

Mobile Tech: IP in an Interconnected World

Smartphone Market Success

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Markets Functioning with (F)RAND SEP Licensing

Hold-up and royalty stacking theories predict excessive royalties, other harms and effects which evidence disproves

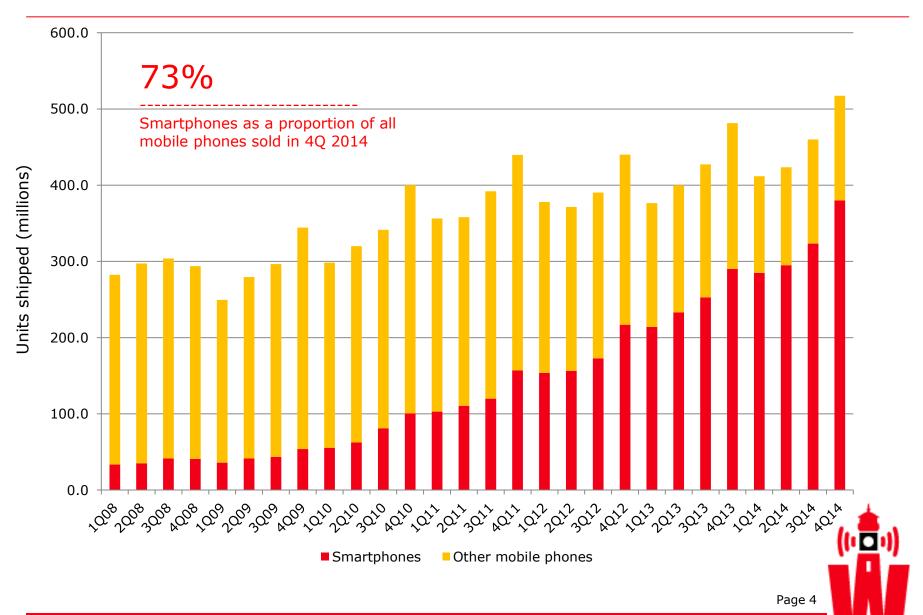
- Consumer adoption and consumption increasing
- Innovation and technical progress accelerating
- Cellular technology R&D up 74% to \$46bn since 2009
- Time-to-market for new standards shortening
- Technology/device OEM vertical integration collapsed
- Market entry downstream in smartphones burgeoning
- Concentration in handset OEM supply low and declining
- Smartphone prices falling on average, and dramatically so on a quality-adjusted basis
- Royalties for SEPs and other patents very small proportion of consumer product and service prices

Highlighting Progress and Success in Mobile Services, Devices and Standard-based Technologies

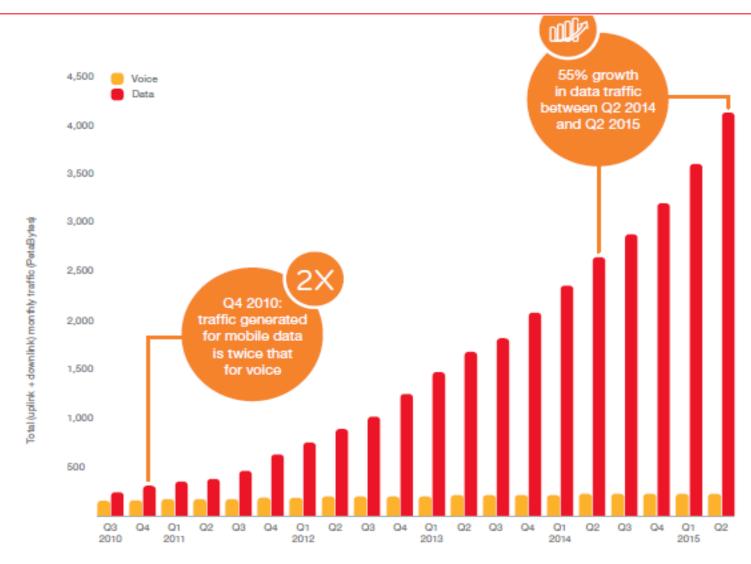
- 7 billion subscribers since inception in early 1980s
- \$400 bn in handset sales and \$1.2 trillion in services annually
- Prices as low as \$20 since mid 2000s, <\$75 smartphones now
- Hundreds of companies including SMEs contribute to and implement 3GPP (ETSI is a partner) standards
- >124,000 patents declared possibly essential to 3GPP standards
- Relentless innovation with a major 3GPP standards release every year or so
- 4G LTE data speeds >50Mbps are 1,000 times faster than with 2G one decade ago
- 393 commercially launched LTE networks in 138 countries*
- Increasing product choice (e.g. 2,919 4G LTE user devices have been announced by 297 manufacturers*)

