Liren Chen, VP Engineering and Legal Counsel
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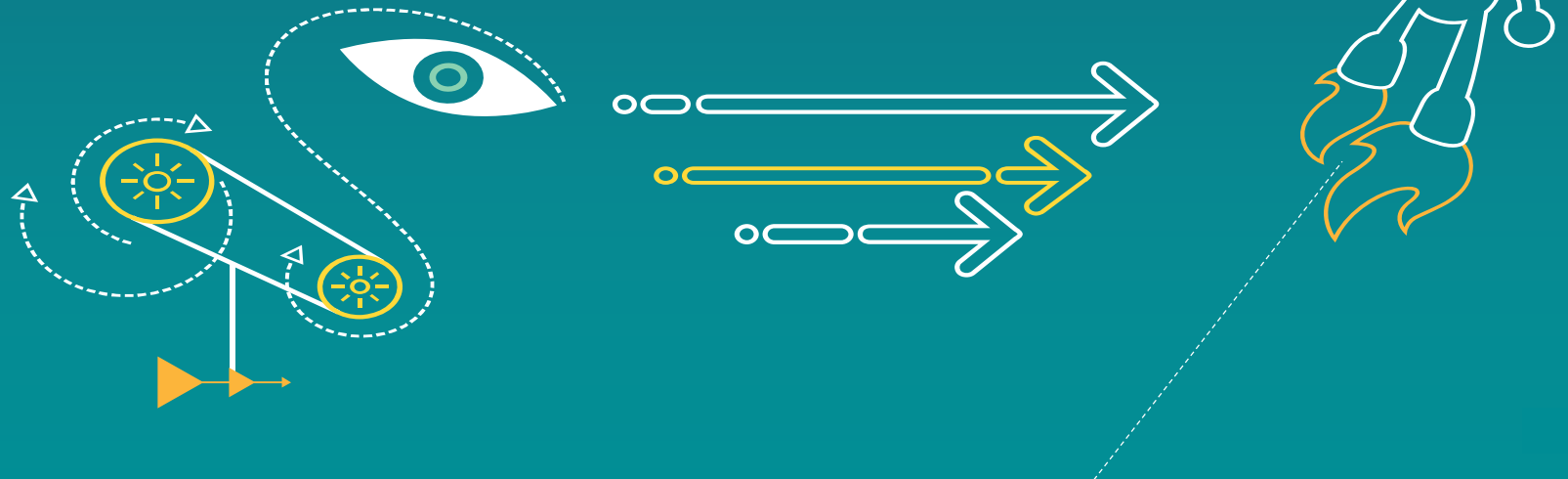
Competition Data and Antitrust – a Corporate Perspective

QUALCOMM®



QUALCOMM

Invent

~$36B invested
in Cumulative R&D
over the past 30 years

Advancing technology through innovation and foresight

Invented
Digitized wireless communications

Foresight
Demand created for higher quality voice

Invented
Increased voice quality

Foresight
Add data to the network

Invented
Data added with 3G technology

Foresight
Using phone as computing device

Invented
First 1GHz mobile processor

Qualcomm Snapdragon is a product of Qualcomm Technologies, Inc.

