

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Amendment of the Commission's Rules
with Regard to Commercial Operations in
the 3550-3650 MHz Band

GN Docket No. 12-354

REPLY COMMENTS OF 4G AMERICAS

Introduction

4G Americas submits these Reply Comments principally to support the Commission's proposal in the Revised Framework to provide priority access to mobile operators who meet eligibility criteria. 4G Americas is the leading industry association in the Americas representing the 3GPP family of technologies, including LTE and LTE Advanced, and is dedicated to promoting, facilitating and advocating for 3GPP technology adoption throughout the Americas.¹ The mobile broadband industry continues to need cleared, exclusive, licensed spectrum as its highest priority. However, 4G Americas recognizes that some bands, like 3550-3650 MHz, cannot be cleared in a time frame consistent with exploding demand. We therefore support

¹ The 4G Americas Board of Governors members include Alcatel-Lucent, America Movil, AT&T, Cable & Wireless, Cisco Systems, CommScope, Entel, Ericsson, Gemalto, HP, Nokia Solutions Networks, Openwave Mobility, Qualcomm, Research in Motion, Rogers, T-Mobile USA, and Telefonica. In response to the Commission's original proposal to dedicate the 3550-3650 MHz band for small cell use (*See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Notice of Proposed Rulemaking and Order, FCC 12-148, 27 FCC Rcd. 15,594, at 15,602 ¶ 20 (2012)), 4G Americas submitted its white paper on *Developing and Integrating a High Performance HET-NET*, available at <http://www.4gamericas.org/documents/4G%20Americas%20Developing%20Integrating%20High%20Performance%20HET-NET%20October%202012.pdf>.

innovative approaches to share underutilized spectrum with incumbents where bands cannot be cleared for the foreseeable future, provided those approaches are structured in a way that will expedite commercial mobile access.

The Commission requests commenters to provide technical information relative to the Revised Framework.² In 4G Americas most recent white paper on innovative spectrum technologies and management, we discuss in detail enhancements in small cell technology and the functioning of a tiered-access database system. 4G Americas also notes in these Reply Comments the benefits of developing a band plan for the 3.5-3.7 GHz spectrum that is internationally harmonized, through existing standards, to the maximum extent possible. Adopting rules for this underutilized band that leverage existing standardization in tiered-access technologies will expedite delivery of additional broadband capacity to U.S. consumers.

Discussion

Much has already been written about the soaring demand for and economic benefits of mobile broadband.³ Global mobile data traffic has doubled each of the last few years, and this growth is projected to continue unabated due to consumer uptake of larger screen devices, video-rich tablets, machine-to-machine applications, and soon the connected vehicle and home. According to the Cisco Visual Networking Index (VNI), global mobile data traffic grew 70 percent in 2012 and is expected to grow steadily at a CAGR of 66 percent from 2012 to 2017.

² See *Commission Seeks Comment on Licensing Models and Technical Requirements in the 3550-3650 Mhz Band*, Public Notice, FCC 13-144, 28 FCC Rcd. 15,300, 15,301 ¶¶ 2, 15,313 ¶ 42 (2013) (“Revised Framework Public Notice”).

³ See, e.g., Cisco, *Cisco Visual Networking Index: Forecast and Methodology, 2012–2017* (May 29, 2013), available at http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360.pdf.

That is a 13-fold increase by the end of 2017.⁴ The Ericsson Mobility Report likewise shows that mobile data traffic doubled in 2012 and is expected to grow at a CAGR of around 50 percent between 2012 and 2018. That is a 12-fold growth by the end of 2018.⁵ The experience of U.S. operators is consistent with these vendor predictions. Early last year, AT&T reported an increase in mobile data traffic on its network of 20,000 times over the previous five years.⁶ To explain that growth through another metric, T-Mobile has noted that it experienced a 30-fold increase in mobile data traffic between 2009 and 2012; in other words, in 2012 it carried during a single day the amount of mobile data traffic that it carried during an entire month in 2009.⁷

