

Assessing the Economic Case for Patents: Perspectives from the ICT Industry

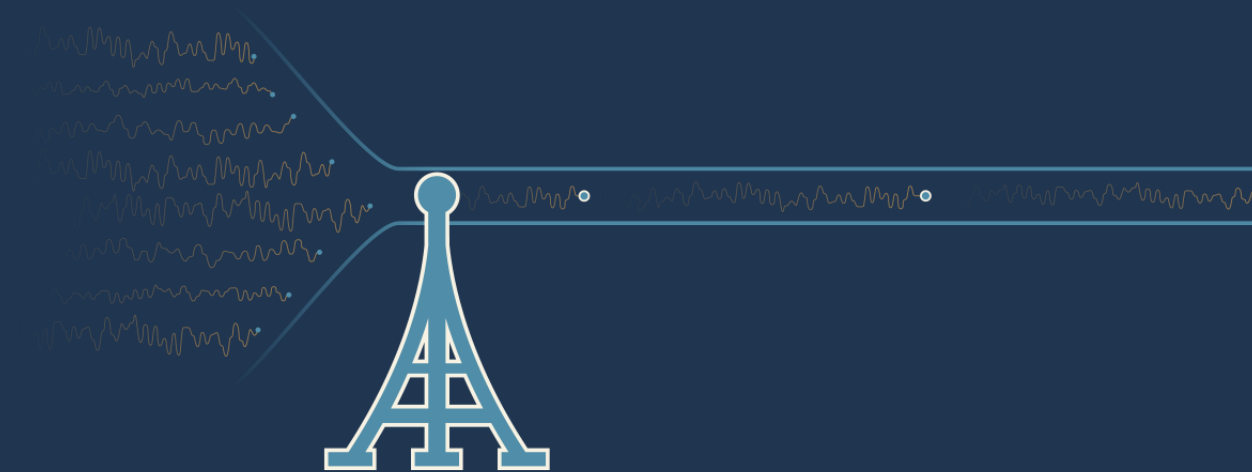
GMU-CPIP IP and Global Prosperity 2016

Dr. Kirti Gupta
Qualcomm Inc.

The Fundamental Challenge of Wireless Communications

Efficient usage of radio frequency spectrum

Wireless communications involve transmitting and receiving radio signals over portions of radio frequency spectrum allocated by regulatory bodies

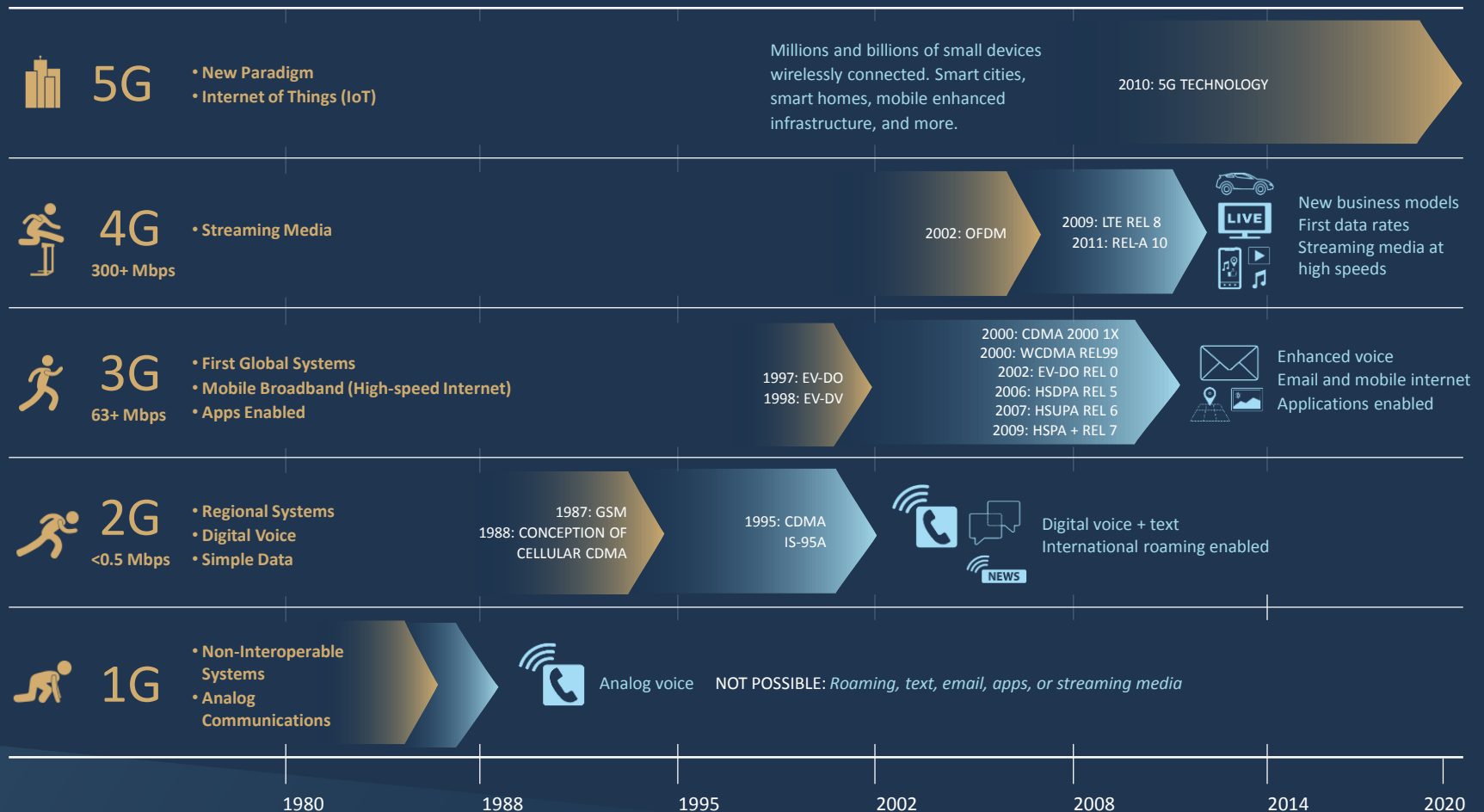


The technologies incorporated from 1G to 4G standards are all targeted towards optimizing usage of scarce spectrum

Investment in Technology Standards Years in Advance

Each new generation of mobile devices and networks takes roughly a decade of risky R&D to invent, and then collaboration among engineers from across the industry who jointly develop the standards