Advancing technology through invention and foresight

Foresight
1000x increase in video on mobile

Invented
LTE Broadcast

Foresight
Enhance experience of video on mobile

Invented
Brought 4K into mobile devices

Foresight
Billions of connected devices

Invented
Technologies that enable IoE

Diverse patent portfolio

Covering all aspects of mobile devices

Apps processor

GPU

NFC

Position location

OS/user interface

Wireless charging

Camera

Security

Sensors

Semiconductor

WWAN

Video codecs

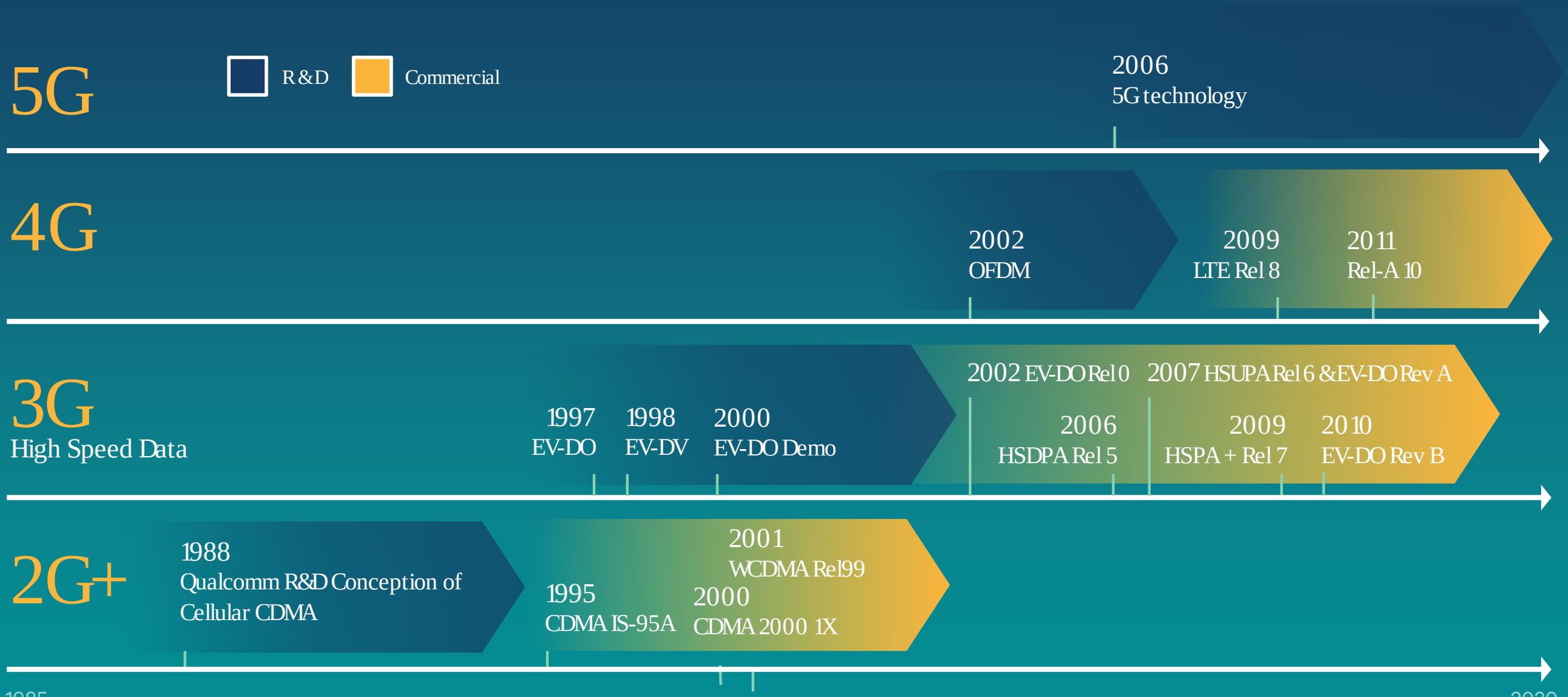
RF and antenna

Display

Audio processing

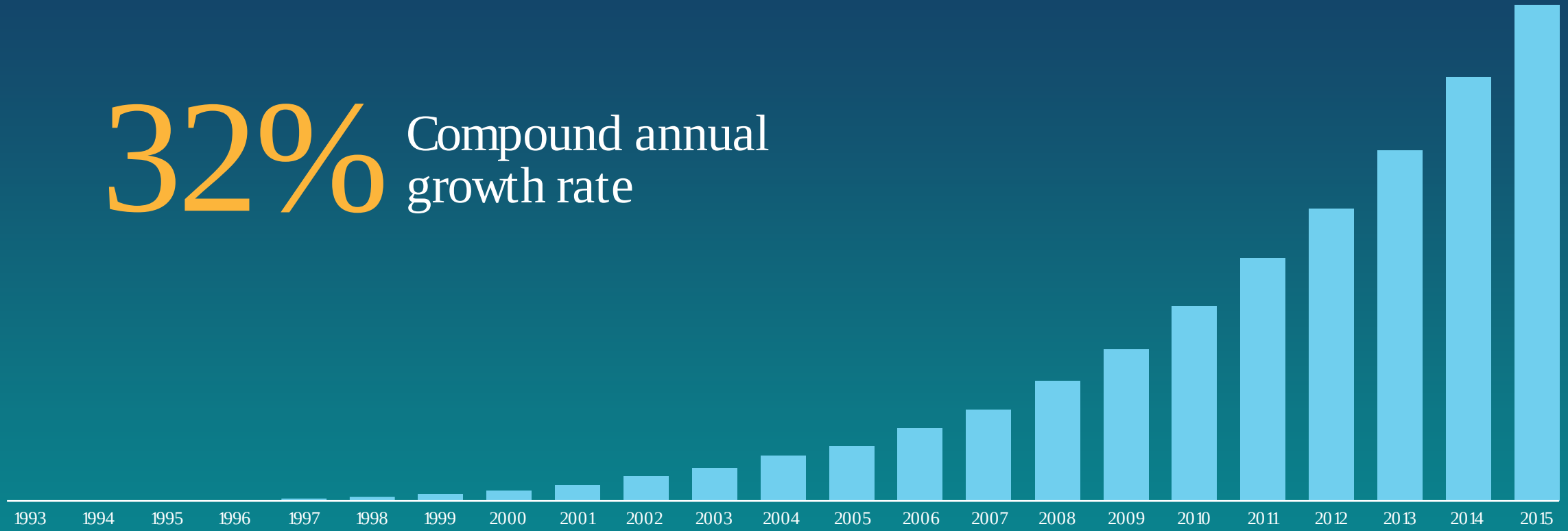
Connectivity (Wi-Fi)

Investment in technology standards years in advance



Consistently growing innovation, large portfolio in China

32% Compound annual growth rate



Current worldwide Qualcomm patent portfolio
(pending and granted)

