

The U.S. DTV Transition: A Digital Dividend

Robert Pepper
Senior Managing Director
Global Advanced Technology Policy

ComReg October 2008

Why Spectrum Matters

Why Spectrum Policy Matters

- **Spectrum is an enabler**
- **Good spectrum policy is prerequisite for new wireless broadband deployment**
- **Extend/complement fixed networks**
- **Serve unserved and underserved areas**
 - Mobile example leapfrogging fixed networks
- **New capabilities**
 - Combines mobility and broadband
- **Competition**

Spectrum for Broadband Wireless Access

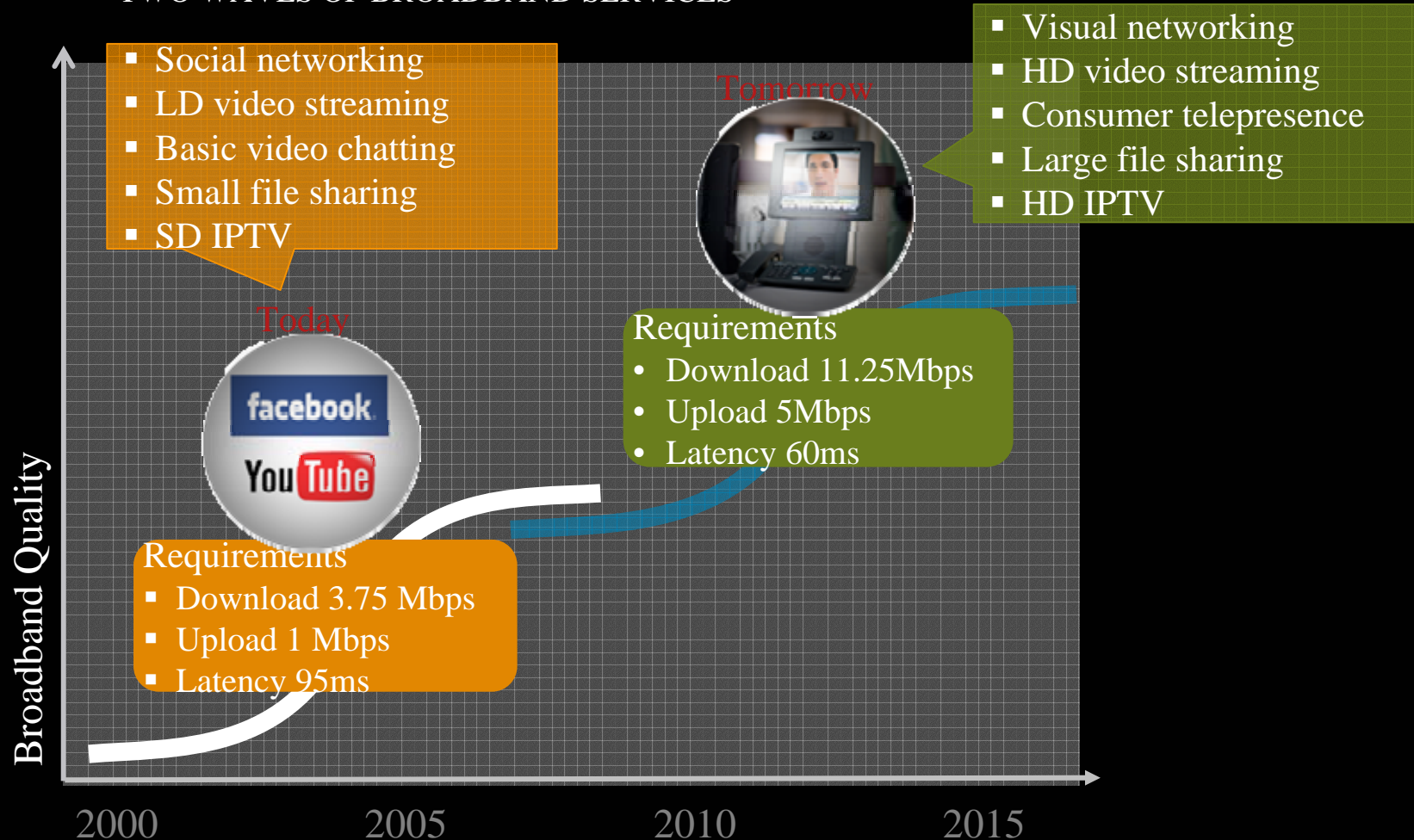
Not All Spectrum is Created Equal

- Spectrum above 5 GHz mostly line-of-sight
- Spectrum below 3 GHz NOT usually needed to be line-of-sight... *but it really helps*
- Between 3 GHz and 5 GHz mixed story
- Lower frequencies can bounce off of structures and find their way to the subscriber
- Higher frequencies are absorbed
- Most desirable spectrum is below 1 GHz
 - Drive for 700/800 MHz—DTV Transition
 - Digital Dividend
- WRC 2007 and EU decisions

Broadband Matters

Changing Quality Requirements

TWO WAVES OF BROADBAND SERVICES



Source: California Broadband Task Force, Jan 2008; Cisco IBSG; Expert interviews; Oxford Team analysis, Aug 2008

Broadband Quality Score (BQS)

BQS CALCULATION

- **BQS is calculated based on normalized values of:**
Download and Upload throughput, and Latency
- **About 8million records sourced from actual tests from Speedtest.net (Ookla) during May 2008**
- **Weights assigned to each factor for *today's* and *tomorrow's* (3 to 5 years) applications.**