Given these growth rates, 4G Americas is working with the mobile industry to meet the need for an estimated 1000x increase in traffic capacity for mobile access networks. In its latest white paper, *Meeting the 1000x Challenge: The Need for Spectrum Technology and Policy Innovation*,⁸ 4G Americas describes a range of technology enhancements to meet the 1000x challenge, including small cells,⁹ as well as policy innovations such as the Commission proposes in its Revised Framework for use of the 3550-3650 MHz band. *Meeting the 1000x Challenge* notes how proponents of tiered-access systems have targeted frequency bands that are already, or have the potential to become, globally harmonized mobile bands in order to take advantage of economies of scale and facilitate re-purposing discussions.¹⁰

⁴ 4G Americas, *Meeting the 1000x Challenge: The Need for Spectrum, Technology and Policy Innovation*, at 6 (October 2013), available at http://www.4gamericas.org/documents/2013_4G%20Americas%20Meeting%20the%201000x%20Challenge%2010%204%2013_FINAL.pdf (“1000x White Paper or *Meeting the 1000x Challenge*”).

⁵ *Id.*

⁶ *Id.* at 15 (referencing AT&T, *Getting to the Future First: 2011 Annual Report* (Feb. 2012), available at www.att.com/Common/about_us/files/pdf/ar2011_annual_report.pdf).

⁷ See Neville Ray, CTO, T-Mobile USA, *The 4G Opportunity: A Carrier’s Perspective on the Evolving Mobile Ecosystem*, at 3 (June 14th 2012), available at <http://assets.fiercemarkets.com/public/mdano/amis/ray-ngmn-presentation.pdf>.

⁸ *Supra* at n.4.

⁹ 1000x White Paper at 36-56.

¹⁰ *Id.* at 95.

Internationally Harmonized Spectrum Preferable

As the Commission and many others have noted in recent years, internationally harmonized spectrum should be preferred due to the global economies of scale and scope it provides U.S. consumers.¹¹ The amount of spectrum required to support mobile broadband services is expanding exponentially. That capacity expansion has increased demand for existing and newly-identified spectrum to be harmonized globally across frequency ranges, channel plans, and emissions requirements. In addition to taking advantage of economies of scale, spectrum harmonization enables global roaming, reduces equipment design complexity, facilitates cross-border coordination, and improves spectrum efficiency.¹² All these benefits ultimately reduce costs for consumers. Widely supported spectrum bands and channels can lower the cost of radio frequency components – a significant factor in device cost.¹³

Band planning includes determining the duplex mode of operation. Harmonizing the duplex mode with global preferences benefits U.S. consumers through spectral efficiencies and economies of scale.¹⁴ LTE standards and band plans today contemplate Time Division Duplex (TDD) mode in the spectrum bands considered in the Commission’s proposed rulemaking. 3GPP TDD Band 42 is 3.4-3.6 GHz and TDD Band 43 is 3.6-3.8 GHz. Today, there is no single 3GPP band that covers the entire 3550-3650 MHz range, but that band could be segmented into two blocks of 50 MHz each that would be covered by the existing TDD Bands 42-43 – the 50 MHz at 3550-3600 MHz is included in Band 42, and the 50 MHz in 3600-3650 MHz is in Band 43. A TDD option would also allow expansion of the band upwards to 3700 MHz in the event

¹¹ See, e.g., President’s Council of Advisors on Sci. and Tech., Exec. Office of the President, *Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth*, § 5.6, at 61-62 (July 2012) (noting the benefits of internationally harmonized spectrum to reduce interference, enhance interoperability and roaming, improve spectral efficiency and cross-border coordination, as well as enabling new products to achieve market economies of scale) (“PCAST Report”).

¹² 1000x White Paper at 105.

¹³ *Id.*

¹⁴ *Id.*

the Commission adopts enabling rules, while still being covered by 3GPP Band 43. Conversely, there is no FDD band defined by 3GPP in that range.¹⁵ The Commission asks how allowing mobile access up to 3700 MHz will impact transition time.¹⁶ Permitting mobile access to the entire 150 MHz would expedite operators' access, given the global harmonization with Bands 42 and 43.

