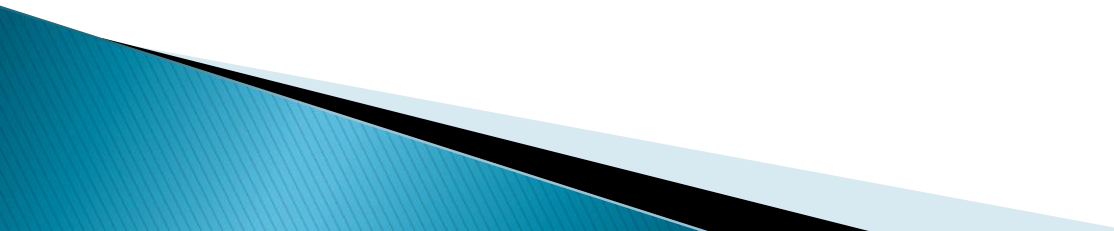


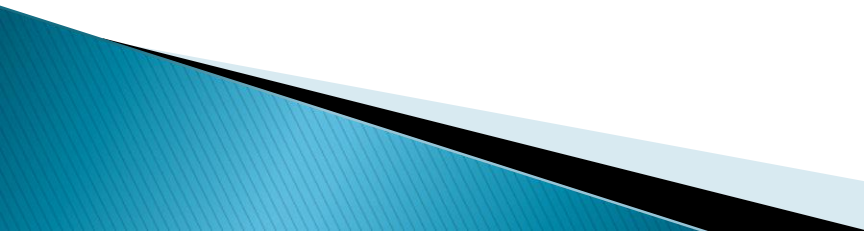
From Convergence to the Singularity

How Technology and Consumer Demand are Driving Spectrum Needs Across the Economy

Convergence

- ▶ Technology and Deregulation Break Down the Barriers Between Two Market Segments
 - '96 Act Eliminates Division between local and long distance
 - Wireless Deployment and Competition Accelerates this Convergence with Nationwide Calling Plans
 - Digital Mobile Merges Voice and Data
 - Local/Long Distance and Voice/Data are Converged
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The Singularity

- ▶ Consumers Demand Everything, Everywhere, and they Don't Care How (or from Whom) They Get It
 - ▶ Wireless Broadband, Consumer Product Innovation, and New Media Business Models Create a Single Universal Addressable Market
 - ▶ To an Unprecedented Degree Diverse Market Participants from Carriers, to Cable, to CE, to Applications and Content are all in direct competition for the consumer
 - ▶ Value of this Singular Market Approaches \$1 Trillion Globally
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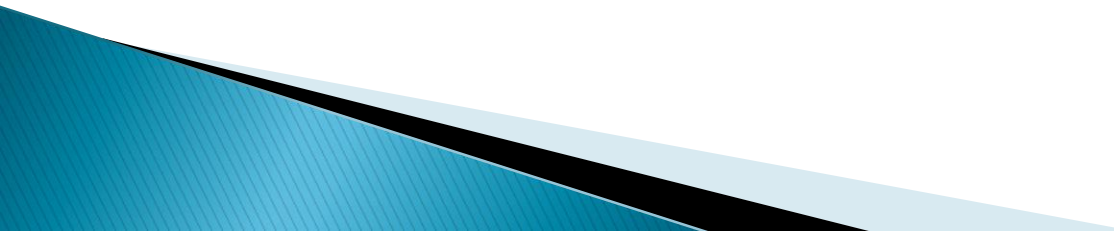
Spectrum is the Key to the Singularity

- ▶ “America's future competitiveness and global technology leadership depend, in part, upon the availability of additional spectrum.”
Presidential Memorandum, June 2010 calling for 500 MHz of spectrum to be made available over 10 years
- ▶ “It is imperative that we make enough wireless spectrum available to meet the needs of rapidly expanding and innovative sectors of the economy . . .” PCAST Report, July 2012