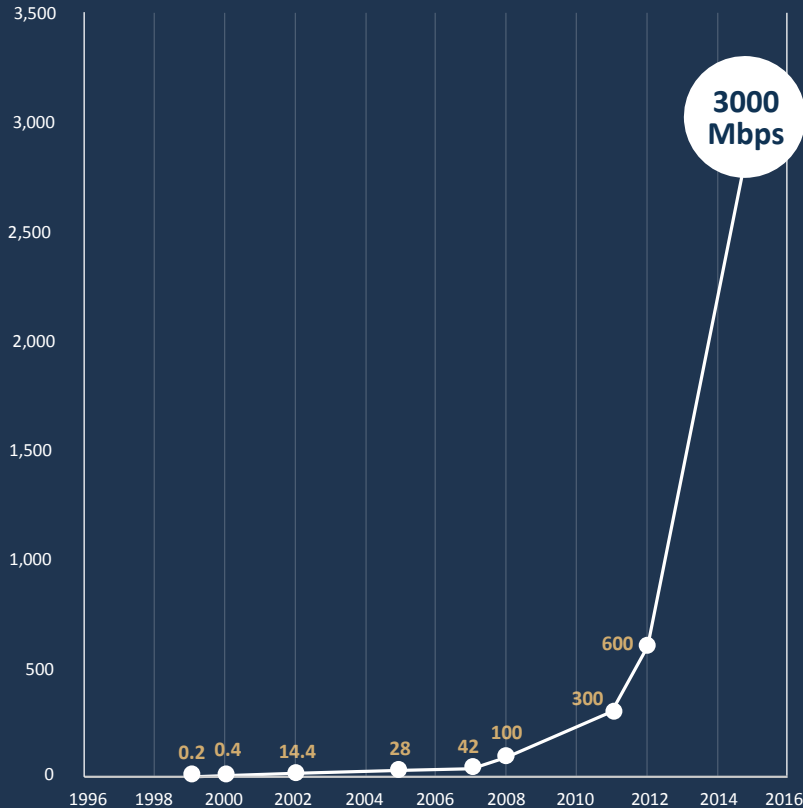
 R&D  Commercial



As Wireless Technology Advances to Increase Supply of Broadband...

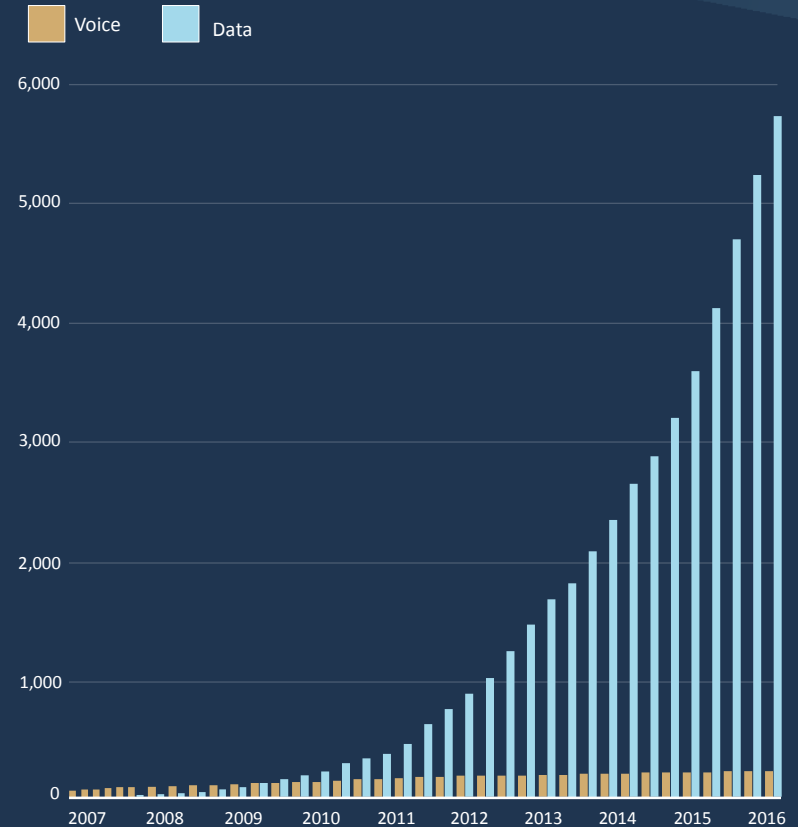
Demand for Mobile Transmission Evolves Toward a World of Data

Peak Data Rates for Mobile Networks in Mbps



~12,000X peak download speeds between 2G and 4G

Voice and Data Usage in Mobile Networks 2007-2016



6,246% growth in data traffic between 2007 and 2016

Source: Compiled from major 3GPP releases including: GSM/EDGE, WCDMA Rel-99, HSPA, HSPA+, LTE Rel-8-12 at www.3gpp.org

Source: Ericsson's Mobility Report (2007-2015)

Case Studies: Wireless System Inventions Enable New Platforms



YouTube
(\$1.65 Billion)

- Multimedia, Audio, Video, Graphics
- Cellular Modem 3G/4G
- Camera



Pokemon Go
(\$160 Million)

- Multimedia, Audio, Video Graphics
- High Data Rates
- GPS Positioning
- Camera



Uber
(\$62.5 Billion)