4G Americas cautions that any new band plan unique to the U.S. could delay availability of devices and infrastructure in our market. As an indicator of the timeline for the introduction of TD-LTE devices in the 3550-3700 MHz band, single-band TD-LTE chipsets and devices were available in 2012, and multi-mode band devices are now available.¹⁷ In order to enable an innovative ecosystem of LTE devices and applications, the final rules adopted in this proceeding should not preclude the deployment of TD-LTE at 3550-3700 MHz. The Commission asks about the impact of its Revised Framework proposal on equipment costs – particularly device capability to operate across the entire band.¹⁸ Permitting mobile operators to provide TD-LTE broadband across the entire 150 MHz will lower device costs for U.S. consumers.

Commission policy that allows harmonized deployment in the 3550-3700 MHz band will also minimize interference and facilitate worldwide compatibility and global roaming.¹⁹ 4G Americas notes that a version of the Revised Framework proposed by the Commission is being standardized in Region 1, albeit with a static channel model.²⁰ In contrast, no other country is

¹⁵ FDD Band 22 is 3410-3490 MHz/3510-3590 MHz. *See id.* at 110.

¹⁶ *See* Revised Framework Public Notice at 15,315-16 ¶ 51.

¹⁷ *See, e.g.,* Pankaj Yadav, Qualcomm *Launches 64-bit Snapdragon Chipset with Integrated 4G LTE World Mode*, LTEWORLD (Dec. 10, 2013), <http://lteworld.org/news/qualcomm-launches-64-bit-snapdragon-chipset-integrated-4g-lte-world-mode>. By contrast, 4G Americas is not aware of any LTE Frequency Division Duplex product or chipset availability.

¹⁸ Revised Framework Public Notice at 15,310-11 ¶ 30.

¹⁹ In Region 2, the 3500-3700 MHz band is allocated to Fixed, Fixed Satellite and Mobile Services on a primary basis and the 3400-3600 MHz band has been identified for IMT in various areas).

²⁰ Licensed Shared Access is being standardized by ETSI for the 2.3-2.4 GHz band. *See, e.g.,* PCAST Report § 5.6, at 61. Standardization work is underway in ETSI for LSA in the 2.3-2.4 GHz bands, including on the

contemplating a dynamic spectrum access methodology as complex – with potentially 74,000 short-term licensees – as that contemplated by the Commission. While 4G Americas commends the Commission for its innovation, we believe the Commission would be more successful in facilitating spectrum access in this underutilized band with a more stable and manageable group of licensees. A tiered-access system offering a predictable environment is preferable to the approach outlined in the Revised Framework, which adds complexity and uncertainty that could substantially impede the deployment of services using the spectrum.²¹ Conversely, a more predictable tiered system could be deployed more easily and rapidly, expediting consumers’ access to high-quality, managed broadband services in 3550-3700 MHz, over a broader array of mobile devices.²²

TD-LTE in the 3.5 GHz Band

In addition to the benefits of global harmonization from the Commission allowing TD-LTE in the 3.5 GHz band, the LTE standards for TDD provide for efficient spectrum usage, allowing networks to co-exist with federal radar and FSS incumbents as necessary. The LTE standards are complete for small cells – no new standards need to be completed before deployment. The existing LTE standards for deployment at 3.5 GHz allow for macro, metro, micro, and pico cell operations in TDD Bands 42 and 43 (3400 - 3800 MHz). Moreover, LTE

development of technical specifications on a functional architecture for the interfaces between the logical entities and external entities and the interfaces between the request and response models and security procedures, among other requirements. While LSA is intended to be implemented in Europe first in the 2.3-2.4 GHz bands, CEPT has noted its possible application in other bands, including 3.8 GHz. *See Licensed Spectrum Access opens new opportunities*, ELEC. COMMC’NS COMM. NEWSLETTER (October 2013), <http://apps.ero.dk/eccnews/october-2013/index.html>.