*http://www.gsacom.com

Overwhelming Adoption of Smartphones with Mobile Broadband in Recent Years has Driven...

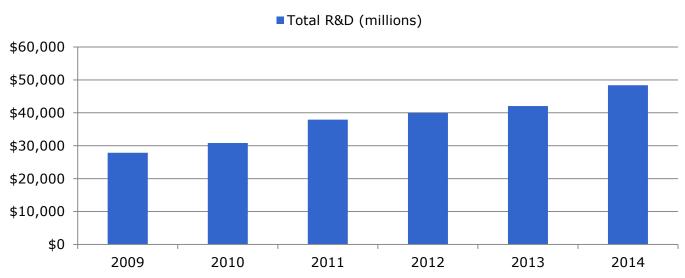


30x Data consumption driven by LTE since 2010



Source: Ericsson. Traffic does not include DVB-H, Wi-Fi, or Mobile WiMax. Voice does not include VoIP

R&D Growth in Line with 74% Revenue Growth

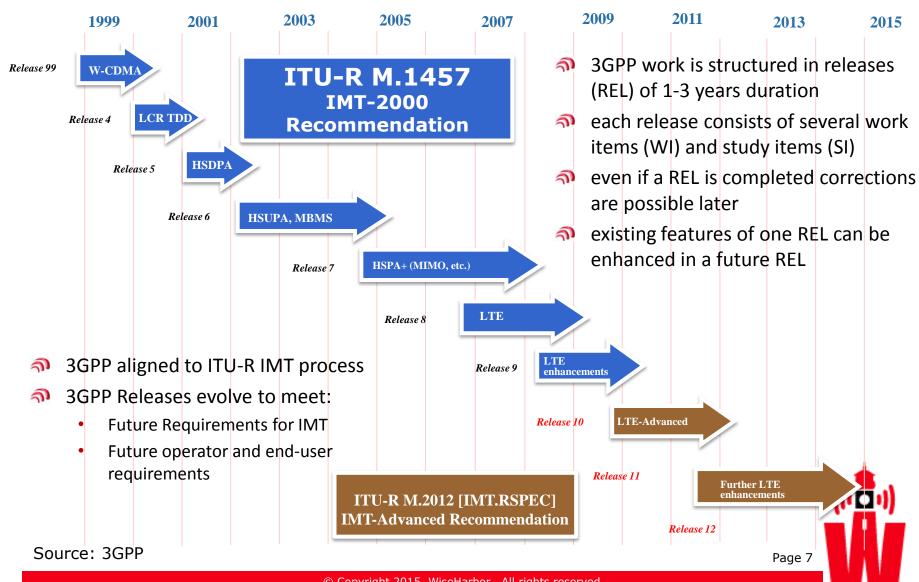


	2009	2010	2011	2012	2013	2014	Growth 2009-2014
Total Sales							
(millions)	\$353,836	\$401,722	\$510,840	\$559,173	\$582,011	\$614,459	74%
Total R&D							
(millions)	\$27,854	\$30,829	\$37,922	\$39,970	\$42,073	\$48,386	74%
R&D/Sales	7.9%	7.7%	7.4%	7.1%	7.2%	7.9%	

