# The Evolution of Mobile Broadband

***Presentation to TFI Communications Technology Asset Valuation Conference***

***Austin, TX***

*January 24, 2012*

*Mark Lowenstein*

*Managing Director*
*Mobile Ecosystem*
*mlowenstein@m-ecosystem.com*
*@marklowenstein*



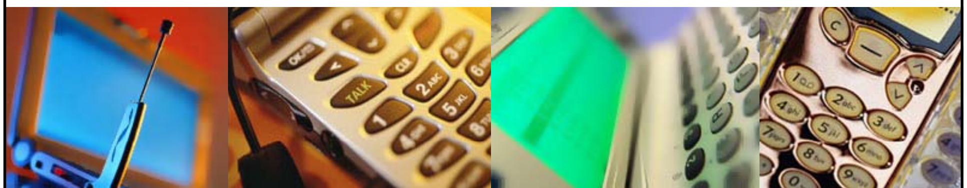
# Agenda

I. Mobile Market Dynamics
II. Network Roadmap
III. Strategies for Containment




Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013

mobile ecosystem



# I. Mobile Market Dynamics

3

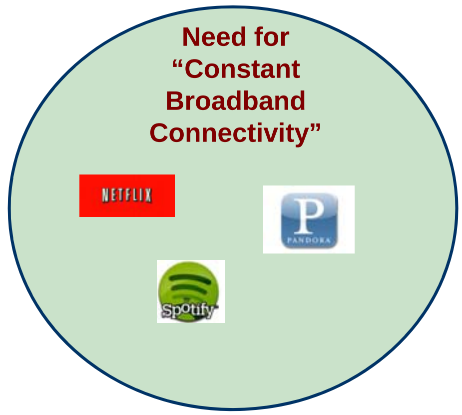
mobile ecosystem

## Facts and Figures

- 6 billion subscribers, globally
- $1.4 trillion operator service revenues (2011)
- 85% of the U.S. population has a cellphone. 50%+ have a smartphone
- U.S. represents 6% of subs but 27% of global capex and 21% of global data revenues
- Globally, ~700m iOS and Android phones in use as of August 2012
- ~ 40% of U.S. operator revenues now come from data services
- App economy: 600,000 apps; 3+ billion downloads; $50+ billion market; 50% of all VC in 2012 YTD

 4

# Drivers


**Not "wireless", but portable mobile computers**

# Drivers of Consumption

- Growth tapering off
- ~1 GB average consumption

- Displacing PCs
- Next major push is the enterprise
- Locus of innovation for cloud

- Ultimate device, network portability
- New business models
- Competes with device-based hotspot

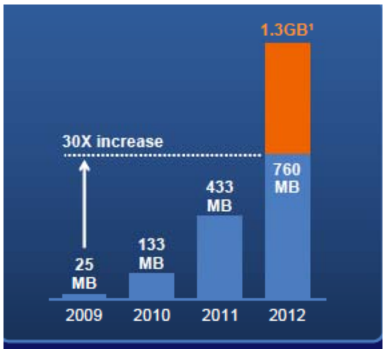
- Surge in connected devices
- Mix of media centric and lower consumption devices
- Innovative business models
- Fastest-growing segment

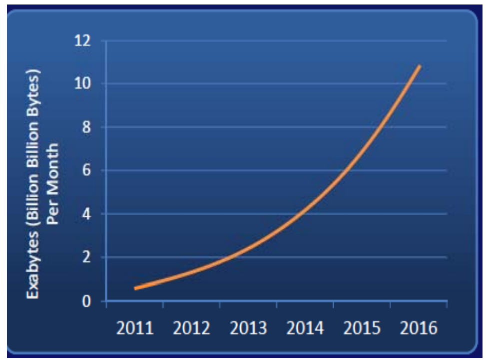
Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013
*Please contact Mr. Lowenstein or TFI regarding reproducing presentation material.*