- Assisted GPS
- High Data Rates
- Mobile Payments



Phone

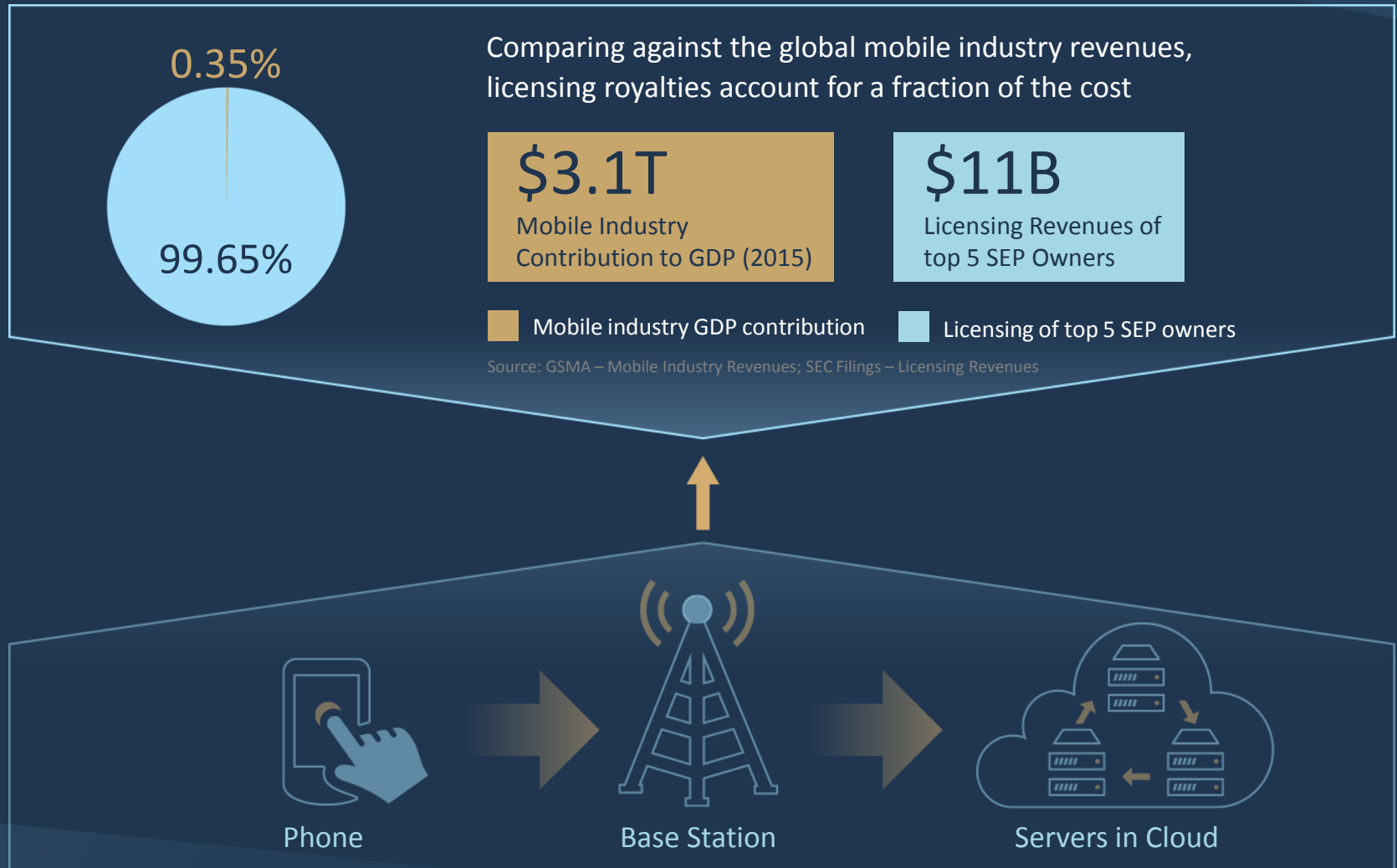


Base Station

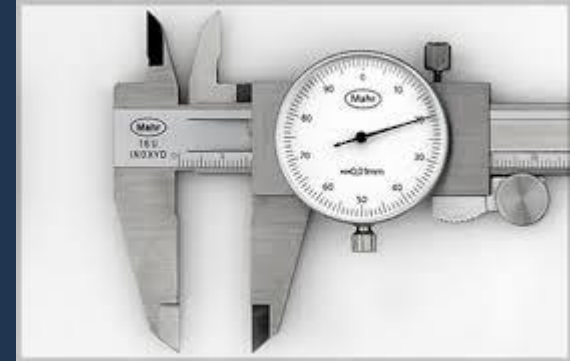
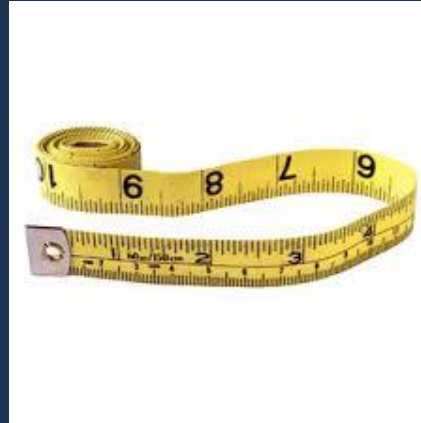


Servers in Cloud

Royalties as a Percentage of Total Mobile Industry Revenues Generated by Enabling Technologies



Types of standards

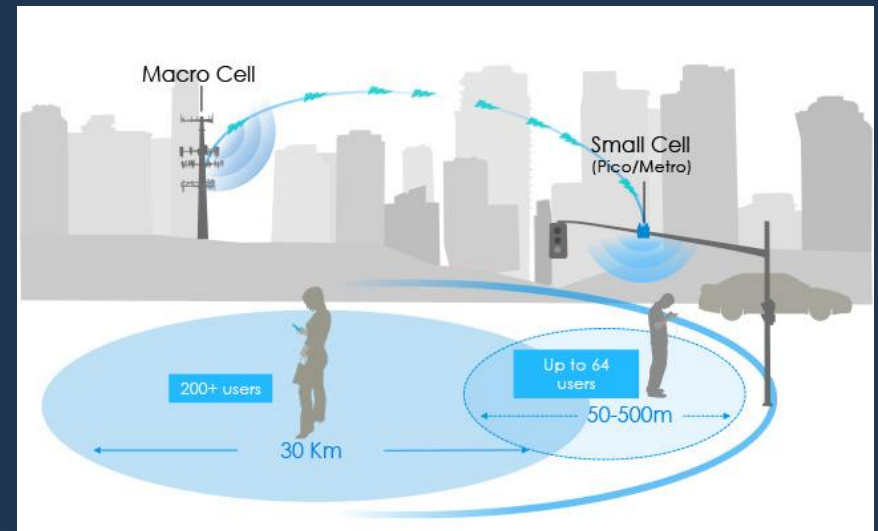
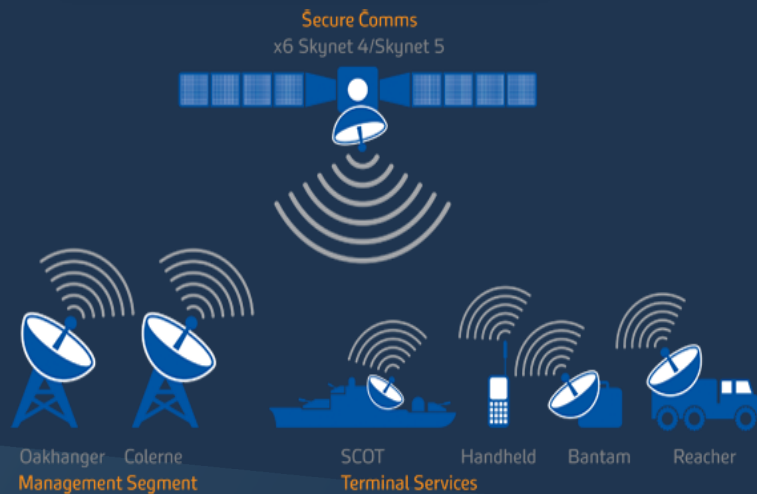