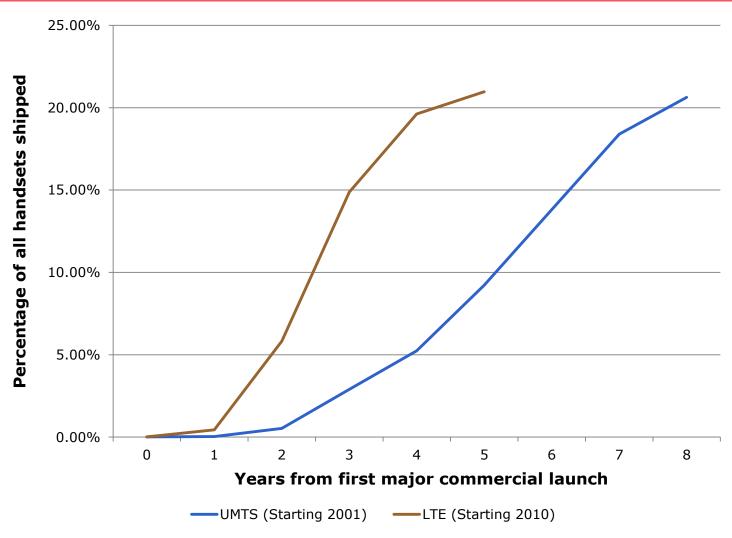
Total revenues and R&D expenditures for eleven largest technology companies with a predominant or exclusive focus on mobile communications: Alcatel-Lucent, Apple, BlackBerry, Ericsson, Huawei, MediaTek, Nokia, Qualcomm, Samsung, LG, ZTE



3GPP Standards Release Schedule



Time-to-Market and Adoption Rate Accelerating



First release of the UMTS standard (Release 99) was in 1999; the first commercial launch was in 10/2001 First release of the LTE standard (Release 8) was in 2008; the first commercial launch was in 12/2009



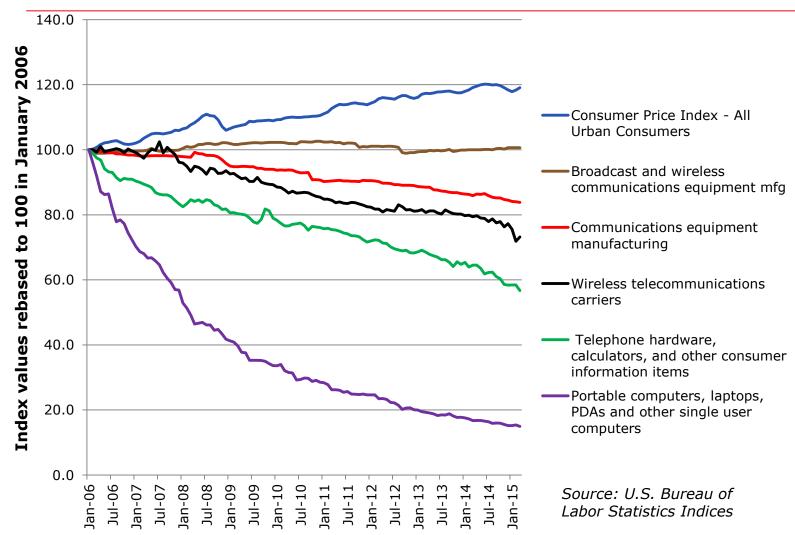
So Much More and for less Money (2006-2013)

