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.

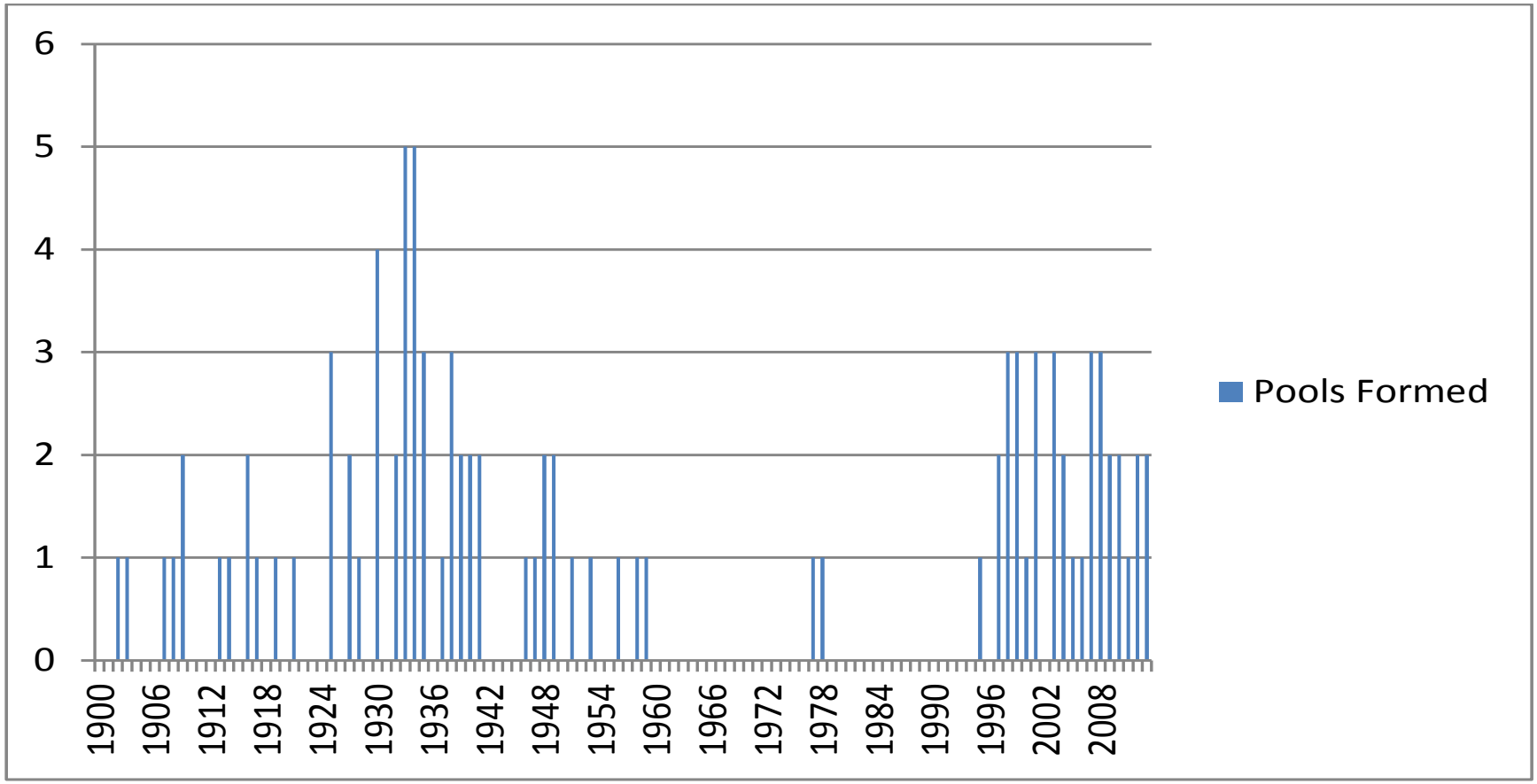
Minority View

- 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

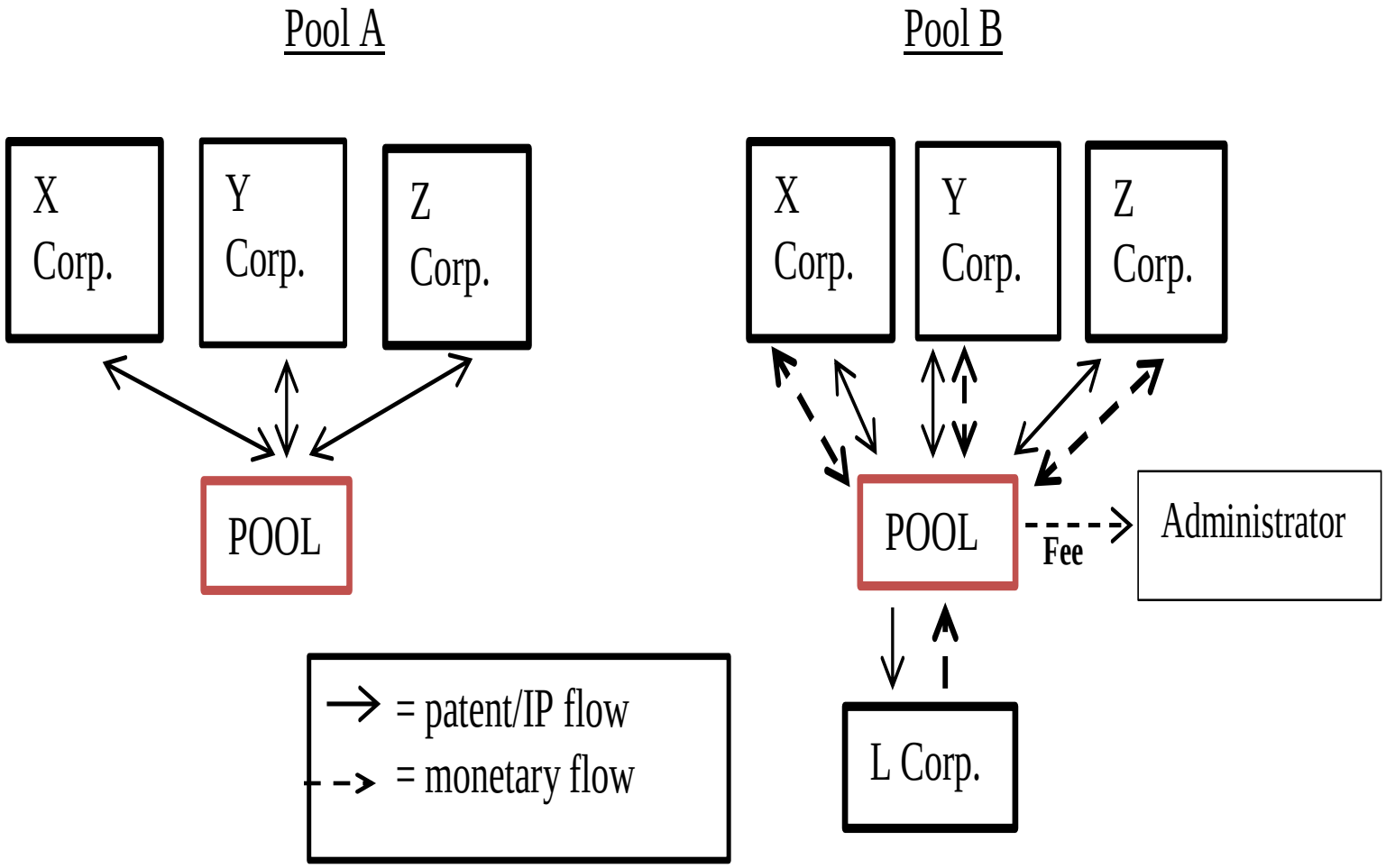
- Pooling complements standardization by providing licensees/adopters with (i) a single patent portfolio and (ii) a defined and fully enforceable set of terms and conditions.

