

**Dynamic Spectrum Alliance
Response to Communications Regulatory Authority's
Consultation on Future Spectrum Demand in Qatar**

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1 Introduction

The Dynamic Spectrum Alliance¹ is pleased to contribute to the Communications Regulatory Authority's (CRA's) consultation on future spectrum demand in Qatar. As discussed in greater detail below, the Dynamic Spectrum Alliance urges the CRA expand this consultation's scope to consider future demand for devices and applications relying on licence-exempt spectrum access, even as the CRA appropriately considers allocating more spectrum for exclusive use licensing. To comprehensively address growing demand for voice, data, and video applications, the Dynamic Spectrum Alliance urges the CRA to expand its class radio frequency licensing regime, thereby making more spectrum available on a licence-exempt basis. In addition, the Dynamic Spectrum Alliance urges the CRA to increase reliance on dynamic spectrum sharing regimes on spectrum that is allocated but unassigned or is otherwise unused.²

2 Dynamic Spectrum Alliance Response

The Dynamic Spectrum Alliance's response is clustered in three main categories to highlight the main message related to each set of questions.

A. Factors affecting future spectrum demand (question 1)

As the CRA observes “exponential growth of the data use has been experienced globally in recent years. . . . More and more bandwidth intensive applications are being developed that need faster access technologies.”³ A growing percentage of network access is occurring on wirelessly connected devices. Indeed, the Cisco Visual Networking Index projects that mobile data traffic globally will increase eleven-fold over the next four years, and traffic from wireless devices will constitute the majority of all IP traffic by 2016.⁴

¹ The Dynamic Spectrum Alliance is a global, cross-industry alliance focused on increasing dynamic access to unused radio frequencies. The membership spans multinational companies, small-and-medium-sized enterprises, academic, research, and other organizations from around the world, all working to create innovative solutions that will increase the utilization of available spectrum to the benefit of consumers and businesses alike. For more information and a full list of members, please visit www.dynamicspectrumalliance.org.

² “Dynamic spectrum sharing” describes a set of technologies and techniques that enable radio communications devices to opportunistically transmit on available radio spectrum. These technologies and techniques ensure that consumers and their devices have wireless bandwidth when and where they need it.

³ See Future Spectrum Demand Consultation at 9.

⁴ Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update: Forecast and Methodology, 2013-2018 (Feb. 5, 2014), *available at* http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.html (“Cisco Global Mobile Data Traffic Forecast Update”); Cisco

As a result, usage of spectrum on both a licensed and licence-exempt (also referred to as “unlicensed”) basis for a range of voice, video, and data applications, ranging from mobile broadband to the Internet of things, is skyrocketing globally and Qatar’s consumers are following this trend. Wireless networks (like Wi-Fi) utilizing licence-exempt access to spectrum transport more traffic across mobile devices than the mobile networks themselves.⁵ Cisco projects that by 2018, there will be 3.9 billion global Internet users (up from 2.5 billion global Internet users in 2013), 21 billion networked devices globally (up from 12 billion networked devices in 2013), and global IP traffic will reach an annual total of 1.6 zettabytes (up from 614 exabytes in 2013).⁶

Meeting this demand is essential to promoting technological innovation and economic growth. Meeting this demand also requires access to more spectrum. An efficient and flexible spectrum management approach has become more important than ever. The CRA should support robust access to spectrum on both licensed and licence-exempt basis at a variety of high, medium, and low frequencies. Just as licensed and licence-exempt access are complementary means of meeting growing spectrum demand, access to spectrum at different frequency ranges is essential to meeting users’ varied needs. Lower frequencies enable non-line-of-sight transmission over longer distances, through walls, foliage, and other obstructions. Higher frequencies are ideal for greater transmission capacity over short distances. With a variety of licensing approaches over a range of frequencies, hardware developers and service providers can better and more cost-effectively meet the needs of businesses and consumers, and use spectrum more efficiently.

To that end, the CRA should support and implement policies that: (1) enable robust access to more spectrum both on a licensed and licence-exempt basis across a range of complementary bands; and (2) enable dynamic spectrum sharing as a means to ensure effective spectral utilization. Following steps already taken by other communications regulators that are leaders in their respective regions, the CRA should expand its class licensing regime to enable licence-exempt access to the allocated by unassigned UHF frequencies (the “TV white spaces”) and additional UNII band spectrum below 5.47 GHz and above 5.875 GHz.

DSA recognizes the benefits that could be delivered by allocating more spectrum on an exclusive-use licensed basis. The further roll-out of terrestrial and satellite mobile broadband services will contribute towards addressing the growing consumer demand for wireless data. However, as the CRA notes, increased use of shared spectrum – for example, for mobile data offload -- could help address future demand for spectrum

Visual Networking Index: Forecast and Methodology, 2013-2018 at 1-2 (June 10, 2014), available at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.pdf (“Cisco Forecast and Methodology”).