BQS (today) = 55% Download + 23% Upload + 22%Latency

BQS threshold: 32

- Download 3.75 Mbps
- Upload 1 Mbps
- Latency 95ms

BQS (tmrw) = 45% Download + 32% Upload + 23%Latency

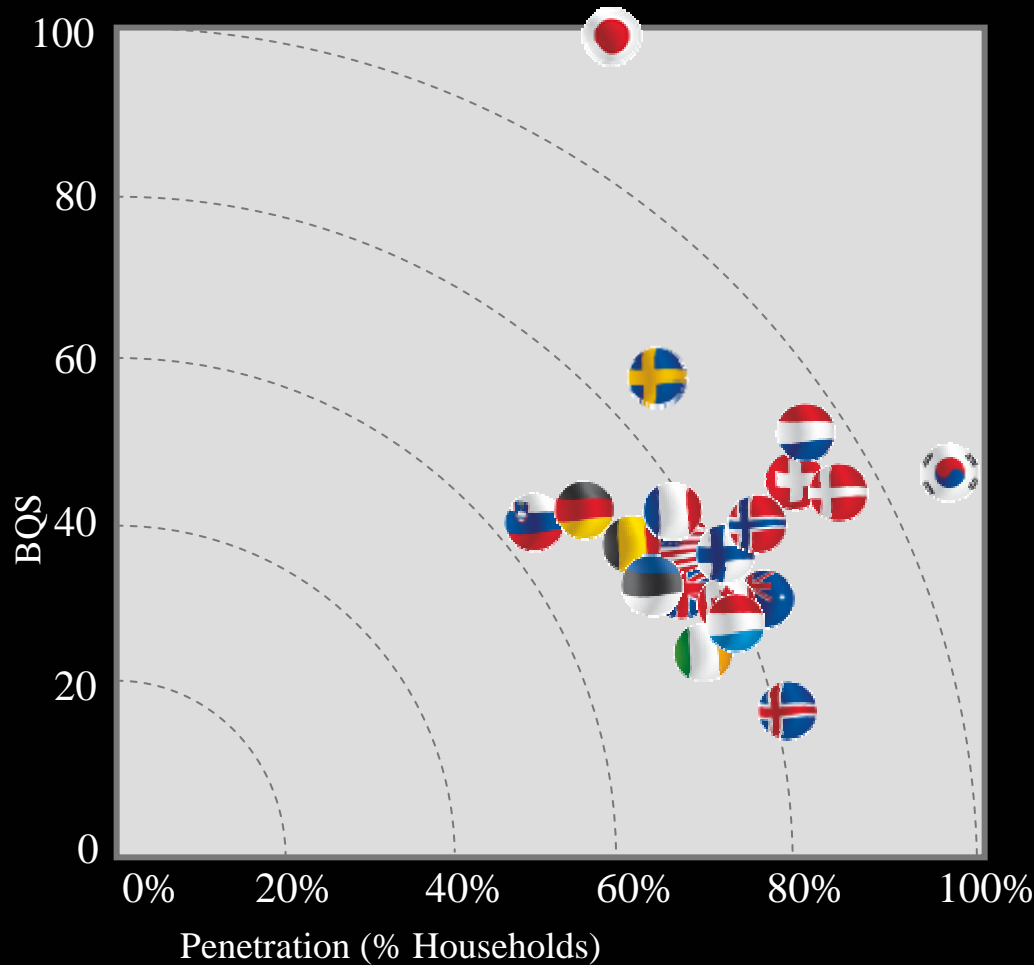
BQS threshold: 75

- Download 11.25Mbps
- Upload 5Mbps
- Latency 60ms

Source: University of Oviedo; Delphi interviews; Oxford University Team Analysis, Aug 2008