Standard

www.danfoss.com - DH0401

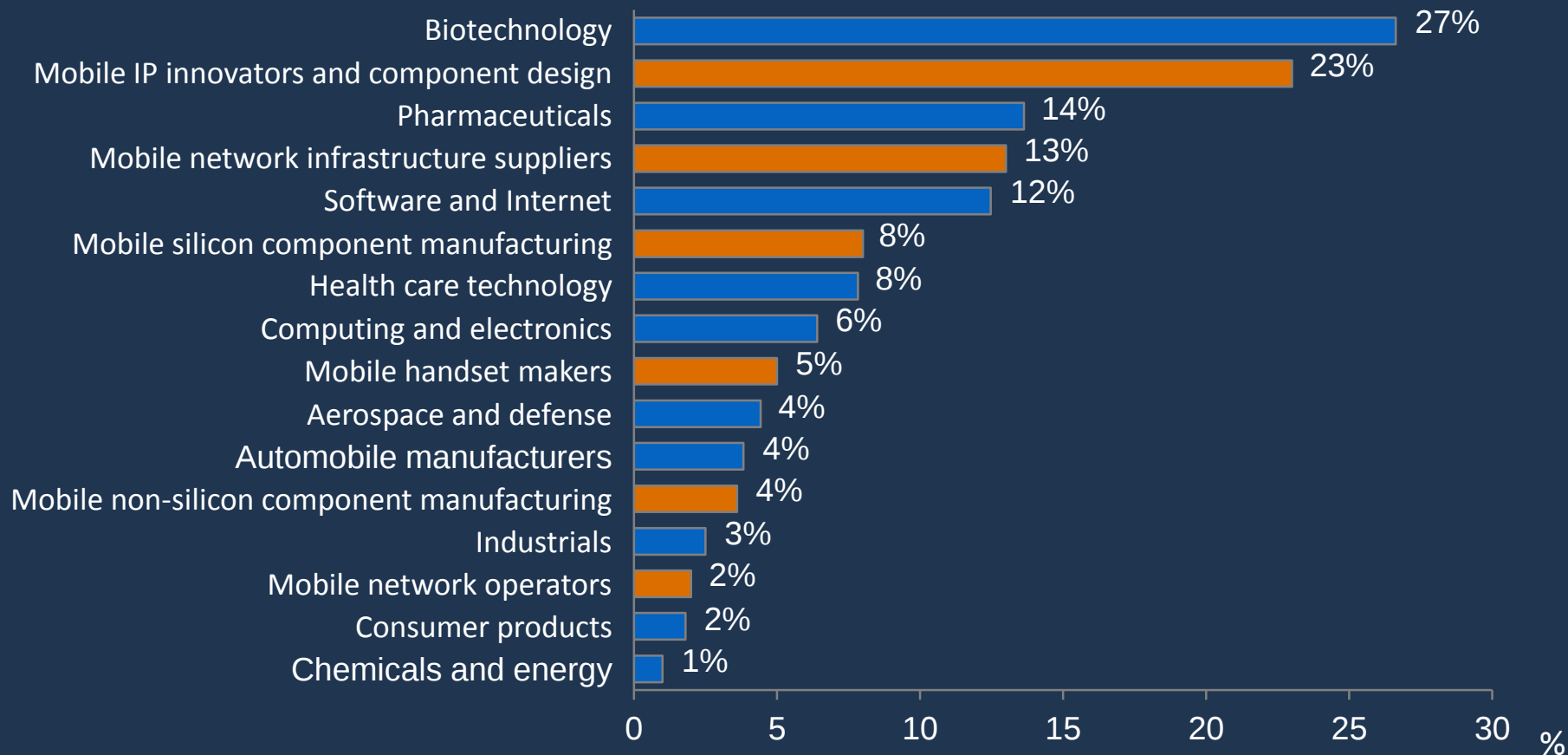
Size	Port	Body	Length	Weight	Material	Pressure	Flow
DN25	30	55	31	1.1	Stainless Steel	G 1/4"	1.5 m³/h
DN25	30	55	31	1.1	Stainless Steel	G 1/4"	1.5 m³/h
DN38	45	80	51	1.1	Stainless Steel	G 1/2"	2.5 m³/h
DN38	45	80	51	1.1	Stainless Steel	G 1/2"	2.5 m³/h
DN50	60	100	71	1.1	Stainless Steel	G 3/4"	4.0 m³/h
DN50	60	100	71	1.1	Stainless Steel	G 3/4"	4.0 m³/h
DN65	75	120	91	1.1	Stainless Steel	G 1"	6.0 m³/h
DN65	75	120	91	1.1	Stainless Steel	G 1"	6.0 m³/h
DN80	90	140	111	1.1	Stainless Steel	G 1 1/4"	8.0 m³/h
DN80	90	140	111	1.1	Stainless Steel	G 1 1/4"	8.0 m³/h
DN100	120	180	141	1.1	Stainless Steel	G 2"	12.0 m³/h
DN100	120	180	141	1.1	Stainless Steel	G 2"	12.0 m³/h
DN125	150	220	171	1.1	Stainless Steel	G 2 1/2"	18.0 m³/h
DN125	150	220	171	1.1	Stainless Steel	G 2 1/2"	18.0 m³/h
DN150	180	260	201	1.1	Stainless Steel	G 3"	24.0 m³/h
DN150	180	260	201	1.1	Stainless Steel	G 3"	24.0 m³/h

Types of standards (but of a very different kind)



The Mobile industry is one of the most R&D intensive

Industry R&D spend as a percentage of Revenue (%, 2013)

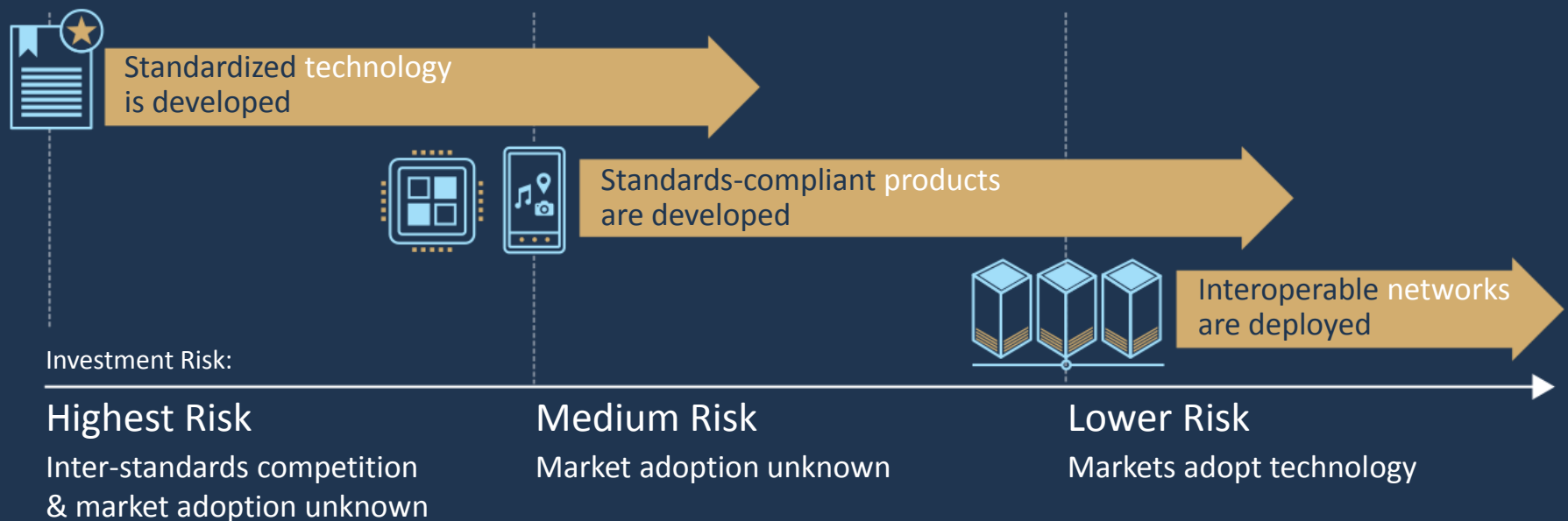


Sources: Boston Consulting Group, "The mobile revolution: How mobile technologies drive a trillion dollar impact" (2015) (based on data from Ovum; Gartner)

The Mobile Industry Technology Development Stages

R&D Investment is risky

The stages of development in this industry include:

