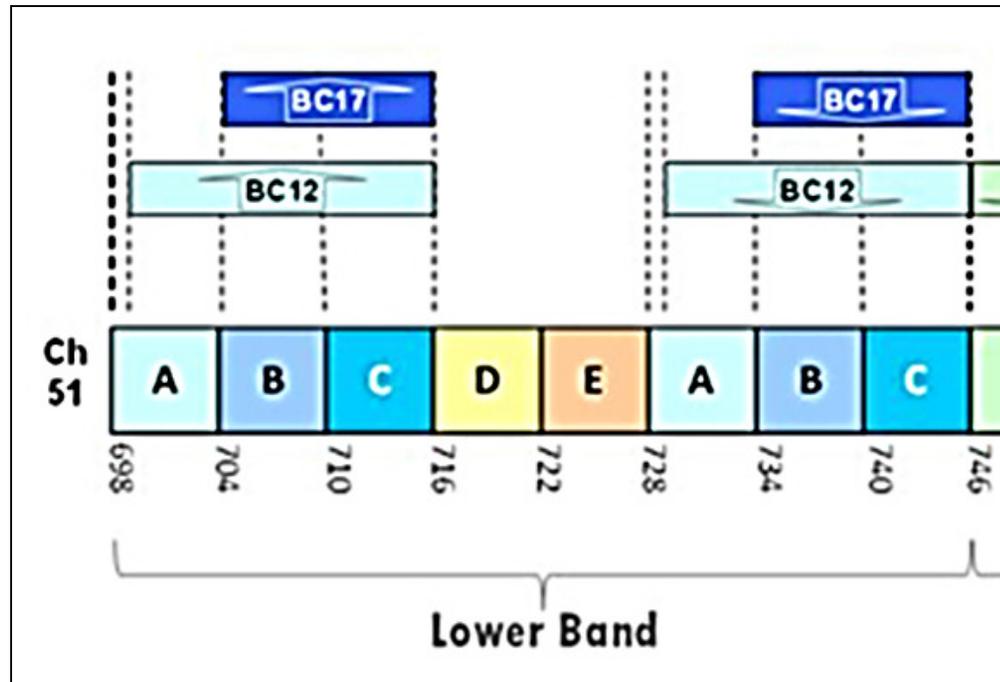


# Restoring Interoperability to the Lower 700 MHz Band

January 2, 2013



# Two Lower 700 MHz Band Classes



# Restoring Lower 700 MHz Interoperability

- Restoring interoperability will yield numerous benefits, including:
  - Deployment Benefits: Enhanced spectrum use and greater spectrum efficiency
  - Consumer Benefits: Increased broadband availability and affordability
  - Public Interest Benefits: More innovation, investment, and jobs
  - Competition Benefits: Additional scale economies and roaming opportunities
- Restoring interoperability has few, if any, costs:
  - Exhaustive battery of field and lab tests show no Band Class 12 interference.
  - No technical impediments to restoring Lower 700 MHz interoperability exist.
  - Interoperability does not materially affect the cost of user equipment, base stations, or network infrastructure.
- No alternative to FCC action exists.
  - Industry-based solutions have not emerged and major disincentives exist.
  - Moving Channel 51 broadcasters will not resolve interoperability concerns.
- Every day of continued inaction frustrates broadband deployment, harms consumers, and thwarts competition.
  - The FCC should immediately adopt an interoperability solution.