Model	Nokia N93 (2006)	Samsung Galaxy S III (2013)
Images not to scale		12:45 12:45
2G Network	GSM 900/1800/1900	GSM 850/900/1800/1900
3G Network	UMTS (WCDMA) 2100	HSDPA 850/900/2100
4G Network	No	LTE 700/2100 or LTE 800/1800/2600*
Data Speed	384 kbps (3G)	50 Mbps (LTE)
Chipset	Nokia/TI baseband processor and	Qualcomm MSM 8960 or Exynos 4412
	Texas Instruments OMAP 2420	Quad*
	Applications Processor	
Central	332 MHz Dual ARM 11	Dual core 1.5 GHz or Quad core 1.4 GHz
processor		Cortex-A9*
Graphics	3D Graphics hardware accelerator	Adreno 225 or Mali-400MP*
processor		
Operating	Symbian OS 9.1, Series 60 3 rd	Android OS v4.0 (Ice Cream Sandwich) or
System	edition UI	Android OS v4.1.1 (Jelly Bean)*
Display	TFT, 256K colours, 240 x 320 pixels,	Super AMOLED, 16M colours, 720 x 1,280
	2.4 inches, 36 x 48mm, 167 pixels per inch	pixels, 4.8 inches, 306 pixels per inch
Touchscreen	No	Capacitive multitouch
Memory	50MB storage +64 MB RAM +128 MB	16GB storage, 2GB RAM, up to 64 GB
	miniSD Card	microSD
Cameras	3.15 megapixels, VGA @30 fps:	8MP, autofocus, LED flash: secondary
	secondary CIF videocall camera	1.9MP, 720p @30 fps
Price without	Euro 550 x \$1.26 = \$693	\$599-\$649 (24% cheaper with 14%
subsidy		cumulative inflation)

So Much More and for less Money (2013-2014)

Model	Samsung Galaxy S III (2013)	Xiaomi M i4 (2014)
Images not to scale	12:45 na. stay	
2G Network	GSM 850/900/1800/1900	GSM 850/900/1800/1900
3G Network	HSDPA 850/900/2100	TD-SCDMA 2010-2025/1880-1920
4G Network	LTE 700/2100 or LTE 800/1800/2600*	TD-LTE 2570-2620/1880-1920/2300-2400
Chipset	Qualcomm MSM 8960 or Exynos 4412 Quad*	Qualcomm MSM8974AC Snapdragon 801
Central	Dual core 1.5 GHz or Quad core 1.4 GHz	Quad-core 2.5GHz Krait 400
processor	Cortex-A9*	
Graphics processor	Adreno 225 or Mali-400MP*	Adreno 330
Operating System	Android OS v4.0 (Ice Cream Sandwich) or Android OS v4.1.1 (Jelly Bean)*	Android OS, v4.43 (KitKat)
Display	Super AMOLED, 16M colors, 720 x 1,280	IPS LCD, 16 M colors, 1080x1920 pixels,
. ,	pixels, 4.8 inches, 306 pixels per inch	5.0 inches , 441 pixels per inch
Touchscreen	Capacitive multitouch	Capacitive multitouch
Memory	16GB storage, 2GB RAM, up to 64 GB microSD	16 GB (64GB at higher price), 3GB RAM
Cameras	8MP, autofocus, LED flash: secondary 1.9MP, 720p @30 fps	13 MP, autofocus, dual-LED flash. Video includes 2140p@30fps. Secondary 8MP, 1080p@30fps
Launch price	\$599-\$649	\$400-\$460 (18% cheaper)
without subsidy		

Telecom, Wireless and Personal Computing Prices Flat or Falling versus Rising CPI