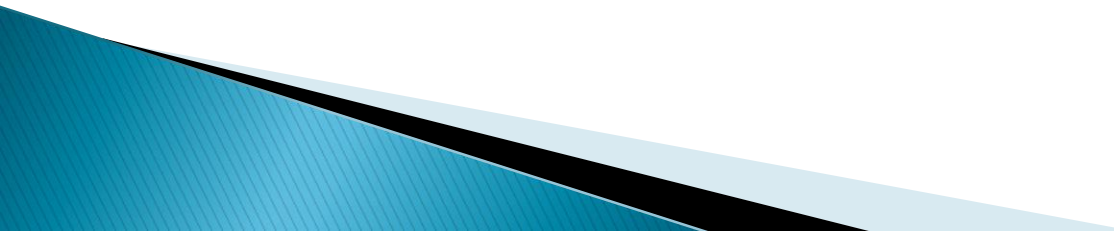
Wireless Carriers Want to Move Into the Home

- AT&T's wireless focus is “all about architecting networks to *deliver video*” AT&T CEO, Randall Stephenson
- “What is 5G all about? *Video*” Lowell McAdams, CEO Verizon Wireless
- ▶ “This transaction provides an excellent opportunity for SOFTBANK to leverage its expertise in smartphones and next-generation high-speed networks, including LTE, to drive the *mobile Internet revolution* in the world's largest market.” Masayoshi Son, CEO of Softbank on acquisition of Sprint

Cable and DBS want to Move Out of the Home

- ▶ “Comcast has implemented an innovative strategy to provide broadband services to our customers *outside the home* using our Wi-Fi network to deliver wireless services that operate over the 2.4 GHz and 5 GHz bands.”
Tom Nagel, SVP Comcast
 - ▶ “We have to make our Video *ubiquitous*”
Charlie Ergen, CEO DISH Networks
- 

Application Layer wants to control the Customer and Will Build if Needed

- ▶ Google ChromeCast
 - ▶ X Box One
 - ▶ Amazon Phone
 - ▶ Qualcomm - LTE on unlicensed
- 

Pending Auctions

TV Broadcast Spectrum (~upper 500–698MHz band up to 120 MHz to be made available)

FCC Hopes to hold an auction in 2014. Likely to slip to 2015–2016 due to challenges around spectrum clearing and competing band plans.

AWS-2 (H Block) (1915–1920MHz/1995–2000MHz)

FCC Auction 96 January 2014. DISH committed to a minimum bid of \$1.5 billion. Sprint and T-Mobile announce they will not participate.

AWS-3 (Three blocks of spectrum 1695–1710MHz asynchronous uplink; 2020–2025MHz asynchronous uplink; 1755–1780/2155–2180MHz paired)

Auction deadline is February 15. Major hurdles remain for clearing government agencies from 1755–1780 MHz.

Secondary Markets

DISH-Owned MSS Spectrum/AWS-4 (2000-2020/2180-2200MHz)


This 40 MHz of spectrum is equally paired uplink and downlink, but is also closely tied to the outcome of the H Block Auction and the Lightsquared Bankruptcy. DISH is widely believed to be seeking to combine all of these blocks before finalizing its build/partner strategy.

Lightsquared Bankruptcy (1525-1544, 1545-1559MHz downlink; and 1626.5-1645.5 and 1646.5-1660.5MHz uplink)

The Bankruptcy Court is scheduled to rule 12/10/13 on the the sale of these assets. DISH-affiliated entities have made a bid that would pair 20MHz of this spectrum for uplink with 20MHz of AWS-4 for downlink. Likely pairing scenarios would remove 1525-1559MHz from high-power downlink build-out.

Big-Leo at 2.4GHz (2483.5-2500MHz) The FCC has issued an NPRM seeking comment on Globalstar's petition to deploy a terrestrial low power service across its licensed spectrum and the adjacent 10.5 MHz of ISM spectrum at 2473-2483.5MHz. In its original petition, Globalstar also sought authority to use its Lower Big Leo Band Spectrum at 1610-1618.725MHz for LTE uplink. The FCC deferred consideration of this request to a later proceeding.

Look Down Range and be Prepared

- ▶ The Approaching Singularity expands the traditional scope of spectrum demand.
 - ▶ Transformational technologies and business models make more industries spectrum dependent.
 - ▶ Increased competition and technical innovation can also promote “Strange Bedfellows” and unlikely partnerships.
 - ▶ Identifying these developments early and being aware of the macro environment is key to long range spectrum planning.
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Questions?

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