On One Measure, Ireland is Doing OK

BROADBAND LEADERSHIP MATRIX (TOP-20)



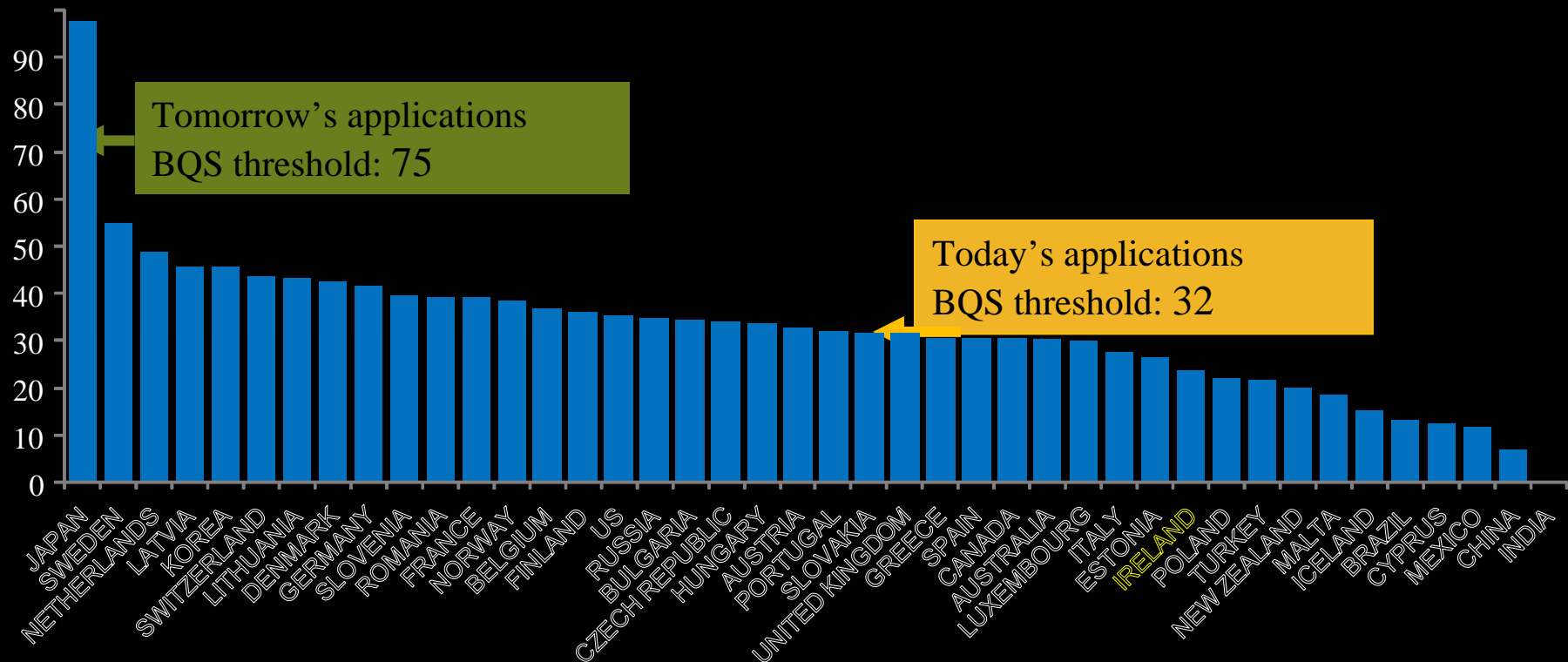
1.  Japan
2.  South Korea
3.  Netherlands
4.  Denmark
5.  Switzerland
6.  Sweden
7.  Norway
8.  Australia
9.  Iceland
10.  Luxembourg
11.  Canada
12.  Finland
13.  France
14.  US
15.  United Kingdom
16.  Ireland
17.  Belgium
18.  Estonia
19.  Germany
20.  Slovenia