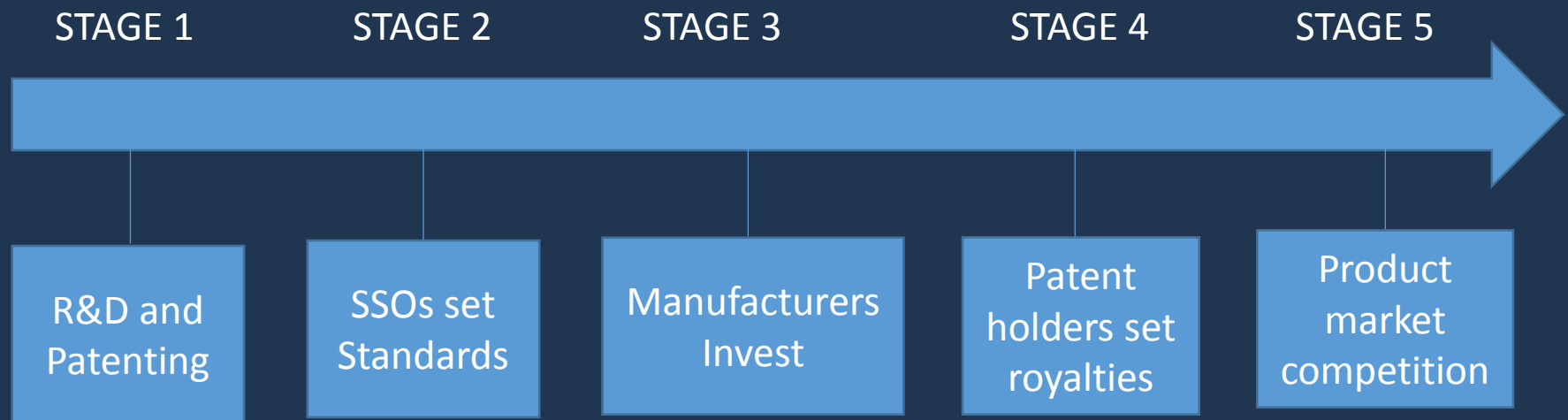


Gupta, Kirti. "Technology Standards and Competition in the Mobile Wireless Industry." *Geo. Mason L. Rev.* 22 (2014): 865.

Some Highlights of the SEP/FRAND Debate

Suggested theories of harm

The Premise for “Patent hold-up” and “Royalty Stacking”

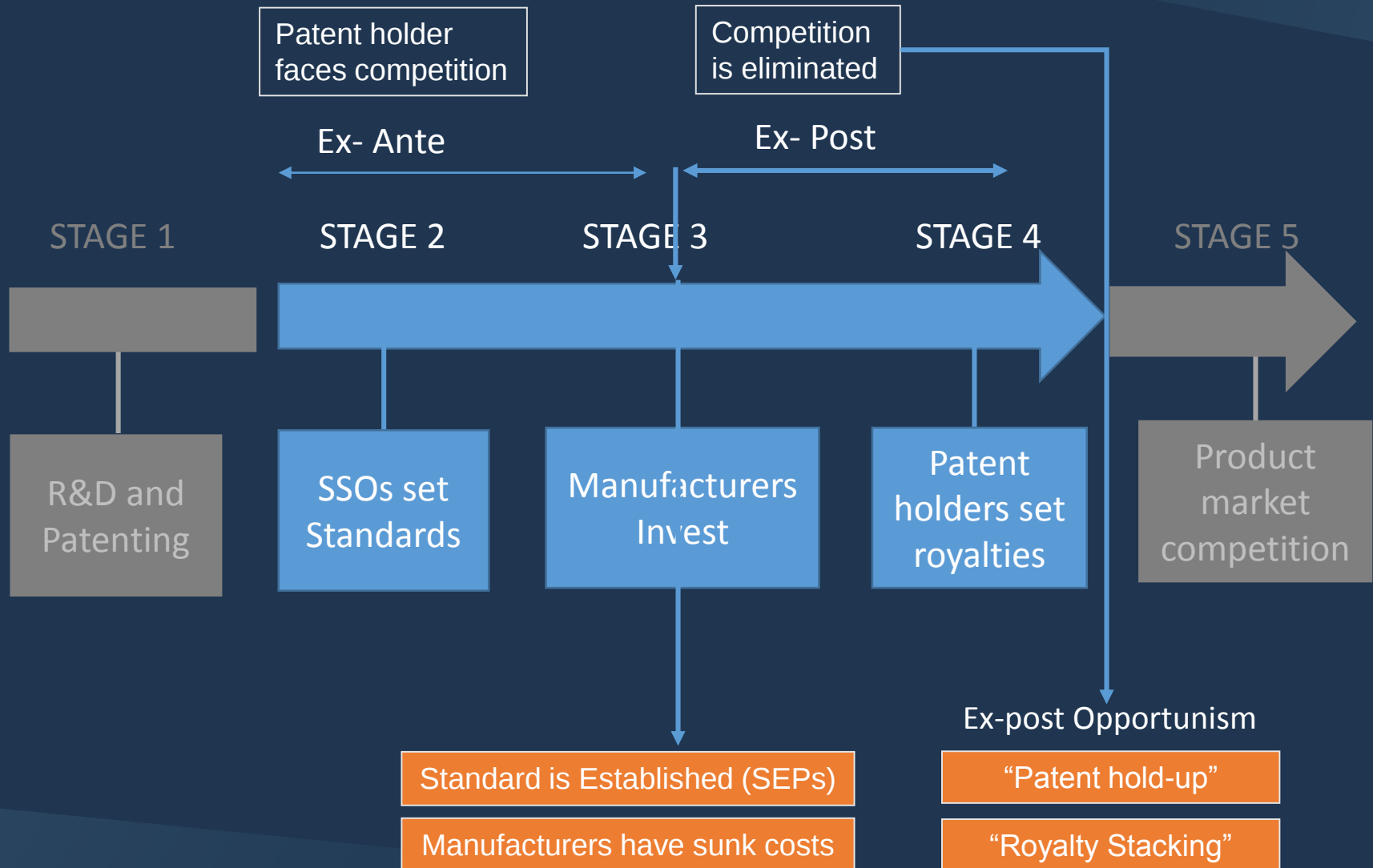


- Patent owners make a commitment to license their SEPs on Fair Reasonable and Non Discriminatory (FRAND) terms.
- However, under this model, concerns have been raised about patent holders charging “excessive royalties” at Stage 4.

Source: Gelatovic and Haber (2016)