# Data Growth

**Smartphone Consumption/Month**

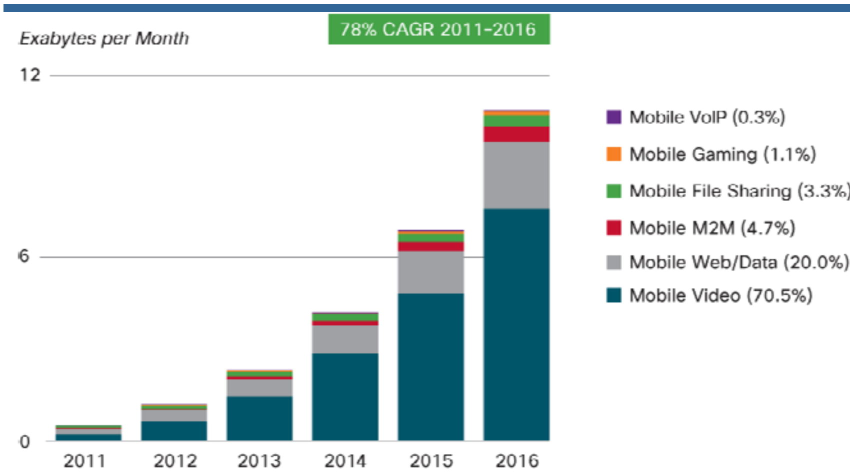



**Global Mobile Data Traffic Growth**




 7

# Video/Rich Media To Be a Big Driver




Figures in legend refer to traffic share in 2016.
Source: Cisco VNI Mobile, 2012

**Cisco estimates cloud apps will grow from 45% of traffic in 2011 to 71% in 2016**

 8

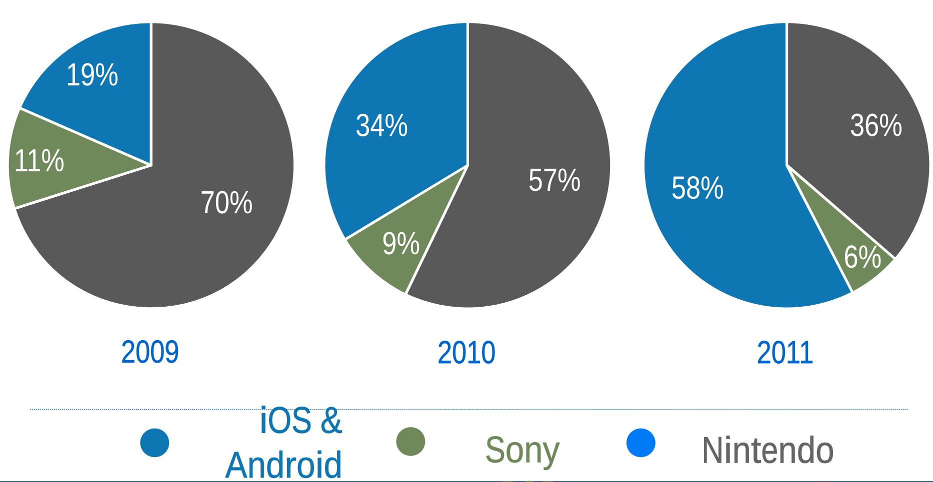
## Some Metrics on Mobile Growth/Displacement

- 70% of Pandora use is from mobile
- 60% of Twitter use is from mobile
- ESPN: 3.1b minutes on mobile in 2012
- Fandango: 40% of ticket sales from mobile
- Expedia: >$1b from mobile