Source: Speed Test database; Point Topic, BQS Team Analysis, Cisco IBSG, Aug 2008

OK Is Not Good Enough

Country Broadband Quality Scores

BROADBAND QUALITY SCORE BY COUNTRY



Source: Speed Test database, Expert Interviews, BQS Team Analysis, Aug 2008

The U.S. DTV Transition—And Dividend

In The Beginning: HDTV

- Twenty years in the making
- Began as debate over HDTV
 - A way for terrestrial broadcasters to provide HDTV
 - And keep unused spectrum
 - Proposed analog standard
- FCC opened inquiry in 1987
- Competing standards proposals
- Creation of ATSC
- Digital revolution intervened

The Digital Advantage

- Goals for the DTV transition
 - Give terrestrial broadcasting a future in digital multi-channel world
 - Provide new services for consumers
 - Reclaim spectrum and provide new services
 - Digital more efficient—permitted repacking
 - Public Safety and wireless broadband

U.S. Digital TV Transition

- **Command and Control AND market-based policies**
- **Command and Control**
 - Government requirement for analog-digital transition for terrestrial TV
 - Statutory mandate by Congress
 - Statutory analog switch off, February 2009
 - Digital turner mandate
 - Established ATSC standard for DTV...not cable or satellite
 - Incumbents got first right of refusal for digital license
 - Return analog license at end of transition
 - Repack band at end of transition
 - Set aside 24 MHz for public safety (emergency) service

DTV Standard

- ATSC Industry led
 - FCC added computer representatives
- DTV standard
 - Designed for terrestrial
 - MPEG 2
 - 19.39 Mbps
 - Flexible—technology and rules
 - HDTV
- Enables reclaimed spectrum
 - 108 MHz @ 700 MHz returned
 - 24 MHz for public safety
 - 84 MHz auctioned

Switch Off

- Mandated by Congress
- Switch off 17 February 2009
- Auction returned spectrum
- Subsidy for D-A converters
 - Funded from auction revenues
 - Vouchers
- Public education program