Some Highlights of the SEP/FRAND Debate

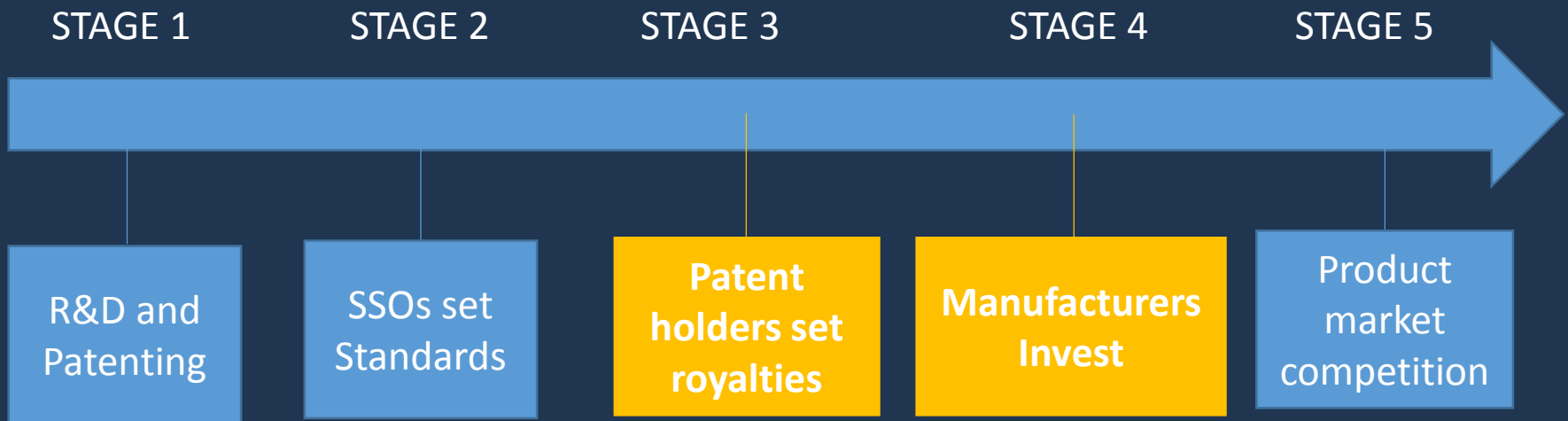
Suggested theories of harm



Some Highlights of the SEP/FRAND Debate

Suggested theories of harm – Problem 1: Issue with underlying premise

The Premise of ex-post licensing rates is incorrect

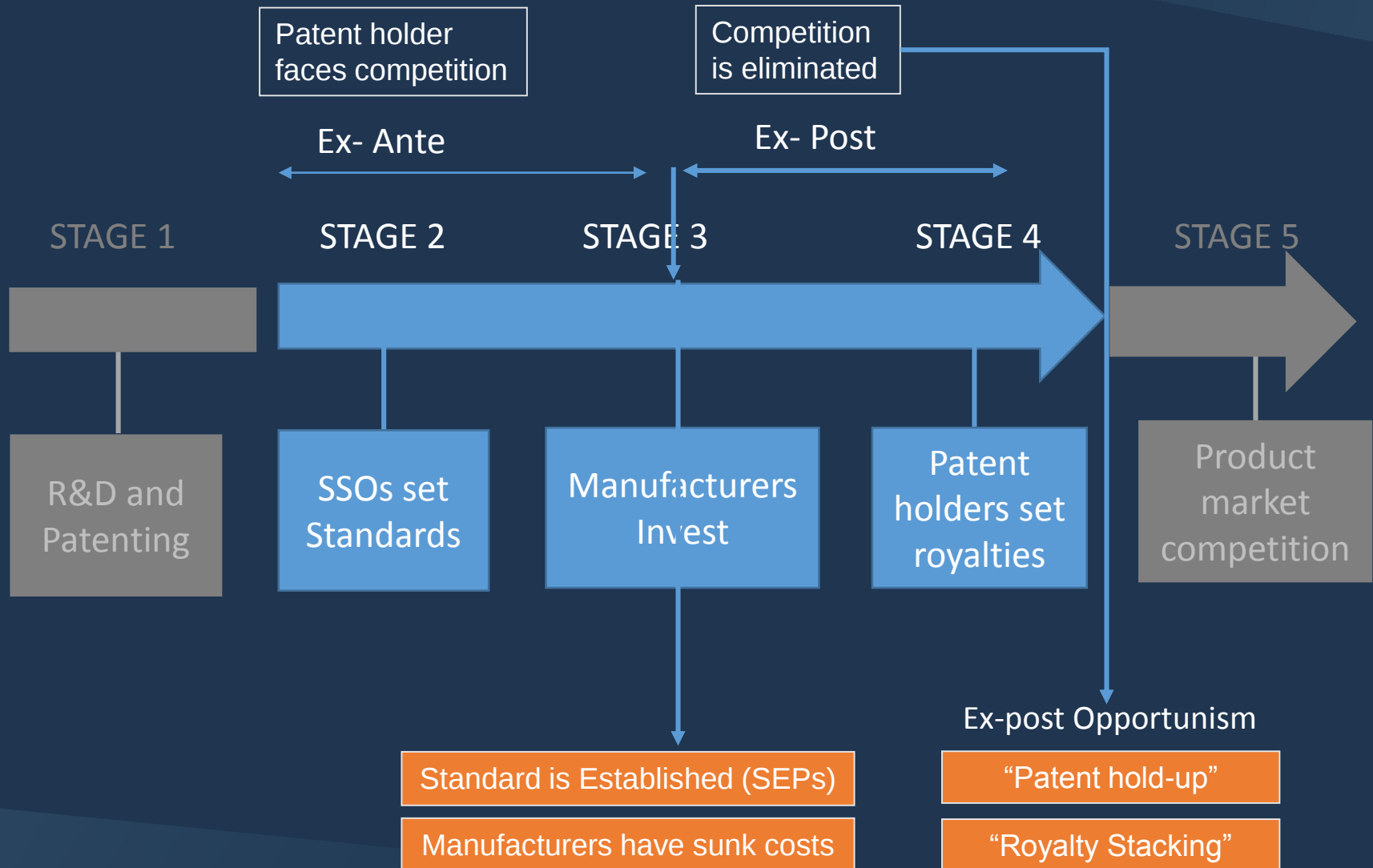


For e.g.: Royalty rates for 4G LTE were announced prior to widespread deployment of the technology

Source: Stasik (2010), ETSI (2010)