- 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

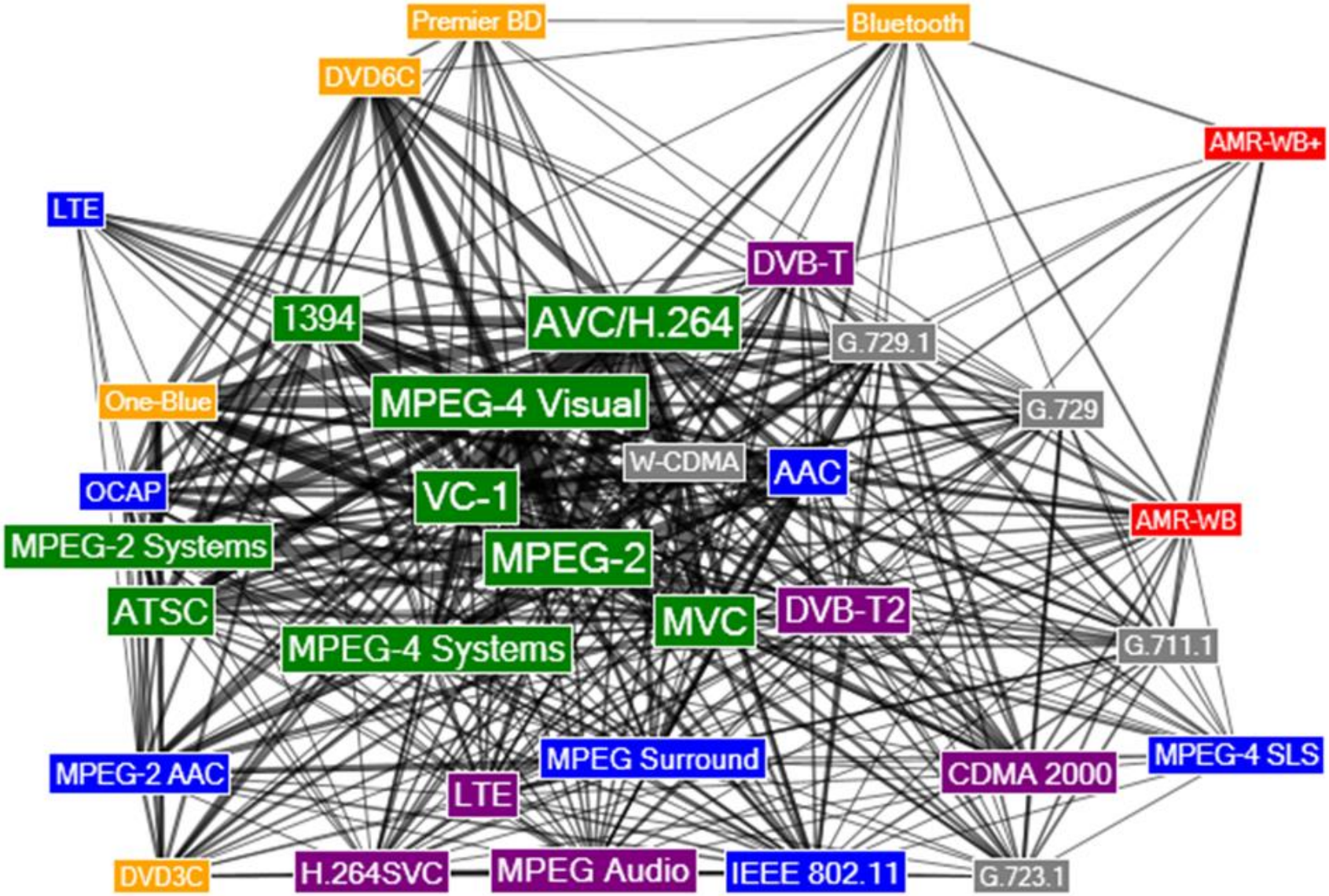


Patent Pools in ICT Markets (1997-2014)