Source: Qualcomm Incorporated data

Innovation in mobile technology driving trillions of dollars of impact

$1.8 trillion invested in past 5 years

R&D and infrastructure investments from 2009-2013

$3.3 trillion in revenue

Revenues of the global mobile value chain in 2014

11 million jobs

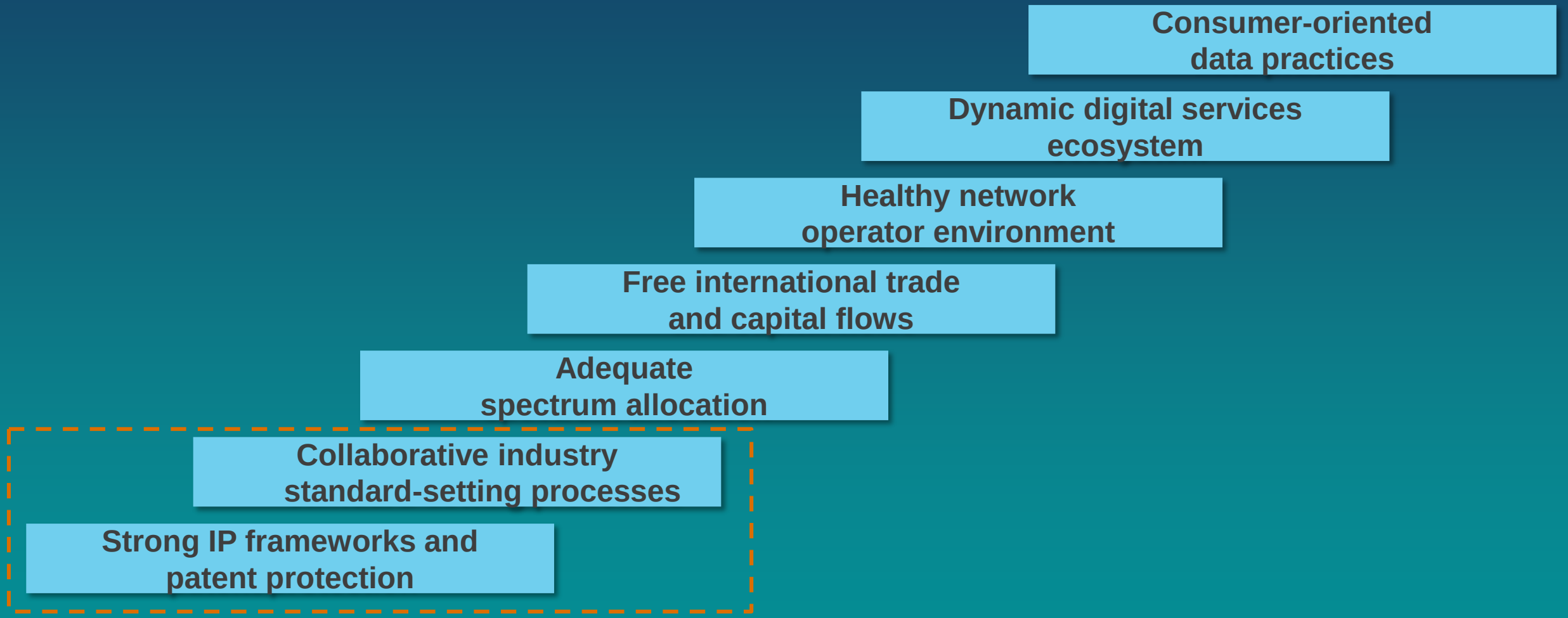
Jobs in the global mobile value chain

Another $4 trillion investment coming

Additional R&D and infrastructure investments needed by 2020

Source: "The Mobile Revolution: How Mobile Technologies Drive a Trillion Dollar Impact", Boston Consulting Group (2015)

IP frameworks and standard setting are two fundamental enablers of mobile's growth