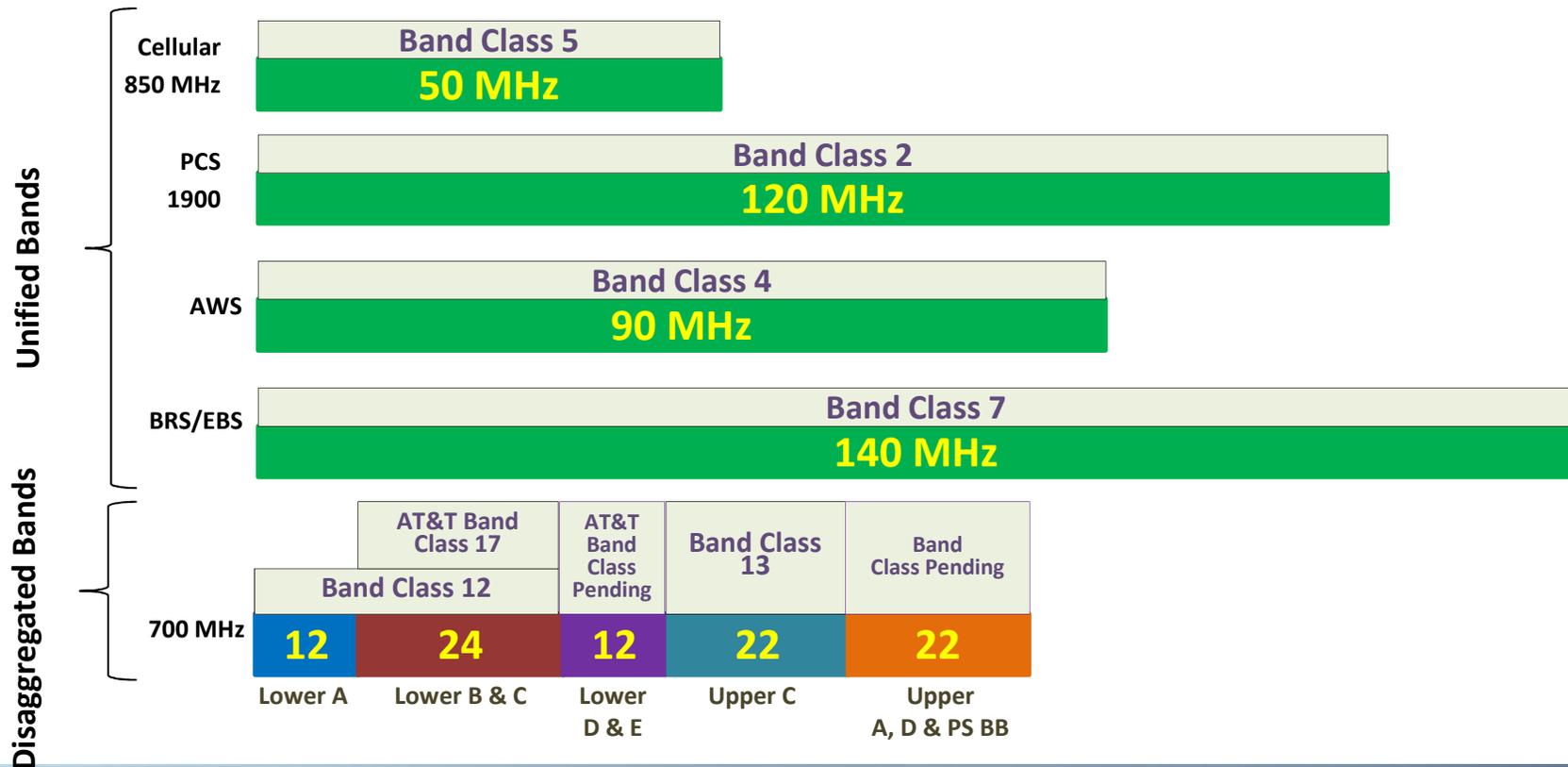


# Activity Timeline for Lower 700 MHz Band Interoperability

- **Dec 2007 (prior to auction)** Only Band Class 12 was under consideration by 3GPP
- **March 2008** Auction closes with \$19 B in revenue
- **May 2008** Motorola submits paper to 3GPP proposing Band Class 17 – only covers B and C Blocks
- **June 2008** Ericsson questions reason for fracturing the band into separate band classes; Ericsson removes objections after AT&T supports Band Class 17
- **September 2008** 3GPP ratifies Band Class 17 and Band Class 13 (Verizon's Upper C Block)
- **September 2009** A Block licensees petition FCC for device interoperability
- **December 2010** 3GPP ratifies Band Class 12 with 1 MHz guard band
- **November 2011** Ericsson requests that an additional 1 MHz of guard band be provided by Band Class 12 to protect spectrum being acquired from Qualcomm; AT&T speaks at 3GPP in favor of request
- **December 2011** FCC grants approval to AT&T acquisition of Qualcomm D and E Block licensees without conditions addressing interoperability
- **March 2012** FCC adopts Interoperability NPRM
- **June-July 2012** Major lab and field test reports demonstrate no interference risk to Lower B and C Block operations with interoperable devices



