How Many Standards in a Laptop (and Other Empirical Questions)

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*Paper and related comments reflect only our personal views*
How Many Standards in a Laptop?

5? 50? 500?
Counted *Interoperability Standards* in Various Technical Areas

- Memory
- Display
- Graphics
- Wireless
- Sound
- Power
- Input/Output (I/O)
- Security
- Processor
- Content Protection
- Software
- Networking

(We know we missed some key areas)
Excluded Other Kinds of Standards

- Performance
- Accessibility
- Design Process
- Manufacturing Process
- Quality

- Safety
- Environmental
- Measurement
- Electromagnetic compatibility
“Standards”

Technical specifications produced and made available for 3rd party adoption by:

1. Formal SDOs
2. Consortia
3. Individual companies

Not popular/dominant proprietary technologies
SSO Framework

Standards Setting Organizations (SSOs)

COMPANY
Spec licensing programs

Consortia
(or Fora or “SIGs”)

- Lightweight contractual SIGs, spec dev only
- Complex nonprofit orgs w/ spec dev, C&I and marketing programs

Formal standards development orgs (SDOs)

- Small accredited SDOs
- ISO, IEC, ITU
How Many Standards in a Laptop?

- At least **251** – and probably closer to 500
Two Additional Questions

- Who made these standards?
  - SDO, Consortia or Company?

- What intellectual property rules govern these standards?
  - [Fair,] Reasonable and Non-Discriminatory ([F]RAND) license commitment
  - Royalty-Free (RF) (RAND-Z, RAND-Zero, RF-RAND, non-assert, etc...)
  - Patent Pool
Who made these standards?

- Only about 1/3\(^{rd}\) produced by formal SDO
What IPR Rules Govern?

Allocated into four “buckets”
- Caution: masks significant complexity

RAND (148)
RF (43)
POOL (6)
UNKNOWN (54)
IPR Rules, Con’t

3/4<sup>th</sup> RAND, very few Pools
Key Observations

- ~500 interoperability standards in a laptop!
  - Critical role facilitating innovation, trade, etc.
  - ICT different from other industries?
- Importance of Consortia, Company specs
- Historical dominance of RAND
  - But note: RAND with royalty programs v. RAND without
  - Potential new pressures emerging (e.g. patent litigiousness; open source)
  - Historic limited role for patent pools
Potential Future Research

- Expand data set and refine data quality
- More granular analysis of RAND
  - Royalty programs
  - ‘Hidden’ royalty programs, via cross-licenses
  - RAND but *de facto* RF
- Rate standards against “openness” criteria
- Map trade impacts of these laptop standards
  - Global supplier/product ecosystems
Questions/Discussion

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