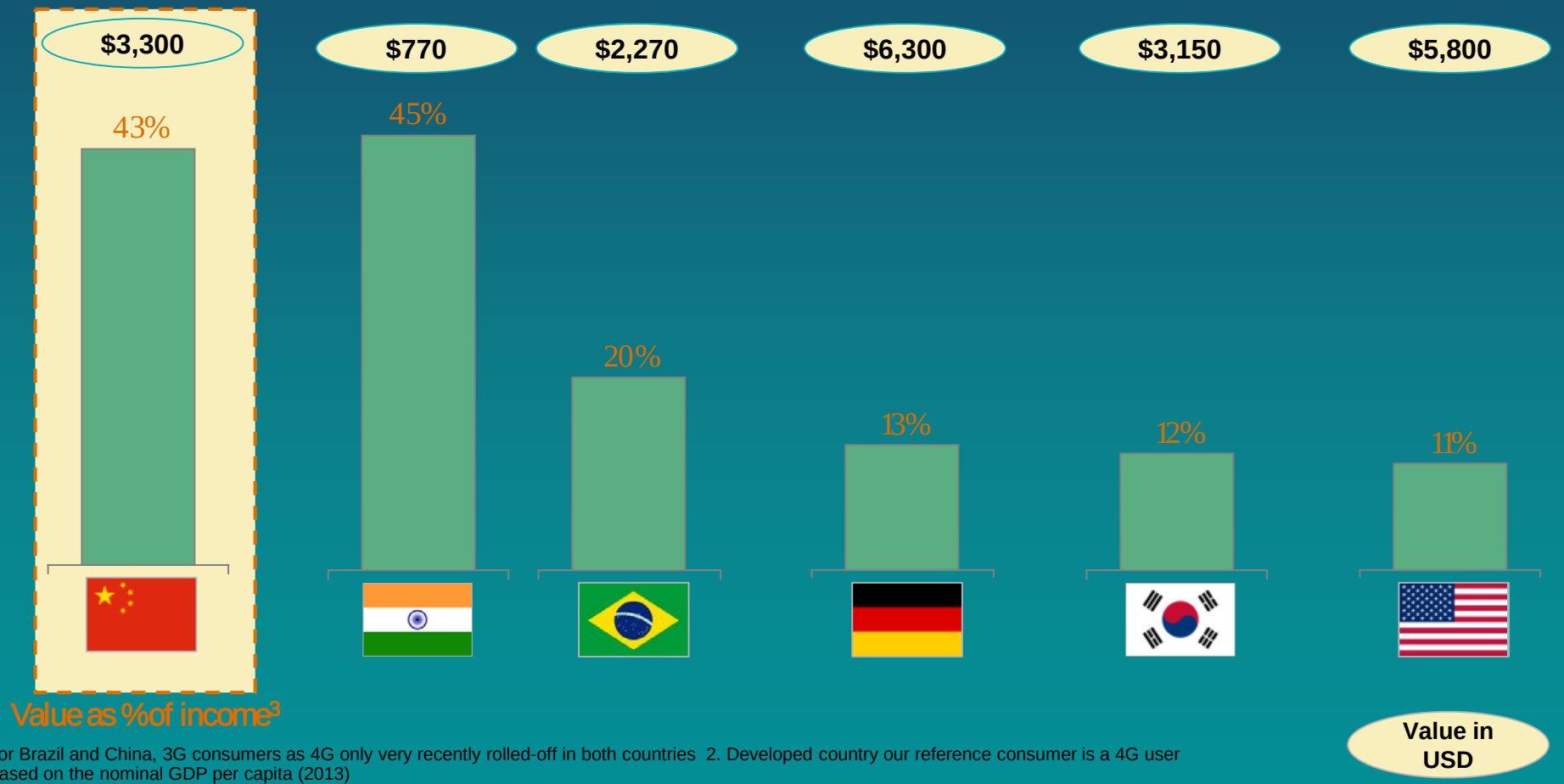


Source: "The Mobile Revolution: How Mobile Technologies Drive a Trillion Dollar Impact", Boston Consulting Group (2015)

Chinese consumers value their mobile device at ~40% of their income, well above US, Germany, Korea, and Brazil

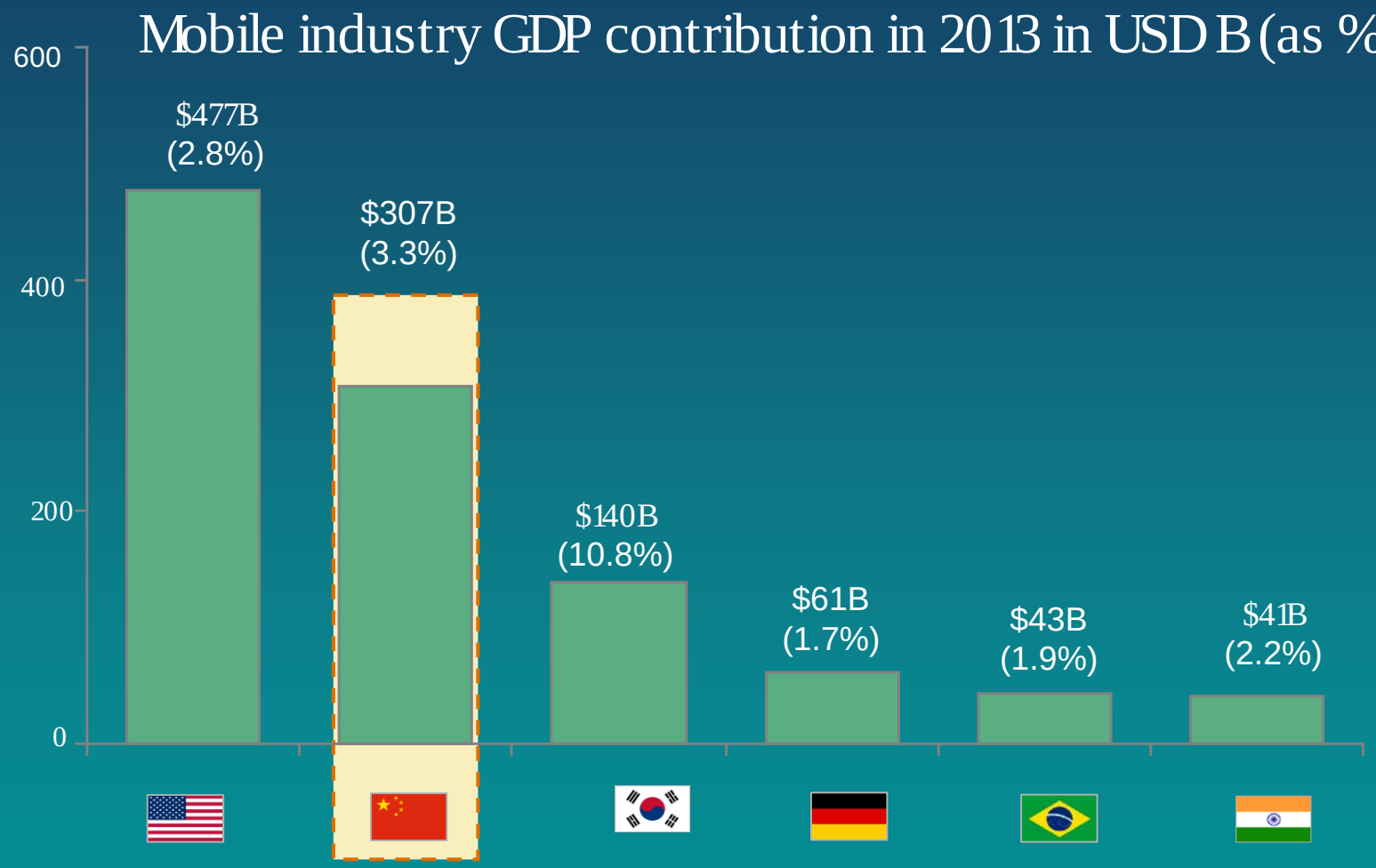
Mobile valued at 20~40% of their income by consumers in emerging economies[1]