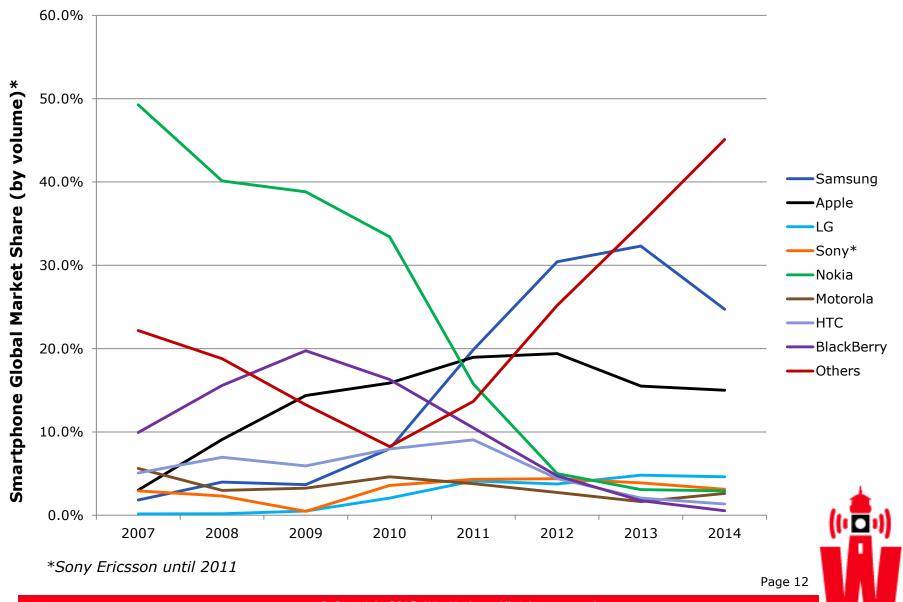


"Telephone" category understates smartphone price declines. PDAs are today's smartphones; which significantly exceed sales of other kinds of "portable computer" (>2 x by volume for US in 2014)

Page 11



How the Mighty Have Fallen: "Others" Predominate now in Smartphone Supply

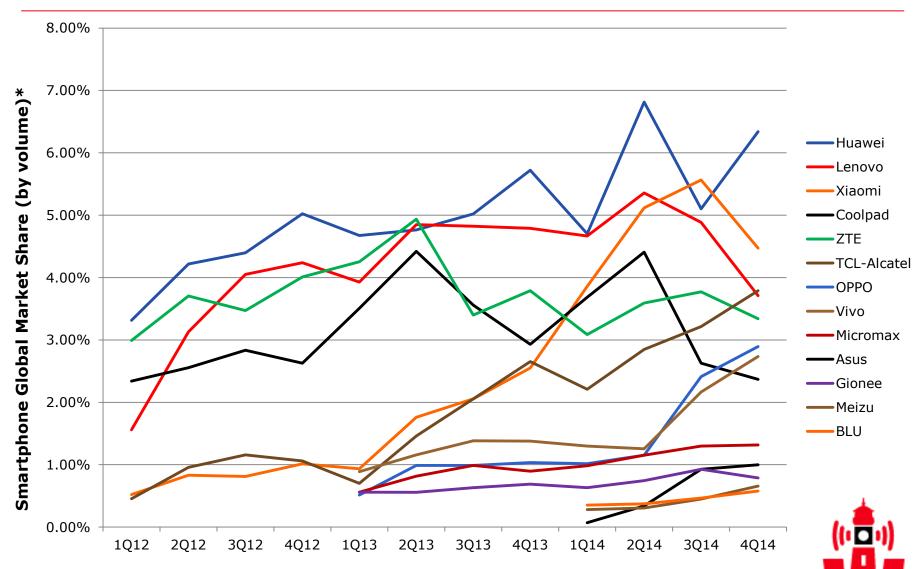


Vertical Integration of OEMs has Collapsed

 Almost all major developers of mobile standard-essential technologies have exited the handset market, while some of the brand names are still used independently of their former parents