⁵ See *id.* at 1-3.

⁶ *Id.*

resources.⁷ Therefore, it is crucial that CRA recognizes that a balanced approach, which enables access to both licensed and licence-exempt spectrum, is key to meeting these increasing spectrum demands.

B. Mobile data Trends (questions 20 – 26)

License-exempt use complements licensed use. For example, “the availability of Wi-Fi networks in many locations...enable[s] users to take much of their data off of a licensed network,” benefiting users by enabling faster service and reducing congestion for licensed operators.⁸ Cisco projects that by 2018, more traffic will be offloaded from cellular networks on to Wi-Fi than remain on cellular networks.⁹ This ability to offload data from cellular networks to Wi-Fi has saved mobile network operators billions of dollars in network deployment costs.¹⁰ The Wi-Fi experience also makes clear that greater licence-exempt spectrum access increases both demand for and the utility of spectrum set aside for exclusive use licensing. Wi-Fi availability has enabled consumers to use their phones and tablets more intensively to access online content and services. Use and development of these online services in turn drives demand for licensed and licence-exempt network access, creating a virtuous cycle of investment in content, services, and applications.

While recognizing the importance of allocating spectrum for licensed mobile broadband, CRA also should continue to explore ways to open more spectrum for licence-exempt access. Enabling licence-exempt access across a variety of bands, as well as diverse licensed opportunities, can best allow CRA to meet Qatar’s growing wireless data needs.

C. Spectrum Management (questions 27 – 30)

Enabling access to spectrum on both a licensed and licence-exempt basis is key to meeting increasing spectrum demands. Spectrum policy that balances licensed and licence-exempt approaches will maximize innovation and investment and deliver higher-

⁷ See Future Spectrum Demand Consultation at 9.

⁸ U.S. Federal Communication Commission, *The National Broadband Plan*, at 95 (2010), available at www.broadband.gov.

⁹ Cisco Global Mobile Data Traffic Forecast Update at 3.

¹⁰ European Commission, *Study on the Importance of Wi-Fi & the Socioeconomic Benefits of Using Small Cell Infrastructures* at 5 (Aug. 1, 2013), available at <http://ec.europa.eu/digital-agenda/en/news/study-importance-wi-fi-socioeconomic-benefits-using-small-cell-infrastructures>, (finding that offloading reduced the network costs of European network operators by 35 billion euros in 2012, with savings expected to rise to as much as 200 billion euros in 2016); Mark Cooper, *Efficiency Gains and Consumer Benefits of Unlicensed Access to the Public Airwaves*, at iii, 15–18 (Jan. 2012) (finding that offloading lowers U.S. operator costs by approximately USD 26 billion per year).

quality, more ubiquitous, and lower-cost wireless bandwidth to consumers. In the past, a balanced approach has fueled the wireless economy, benefiting consumers, innovators, and investors. Exclusive access to licensed spectrum provides the certainty major operators need to make large investments in their wide-area networks, while open access to spectrum on a licence-exempt basis fosters widespread contributions to innovation and investment in emerging technologies. Thousands of new licence-exempt devices are certified each year. Wi-Fi devices are the best known, but Bluetooth,¹¹ Zigbee,¹² and RFID¹³ devices have all also experienced rapid growth in the last several years. Machine-to-machine (“M2M”) technologies, which often rely on licence-exempt spectrum, represent a large and growing market as well.¹⁴

Licence-exempt access to spectrum has several other benefits. First, opening up additional spectrum for licence-exempt access will increase coverage for wireless devices and reduce consumer costs. For example, increasing the spectrum available for Wi-Fi hot-spots has the possibility to improve indoor coverage and increase low-cost wireless Internet access in outdoor areas.

Second, enabling additional licence-exempt spectrum access will increase capacity. In many countries, more traffic travels over licence-exempt devices than travel over devices operating on exclusive use licensed spectrum. Indeed, the rapid increase in traffic offloading from macrocell networks to Wi-Fi networks demonstrates that licence-exempt access serves a critical role in improving overall wireless capacity. This is especially true in congested areas that would benefit from increased small-cell coverage for offload.

Third, enabling license-exempt access can be accomplished quickly. With class licensing, clear interference rules, streamlined type-approvals, the benefits of a global market, and existing industry processes for standardization, licence-exempt devices can be brought to market quickly. Indeed, after substantial investment, the building blocks are falling into place for a globally scalable marketplace for devices capable of dynamically accessing unused frequencies. Hundreds of millions of consumers have begun using 5 GHz Wi-Fi devices leveraging the 802.11ac standard for 5 GHz. One critical element of the 802.11ac standard is the ability of devices to aggregate 5 GHz frequencies to support Gigabit broadband connectivity and provide instant access to content.