Mobile valued at ~11% of their income by consumers in developed economies[2]



1. For Brazil and China, 3G consumers as 4G only very recently rolled-off in both countries 2. Developed country our reference consumer is a 4G user
3. Based on the nominal GDP per capita (2013)
Source: Conjoint analysis, BCG Consumer Impact Survey (USA: n=1003, Germany: n=1014, Korea: n=1002, Brazil: n=1000, China n=1070, India: n=2640)

Mobile contributed to more than $1.2 trillion to GDP in



IP and antitrust: Technology standards under scrutiny

Concerns raised by FTC, DOJ, and most recently NDRC, about potential "consumer harm" due to IPR related to standards

For example, see:

- FTC (2011) report, "The evolving IP marketplace"
- DOJ (2012) remarks "Six "small" proposals for Standard Setting Organizations (SSOs) before launch"
- Kuhn, Scott-Morton, Shelanski (2013), "SSOs can help solve the Essential Patents licensing problem"

IP and antitrust: technology standards under scrutiny

Example 1: "Patent hold-up"

- With no alternative to a technology standard, patent owners can potentially "hold-up" the standard's implementers, deriving supracompetitive rents and **harming competition and consumers**

For example:

> "Hold-up may have especially severe consequences for innovation and competition in the context of standardized technology." (FTC (2011) report)
>
> "Patent holders may seek to take advantage of that market power by engaging in one form of patent hold-up, such as excluding a competitor from a market or obtaining an unjustifiably higher price for its invention. Consumers could be harmed as well by (increased consumer prices)." (DOJ (2012) remarks to ITU-T)