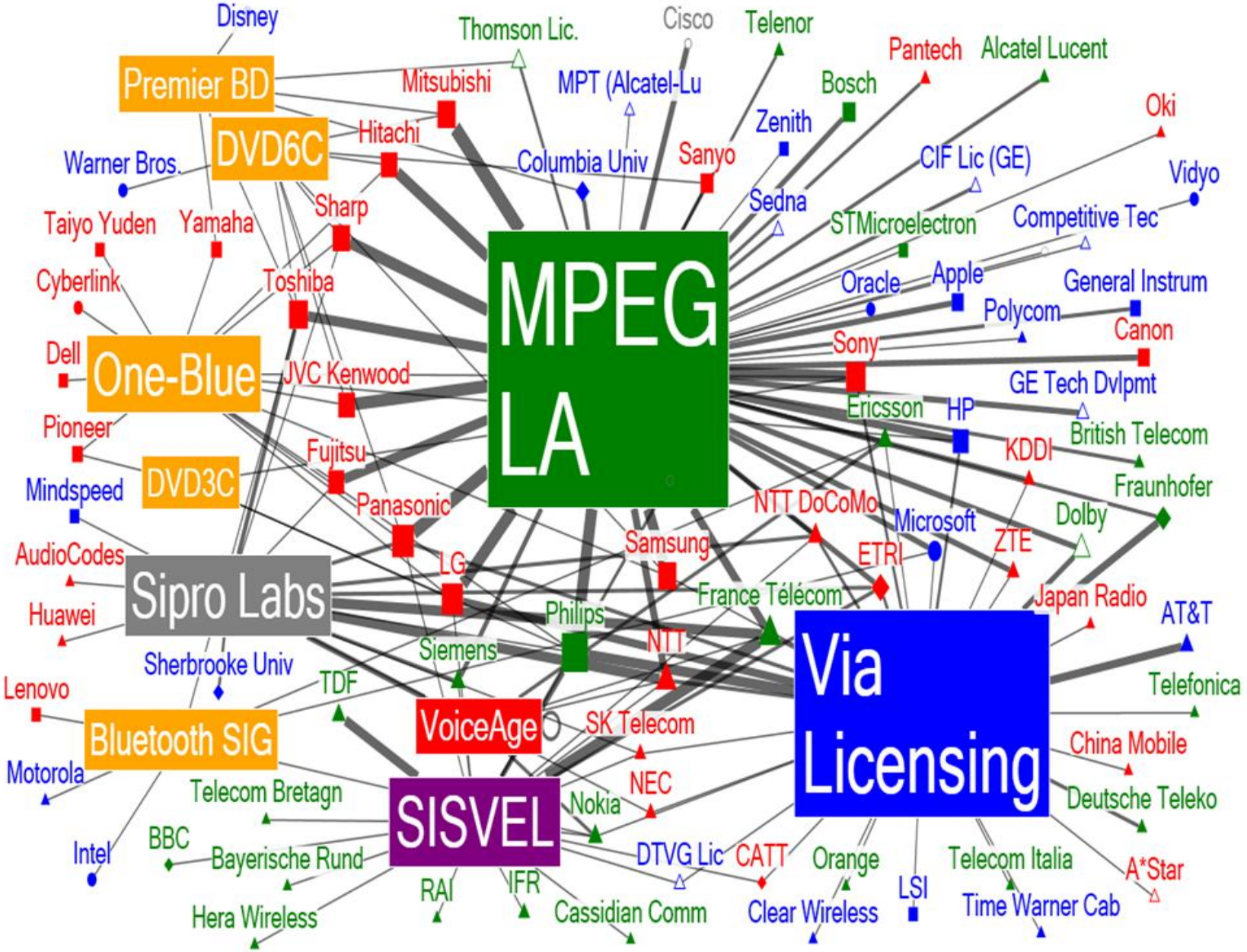
Pool Intermediary	**First Pool Formed**	**Total Pools**	**Total Licensors**	**Total Licensees**
Pools				
MPEG-LA	1997	11	131	4046
SISVEL	1997	9	42	c.2099*
Sipro Lab Telecom	1998	5	34	c. 225*
Via Licensing	2003	8	14	c. 1761*
VoiceAge	2004	3	11	n/a
Consortia				
Bluetooth SIG	1998	1	7	>20000
DVD3C (One-Red)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