¹¹ Bluetooth is a standard facilitating hands-free operation of music players, mobile phones, and other devices.

¹² Zigbee powers technologies that benefit from ad hoc and mesh networking solutions, such as home automation.

¹³ Radio Frequency Identification (“RFID”) technologies are used in a variety of industries to track inventory or other objects.

¹⁴ Analysys Mason, *M2M Is Already a USD 10 Billion Sector*, Sept. 9, 2013, available at <http://www.analysismason.com/About-Us/News/Insight/M2M-growth-opportunities-Sep2013/> (last visited Dec. 26, 2013).

More recently, technology standards have been completed for use of the TV white spaces spectrum, including the IEEE’s 802.11af standard for Wi-Fi, the IEEE 802.22 standard for wide area networks, and the Weightless standard for machine-to-machine (M2M) communication. These advances are creating opportunities for vendors to begin developing interoperable products. Moreover, the IETF PAWS standardized protocol for device to database communication is now stable, with devices and databases now deploying to meet the draft standard. And, the TV white space database providers have developed a specification for database-to-database communication, which is being extended to countries beyond the United States. In Europe, the ETSI BRAN has completed and approved EN 301 598, which will likely become the European standard for TV white space devices.

Fourth, licence-exempt access enables innovation. Because license-exempt access to spectrum is free from the delays associated with the licensing process, and the use of the spectrum itself is not subject to licensing fees or auction participation, manufacturers can rapidly develop equipment to fill a unique need and enter the marketplace quickly.¹⁵ Many of the newest wireless devices—such as the new wave of networked devices commonly referred to as the Internet-of-Things—will rely exclusively on licence-exempt access.¹⁶ The “attendant economic benefits from licence-exempt technologies are substantial, widely dispersed, and likely to exceed \$270 billion per annum globally.”¹⁷ In fact, the spectrum bands authorised for licence-exempt access now account for the majority of innovation in wireless communications, the majority of wireless devices manufactured, and the majority of Internet data traffic delivered to consumers.¹⁸

As other regulators have recognized through their recent complementary efforts to open up additional 5 GHz spectrum, as well as allocated but unassigned UHF television (“TV white spaces”) spectrum, for license-exempt use, enabling opportunistic use through spectrum sharing allows new devices and services to take advantage of spectrum currently lying fallow. Spectrum sharing techniques, such as databases, sensing, dynamic power control, dynamic frequency selection, or other means, thus allow users to make the most of a finite resource. Spectrum sharing can be utilized effectively in times of

¹⁵ Kenneth R. Carter, Ahmed Lahjouji & Neal McNeil, FCC, *Unlicensed and Unshackled: A Joint OSP-OET White Paper on Unlicensed Devices and Their Regulatory Issues*, OSP Working Paper Series at 5 (May 2003).

¹⁶ Richard Thanki, *The Economic Significance of License-Exempt Spectrum to the Future of the Internet* (June 2012), available at http://research.microsoft.com/en-us/projects/spectrum/economic-significance-of-license-exempt-spectrum-report_thanki.pdf (last visited June 2, 2014).

¹⁷ See Richard Thanki, *The Case for Permissive Dynamic Access to the Radio Spectrum*, at 16 (Aug. 2013), available at http://research.microsoft.com/en-us/projects/spectrum/case-for-permissive-rule-based-dynamic-spectrum-access_thanki.pdf (last visited June 5, 2014).

¹⁸ *Id.* at 2.

transition between clearing and auctioning—geolocation databases and/or sensing technologies can enable temporary access to available spectrum before new licensed services become operational.¹⁹ A commitment from CRA to allow licence-exempt access to a range of complementary frequencies – namely additional UNII band spectrum below 5.47 GHz and above 5.875 GHz, and the TV white spaces found in the 470-694 MHz frequencies – will ensure that consumers have wireless access when and where they need it.

3 Conclusion

In order to enable continued growth and innovation in wireless technologies and the Qatar economy as a whole, we urge CRA to consider and execute policies that increase the amount spectrum available on a licence-exempt basis for wireless use, alongside the proposed allocation of more exclusive-use licensed spectrum for mobile broadband. Specifically, the CRA should follow other communications regulators that are leaders in their respective regions and expand its class licensing regime to enable licence-exempt access to the TV white spaces frequencies and additional UNII band spectrum below 5.47 GHz and above 5.875 GHz. The Dynamic Spectrum Alliance appreciates the opportunity to contribute to the CRA’s consultation on future spectrum demand in Qatar, and would be happy to provide further information at the request of CRA.

¹⁹ See Michael Calabrese, *Use it or Share it: Unlocking the Vast Wasteland of Fallow Spectrum* (2011), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1992421; see also Federal Communications Commission, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, 27 FCC Rcd 12357, ¶ 405 (2012).