IP and antitrust: technology standards under scrutiny

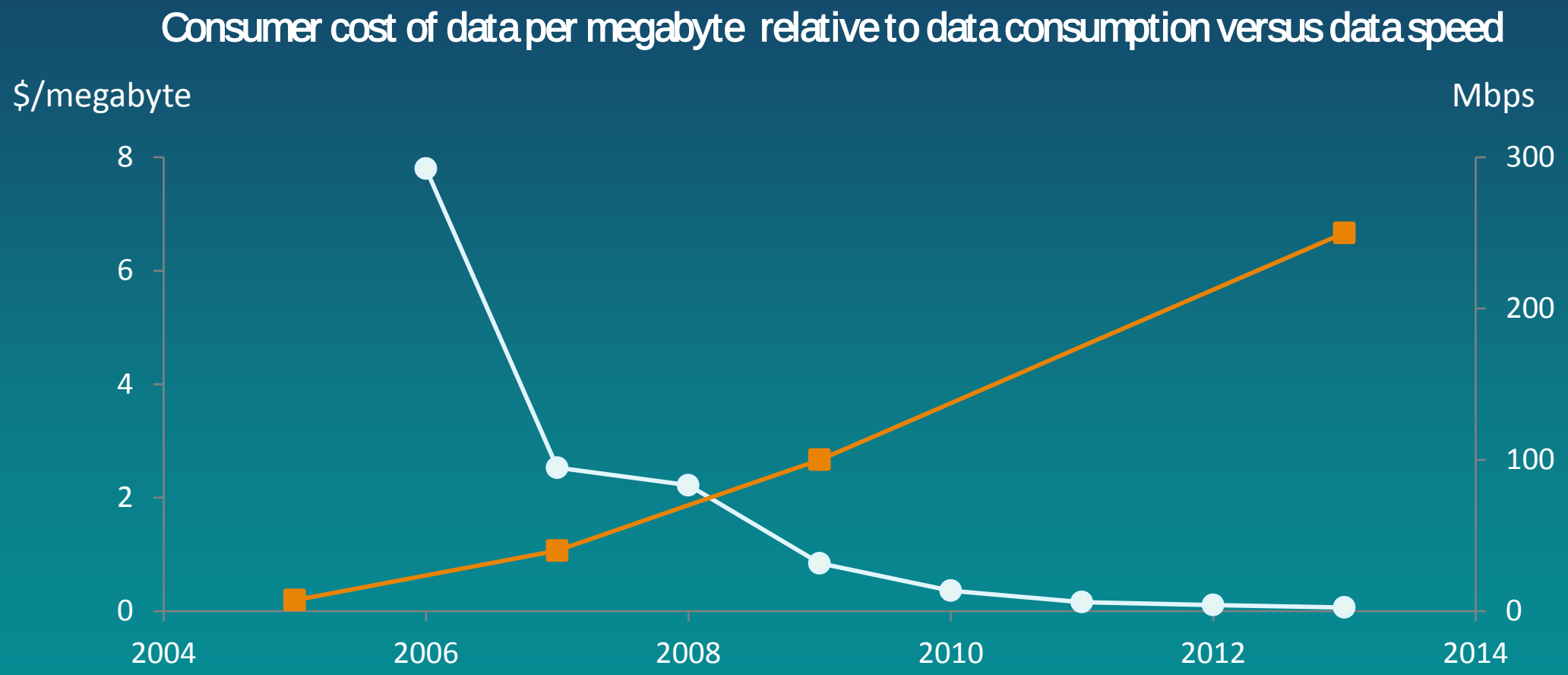
Example 2: "Royalty Stacking"

- Royalties paid by product manufacturers to many different patent owners can add to prohibitively high as a percentage of the product's value, **diminishing their margins & commercialization incentives**

For example:

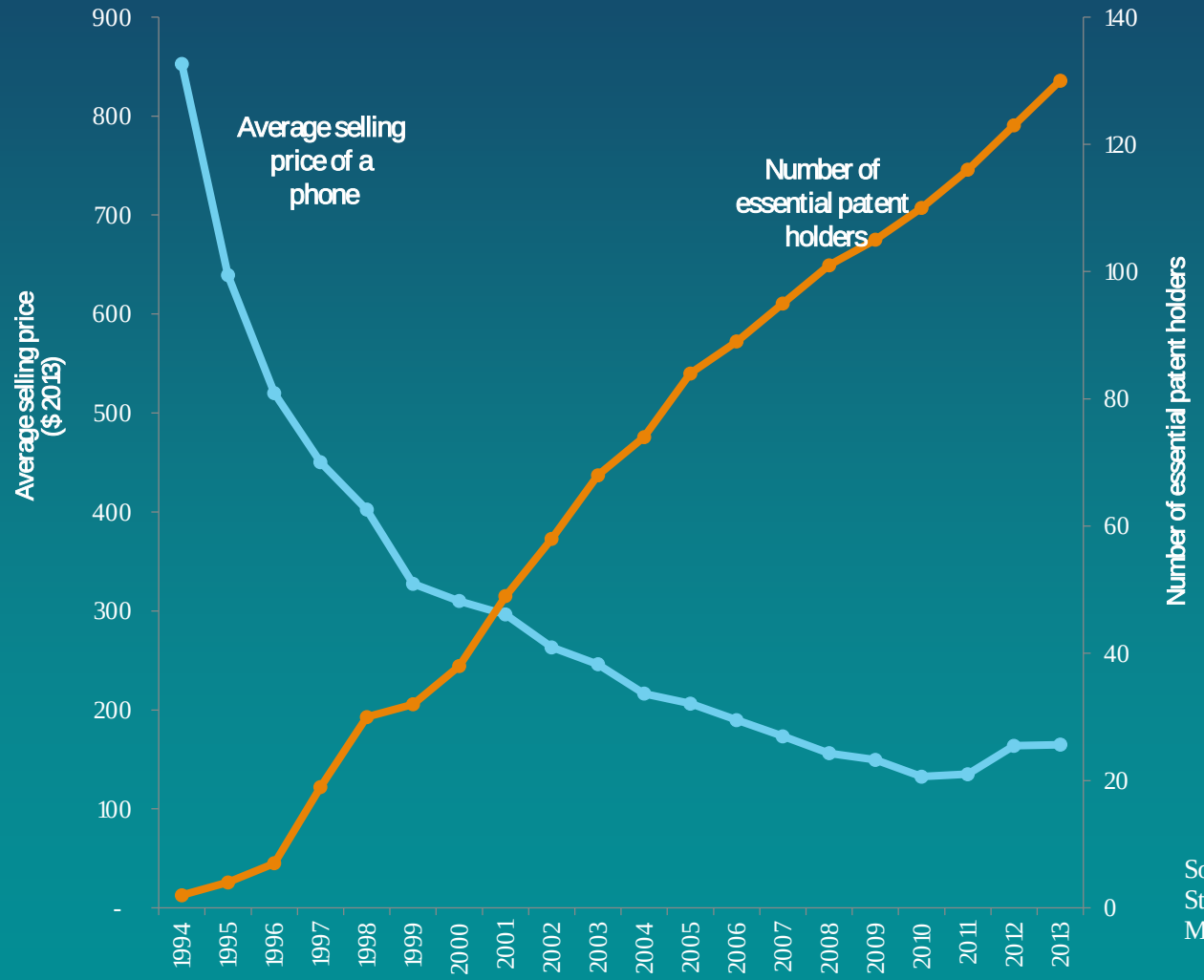
> "Time and time again, we have seen this sort of royalty-stacking problem arise. One great example is 3G telecom in Europe. The standard-setting organization (SSO) put out a call for essential patents, asking which they must license to make the 3G wireless protocol work and the price at which the patent owners would license their rights. 3G telecom received affirmative responses totaling over 6000 essential patents and the cumulative royalty rate turned out to be 130%. *This is not a formula for a successful product*." (Lemley (2002))