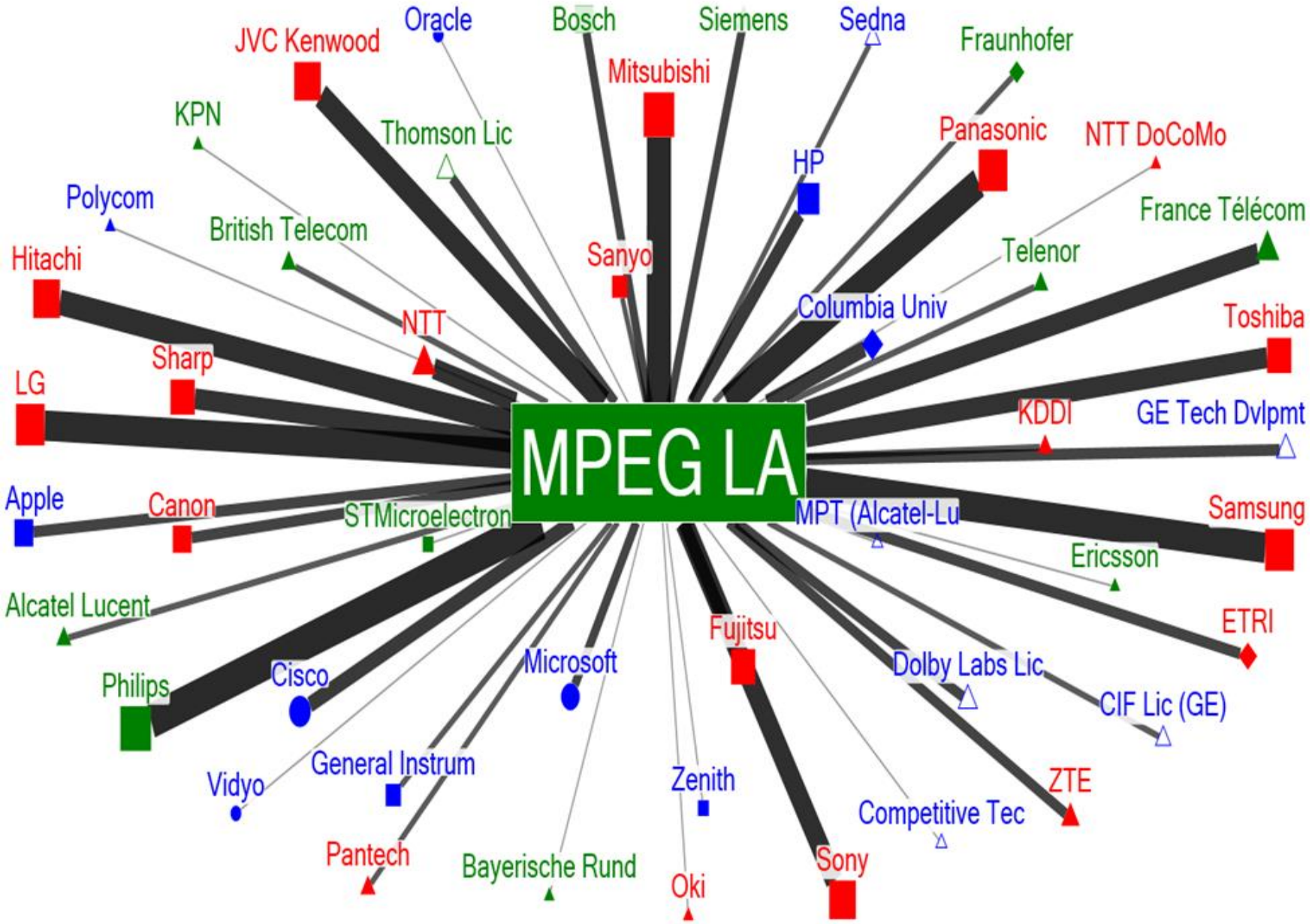
Network Graphs

- 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”



Created with NodeXL (http://nodexl.codeplex.com)


Disney
Thomson Lic.
Cisco
Telenor
Pantech
Alcatel Lucent
Premier BD
Mitsubishi
MPT (Alcatel-Lu
Bosch
Oki
DVD6C
Hitachi
Zenith
Warner Bros.
Columbia Univ
Sanyo
CIF Lic (GE)
Vidyo
Sharp
Sedna
Taiyo Yuden
Yamaha
STMicroelectron
Competitive Tec
MPEG LA
Cyberlink
Toshiba
Oracle
Apple
General Instrum
Polycom
Canon
Dell
One-Blue
JVC Kenwood
Sony
GE Tech Dvlpmt
Ericsson
HP
Pioneer
British Telecom
KDDI
Fujitsu
DVD3C
Fraunhofer
Mindspeed
Panasonic
NTT DoCoMo
Microsoft
Dolby
ZTE
AudioCodes
Samsung
ETRI
LG
Sipro Labs
France Télécom
Japan Radio
AT&T
Huawei
Philips
Via Licensing
Siemens
NTT
Sherbrooke Univ
TDF
Telefonica
Lenovo
VoiceAge
SK Telecom
Bluetooth SIG
China Mobile
Motorola
NEC
Telecom Bretagn
Nokia
Deutsche Teleko
SISVEL
Intel
BBC
DTVG Lic
CATT
Orange
Telecom Italia
A*Star
Bayerische Rund
RAI
IFR
LSI
Hera Wireless
Cassidian Comm
Clear Wireless
Time Warner Cab