## APPS DISRUPTING THE GAMING INDUSTRY

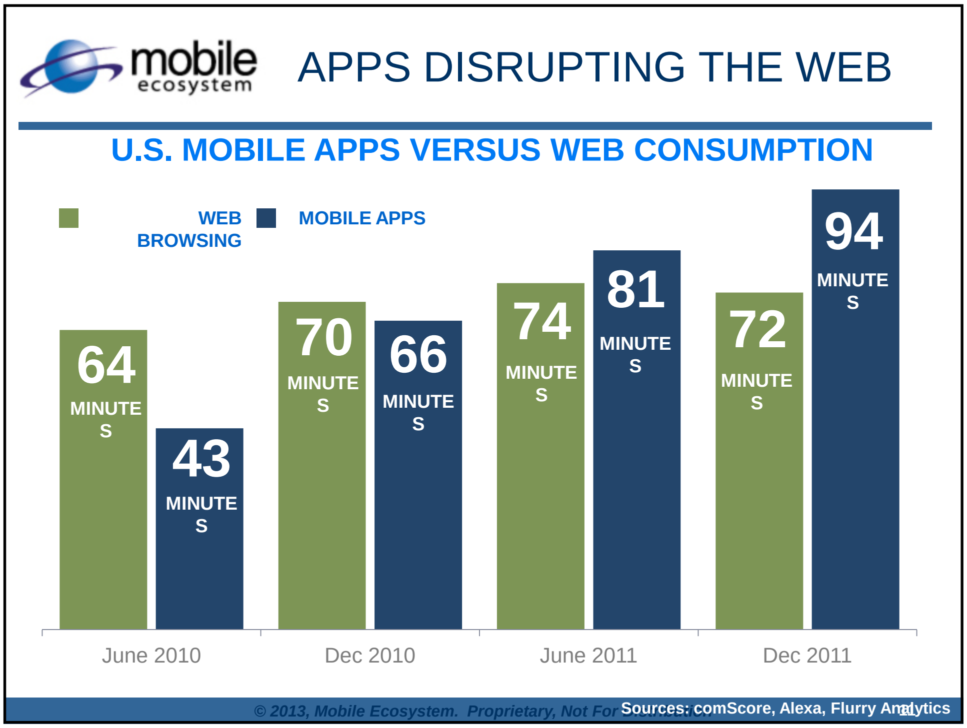
U.S. PORTABLE GAME SOFTWARE BY REVENUE




Source: Flurry Analytics, The NPD Group; Flurry analysis & estimates




Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013
*Please contact Mr. Lowenstein or TFI regarding reproducing presentation material.*





Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013
*Please contact Mr. Lowenstein or TFI regarding reproducing presentation material.*

## Current Pricing Does Not Support Mobile Broadband Usage

| Application | Throughput (Mbps) | MByte/hour | Hrs./day | GB/month |
|---|---|---|---|---|
| Audio or Music | 0.1 | 58 | 0.5 | 0.9 |
| | | | 1.0 | 1.7 |
| | | | 2.0 | 3.5 |
| | | | 4.0 | 6.9 |
| Small Screen Video (e.g., Feature Phone) | 0.2 | 90 | 0.5 | 1.4 |
| | | | 1.0 | 2.7 |
| | | | 2.0 | 5.4 |
| | | | 4.0 | 10.8 |
| Medium Screen Video (e.g., Smartphone Full-Screen Video) | 1.0 | 450 | 0.5 | 6.8 |
| | | | 1.0 | 13.5 |
| | | | 2.0 | 27.0 |
| | | | 4.0 | 54.0 |
| Larger Screen Video (e.g., Netflix Lower Def. on Tablet or Laptop) | 2.0 | 900 | 0.5 | 13.5 |
| | | | 1.0 | 27.0 |
| | | | 2.0 | 54.0 |
| | | | 4.0 | 108.0 |
| Larger Screen Video (e.g., Netflix Higher Def. on Laptop) | 4.0 | 1800 | 0.5 | 27.0 |
| | | | 1.0 | 54.0 |
| | | | 2.0 | 108.0 |
| | | | 4.0 | 216.0 |

**Average retail price is $10-15/Gb**

 13

## Voice and Text Substitution

- 4G and IP-based networks
- Social networking, private messaging

 14

Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013
*Please contact Mr. Lowenstein or TFI regarding reproducing presentation material.*

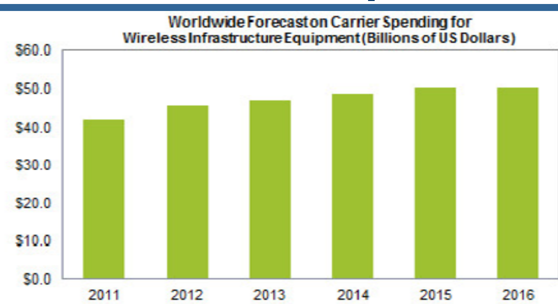
mobile ecosystem

# II. Mobile Network Roadmap



mobile ecosystem

## Global Wireless Infra Spend




Source: IHS iSuppli Research, August 2012

- **Up ~8% in 2012**
- **Global spending on 4G to exceed 3G in 2013**
- **IHS estimates total WW spending on all wireless is about $150 billion, which includes includes expenditures for cables, plants and site procurements; as well as capital spending on maintenance and software upgrades**