Theory versus evidence: Lower costs and improved performance of mobile



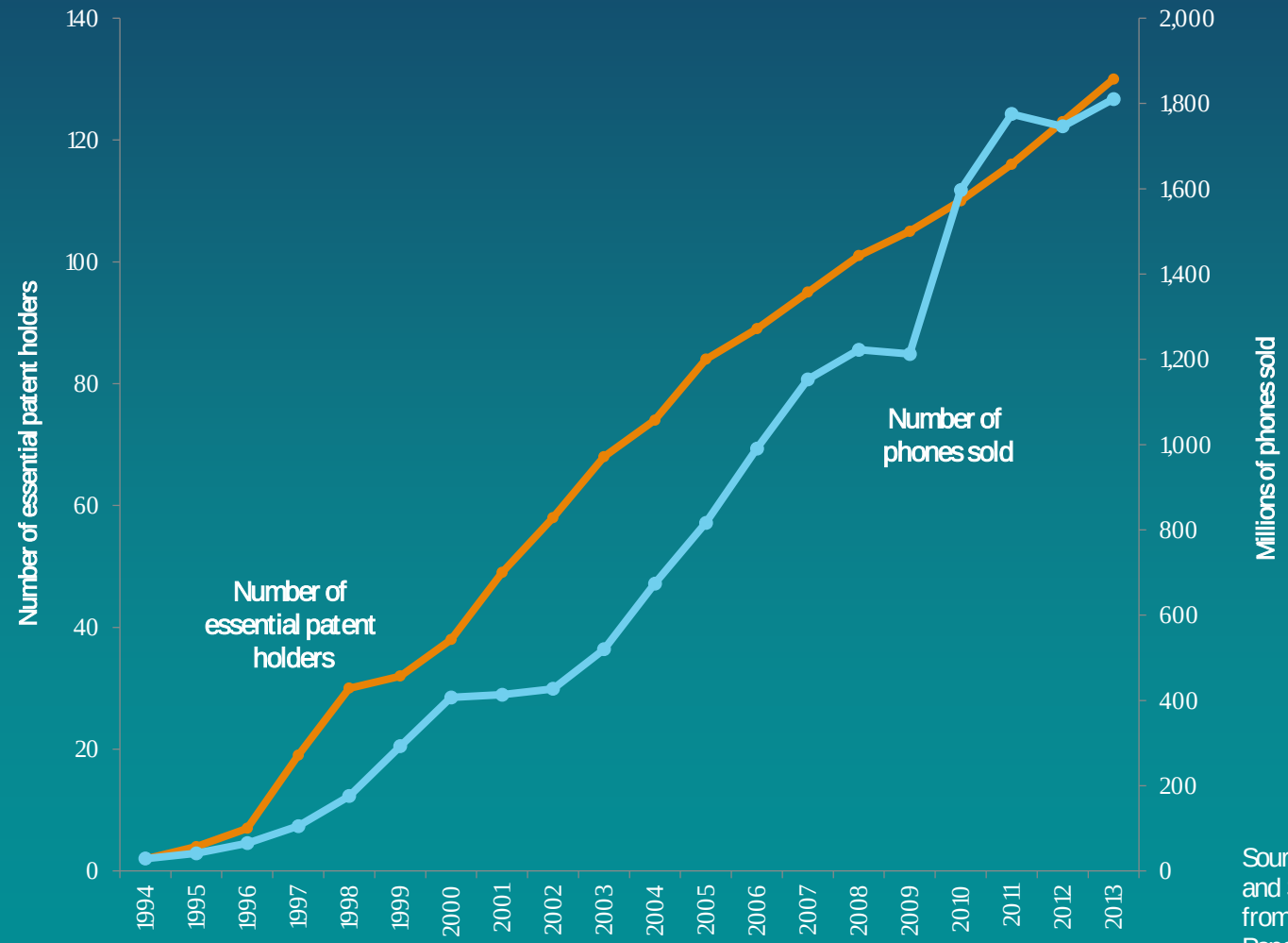
Sources: Cisco Visual Networking Index, ITU, IE Market Research, Motorola, Deutsche Bank, Qualcomm