²¹ 1000x White Paper at 97 (“[Authorized Shared Access] offers a predictable environment for deployment of mobile broadband compared to the Commission’s three-tier approach which adds complexity and uncertainty that could substantially impede the rollout of services using the spectrum.”).

²² *Id.* at 97-98.

devices have mitigation interference cancellation techniques embedded, further facilitating spectrally efficient use through significant capacity gains.

A licensing construct akin to the Spectrum Access System can work to manage networks deploying LTE Self-Optimizing Network (“SON”) technology. SON will help realize many of the Commission’s goals toward more efficient spectrum use and consumer satisfaction of applications relying on mobile broadband technology. Mobile broadband licensees using SON techniques can more quickly move off the spectrum when incumbents need to operate, falling back to other bands if needed. 4G Americas supports a Framework that would allow negotiations on the size of exclusion zones between eligible operators and incumbents, since SON could help shrink those exclusion zones.²³

Commercial Mobile Broadband in the Priority Access Tier

4G Americas commends the Commission for the Revised Framework proposal that eligible commercial mobile broadband providers be provided access to the priority tier, given their need for quality of service. Mobile operators can deploy small cells in the 3.5 GHz band as part of heterogeneous networks – HetNets. Small cells in the band can be used for off-loading traffic, much like WiFi is used today by mobile carriers. However, the use of TD-LTE small cells provide greater network management in the off-load of mobile data from the macro cell network. Licensed operations at 3.5 GHz would thereby allow more reliable network planning.

4G Americas appreciates the Commission’s willingness to consider innovative spectrum management approaches. 4G Americas has frequently noted the benefits of international spectrum harmonization, such as allowing U.S. consumers increased access to more innovative and affordable mobile applications and devices. This is true in the context of a tiered-access

²³ *Id.* at 109.

system, where standardization of technologies and licensing approaches is underway. The Commission would be ill-advised to adopt a licensing approach that raises too many challenges to industry's deployment strategies. The mobile industry has invested hundreds of billions on broadband infrastructure based on larger geographic licenses and multi-year licensing terms. Such predictability allows for more investment through longer-term budget cycles and a broader addressable market. Many commenters have argued for 10-year licenses with an expectation of renewal: 4G Americas supports that proposal.²⁴ Attempting to implement an authorization construct that must interface with 74,000 census tract, short-term, non-renewable licensees will create a degree of unpredictability that will most likely slow down the use of the band for commercial broadband.

The self-organization of small cells allowed in the 3GPP standards enables small cells to expand and contract their coverage areas as needed to avoid interference with one another, to instantly recognize new cells and incorporate them into the carrier's network, and to provide instant mobility with fallback to carrier networks where small cell connectivity is not available, resulting in more capacity and reliability than that offered by today's simple Wi-Fi off-loading. Consumers would therefore benefit by more reliable speed of service if commercial providers were allowed access to the priority tier.

²⁴ See, e.g., Comments of Ericsson in Response to the Public Notice, GN Docket No. 12-354 (filed Dec. 5, 2013); Comments of Nokia Solutions and Networks US LLC, GN Docket No. 12-354 (filed Dec. 5, 2013); Comments of Qualcomm Incorporated on 3.5 GHz Licensing Public Notice, GN Docket No. 12-354 (filed Dec. 5, 2013); Comments of T-Mobile USA, Inc., GN Docket No. 12-354 (filed Dec. 5, 2013).

Conclusion

4G Americas commends the Commission in taking yet another step toward America's broadband future. With mobile data growth skyrocketing, and the need in the U.S. for at least 1000 MHz of spectrum for mobile broadband by 2020,²⁵ mobile operator use of 3550-3650 MHz is an important component of operators' ability to manage demand and deliver quality-of-service broadband to consumers. Permitting TD-LTE in the 3.5 GHz band will help meet that demand through established, spectrally-efficient and globally-harmonized band plans.

Respectfully submitted,



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²⁵ See 1000x White Paper at 6.