## Comparative Spectrum Picture

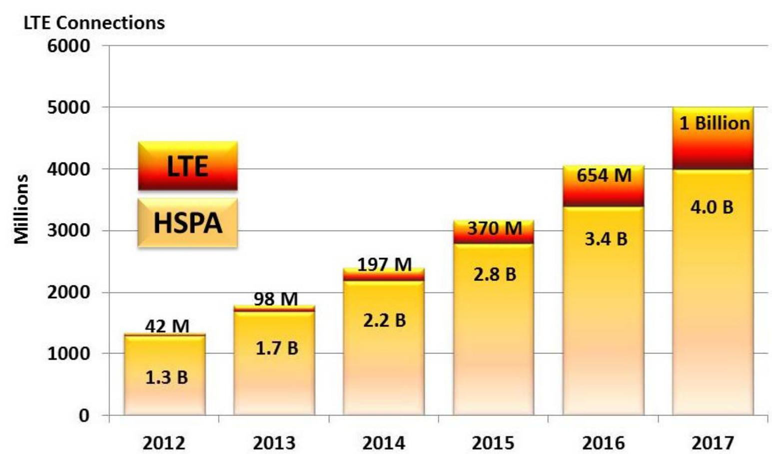
| | USA | Japan | Germany | UK | France | Italy | Canada | Spain | South Korea | Mexico |
|---|---|---|---|---|---|---|---|---|---|---|
| Subscribers** | 322.8M | 121.9M | 109.8M | 75.7M | 63.2M | 91.2M | 25.7M | 57.3M | 51.8M | 95.1M |
| Average Consumers' Minutes of Use per Month** | 777 | 136 | 130 | 195 | 231 | 161 | 369 | 149 | 303 | 191 |
| Average Revenue per minute – A Measure of the Effective Price per Voice Minute** | $0.03 | $0.21 | $0.10 | $0.10 | $0.13 | $0.11 | $0.10 | $0.16 | $0.08 | $0.04 |
| Spectrum Assigned for Commercial Wireless Use*** | 409.5 MHz* | 347 MHz | 615 MHz | 375 MHz | 375 MHz | 375 MHz | 270 MHz | 625 MHz | 270 MHz | 260 MHz |
| Potentially Usable Spectrum in the Pipeline*** | 50 MHz | 400 MHz | Recently auctioned 350 MHz | 310 MHz | 250 MHz | 250 MHz | Up to 200 MHz | 59.6 MHz (Recently auctioned 250 MHz) | 120 MHz | 150 MHz |

* Figure includes AWS-1, 700 MHz spectrum not yet in use and 55.5 MHz of spectrum at 2.5GHz
** Glen Campbell, et. al "Global Wireless Matrix 3Q 2011," Bank of America Merrill Lynch, Sept 28, 2011, at Tables 1-2
*** Regulatory and company websites and press reports
Sources: CTIA, The Wireless Association® Mid-Year 2011

*Source: 4G Americas*




## Growth of 4G = Mobile Broadband (WW)




Source: Informa Telecoms & Media, WCIS+, June 2012

www.4gamericas.org




Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013
*Please contact Mr. Lowenstein or TFI regarding reproducing presentation material.*

## Aggressive Evolution/Replacement Cycle in U.S.

- By YE 2014, all major U.S. operators should have 4G LTE deployed to 80%+ of their footprint
  - Sprint/Clearwire, T-MO, AT&T acceleration
- CDMA 1x retirement and use of spectrum for data
- WiMax and iDEN retirement
- Significant upgrade to backhaul plant – fiber to nearly all cells
- IMS-based services and VoLTE

## Active Spectrum Cycle

- NPRM for incentive auction
  - Nearest term for broad deployment of beachfront spectrum
- 3.5 GHz small cell spectrum
- Wi-Fi spectrum
- Dynamic Spectrum Sharing (TV White Space)
- Continued horse-trading based on VZW-cable deal, Sprint/Clearwire, DISH