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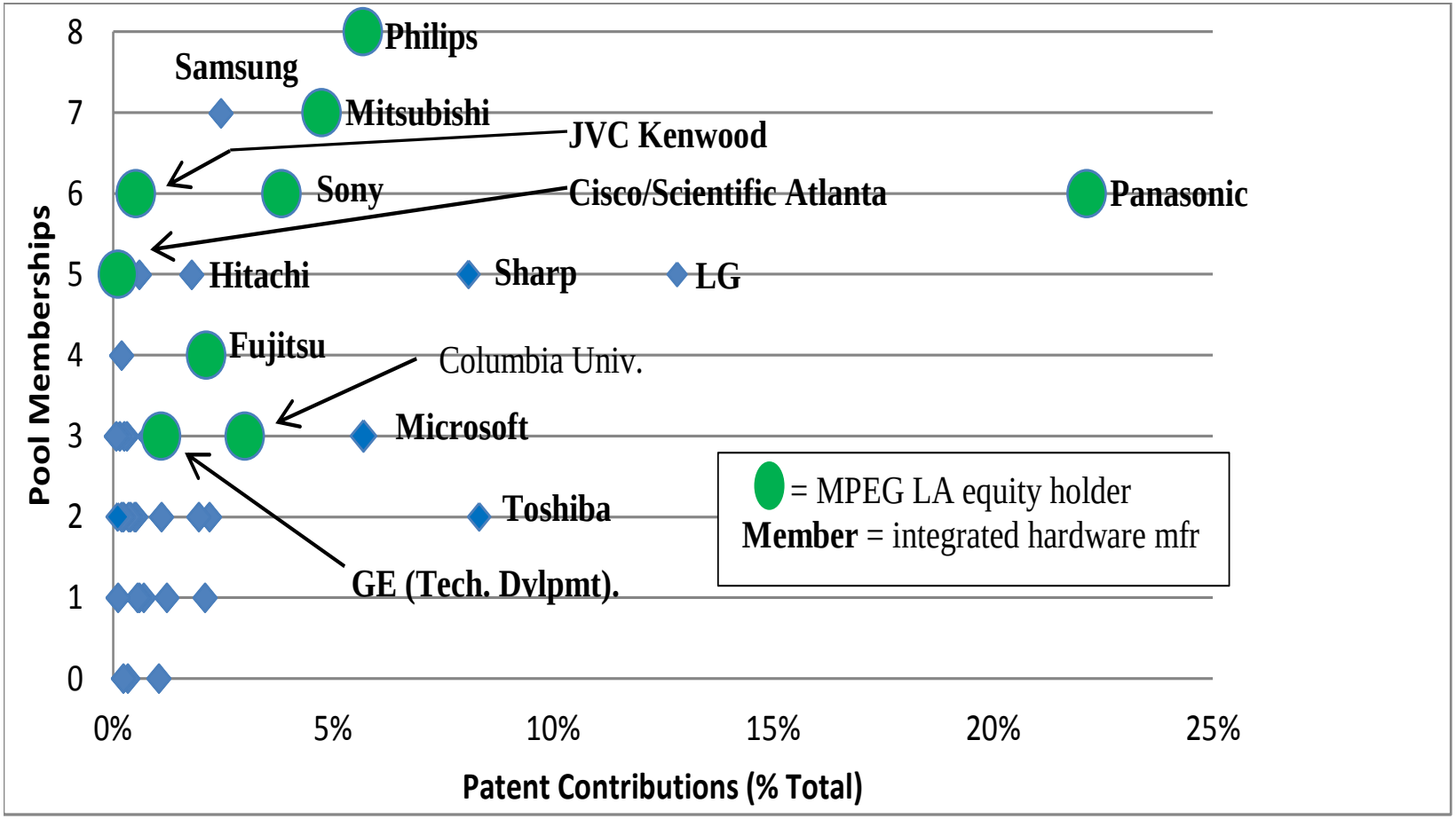
“Dominant” MPEG LA Pool Members



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.

Commoditizing Firm	Target Firm	Commoditized Feature	Non-Commoditized Feature
MS	IBM	PC Hardware	OS
MS	Netscape	Browser	OS
IBM	MS	OS (Linux)	Server hardware
Google	Content cos.	Content	Ads

Non-Price Evidence

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

Pool	License Rate	Annual Royalty Cap	Implied Rate on PC Sales Revenue
AVC/H.264	$.10 to $.20/unit	$6.5M	.013%
VC-1	Same	$5M	.013%
MPEG-4 Visual	Same	$2.5M	.008% (cap applies)
MVC	$.10/unit	$6.5M	.012%
MPEG2	$2/unit	None	.233%
1394 (Firewire)	$.25/unit	None	.029%
TOTAL			.307%

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.