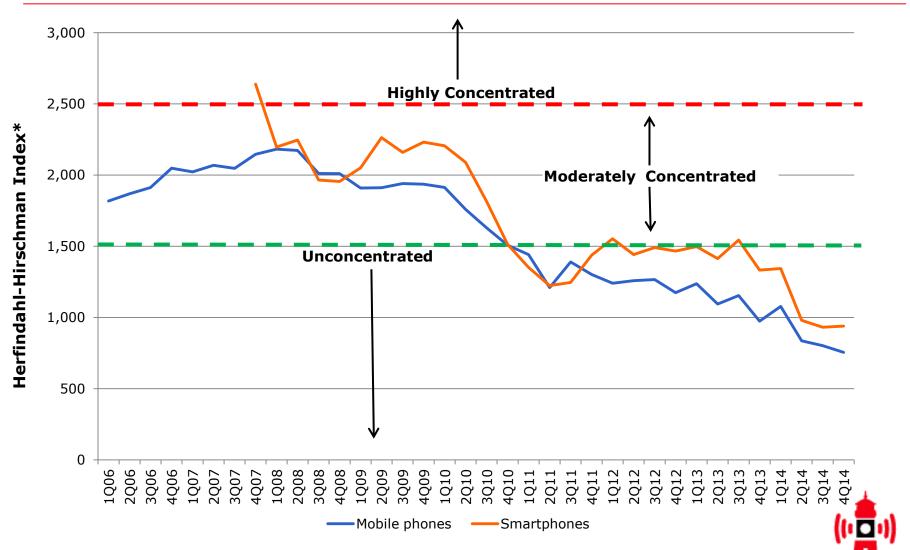
	Peak share year	Peak share %	Exited market	Prior year share	Sold to	
Qualcomm		Small: CDMA- only	2000	Small: CDMA- only	Kyocera	
Alcatel	2002	2.8%	2005	1.1%	TCL: uses Alcatel OneTouch brand	
Siemens	2003	8.4%	2005	7.3%	BenQ: bankruptcy followed in 2006	
Motorola	2006	22%	2012	2.7%	Google, who then sold to Lenovo in 2014	
Ericsson	2007	9.2%	2011	3.2%	Sony, following 2001- formed JV	
Nokia	2008	40%	2014	15%	Microsoft	

Many Fast-Growing Newcomers Capitalize on Low Barriers to Entry for Smartphone OEMs



^{*}For new entrants with more that 0.5% market share -- equivalent to 6 million units annually in 2014
Page 14

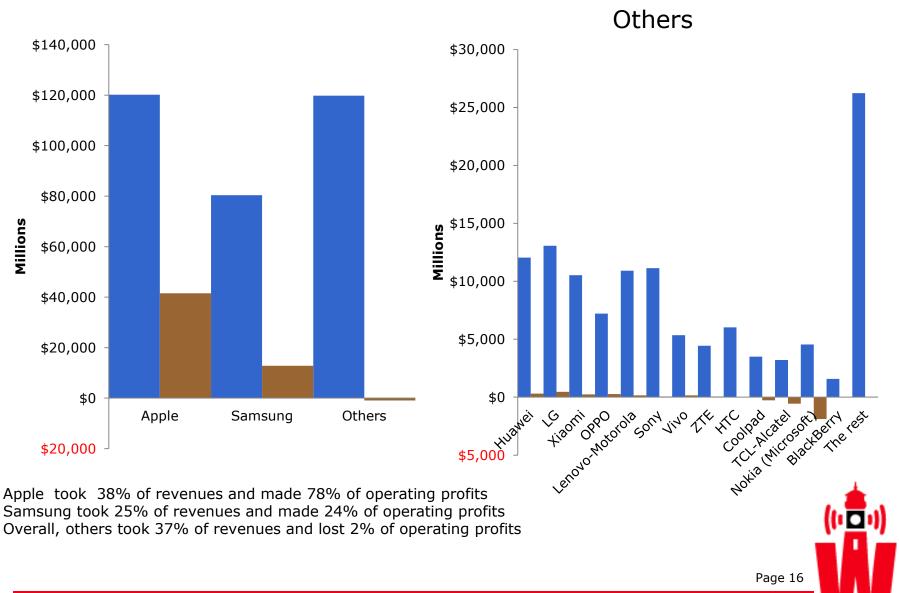
Competition: Unconcentrated Handset OEM Supply