# LTE Progression

**2010 to 2012**

**Initial Deployments**

5 or 10 MHz Radio Channels

2X2 Multiple Input Multiple Output (MIMO) Antennas

Initial Self-Optimization/Organization for Auto Configuration

**2013 to 2016**

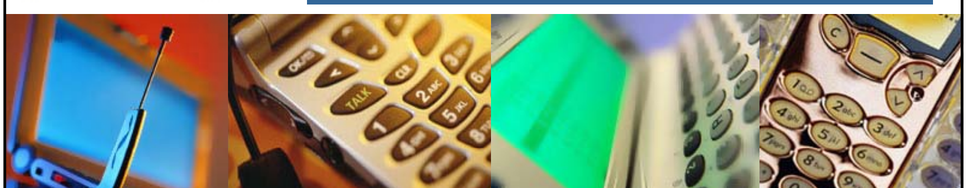
**Higher Capacity/Throughput and/or Efficiency**

Wider Radio Channels: 20 MHz
Carrier Aggregation: up to 100 MHz
Advanced Antenna Configurations
More Advanced MIMO (Higher Order, Multi-User, Higher Mobility)
Coordinated Multipoint Transmission
Het-nets (Macrocells/Picocells/Femtocells)
Het-net Self Optimization/Organization
More Intelligent and Seamless Offload

**Greater Capabilities**

Voice Widely Handled in the Packet Domain
Policy-Based Quality of Service

Enables more users, more applications and a better experience

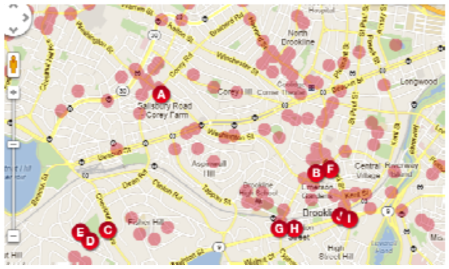


# *III. Strategies for Containment*

22

Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013
*Please contact Mr. Lowenstein or TFI regarding reproducing presentation material.*

## A Different View of the Network is Emerging



- **Un-covered**
- **Under-covered**
- **Capacity boost**
- **Premium service**

- **HetNets**
- **Wi-Fi offloading**
- **Wholesale networks**
- **Cable national hotspot network**
- **Dynamic capacity allocation**
- **Networks will not be as monolithic**
- **SON**




## HetNets

- Uses smaller cells, such as micro cells and pico cells. Rather than radios mounted on towers, small cells are mounted on light poles or placed in venues, to expand capacity and coverage more quickly and at lower cost.
- The wireless network of the future will be a mix of “macro-cell” and “microcell” technology, also dynamically using Wi-Fi for network offload. These are all “tools in the toolbox” to provide coverage, expand capacity, and meet the intense demand for data

## The Return of Wi-Fi

About 50% of all smartphone data use is Wi-Fi

- Return of “muni Wi-Fi” model
- Combined femtocell/Wi-Fi router
- Expansion of public hotspots
- Development of mobile policies to encourage subscribers to use Wi-Fi
- HotSpot 2.0




## A More Dynamic Connectivity Model

- Session and content based “boosts”
- QOS for enterprises
- More flexible models for M2M
- Differentiated pricing for rich media
- New business models with content providers

## Dynamic Spectrum Sharing

### *Cities Will Be Well Served*

- LTE Network offload
- Wi-Fi density
- HetNet alternatives being aggressively deployed

### *Ex-Urban and Rural Markets*

- Less “network”
  - Sites, fiber, backhaul
- Under-served broadband (fixed and mobile)
- Clearer path to TVWS usability




## Q&A

lowenstein's lens on wireless

**Sign up for free thought leadership newsletter**
**www.m-ecosystem.com**

twitter **@marklowenstein**

**Contact:**
***Mark Lowenstein***
***mlowenstein@m-ecosystem.com***
***(617) 913-8900***
***www.m-ecosystem.com***




Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013
*Please contact Mr. Lowenstein or TFI regarding reproducing presentation material.*