# Band Disaggregation Remains Unique to the Lower 700 MHz Band



# Disaggregation Creates Consumer and Competitive Harms That Grow Worse With Time

- The development and innovation of products and services follows scale.
  - 3GPP segregates support for Band Class 17 from Band Class 12 and, due to its larger scale, prioritizes Band Class 17 over Band Class 12.
  - This prioritization means Lower 700 MHz A Block licensees face delays and additional expenses not only in acquiring and introducing new network and user equipment, but also in securing and implementing important LTE innovations, such as MIMO, carrier aggregation, and other LTE improvements and features.
  - Just as developer activity has shifted from, for example, WiMAX to LTE, the delays associated with the prioritization of Band Class 17 over Band Class 12 will compound over time, leaving Band Class 12 operators progressively worse off relative to other LTE operators.
- Common device hardware is essential to achieving economies of scale in the cost and variety of devices and to restoring some measure of equality in the delivery of new features.



# Interoperability Produces Numerous Benefits



## Consumer Benefits: Availability, Affordability, and Customer Satisfaction

Increases availability and affordability of end user equipment and mobile service options

Reduces switching costs for consumers seeking to change providers

Enhances customer satisfaction and retention through lower costs, more options, and shorter wait periods

Increases competition in pricing and services

## Competitive Carrier Benefits: Device Scale, Roaming, and Competition

Increases economies of scale for small and regional carriers by participation in a larger ecosystem

Enhances nationwide roaming opportunities for small and regional carriers

Promotes greater competition for next-generation wireless services, especially in rural areas

## Spectrum Efficiency and 4G Deployment Benefits

Encourages more efficient use of licensed spectrum that is currently not substantially deployed

Helps alleviate the current spectrum crunch

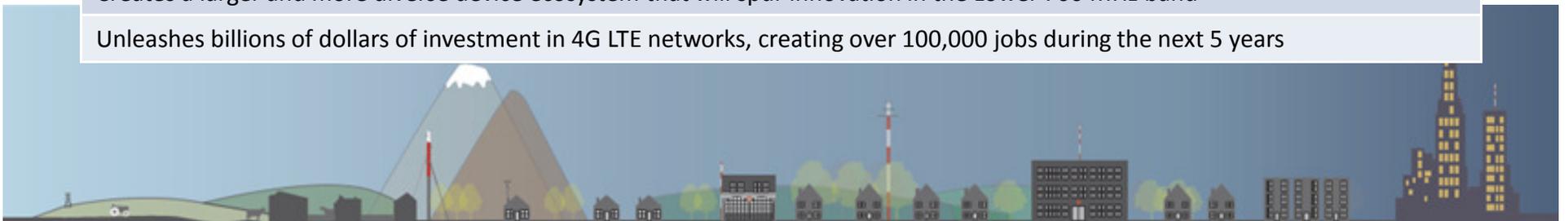
Accelerates 4G deployment throughout the country

Provides an incentive for broader participation in future spectrum auctions

## Public Interest Benefits: Innovation, Investment, and Job Growth

Creates a larger and more diverse device ecosystem that will spur innovation in the Lower 700 MHz band

Unleashes billions of dollars of investment in 4G LTE networks, creating over 100,000 jobs during the next 5 years



# Interoperability Benefits Occur Regardless of the 3G Roaming “Fall Back”

- The cost savings and innovation benefits of Lower 700 MHz interoperability are entirely independent of the 3G network technology, if any, that a device may use.
  - Not all Band Class 12 devices will fall back to a 3G network. New entrants may deploy only 4G devices with no 3G fallback, or use the same devices as AT&T deploys.
  - Multi-technology chipsets mean fall back economies can extend to multiple 3G air-interfaces.
    - Today Qualcomm does not produce “CDMA chips” or “GSM chips.”
    - Instead, a single chipset supports both technologies, and vendors such as Qualcomm simply use software to produce the desired air-interface.
    - Therefore, if multi-technology Band Class 17 and 12 devices share common hardware – that is, interoperable device filters covering the Lower A, B and C Blocks – Lower 700 MHz A Block licensees can, in fact, benefit from common scale economies.
  - Network operators worldwide are in the process of transitioning from 3G fall back networks to 4G LTE. Focusing on “fall back” capabilities alone is a backward-looking approach and ignores the future of mobile broadband technologies.
- The benefits of interoperability – both for equipment costs and, just as important, for 4G LTE platform innovation – occur regardless of whether the device falls back to a CDMA or a GSM network when a 4G LTE network is unavailable.