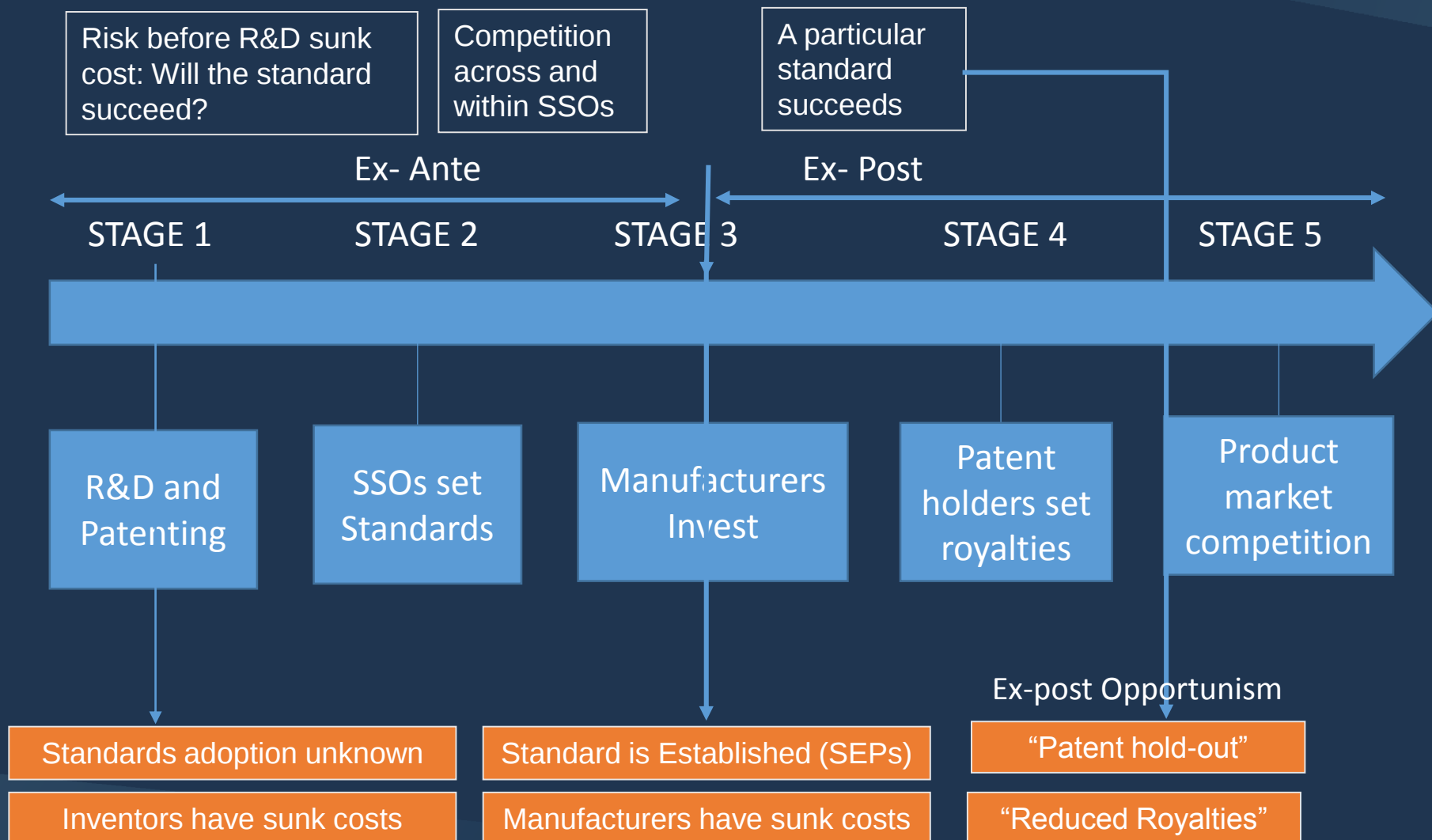
Some Highlights of the SEP/FRAND Debate

Suggested theories of harm - Problem 2: Limited Model



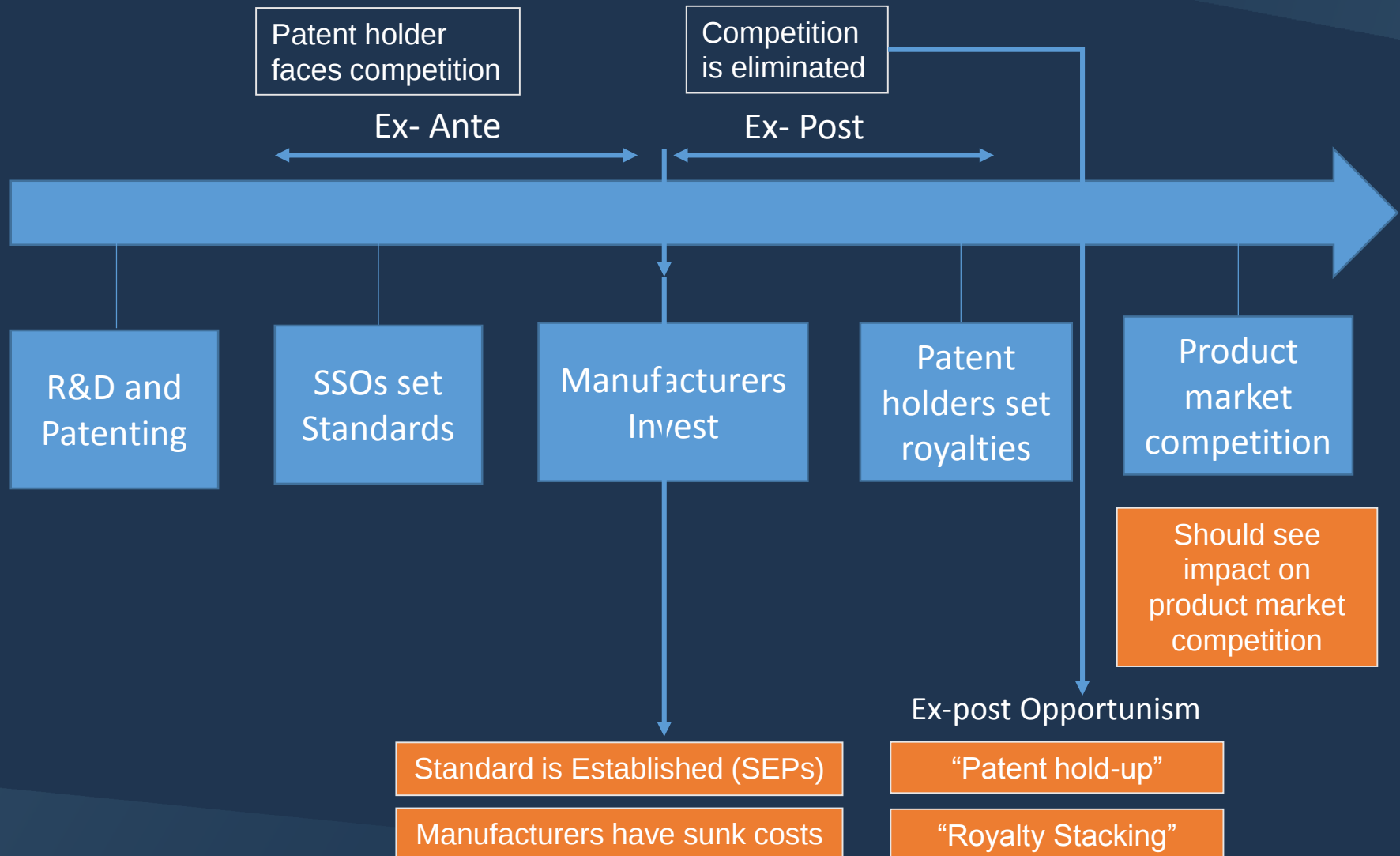
Some Highlights of the SEP/FRAND Debate

Suggested theories of harm - Problem 2: Limited Model



Some Highlights of the SEP/FRAND Debate

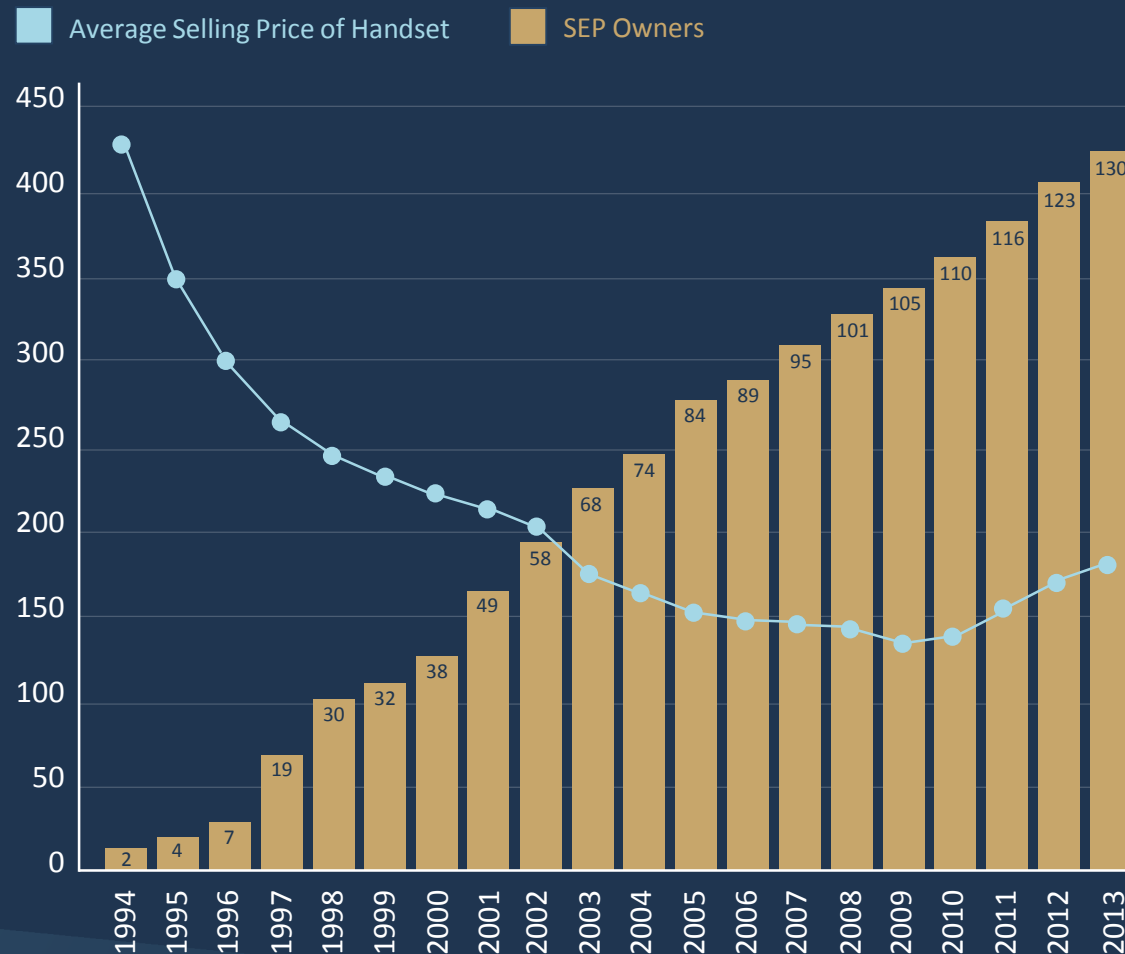
Suggested theories of harm – Problem 3: Evidence from the market?



Evidence From the Mobile Industry

Reducing consumer prices as number of SEP owners increase

Average Selling Price and Number of SEP Owners (1994-2013)