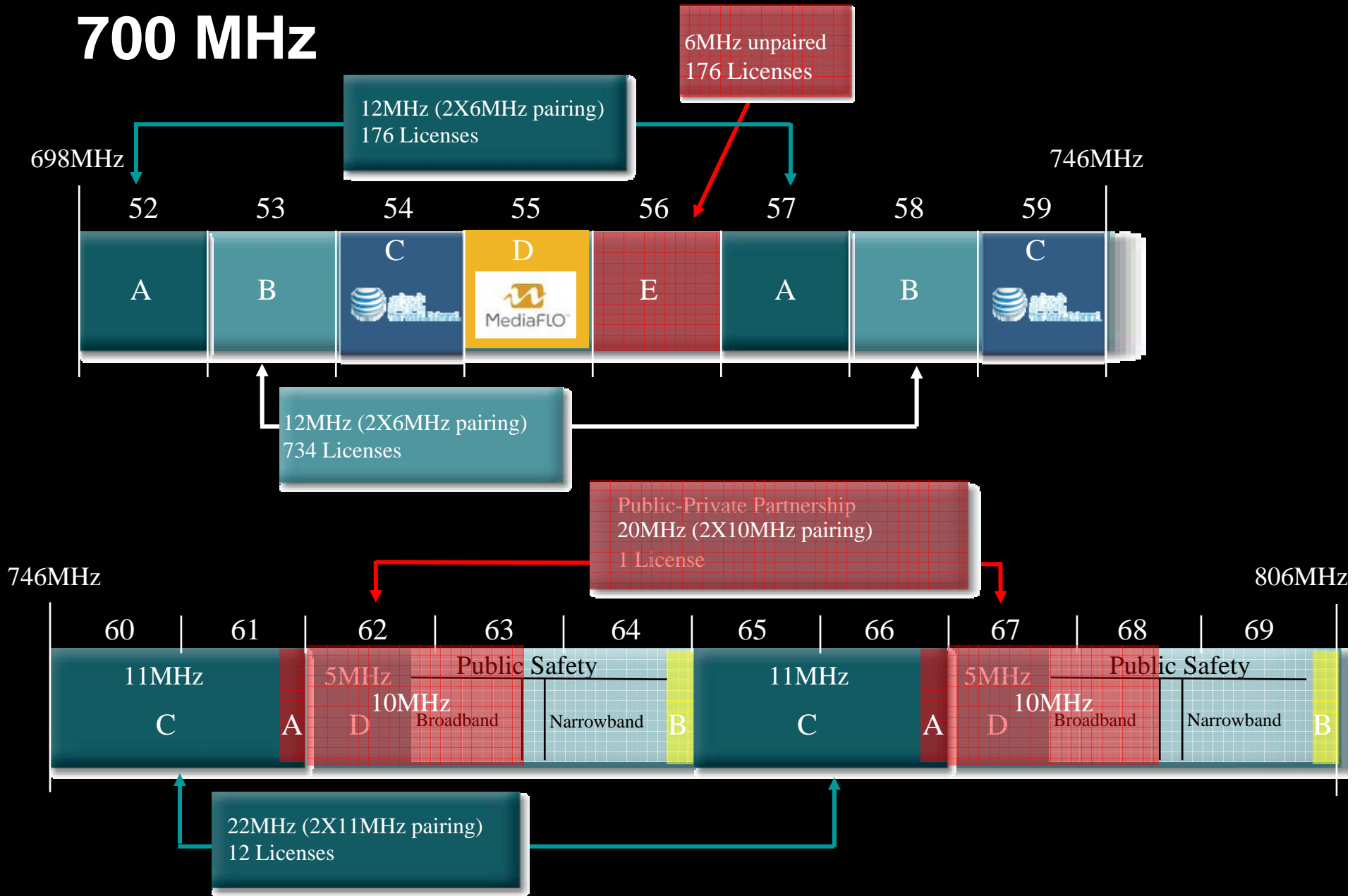
DTV Transition Opportunities

- More efficient use of spectrum
 - More content “channels”
 - Less overall spectrum needed
 - Opportunities from “repacking”
- Higher quality
 - Transmission
 - HDTV
- Greater flexibility
 - Video, data, and more
- “Digital Dividend”
 - New services with returned spectrum
- 700 MHz auction—Broadband