^{*}This widely-accepted measure of market concentration in competition analysis is calculated by summing the squared market shares of all firms in any given market

Page 15

Apple and Samsung took 62% of Revenues and 102% of Operating Profits in Smartphones, 2014



Similar Spec, but at Twice the Price with Cellular*

iPod Touch 5th Generation (no cellular capabilities)



\$199 price for 16 GB version, May 2015*

iPhone 5c



\$450 price, unlocked and contract/SIM free, for 8 GB version, May 2015**

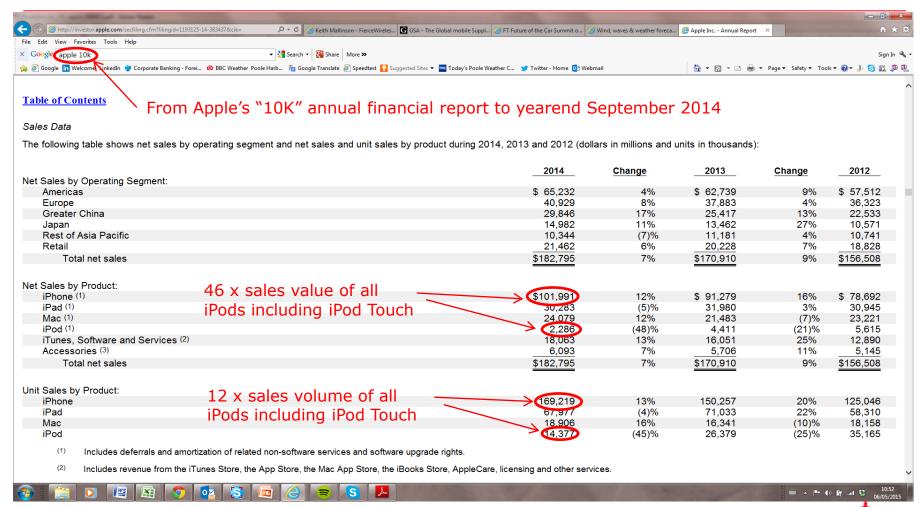
http://www.phonearena.com/phones/Apple-iPod-touch-5th-generation_id7545 http://www.phonearena.com/phones/Apple-iPhone-5c_id7983

*With equivalent comparison between iPads; cost of adding cellular is \$32 in components plus \$1 in manufacturing: http://www.isuppli.com/Teardowns/News/Pages/New-iPad-Air-Costs-Less-to-Make-Than-Third-Generation-iPad-Model-,IHS-Teardown-Reveals.aspx.

**According to Apple's US web site. http://www.apple.com



And iPhones Outsell all iPod models 46-fold in Revenues and 12-fold in Volume



Apple is generating more that \$40 billion annually in gross profits on its iPhones with margins in the 40%-50% range in recent years

Aggregate Royalty Yield < 2.8% for Five Licensors who Collectively Own Most Mobile SEP Value

	201	L 3	2014		
	2013 Total Royalties (millions)	2013 Royalty Yield*	2014 Total Royalties (millions)	2014 Royalty Yield*	
Qualcomm**	\$7,878	2.09%	\$7,862	1.92%	
Ericsson	\$1,583	0.42%	\$1,480	0.36%	
Nokia***	\$688	0.18%	\$791	0.19%	
InterDigital****	\$264	0.07%	\$416	0.10%	
Alcatel-Lucent	\$100	0.03%	\$75	0.02%	
Total	\$10,513	2.79%	\$10,625	2.59%	

^{*}As a percentage of global handset revenues of \$377 billion in 2013 and an estimated \$410 billion in 2014 (Morgan Stanley)

From audited company reporting in all cases. Mid-year exchange rates used



^{**}September yearend

^{***}Nokia Technologies: figures for patent, technology and brand licensing

^{****} Net of patent disposal income in 2013

Thank You



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