Theory versus evidence: Lower consumer prices of products as patent owners increase



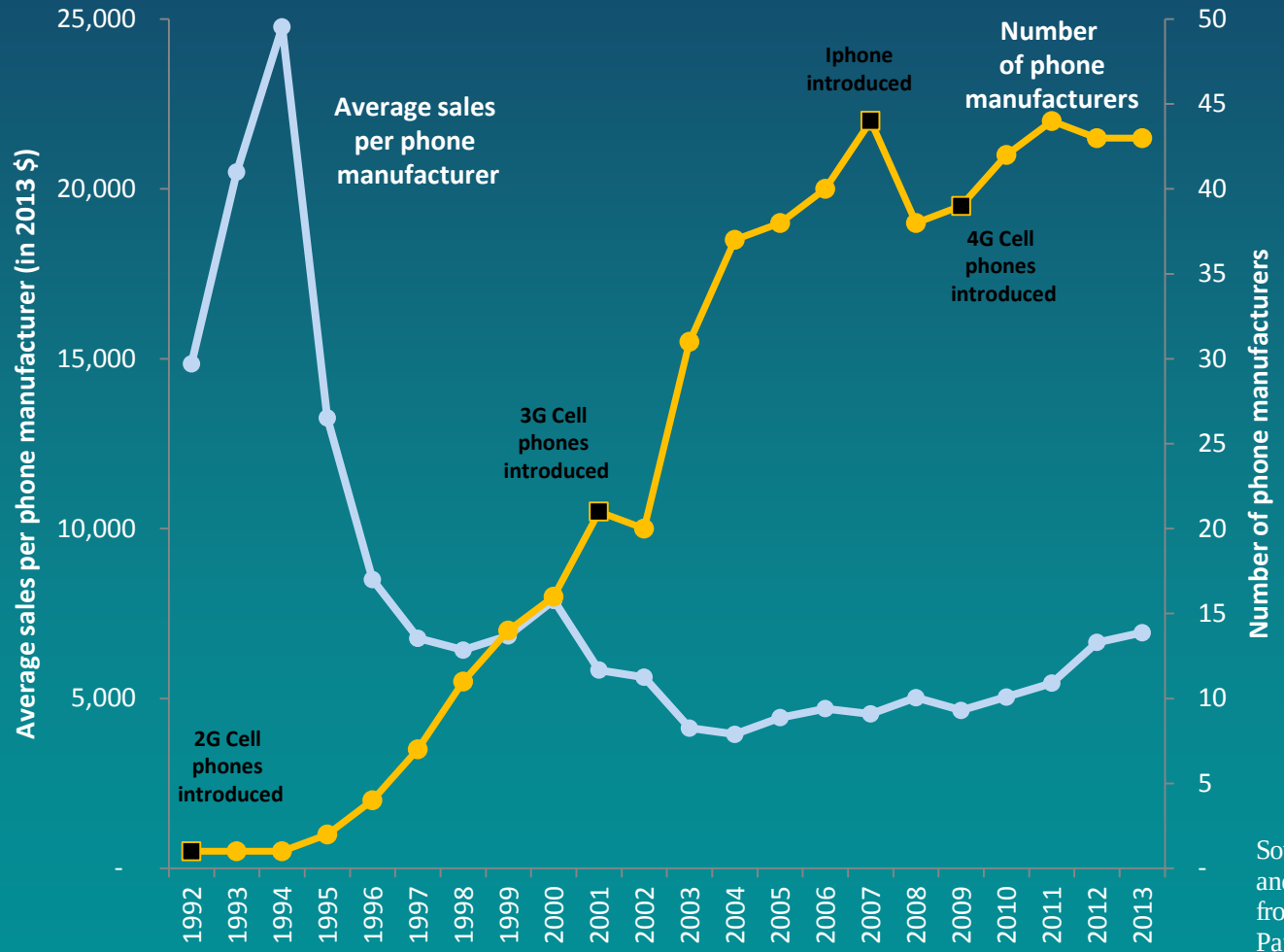
Source: Gelatovic and Gupta (2015), "Royalty Stacking and Standard Essential Patents: Theory and Evidence from the Mobile Wireless Industry:, Hoover IP2 Working Paper

Theory versus evidence: High market entry, more consumer products as patent owners increase



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

Theory versus evidence: Higher market entry and lower concentration



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

Need for future research

Filling the gap between theory and evidence

- What explains the disconnect between these policy concerns about competitive harm and the reality of a healthy, thriving industry?
- While one can always argue that the "but for" world would be better in some way, competition concerns demand consideration of objective criteria
- What policies should China and other emerging innovation economies embrace for promoting IP and standards

Thank you

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