</td>
<td>Netscape</td>
<td>Browser</td>
<td>OS</td>
</tr>
<tr>
<td>IBM</td>
<td>MS</td>
<td>OS (Linux)</td>
<td>Server hardware</td>
</tr>
<tr>
<td>Google</td>
<td>Content cos.</td>
<td>Content</td>
<td>Ads</td>
</tr>
</tbody>
</table>
Non-Price Evidence

• Pool composition: Dominated by large vertically integrated hardware manufacturers and telecom carriers.

• Pool “non-membership”: Patent pool coverage is often incomplete. Upstream non-integrated R&D suppliers often decline to participate, sometimes causing pools to fail (e.g., LTE pools).

• Protective non-price licensing terms:
  – Non-discrimination: licensor = licensee
  – Rate protection; royalty caps
  – Grant-back
  – Non-exclusivity; withdrawal rights
Pricing Evidence

• Why are there positive royalty rates?

• Limited pricing power:
  – Adoption pressures
  – Substitutes: independent licensing
  – Repeat-play pressures

• Gross v. net royalty rates: licensee payable **LESS** licensor receivable

• Using hypothetical calculations for Dell (large OEM), aggregate royalty payable to MPEG LA for 2012 = $2.64 per PC unit, which implies a .31% royalty on Dell’s total PC worldwide sales revenues. Well below estimated range of patent royalties for consumer electronics (3-6%).
## Estimated Implied Royalties to MPEG LA Pools for Large OEM in PC Market (2012 Data)

<table>
<thead>
<tr>
<th>Pool</th>
<th>License Rate</th>
<th>Annual Royalty Cap</th>
<th>Implied Rate on PC Sales Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVC/H.264</td>
<td>$.10 to $.20/unit</td>
<td>$6.5M</td>
<td>.013%</td>
</tr>
<tr>
<td>VC-1</td>
<td>Same</td>
<td>$5M</td>
<td>.013%</td>
</tr>
<tr>
<td>MPEG-4 Visual</td>
<td>Same</td>
<td>$2.5M</td>
<td>.008% (cap applies)</td>
</tr>
<tr>
<td>MVC</td>
<td>$.10/unit</td>
<td>$6.5M</td>
<td>.012%</td>
</tr>
<tr>
<td>MPEG2</td>
<td>$2/unit</td>
<td>None</td>
<td>.233%</td>
</tr>
<tr>
<td>1394 (Firewire)</td>
<td>$.25/unit</td>
<td>None</td>
<td>.029%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>.307%</strong></td>
</tr>
</tbody>
</table>
A New View on Patent Thickets

• Evidence for persistent thickets in patent-governed markets is weak. Markets self-correct whenever allowed to do so by antitrust authorities.

• Appropriately structured patent pools do not appear to carry high collusive risk. Principal policy risk is that prices for technology inputs are being pushed too low.

• The “thicket problem” is a weak basis for significant relaxations in current patent coverage.