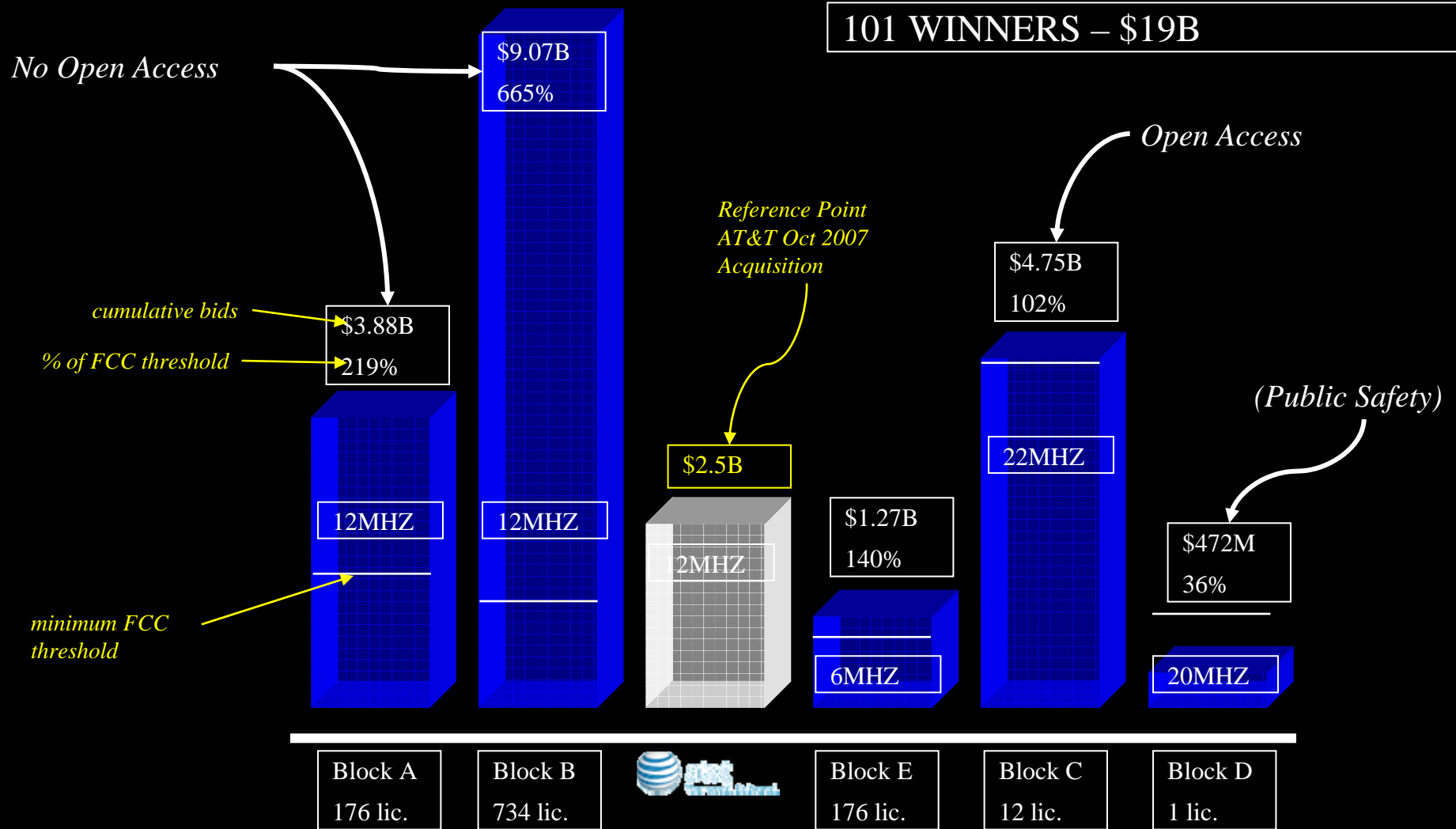
700 MHz Auction

- Completed
- Wireless broadband
- Mobile TV
- New services
- Re-auction “D Block”

700 MHz



How the Market Valued 700MHz Licenses



Conclusions

- Long and difficult process
- Huge benefits at the end of the process
- Be careful what you ask for
- Spectrum policy matters
- Old analog models don't work
- Citizens, broadcasters, new services all can benefit—zero sum game is a false choice
- But huge opportunities for new two-way broadband services with returned spectrum