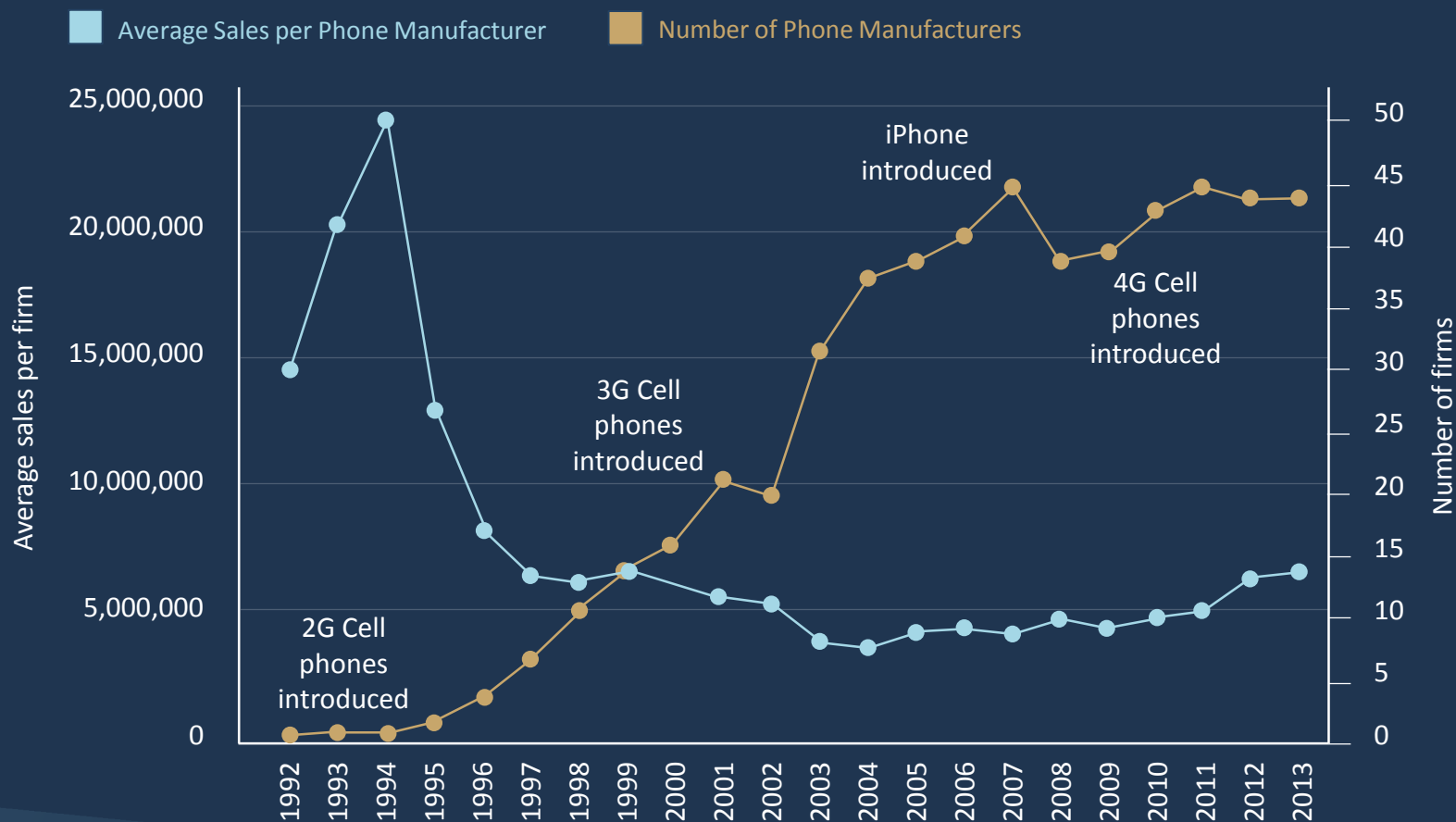


Source: Gelatovic and Gupta (2015), "Royalty Stacking and Standard Essential Patents: Theory and Evidence from the Mobile Wireless Industry", Hoover IP2 Working Paper

Evidence From the Mobile Industry

Increasing market entry and reducing concentration as number of SEP owners increase

Number of firms and average sales per firm (1992-2013, thousands of 2013 \$)



Source: Gelatovic and Gupta (2015), "Royalty Stacking and Standard Essential Patents: Theory and Evidence from the Mobile Wireless Industry", Hoover IP2 Working Paper