# No Technical or Cost Barriers to Restoring Lower 700 MHz Interoperability Exist

- A Block licensees have conducted extensive lab and field testing demonstrating that no technical barriers to interoperability in the Lower 700 MHz band exist
  - Empirical studies of a combination of nine commercially deployed Band Class 12 and Band Class 17 devices reveal that interoperable devices will not face harmful interference from Channel 51 or Lower E Block transmissions
- An interoperability requirement would impose no material cost on mobile devices, base stations, or network deployment
  - Future interoperable devices would need only a different duplex filter, at no marginal cost
  - Base stations could be updated to support a common band plan via a routine software update
  - Current radiofrequency designs and deployments would remain unchanged



# Extensive Lab and Field Testing Shows Harmful Interference Will Not Occur

	Lower E Block		Channel 51	
	Lab Tests	Field Tests	Lab Tests	Field Tests
Hyslop-Kolodzy	YES (2 devices tested)	YES	YES (2 devices tested)	YES
V-Comm	YES (7 devices tested)	YES	YES (7 devices tested)	YES
AT&T	NONE	NONE	<b>FLAWED</b> <ul style="list-style-type: none"> <li>Specified inadequate emissions control, rendering invalid results (Only 1 device tested)</li> </ul>	NONE
Qualcomm	NONE	NONE	<b>FLAWED</b> <ul style="list-style-type: none"> <li>Used 2 GHz (European Band) components</li> <li>Hypothetical device performance assumptions</li> </ul>	NONE



# Interoperability Requires No Additional Equipment or Infrastructure Spending

Considerations	Changes	Additional Costs
<p><b>700 MHz Handsets</b> antennas, duplex filters, power amplifiers, low noise amplifiers, base band hardware, base band software</p>	<p><b>No change</b> OEM simply installs interoperable filter and software at the factory in lieu of present filter and software</p>	<p><b>No additional cost</b> OEM simply uses interoperable filter instead of non-interoperable filter at the factory – a replacement with <u>zero</u> difference in cost at scale</p>
<p><b>700 MHz Base Stations</b> antennas, duplex filters, power amplifiers, low noise amplifiers, base band hardware, base band software, network controls</p>	<p><b>No change, except a one-time software upgrade</b> to allow the base station to interoperate with devices supporting all A, B and C Block channel numbering</p>	<p><b>No additional cost</b> Carrier implements the requisite software change during the routine software-update cycle</p>
<p><b>Channel 51 and 700 MHz E Block Incumbents</b> including all deployed Channel 51 operations and any 700 MHz E Block deployments</p>	<p><b>No change</b> Extensive field and laboratory testing shows no changes required</p>	<p><b>No additional cost</b> Band 12 and Band 17 systems have <u>identical</u> performance specifications to manage Channel 51 operations. Band Class 12 already effectively manages high power E Block deployments</p>



# Moving Channel 51 Broadcasters Will Not Resolve Interoperability Concerns

- Channel 51 full power broadcasters must be protected by adjacent A Block licensees, which present network deployment challenges in roughly 30 markets.
- Requiring Channel 51 broadcasters to move would assist some A Block licensees with base station deployment obstacles, but would not solve the problems of economies of scale, roaming, competition, spectrum efficiency, and consumer harm that the current lack of interoperability creates.
- AT&T may keep Band Class 17 even if all Channel 51 broadcasters were moved, especially given AT&T's incentive to maintain and expand the non-interoperable Band Class 17 for carrier aggregation and special features.



# Industry-based Solutions Will Not Emerge

- FCC action is essential.
  - Interoperability opponents have expressed mid- to long-term commitment to the bifurcated ecosystem.
  - Vendors will not oppose the direction indicated by their largest customer in the Lower 700 MHz Band.
- The Commission has clear legal authority to adopt an interoperability solution under these circumstances, which constitute a ‘worst-case’ scenario for which regulatory action is necessary

